Exhibit 68

OFFICE OF WATER 820-F-12-058

Recreational Water Quality Criteria

NOTICES

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FOREWORD

Under §304(a)(l) of the Clean Water Act (CWA) of 1977 (P.L. 95-217) the Administrator of the EPA is directed to develop and publish water quality criteria (WQC) that accurately reflect the latest scientific knowledge on the kind and extent of all identifiable effects on health and welfare that might be expected from the presence of pollutants in any body of water, including groundwater. CWA §304(a)(9) directs the Administrator to publish new or revised WQC for pathogens and pathogen indicators (including a revised list of testing methods, as appropriate), based on the results of the studies conducted under §104(v) of the CWA, for the purpose of protecting human health in coastal recreation waters. Coastal recreation waters ("coastal waters") are defined under §502(21) of the CWA as the Great Lakes and marine coastal waters (including coastal estuaries) that are designated by a state for use for swimming, bathing, surfing, or similar water contact activities. This document includes WQC recommendations for pathogens and pathogen indicators based on the results of the studies conducted under §104(v) of the CWA for both coastal recreational waters and other waters designated for primary contact recreation ("non-coastal waters"). As such this document is published pursuant to §304(a)(1) and §304(a)(9) of the CWA and it includes EPA's recommended final recreational water quality criteria (RWQC) for the protection of primary contact recreation in both coastal and non-coastal waters, based upon consideration of all available information relating to the effects of fecal contamination on human health, including the studies conducted under CWA §104(v).

The term "water quality criteria" is used in two sections of the CWA: §304 (i.e., §304(a)(1) and 304(a)(9)) and §303(c)(2). The term has a different program impact in each section. CWA §304 criteria are developed by EPA based on the latest scientific information on the relationship that the effect of a constituent concentration has on particular aquatic species and/or human health. They are a non-regulatory, scientific assessment of effects on human health or aquatic life. The criteria recommendations presented in this document are such scientific assessments. The term "criteria," as used in §303(c)(2), refers to elements of state water quality standards (WQS), expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use. When criteria are met, water quality will generally protect the designated use. If WQC uses are adopted by a state or promulgated by EPA WQS under §303, they become the relevant standard for developing permit limits, assessing waters, and developing total maximum daily loads (TMDLs) for waters that do not meet the WQS. It is not until their adoption as part of state WQS that 303(c) criteria have a regulatory impact.

In establishing WQC for adoption in WQS, states could establish numerical values based on EPA's §304(a) recommendations, or the 304(a) recommendations modified to reflect site-specific conditions, or other scientifically defensible methods. In all cases, the criteria adopted by states must be scientifically defensible and protective of designated uses. Guidelines to assist in modifying the criteria recommendations presented in this document are contained in the Water Quality Standards Handbook (U.S. EPA, 2012a). This handbook and additional guidance on the development of WQS and other water-related programs of this agency have been developed by EPA.

The contents of this final document include only EPA recommendations and additional information for use by states in developing or implementing RWQC. This document does not establish or affect legal rights or obligations. It does not establish a binding norm and cannot be finally determinative of the issues addressed. Agency decisions to approve or disapprove WQC adopted into state WQS in any particular situation will be made by applying the CWA and EPA regulations on the basis of specific facts presented and currently available scientific information.

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Acronyms

BAV	beach action value
BEACH	Beaches Environmental Assessment and Coastal Health
cce	calibrator cell equivalent
CDC	U.S. Centers for Disease Control and Prevention
cfu	colony forming units
CI	confidence interval
CSO	combined sewer overflow
Ct	cycle threshold
CWA	Clean Water Act
DNA	deoxyribonucleic acid
E. coli	*Escherichia coli*
EPA	Environmental Protection Agency
E.U.	European Union
FIB	fecal indicator bacteria, which includes fecal coliforms, *E. coli*, enterococci, or *Enterococcus* spp.
GI	gastrointestinal
GM	geometric mean
HCGI	highly credible gastrointestinal illness
mL	milliliters
MPN	most probable number
NEEAR	National Epidemiological and Environmental Assessment of Recreational Water
NGI	NEEAR-GI illness
NOAEL	no observed adverse effect level
NPDES	National Pollutant Discharge Elimination System
PC	prospective cohort
PCR	polymerase chain reaction
QMRA	quantitative microbial risk assessment
qPCR	quantitative polymerase chain reaction
RCT	randomized control trial
RT	reverse transcriptase
RWQC	recreational water quality criteria
SCCWRP	Southern California Coastal Water Research Project
SSM	single sample maximum
States	states, tribes, and territories of the United States
STV	statistical threshold value
TMDL	total maximum daily load
TSM	technical support material
U.S.	United States
WERF	Water Environment Research Foundation
WHO	World Health Organization (United Nations)
WQBEL	water quality-based effluent limits
WQC	water quality criteria
WQS	water quality standard(s)
WWTP	wastewater treatment plant

1.0 Executive Summary

The CWA, as amended by the Beaches Environmental Assessment and Coastal Health (BEACH) Act in 2000, requires the U.S. EPA under §104(v) and §304(a)(9) to conduct studies associated with pathogens and human health and to publish new or revised WQC recommendations for these pathogens and pathogen indicators based on those studies. This document was prepared following an extensive review of the available scientific literature and evaluation of new information from studies EPA conducted pursuant to CWA §104(v) and after public notice and comment on the 2011 draft RWQC. This document provides EPA's recommended CWA §304(a) RWQC for states, lays out the science related to the 2012 RWQC, describes how these scientific findings were used during the development of the 2012 RWQC, and describes the water quality methods associated with the 2012 RWQC. It also includes information for states that would prefer to adopt WQC that differ from EPA's 2012 RWQC recommendations. The additional information is intended to assist those states in developing alternative WQC that are scientifically defensible and protective of the primary contact recreational use.

What is new or different in the 2012 RWQC) compared to the 1986 Criteria?

- The 2012 RWQC consists of both a geometric mean (GM) and a statistical threshold value (STV).
- The 2012 RWQC are now comprised of a magnitude, duration, and frequency of excursion for both the GM and STV.
- The 2012 RWQC were developed based on the studies utilized in creating the 1986 WQC as well as more recent scientific information including the National Epidemiological and Environmental Assessment of Recreational Water (NEEAR) data.
- EPA is including two sets of recommended criteria values that protect the designated use of primary contact recreation.
- The criteria recommendations for marine and fresh waters are no longer based on different illness rates.
- There are no longer different criteria recommendations for different use intensities.
- EPA is providing information for states that want to adopt WQS based on a quantitative polymerase chain reaction (qPCR) method that EPA has developed and validated.
- EPA is providing states with Beach Action Values (BAVs) for use in notification programs.
- EPA is providing additional information on tools for assessing and managing recreational waters, such as predictive modeling and sanitary surveys.
- EPA is providing information on tools for developing alternative RWQC on a site-specific basis, such as epidemiological studies in both marine and fresh waters and quantitative microbial risk assessment (QMRA).

1.1 Contents of this Document

Section 1 provides an executive summary and introductory information regarding the history of EPA's WQC recommendations and the CWA.

Section 2 provides an overview of the most recent scientific findings used to support the criteria and explains the scope of the 2012 RWQC. The studies and projects EPA conducted as part of the 2012 RWQC development are described in the *Critical Path Science Plan* and other documents (U.S. EPA 2010a, 2010b; see appendices A, B, and C). The projects align into the following major categories: epidemiological studies, QMRA, site characterization studies, indicators/methods development and validation studies, modeling, level of public health protection, and literature reviews. EPA also considered relevant studies conducted by independent researchers.

Section 3 describes the science that was considered during the development of the 2012 RWQC. This includes indicators of fecal contamination and enumeration methods, linking water quality and health, scope of protected populations, types of waterbodies, sources of fecal contamination, and the expression of the 2012 RWQC.

In the 2012 RWQC, EPA recommends using the fecal indicator bacteria (FIB) enterococci and *Escherichia coli (E. coli)* as indicators of fecal contamination for fresh water and enterococci for marine water. Section 3.1 explains that EPA recommends culture-based methods be used to detect the presence of either indicator and that states adopt standards for these indicators as measured by culture methods, expressed in colony forming units (cfu). Section 3.1 also includes information and recommendations for states that would like to adopt standards for *Enterococcus* spp., as measured by a rapid qPCR method. Because of the limited experience with this method and concerns with interference, EPA recommends that states evaluate qPCR performance in ambient waters in which it would be employed prior to developing new or revised standards based on the qPCR method. EPA will provide separate guidance on how to evaluate qPCR performance.

Section 3.2.1 provides a historical overview of how WQC that protect the designated use of primary contact recreation have changed throughout the past century. Scientific advancements in microbiological, statistical, and epidemiological methods have demonstrated that culturable enterococci and *E. coli* are better indicators of fecal contamination than the previously used general indicators, total coliforms and fecal coliforms. Fecal contamination in recreational waters is associated with an increased risk of gastrointestinal (GI) illness and less often identified respiratory illness. As such, fecal contamination and its indicators are considered "pathogen indicators," as defined by §502(23) of the CWA.

Section 3.2.2 discusses the various human health endpoints that EPA and others have examined in epidemiological studies. Additionally, EPA's two different GI illness definitions are discussed. EPA's 1986 criteria recommendations correspond to a level of water quality that is associated with an estimated illness rate expressed in terms of the number of highly credible gastrointestinal illnesses (HCGI) per 1,000 primary contact recreators. EPA's NEEAR study used a more comprehensive definition of GI illness, referred to as NEEAR-GI (NGI). Because NGI is broader than HCGI (i.e., NGI includes diarrhea without the requirement of fever), more illness cases were reported and associated with aquatic recreation in the NEEAR study using the NGI definition of illness, at the same level of water quality observed using the previous illness definition (i.e., HCGI).

Section 3.2.3 provides an overview of the epidemiological studies conducted by EPA as part of the NEEAR study. Seven studies were performed at temperate beaches primarily impacted by wastewater treatment plants (WWTPs) discharging effluent from treated municipal sewage. Three of those beaches were marine water and four were fresh water. Studies also were performed at two additional beaches: a temperate beach in Surfside, South Carolina impacted by urban runoff sources, and a tropical beach in Boquerón, Puerto Rico. EPA also considered epidemiological studies from other research efforts in developing these recreation criteria.

Section 3.2.4 describes the process EPA used to derive the culturable enterococci criterion value and comparable illness rates for *E. coli* measured by culture and *Enterococcus* spp. measured by qPCR thresholds. Based on the selected illness rates, EPA derived qPCR values for *Enterococcus* spp. comparable to the culture-based values for both marine and fresh waters, computed from the regression model derived from the NEEAR epidemiological study in marine and fresh waters.

Section 3.3 discusses subpopulations that participated in recreational activities in the NEEAR study. Children aged ten years and younger showed a higher rate of illnesses than adults in fresh water, but did not for marine water exposures. The sample sizes in the epidemiological data were not large enough to evaluate potential differences for persons over 55 years of age, pregnant women, or other vulnerable individuals. EPA's 2012 RWQC recommendations are based on the general population, which includes children. Because children may be more exposed and/or more sensitive to pathogens in recreational waters, it is important to have effective risk communication outreach to mitigate their exposure to contaminated recreational waters. EPA is also providing BAVs that are the 75th percentile value of a water quality distribution based on these new criteria. These values, while not recommended for determining use attainment, are provided for states to use as a precautionary tool to provide an early alert to beachgoers, including families with children.

Section 3.4 describes EPA's review of the available information comparing coastal (including Great Lakes and marine) and non-coastal (including flowing and non-flowing inland) waters to evaluate whether EPA should recommend that states use the 2012 RWQC in developing recreational WQS in all waterbody types. Based on EPA's evaluation of the body of information described in section 3.4, EPA recommends the 2012 RWQC for use in both coastal and non-coastal waterbodies. While some differences may exist between coastal and non-coastal waters, the recommended indicators, enumeration methods, and criteria values are scientifically defensible and protective of the primary contact use in coastal and non-coastal waters. Therefore, EPA's 2012 RWQC recommendations are national recommendations for all waterbody types designated for swimming, bathing, surfing, or similar water contact activities (referred to throughout this document as "primary contact recreational use").

Section 3.5 describes EPA's evaluation of how different fecal sources may influence risks to human health. Human pathogens are often present in animal fecal matter, and thus, there are risks associated with recreating in animal-impacted waters. However, quantifying that level of risk associated with animal fecal material is difficult, and the methods necessary to distinguish between human and nonhuman fecal sources, with the appropriate level of confidence, are still under development. Thus, EPA believes that the 2012 RWQC are protective of public health, regardless of the source of fecal contamination. EPA is not developing recommendations that take source of fecal contamination into account. Rather, states interested in adopting different standards to address the variability in human health risks associated with different sources of fecal contamination on a site-specific basis should refer to section 6, where EPA describes methods for developing site-specific standards.

Section 3.6 describes the statistical expression of the 2012 RWQC. As part of the 2012 RWQC, EPA is recommending criteria expressed using two components: the GM and the STV. For each of the sets of criteria values, EPA computed the STV based on the water quality distribution observed during EPA's epidemiological studies. The STV approximates the 90^{th} percentile of the water quality distribution and is intended to be a value that should not be exceeded by more than 10% of the samples used to calculate the GM. Because densities of FIB are highly variable in ambient waters, distributional estimates are more robust than single point estimates.

Section 4 presents EPA's recommended WQC consisting of the magnitude, duration, and frequency of excursions for enterococci and *E. coli* as measured by culture-based methods. EPA provides two sets of recommended criteria, each of which correspond to two different illness rates. The designated use of primary contact recreation would be protected if either set of criteria recommendations in section 4.0 are adopted into state WQS and approved by EPA.

Section 5 provides additional elements for states' use to enhance public health protection. These elements include BAVs and values for *Enterococcus* spp. as measured by qPCR.

Section 6 describes the additional tools that can be used to manage recreational waters and derive site-specific criteria. The tools listed in section 6 will not only provide states with additional tools for revising their WQS for primary contact recreation, but will also help states gain a better understanding of their surrounding watersheds and of appropriate management strategies. Section 6.1 describes sanitary surveys and provides an overview of predictive models. Section 6.2 provides an overview of options for states to develop site-specific criteria. Tools described in section 6 will be further developed and explained in technical support material(s) (TSM) that are being developed by EPA. EPA will publish multiple TSM focusing on these tools as they are available.

Appendices are also included that describe data and information used to evaluate the linking of water quality and health. Appendix A provides a translation of the illness rates associated with the1986 criteria to equivalent illness rates for use with new health data developed using rapid methods for measuring water quality. Appendix B includes a comparison of NEEAR culturable water quality and health effects to EPA's epidemiological studies from the 1980s. Appendix C is an analysis of the NEEAR marine and fresh water data for culturable enterococci.

1.2 EPA's Recommended §304(a) Water Quality Criteria

An important goal of the CWA is to protect and restore waters for swimming. Section 304(a) of the CWA directs EPA to publish and, from time to time, revise the WQC to accurately reflect the latest scientific knowledge on the identifiable effects on health and welfare that might be expected from the presence of pollutants in any body of water, including groundwater. These recommendations are referred to as §304(a) criteria. Under §304(a)(9) of the CWA, EPA is required to publish WQC for pathogens and pathogen indicators based on the results of the studies conducted under §104(v), for the purpose of protecting human health in coastal recreation waters, which are defined as marine and Great Lakes waters designated under CWA §303(c) for use for swimming, bathing, surfing, or similar water contact activities (referred to throughout the document as primary contact recreation).

CWA §304(a) criteria do not reflect consideration of economic impacts or the technological feasibility of meeting pollutant concentrations in ambient water. The 2012 RWQC recommendations are based on data and scientific conclusions on the relationship between FIB density and GI illness. These criteria recommendations may be used by the states to establish WQS, and if adopted in state WQS and approved by EPA, will ultimately provide a basis for controlling the discharge or release of pollutants and assessing waterbodies. Additionally, the criteria also provide guidance to EPA when promulgating WQS for states under CWA §303(c), when such actions are necessary.

When states adopt new or revised WQC into WQS, they must be scientifically defensible and protective of the designated uses of the waterbodies. EPA's regulation 40 CFR §131.11(b)(1) provides that "In establishing criteria, states should (1) Establish numerical values based on (i) 304(a) Guidance; or (ii) 304(a) Guidance modified to reflect site-specific conditions; or (iii) Other scientifically defensible methods." EPA's 2012 RWQC recommendations describe the desired ambient water quality conditions to support the designated use of primary contact recreation.

EPA has a long history of using FIB for protecting people who use recreational waters. In the 1960s, the U.S. Public Health Service recommended using fecal coliform as FIB, and EPA recommended fecal coliform bacteria in 1976 (U.S. EPA, 1976). In the late 1970s and early 1980s, EPA conducted epidemiological studies that evaluated the use of several organisms as possible indicators of fecal contamination, including fecal coliform, *E. coli*, and enterococci (Cabelli et al., 1983; Dufour, 1984). These studies showed that enterococci are good predictors of GI illnesses in marine and fresh recreational waters, and *E. coli* are good predictors of GI illnesses in fresh waters. As a result, EPA published *EPA's Ambient Water Quality Criteria for Bacteria – 1986* (hereafter referred to as "the 1986 criteria"). The 1986 criteria document includes EPA recommendations to use enterococci for marine and fresh recreational waters (a GM of 33 enterococci cfu per 100 mL in fresh water and 35 enterococci cfu per 100 mL in marine water) and *E. coli* for fresh recreational waters (a GM of 126 *E. coli* cfu per 100 mL) (U.S. EPA, 1986). The 1986 recommendations replaced EPA's previously recommended fecal coliform criteria of 200 fecal coliform cfu per 100 mL (U.S. EPA, 1976). In the 2004 BEACH Act Rule, EPA promulgated WQS for coastal recreational waters in the 21 states that had not yet adopted standards as protective of human health as EPA's 1986 criteria recommendations (U.S. EPA, 2004).

Like past EPA recommendations for primary contact recreational uses, the 2012 criteria are based on indicators of fecal contamination. A pathogen indicator, as defined in §502(23) of the CWA, as amended by the BEACH Act, is defined as follows: "a substance that indicates the potential for human infectious disease." Most strains of enterococci and *E. coli* do not cause human illness (that is, they are not human pathogens); rather, they indicate the presence of fecal contamination. The basis for recommending criteria that use bacterial indicators of fecal contamination is that pathogens often co-occur with indicators of fecal contamination.

EPA recommends that states make a risk management decision regarding illness rate which will determine which set (based on illness rate selected) of criteria values are most appropriate for their waters. The designated use of primary contact recreation would be protected if either set of criteria (including a GM and related STV) shown in Table 1 is adopted into state WQS and approved by EPA. EPA recommends states apply this risk management decision statewide. Note that criteria for either enterococci or *E. coli* can be used for fresh waters. Selecting a mixture of the GM and STV that are associated with different illness rates is not scientifically defensible since the STV is derived from the water quality distribution as defined by the GM.

Table 1. Recommended 2012 RWQC.

Criteria Elements	**Estimated Illness Rate (NGI): 36 per 1,000 primary contact recreators**		OR	**Estimated Illness Rate (NGI): 32 per 1,000 primary contact recreators**	
	Magnitude			**Magnitude**	
Indicator	GM (cfu/100 mL)[a]	STV (cfu/100 mL)[a]		GM (cfu/100 mL)[a]	STV (cfu/100 mL)[a]
Enterococci – marine and fresh	35	130		30	110
OR					
E. coli – fresh	126	410		100	320
Duration and Frequency: The waterbody GM should not be greater than the selected GM magnitude in any 30-day interval. There should not be greater than a ten percent excursion frequency of the selected STV magnitude in the same 30-day interval.					

[a] EPA recommends using EPA Method 1600 (U.S. EPA, 2002a) to measure culturable enterococci, or another equivalent method that measures culturable enterococci and using EPA Method 1603 (U.S. EPA, 2002b) to measure culturable *E. coli*, or any other equivalent method that measures culturable *E. coli*.

EPA is also providing information for developing site-specific criteria that measure enterococci using EPA's *Enterococcus* spp. qPCR Method 1611 (U.S. EPA, 2012b). For the purposes of beach notification, EPA encourages the use of a BAV, which approximates the 75th percentile of a water-quality distribution based on the desired GM. See section 5.1 and 5.2 for 'Supplemental Elements.'

2.0 Applicability and Scope of the 2012 RWQC

EPA's 2012 RWQC are for all waters in the United States including marine, estuarine, Great Lakes, and inland waters that are designated for primary contact recreation. Primary contact recreation typically includes activities where immersion and ingestion are likely and there is a high degree of bodily contact with the water, such as swimming, bathing, surfing, water skiing, tubing, skin diving, water play by children, or similar water-contact activities.

Since EPA last published recommended RWQC in 1986, scientific advances have been made in the areas of epidemiology, molecular biology, microbiology, QMRA, and methods of analytical assessment. EPA's evaluation and consideration of these new scientific and technical advances in the development of the 2012 RWQC strengthens the scientific foundation of EPA's criteria recommendations to protect the designated use of primary contact recreation.

In accordance with §104(v) of the CWA, as amended by the BEACH Act, EPA developed and implemented a research plan to ensure that state-of-the-art science would be available to support the development of the 2012 RWQC recommendations. To facilitate the identification of research required to develop the 2012 RWQC, EPA held a five-day scientific workshop in 2007 to obtain a broad range of external scientific input. Forty-three domestic and international experts provided input on near-term research requirements that would be needed in the next two to three years to further develop the scientific foundation of new 2012 RWQC and implementation guidance. The report from this workshop, *Report of the Experts Scientific Workshop on Critical Research Needs for the Development of New or Revised Recreational Water Quality Criteria* (U.S. EPA, 2007a), included chapters from the seven breakout groups, including: (1) approaches to criteria development, (2) pathogens, pathogen indicators, and indicators of fecal contamination, (3) methods development, (4) comparison of the risks of different contamination sources to humans, (5) acceptable risk, (6) modeling applications for criteria development and implementation, and (7) implementation realities.

The report from the *Experts Scientific Workshop* provided a core part of the information EPA used to develop the *Critical Path Science Plan for the Development of New or Revised Recreational Water Quality Criteria* (U.S. EPA, 2007b). The *Critical Path Science Plan*, which was peer reviewed, includes 32 projects that EPA completed for the development of the 2012 RWQC. All projects included in the *Critical Path Science Plan*, were completed and considered during the process of developing the 2012 RWQC. Projects included epidemiological studies to provide data correlating illness with indicators, site-characterization studies to facilitate QMRA, indicator and methods development and validation, water quality modeling, literature reviews, and additional studies to support the recommended criteria values and associated level of public health protection. EPA specific-projects included efforts in the following areas:[1]

- Epidemiological Studies and QMRA
  - 2003–2004 Temperate fresh water: four beach sites on the Great Lakes
  - 2005–2007 Temperate marine: three beach sites: Alabama, Rhode Island, Mississippi
  - 2009 sites: Puerto Rico (tropical), South Carolina (urban runoff)
  - QMRA for fresh water impacted by agricultural animals
- Site Characterization Studies
  - Development of site characterization tool for QMRA applications
  - Expanded data collection at epidemiological study locations to support modeling and QMRA
  - Site selection evaluation for Puerto Rico and South Carolina epidemiological studies
  - Study to better understand spatial and temporal variability
  - Pilot sanitary survey in the Great Lakes
- Indicators/Methods Development and Validation Studies

[1] EPA's Recreational Water Quality Criteria website:
http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/

    - Evaluate multiple indicator/method combinations to develop quantifiable relationships
    - Study the effects of sample holding time, storage, and preservation
    - Performance of qPCR signal in ambient water and wastewater (fate and transport)
    - Develop, refine, validate, and publish new ambient and wastewater methods
    - Publish a rapid test method that has been validated by multiple laboratories
    - Evaluate the suitability of individual combinations of indicators and methods for different CWA purposes
    - Develop new and/or evaluate previously published source-identifying assays
    - Evaluate genetic markers for human, bovine, chickens, and gulls
- Modeling
    - Pilot test Virtual Beach Model Builder
    - Refine and validate existing models for fresh water beaches
    - Refine and validate other existing models for marine beaches
    - Develop technical protocol for site-specific application of predictive models
- Recommended Level of Public Health Protection
    - Evaluate 1986 recommendations for culturable enterococci and *E. coli* compared to data collected in EPA studies and non-EPA studies
    - Evaluate applicability of EPA Great Lakes epidemiological data to inland waters
    - Evaluate available children's health data
- Literature Reviews
    - State-of-the-science reviews of published studies to characterize relative risk from different fecal sources
    - State-of-the-science review on occurrence and cross-infectivity of specific pathogens associated with animals
    - Comparison and evaluation of epidemiological study designs of health effects associated with recreational water use

EPA conducted epidemiological investigations at U.S. beaches in 2003, 2004, 2005, 2007, and 2009, and as a group these investigations are referred to as the NEEAR study. The NEEAR study enrolled 54,250 participants, encompassed nine locations, and collected and analyzed numerous samples from a combination of fresh water, marine, tropical, and temperate beaches (U.S. EPA, 2010a; Wade et al., 2008, 2010).

EPA provided assistance and technical support to several additional projects: the Water Environment Research Foundation (WERF) workshop, *Experts Scientific Workshop on Critical Research and Science Needs for the Development of Recreational Water Quality Criteria for Inland Waters*, to consider the significance of the differences between inland and coastal recreational waters (WERF, 2009); and the Southern California Coastal Water Research Project (SCCWRP) for epidemiological studies at the California beaches of Doheny (Colford et al., 2012), Avalon, and Malibu.

Finally, EPA also considered other research and studies relevant to the development of the 2012 RWQC. These studies included epidemiological studies, research on the development of new and improved water quality indicators and analytical methods, approaches to QMRA, water quality predictive modeling, and microbial-source tracking. EPA considered all available data from the open literature and water quality data received from SCCWRP on studies they conducted with technical support from EPA at Doheny, Avalon, and Malibu beaches. These SCCWRP studies were generally consistent with the NEEAR study findings. These studies are discussed further in section 3 of this document.

3.0 Basis of the 2012 RWQC

To develop the 2012 RWQC, EPA considered indicators of fecal contamination, methods for detecting and enumerating such indicators, the relationship between the occurrence of FIB in the water and their human health effects, the populations to be protected by the 2012 RWQC, waterbody types, sources of fecal contamination, and how the 2012 RWQC should be expressed in terms of a magnitude, duration, and frequency. EPA also considered all of the comments received on the December 2011 draft RWQC document (EPA, 2011). EPA's responses to comments will be available separately. In response to comments asserting that the allowable illness rate in the 2011 draft RWQC was too high, EPA conducted additional analyses of the NEEAR data. These analyses and EPA's recommendations are presented in sections 3.0 and 4.0.

3.1 Indicators of Fecal Contamination

Public health agencies have long used FIB to identify potential for illness resulting from recreational activities in surface waters contaminated by fecal pollution. EPA based its 1986 criteria for recreational marine and fresh waters on observed illness levels in swimmers and corresponding levels of bacterial indicators of fecal contamination, specifically enterococci and *E. coli* for fresh water and enterococci for marine water. Although most strains of FIB are not pathogenic, they demonstrate characteristics that make them good indicators of fecal contamination (i.e., often of fecal origin and simple methods of detection) and thus, indirectly indicate the potential presence of fecal pathogens capable of causing GI illnesses. As such, FIB are "pathogen indicators" as that term is defined by CWA §502(23) –"a substance that indicates the potential for human infectious diseases" – even though they are not generally thought of as "pathogen indicators," as that term is typically used by the scientific community as direct indicators of pathogens. EPA is not publishing criteria for "pathogens" because the state of the science was not sufficient at the time of completion of these RWQC. In addition, there are numerous pathogens that cause the full range of illnesses associated with primary contact recreation. Pathogen-specific enumeration methods for environmental waters were not available at the time of the NEEAR study, and thus health relationships with specific pathogens were not established (U.S. EPA, 2010c, 2010d).

Microorganisms that are potential indicators of fecal contamination are normally present in fecal material. Not all of these indicators, however, have a clear relationship to illness rates observed in epidemiological studies. As discussed in section 3.2.3, two microorganisms that have consistently performed well as indicators of illness in sewage-contaminated waters during epidemiological studies are enterococci in both marine and fresh water and *E. coli* in fresh water measured by culture (Prüss, 1998; Wade et al., 2003; Zmirou et al., 2003). Additionally, two recent epidemiological studies also demonstrate the utility of *E. coli* as an indicator as recommended in the 1986 criteria (Marion et al., 2010; Wiedenmann, 2006). Together the available body of information supports EPA's 2012 RWQC recommendations to use enterococci and *E. coli* as indicators of fecal contamination. See section 6.2.3 for discussion of the use of alternative indicators, such as *E. coli* measured by qPCR, which EPA has not specifically included in the 2012 RWQC.

3.1.1 Enumeration Methods in RWQC

Indicators of fecal contamination are detected and enumerated using a variety of methods. Thus, the chosen indicator and method combination is critical for determining a criterion value. The important linkage between the organism and the method is captured throughout this document by the use of the term "indicator/method" to refer to this combination.

FIB can be enumerated using various analytical methods including those in which the organisms are grown (cultured) and those in which their deoxyribonucleic acid (DNA) is extracted from an environmental sample, amplified, and quantified (using qPCR). These different enumeration methods result in method-specific units and values. One culture-based method, membrane filtration, results in the number of colonies that arise from bacteria captured on the membrane filter per volume of water filtered. One colony can be produced from one or several cells (clumped cells in the environmental sample). Another culture-based method, the defined substrate method, produces a most probable number (MPN) per volume. MPN analyses estimate the number of organisms in a sample using statistical probability tables, hence the term "most probable number." Bacterial densities MPN are based on the combination of positive and negative test tube results that can be read from an MPN table (U.S. EPA, 1978). Culture-based approaches for the enumeration of FIB, such as MPN and membrane filtration, generate results following the culturing of a particular microbe for 18–24 hours, and in the case of MPN do not result in a direct count or concentration density of the bacteria being enumerated but rather rely on probabilities. Results from qPCR analyses are reported in units that are calculated based on the target DNA sequences from test samples relative to those in calibrator samples that contain a known quantity of target organisms (Haugland et al., 2005; Wade et al., 2010)[2].

The results from each of these enumeration techniques (i.e., culture and qPCR) depend on the method used. Each analytical technique focuses on different attributes of the fecal indicator and results in a "signal" specific to that technique. For example, culture-based methods fundamentally depend on the metabolic state (i.e., viability and activity) of the target organisms for effective enumeration. Only the culturable sub-set of the target indicator is detected using culture-based techniques. Alternatively, qPCR-based approaches detect specific sequences of DNA that have been extracted from a water sample, and results contain sequences from both viable and non-viable forms of the targeted indicator. In the context of the 2012 RWQC, the results for enterococci determined using the culture-based methods are not the same as the results for EPA's *Enterococcus* spp. qPCR Method 1611 (U.S. EPA, 2012b). These results are not directly interchangeable and require an explanation of each method's results, as they relate to the reported health effects (i.e., epidemiological relationships; see section 3.2).

[2] Note that in some EPA NEEAR study publications, the term calibrator cell equivalent (cce) has been shortened to cell equivalent (ce). EPA considers these terms to be synonymous and in all cases calibrator cells were used. EPA used the delta-delta comparative cycle threshold (Ct) calibration model for estimating cce or ce in all NEEAR study data (U.S. EPA, 2012b).

FIB, such as enterococci and *E. coli*, enumerated by culture-based methods, have an association with GI illness from exposure to ambient recreational water as demonstrated previously (Cabelli et al., 1982; Cabelli, 1983; Calderon et al., 1991; Dufour 1984; Marion et al., 2010; Wade et al., 2003, 2006, 2008, 2010; Wiedenmann et al., 2006). Wade et al. (2008, 2010) did not show a statistically significant correlation of illness rates with culturable enterococci as was shown in the studies conducted in the 1980s. However, the NEEAR study did reaffirm an association with health as indicated by increased illness above the 1986 criteria values. The early and more recent studies conducted by EPA and others therefore support the establishment of WQC based on culturable indicators (see section 3.2.4). Thus, culturable indicators are scientifically defensible and are retained as the basis for the 2012 RWQC. FIB enumerated by culture-based methods also provide a historical association with previous water-quality data in states that already have WQS based on those indicators.

EPA is also providing information on how to use a more recently developed qPCR method. Enterococci measured by EPA's *Enterococcus* spp. qPCR Method (U.S. EPA, 2012b) showed a statistically significant correlation with GI illness among primary contact recreators in both marine and fresh recreational waters impacted by human fecal contamination (Wade et al., 2006, 2008, 2010). The technical literature demonstrates that enumeration of enterococci using this technique can provide results more rapidly than culture-based methods with results available the same day (Griffith and Weisberg, 2011).

As with other methods, the qPCR methodology may be affected by interference[3] from substances in different environmental matrices such as surface waters. Mitigation approaches discussed in EPA's *Enterococcus* spp. qPCR Method 1611 have been identified that show promise for reducing the effects of interference in particularly problematic water samples, including those that occurred in the tropical marine NEEAR study (Haugland et al., 2012; U.S. EPA, 2012b). Although the fresh water NEEAR study sites in the Great Lakes and four temperate marine beaches demonstrated minimal to no interference, EPA's overall testing of this qPCR method with different types of ambient waters and use by other laboratories has been limited.

Kinzelman et al. (2011) reported minimal incidences of unacceptable interference with EPA *Enterococcus* spp. qPCR Method 1611 in Great Lakes coastal waters using a more stringent definition of interference; however, increased incidences were observed in some inland water locations. The highest frequency of incidences was seen at sites that were dominated by non-point source pollution. Mitigation techniques, such as purification of the sample or follow-up sample extract dilution, were able to resolve the interference in some of the samples; however, these additional steps resulted in an increase in the amount of time necessary to generate results. Other researchers have also reported inhibition or other types of interference in samples using non-EPA qPCR methodologies (Noble et al., 2010).

[3] Interference is any process that results in lower quantitative estimates than expected or actual values. Interference can result from sample inhibition of the polymerase or binding of substances to the DNA, which prevents either the primers from binding or polymerase function. EPA *Enterococcus* spp. qPCR Method 1611 (U.S. EPA, 2012b) has a sample processing control assay that is performed on each sample to identify unacceptable levels of interference (defined as a 3-Ct unit shift compared to corresponding control samples).

EPA believes that overall testing of the qPCR method with different types of ambient waters, and by different laboratories, remains limited and anticipates that there may be situations at some locations where the performance of the qPCR method may be inconsistent. EPA therefore suggests that states evaluate the qPCR method with respect to laboratory performance and sample interference in their prospective waters prior to developing new or revised standards relying on this method. EPA will provide additional guidance on how to evaluate qPCR method performance at a later date.

3.2 Linking Water Quality with GI Illness and Health

This section discusses the information that EPA considered during the course of evaluating the association between measures of water quality and potential human health effects from exposure to fecal contamination. There are many scenarios where human-derived fecal contamination can impact a waterbody. The relationship between the presence of FIB and any of the enteric pathogens that cause illness in humans can be highly variable, but has been described mathematically as used in QMRA (Schoen and Ashbolt, 2010). The following four subsections describe the lines of evidence EPA used to derive recommended criteria levels. The historical perspectives subsection briefly discusses previous approaches to the development of WQC in the U.S. The human health endpoint subsection explains how the definition of illness is important for understanding the meaning of the associated 2012 RWQC illness rate levels. The water quality and illness subsection presents the results of epidemiological studies that EPA considered when developing the 2012 RWQC. The criteria values development subsection discusses the basis of the 2012 RWQC values.

3.2.1 Historical Perspectives in Criteria Development

EPA's previously recommended RWQC (i.e., the 1986 criteria) and the 2012 RWQC are based on the observed association between the density of FIB and GI illnesses. FIB levels have long served as the surrogate measure of fecal contamination and thus the presence of pathogens that are commonly associated with fecal material.

In the 1960s, the U.S. Public Health Service recommended using fecal coliform bacteria as the indicator of primary contact with FIB. Studies conducted by the U.S. Public Health Service reported a detectable health effect when total coliforms density was about 2,300 per 100 mL (Stevenson, 1953). In 1968, the National Technical Advisory Committee translated the total coliform level to 400 fecal coliforms per 100 mL based on a ratio of total coliforms to fecal coliforms and then halved that number to 200 fecal coliforms per 100 mL (U.S. EPA, 1986). The National Technical Advisory Committee criteria for recreational waters were recommended by EPA in 1976.

In the late 1970s and early 1980s, EPA conducted a series of epidemiological studies to evaluate several additional organisms as possible indicators of fecal contamination including *E. coli* and enterococci. These epidemiological studies showed that enterococci are a good predictor of GI illnesses in fresh and marine recreational waters, and *E. coli* is a good predictor of GI illnesses in fresh waters (Cabelli et al., 1982; Cabelli, 1983; Dufour, 1984).

The 1986 criteria values represented the desired ambient condition of the waterbody necessary to protect the designated use of primary contact recreation. Those values were selected in order to further carry forward the same level of water quality associated with EPA's previous criteria recommendations to protect the primary contact recreation use, which were for fecal coliform (U.S. EPA, 1976). For that effort, the enterococci and *E. coli* criteria values from the existing fecal coliform criteria were translated using the GM values for the FIB established in the previous epidemiological studies (see Text Box 1, below) (Dufour and Schaub, 2007). The single sample maximum (SSM) component of the 1986 criteria was computed using the GM values and corresponding observed variances in the FIB obtained from water quality measurements taken during the epidemiological studies from the late 1970s and early 1980s. Four different SSM values (recommended to be used with different recreational use intensities) were provided and corresponded to different percentiles of the water quality distribution around the GM.
The 1986 criteria values resulted in different water quality values and associated illness rates for marine and fresh waters because the marine and fresh water epidemiological studies reported different GMs for the FIB associated with the level of water quality corresponding to EPA's fecal coliform criteria recommendations.

Text Box 1. Translation of 1960s criteria to 1986 criteria.

The 1986 criteria values (A) were derived as follows

$$A = (B*C) / D$$

Where
B is the observed GM enterococci (from epidemiological studies)
C is the criterion for fecal coliform (200 cfu per 100 mL)
D is the observed GM fecal coliform (from epidemiological studies)

For example, using the equation in Text Box 1, the marine enterococci 1986 criterion was calculated as follows:

B = 20 cfu per 100 mL (observed GM enterococci)
C = 200 cfu per 100 mL (old fecal coliform criterion)
D = 115 cfu per 100 mL (observed GM of fecal coliforms)

Therefore, A = 35 cfu per 100 mL.

Using the observed relationships between the FIB densities and GI illness, EPA estimated in 1986 that the predicted level of illness associated with the criteria was 8 HCGI per 1,000 primary contact recreators in fresh water (see section 3.2.2) and 19 HCGI per 1,000 primary contact recreators in marine waters (U.S. EPA, 1986).

3.2.2 Human Health Endpoint

EPA's 1986 criteria values correspond to a level of water quality associated with an estimated illness rate that is expressed in terms of the number of HCGI. The HCGI case definition is "any one of the following unmistakable or combinations of symptoms [within eight to ten days of swimming]: (1) vomiting (2) diarrhea with fever or a disabling condition (remained home, remained in bed or sought medical advice because of symptoms), (3) stomachache or nausea accompanied by a fever."

EPA's NEEAR epidemiological studies used a different and updated definition of GI illness, defining a case of GI illness as "any of the following [within ten to 12 days after swimming]: (a) diarrhea (three or more loose stools in a 24 hour period), (b) vomiting, (c) nausea and stomachache, or (d) nausea or stomachache and impact on daily activity" (U.S. EPA, 2010a). This illness definition is referred to as NGI and is the definition of illness associated with the 2012 RWQC.

The NGI case definition was broadened in that diarrhea, stomachache, or nausea is included without requiring the occurrence of fever. Viruses are thought to be the etiologic agent responsible for most of the GI illnesses that are contracted in recreational waters impacted by sources of human fecal contamination (Cabelli, 1983; Sinclair et al., 2009; Soller et al., 2010a) and viral gastroenteritis does not always present with a fever. Thus a GI illness case definition that does not require fever should allow studies to more accurately capture cases caused by viruses.

In addition, the NEEAR study extended the number of days following the swimming event in which illness may have been observed to account for pathogens with longer incubation times. For example, the incubation of *Cryptosporidium* spp. can be up to ten days, thus participants contacted after eight days may not have developed the case definition symptoms. By calling participants after ten to 12 days, the study design allowed for illness caused by pathogens associated with longer incubation periods to be included as cases. Similar GI definitions are now widely used nationally and internationally (Colford et al., 2002, 2007; Payment, 1991, 1997; Sinigalliano et al., 2010; Wiedenmann et al., 2006).

Because the NGI definition is broader than HCGI, more illnesses qualify to be counted as "cases" in the epidemiological studies than if the older HCGI definition were applied. Therefore, at the same level of water quality, more NGI will be observed than HCGI illnesses. The relative increase in rates of GI illness between the studies (i.e., HCGI versus NGI) is directly attributable to the changes in how illness was defined and not due to an actual increase in the incidence of illness among primary contact recreators at a given level of water quality.

EPA estimated how the GI illness rate associated with the two GI illness definitions can be compared using the difference between (a) non-swimmer illness rates from the pre-1986 epidemiological data, and the (b) non-swimmer illness rates from the NEEAR study (U.S. EPA, 2011). The mean non-swimmer HCGI rate from pre-1986 epidemiological studies was 14 illnesses per 1,000 non-swimmer recreators, while the non-swimmer recreators mean NGI rate from the NEEAR study was 63 illnesses per 1,000 non-swimmer recreators. Thus an illness rate of 8 HCGI per 1,000 primary contact recreators is estimated to be equivalent with an illness rate of approximately 36 NGI per 1,000 primary contact recreators (estimated translation factor of 4.5 NGI per HCGI[4]). See Appendix A for more information.

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[4] 8 HCGI/1,000 primary contact recreators x 4.5 HCGI / 1 NGI = 36 NGI/1,000 primary contact recreators

Of all the adverse health effects considered, the NEEAR epidemiological studies found the strongest association with GI illnesses (see section 3.2.3). In addition to NGI, the NEEAR epidemiological studies evaluated other health endpoints that could have been caused by pathogens found in fecal matter. These included the following:

1. "Upper respiratory illness," which was defined as any two of the following: sore throat, cough, runny nose, cold, or fever;
2. "Rash," which was defined as a rash or itchy skin;
3. "Eye ailments," which were defined as either an eye infection or a watery eye;
4. "Earache," which was defined as ear pain, ear infection, or runny ears; and
5. "Infected cut," which was defined as a cut or wound that became infected.

Results from the NEEAR study, and previous epidemiological studies, indicate that criteria based on protecting the public from GI illness via the use of FIB will prevent most types of recreational waterborne illnesses. In general, these other illnesses occur at a lower rate than GI illness (as defined by any widely accepted definition) (Fleisher et al., 1998; Haile et al., 1999; McBride et al., 1998; Wade et al., 2008). For example, Wade et al. (2008) reported a mean overall GI illness incidence of 7.3 percent, upper respiratory infection incidence of 5.7 percent, rash incidence of 2.7 percent, and eye irritations and infections of 2.9 percent. Kay et al. (1994) and Fleisher et al. (1998) reported 14.8 percent GI illness in swimmers and 9.7 percent in non-swimmers, 4.7 percent incidence of respiratory infection in swimmers and three percent in non-swimmers, and 4.2 percent incidence of ear ailments in swimmers and 4.8 percent and non-swimmers.

Non-EPA studies in waters not impacted by WWTPs reported correlations between other health endpoints and water quality. For example, Sinigalliano et al. (2010) reported symptoms of human subjects randomly assigned to marine water exposure with intensive environmental monitoring, and compared them against other subjects who were not exposed. Their results demonstrated an increase in GI, respiratory, and skin illnesses among bathers compared to non-bathers. Among the bathers, a relationship was observed between increasing FIB and skin illness, where skin illness was positively related to enterococci enumeration by culture-based methods.

3.2.3 Relationship Between Water Quality and Illness

For decades, epidemiological studies have been used to evaluate how FIB levels are associated with health effects of primary contact recreation on a quantitative basis. The 1986 criteria recommendations are supported by epidemiological studies conducted by EPA in the late 1970s and early 1980s. In those studies, enterococci and *E. coli* exhibited the strongest correlation to swimming-associated gastroenteritis (specifically HCGI, as discussed in section 3.2.2). Because enterococci and *E. coli* correlate with illness, EPA recommended *E. coli* as the indicator to be measured in fresh water and enterococci as the indicator to be measured in both marine and fresh water. Both indicators continue to be used in epidemiological studies conducted throughout the world, including in the European Union (E.U.) and Canada (EP/CEU, 2006; MNHW, 1992). The World Health Organization (WHO) recommends the use of enterococci as water-quality indicators for recreational waters (WHO, 2003). Meta-analyses and systematic reviews of epidemiological studies conducted worldwide indicate that these indicators generally provided substantial improvements over the indicators that were favored previously, such as total and fecal coliforms (Prüss, 1998; Wade et al., 2003; Zmirou et al., 2003).

EPA NEEAR epidemiological study design and conclusions.

EPA conducted the NEEAR epidemiological studies at U.S. beaches in 2003, 2004, 2005, 2007, and 2009 and reported the results in a series of research articles (U.S. EPA, 2010a; Wade et al., 2006, 2008, 2010). The NEEAR study was a prospective cohort (PC) epidemiological study that enrolled participants at the beach (the cohort) at a number of study sites and followed them for an appropriate period of time to compare incidence of illness (i.e., NGI) between the exposed (swimmers) and unexposed groups. This type of study can also include exposure response analyses if varying degrees of exposure are present. The PC design used in the NEEAR study was an enhancement of the cohort design previously employed by Cabelli (1983), Dufour (1984), and numerous others (Calderon et al., 1991; Cheung et al., 1990; Colford et al., 2005, 2012; Corbett et al., 1993; Haile et al., 1999; McBride et al., 1998; Prieto et al., 2001; Seyfried et al., 1985; von Schirnding et al., 1992).

EPA investigators considered several different epidemiological study designs, but only the randomized controlled trial (described below) and PC designs were viewed as potentially viable methods by EPA's external expert advisory panel to address the specific goals of the study. The goals of the study were to obtain and evaluate a new set of health and water quality data at a number of beaches for the new rapid, state-of-the-art methods and to use the results to support the development of new or revised criteria for the protection of primary contact recreation. The NEEAR PC design enhanced and improved upon the PC design used for studies employed in the development of the 1986 criteria (U.S. EPA, 1986).

Characteristics of the NEEAR study's design were used to establish criteria to select the seven beaches studied between 2003 and 2007:

1. The beach was an officially designated recreational area near a large population center;
2. The beach had an attendance large enough to support an epidemiological study (i.e., 300–400 attendees/day);
3. The age range of the swimmers was broad (i.e., includes children, teenagers, and adults);
4. The beach generally met the state or local WQS with a range of indicator densities;
5. The range of indicator density was related to occasional contamination by an identified human source of pollution (point-source); and
6. The swimming season was at least 90 days long.

For more information about the beach selection criteria, enrollment, administration of the health survey, and other details on the study design, please see Wade et al. (2006; 2008; 2010).

Wade et al. (2008, 2010) also described the details on the statistical models used for the NEEAR analysis. Statistical tests were conducted using several approaches and models to determine whether the odds ratios for the different fresh water and marine beaches were statistically different. Covariate analyses are discussed in U.S. EPA (2010a). Additionally, regression models were used to determine the strength and the significance of the relationship between the indicator measures and health effects. Nearly all the studies conducted in recent years have used similar statistical models, usually logistic or log-linear models (Colford et al., 2012; Fleisher et al., 1993; Haile et al., 1999; Kay et al., 1994; McBride et al., 1998; Prieto et al., 2001; Seyfried et al., 1985).

As a result of the statistical analyses, EPA concluded that the *Enterococcus* spp. levels measured by qPCR using EPA Method 1611 (U.S. EPA, 2012b) and GI illness data from the NEEAR epidemiological studies of WWTP-impacted marine and temperate fresh water study sites could be combined. A direct comparison of the slope parameters shows no significant difference (p = 0.44) between the marine and fresh water beaches. The results indicated that for the majority of the range of exposures observed, there were no statistically significant differences in the estimated risk levels for marine and fresh waters (see Appendix C; U.S. EPA, 2011).

For the NEEAR epidemiological study design, EPA collected data from seven WWTP-influenced marine and temperate fresh water beaches at intervals throughout the day at different water depths, resulting in 18 daily samples. The GM of the daily samples provided a single daily water quality value for the health relationship analysis (U.S. EPA, 2010a). The association between the GM of enterococci samples collected at 0800 hours and GI illness was nearly identical to the daily GM of all samples collected. This association is important from an implementation perspective because the results indicate that a sample taken at 0800 hours could be used for beach-management decisions on that day.

A number of FIB were examined in the NEEAR study (see Table 2). The occurrence of GI illness in swimmers was positively associated with exposure to levels of enterococci enumerated with EPA's *Enterococcus* spp. qPCR Method 1611 in marine and fresh water (U.S. EPA, 2012b; Wade et al., 2008, 2010). GI illness in swimmers at marine water beaches was also associated with exposure to levels of anaerobic bacteria of the order *Bacteroidales* enumerated with EPA's *Bacteroidales* qPCR method (Wade et al., 2010).

The association between GI illness and enterococci measured by culture in the NEEAR study was positive, but not as strong as the qPCR relationship to illness. No associations between adverse health outcomes and any of the other fecal indicator organisms were observed in either the fresh water or marine beach studies. Culturable *E. coli* was not included in the NEEAR epidemiological studies because EPA focused on evaluating a single indicator that could be used by states in both marine and fresh waters. Although culturable *E. coli* samples were not included in the NEEAR epidemiological studies, other researchers confirm that culturable *E. coli* is associated with GI illness, and remains a useful indicator of contamination in fresh waters (Prüss, 1998; Marion et al., 2010; Wiedenmann et al., 2006).

In addition to the seven temperate, WWTP-influenced beaches, EPA conducted PC epidemiological studies at two other beaches in 2009: a temperate beach in Surfside, South Carolina that is impacted by urban runoff sources but has no WWTP sources, and a tropical beach in Boquerón, Puerto Rico. Boquerón was selected as an epidemiological study site to specifically examine the health relationships of the indicators in a tropical setting. For both studies the FIB levels and illness rates were found to be low (U.S. EPA, 2010a). Results from EPA studies at the urban-runoff and tropical beaches are consistent with NEEAR study results from other geographical areas and other sources are consistent with EPA's understanding of risk associated with fecal indicators (i.e., low illness rate and low FIB counts). Thus, EPA believes these criteria recommendations are scientifically defensible and protective of the use regardless of source or climate.

Table 2. Fecal indicator organisms and enumeration methods tested in the NEEAR epidemiological studies.

EPA Epidemiological Study	Indicator/Methods Tested in Study
Great Lakes	*Enterococcus* spp. measured by qPCR, enterococci measured by culture, *Bacteroidales* measured by qPCR
Marine (2007)	*Enterococcus* spp. measured by qPCR, enterococci measured by culture, *E. coli* measured by qPCR, *Bacteroides thetaiotamicro* (potentially human associated) measured by qPCR, *Bacteroidales*, male-specific coliphage measured by antibody assay, *Clostridium* spp. measured by qPCR
Tropical	Same indicator/methods as 2007 marine, but no coliphage or *Clostridium* spp.
Urban Runoff	Same indicator/methods as 2007 marine, but no coliphage or *Clostridium* spp.

Other Epidemiological Studies.

Findings from epidemiological studies conducted by non-EPA researchers were also reviewed and considered to the maximum extent possible during the development of the 2012 RWQC, including all available data from the open literature, as well data from SCCWRP's epidemiological studies in Southern California (see below for description of these studies). Numerous epidemiological investigations have been conducted since the 1950s to evaluate the association between illness rate to recreational water users and the concentration of suitable fecal indicators (reviewed in U.S. EPA, 2009b). These studies have been conducted in Australia, Canada, Egypt, France, Hong Kong, Israel, the Netherlands, New Zealand, Spain, South Africa, the U.S, and the United Kingdom. Most of these studies investigated waters that were impacted or influenced by wastewater effluent. Several groups of researchers have compiled information and generated broad and wide-ranging inferences from these epidemiological studies (Prüss, 1998; Wade et al., 2003; Zmirou et al., 2003). For example, a systematic review and meta-analysis of 27 published studies evaluated the evidence linking specific microbial indicators of recreational water quality to specific health outcomes under non-outbreak (endemic) conditions. These studies concluded that: (1) good indicators of fecal contamination and demonstrated predictors of GI illness in fresh waters are enterococci and *E. coli*, and enterococci in marine water, but not fecal coliform; and (2) the risk of GI illness is considerably lower in studies where enterococci and *E. coli* densities were below levels established by EPA in 1986 (Wade et al., 2003).

Recently, SCCWRP conducted a series of PC epidemiological studies in Southern California, at Doheny, Avalon, and Malibu beaches. Many specific characteristics of the SCCWRP studies were designed to be similar to prior EPA and SCCWRP studies (Colford et al., 2007; Wade et al., 2006, 2008, 2010). EPA received the data for the analysis conducted at Doheny beach (Colford et al., 2012), a recreational marine beach impacted by urban runoff. The Doheny beach study evaluated health-risk relationships between GI illness and enterococci using qPCR-based (three different qPCR assays analyzed) and culture-based enumeration methods. Results indicated that when urban runoff with potentially containing human enteric viruses flowed freely into the marine water (berm open), the results were comparable and consistent with NEEAR marine WWTP-impacted beaches. Additionally, when the FIB source was more diffuse (berm closed), the relationship between enterococci and GI illness was not as strong as the relationship observed when the berm was open. These diffuse source results are similar to those observed in the NEEAR Surfside beach study (U.S. EPA, 2010a).

A PC epidemiological study at an Ohio reservoir (a fresh water inland beach) provided an indicator-illness relationship for *E. coli* (Marion et al., 2010). In this small-scale study, *E. coli* levels (EPA Method 1603; U.S. EPA, 2002b, 2010e) were associated with GI illness in a statistically significant manner. As indicated previously, *E. coli* demonstrated a statistically significant association with HCGI in EPA's epidemiological studies in the late 1970s and early 1980s (Cabelli, 1983; Dufour, 1984).

Several epidemiological studies have been conducted using study designs that differ from the NEEAR design, such as those referred to as randomized control trials (RCT) or randomized exposure trials (see below). The RCT is an epidemiological study in which the study subjects are randomly allocated to groups to receive an experimental procedure or intervention. For recreational water exposures, the groups are bathers and non-bathers (swimmers vs. non-swimmers). The bathers are given instructions detailing their time in the water and specific activities, such as immersing their heads in the water. Similar to a PC study, bathers and non-bathers must be followed for an appropriate time to evaluate illness incidence and to determine the potential effect of other biases and potential confounders. Exposure-response analyses may then be conducted.

RCT study designs are preferred by some researchers because they are intended to (1) better account for the possibility that those who do not bathe choose not to do so based on factors other than water quality; (2) associate individuals and the incidence of illness with the water quality at the time and place of bathing, potentially reducing misclassification bias; and (3) account for non-water-related risk factors (Kay, et al., 1994). One of the most significant limitations of RCT is that the exposures in the study are not necessarily representative of those experienced by the general population.

EPA reviewed and considered the results from these RCT studies to the maximum extent possible. For example, the WHO and European Union (E.U.) used RCT epidemiological studies to support their recommended water quality values (EP/CEU 2006; WHO, 2003). The RCT studies were conducted over four bathing seasons (summers) at a different marine beach each season in the United Kingdom. Trends in the gastroenteritis (equivalent to GI illness) rate with increasing enterococci exposure were not significantly different between sites, and thus data from the four beaches were pooled (Kay et al., 1994). The source of FIB in this study was reported as domestic sewage. Gastroenteritis was defined as "all cases of vomiting or diarrhea or all cases of nausea, indigestion, diarrhea or vomiting that was accompanied by a fever". Rates of gastroenteritis were significantly higher in the exposed group than the unexposed group and adverse health effects were identified when fecal streptococci, of which enterococci are a subgroup, density exceeded 32 per 100 mL (Fleisher et al., 1998; Kay et al., 1994). Another E.U. randomized control trial at five fresh water bathing sites in Germany recommended guidance values based on the no observable adverse effects levels (NOAELs) for gastroenteritis of 100 *E.*

coli cfu per 100 mL or 25 enterococci cfu per 100 mL (average values) (Wiedenmann et al., 2006).

Additional RCT studies evaluated include Epibathe, a public health project funded under E.U. Framework Programme 6 to produce "science support for policy," which began in December 2005 and ended in March 2009. The imperative for this research effort was to improve the relative paucity of E.U. data describing the health effects of controlled exposure (head immersion) in E.U. fresh waters and Mediterranean marine waters. Both aquatic environments provide important recreational resources throughout the E.U. (European Commission-Epibathe, 2009). Epibathe comprised a series of marine and fresh recreation water epidemiological studies conducted in 2006 and 2007 in Spain and Hungary, respectively. Four riverine recreational sites were evaluated in Hungary and four coastal sites were evaluated in Spain. All sites were in compliance with the European standards specified in the E.U. bathing Water Directive (EP/CEU, 1976). For E.U. marine waters (Spain and the United Kingdom RCT studies), the clearest trend in increasing illness rate with water quality was evident using enterococci measured by culture. For fresh waters (German and Hungary RCT studies), the clearest indicator-illness relationship between GI symptoms and water quality was seen by a threshold density of *E. coli* measured by culture. Both analyses (marine and fresh water) suggest elevations in GI illness in the controlled exposure (head immersion) cohorts. The authors concluded that the empirical field studies and combined data analysis suggested that the WHO or E.U. WQS recommendations did not need to be revised.

Finally, an RTC epidemiological study at a Florida marine beach not impacted by a WWTP was considered. In this study, investigators found that swimmers randomized to head immersion were approximately twice as likely to develop a skin rash when swimming in water with culturable enterococci levels greater than or equal to 40 cfu per 100 mL than swimmers exposed to levels less than 40 enterococci cfu per 100 mL (Fleming et al., 2008; Sinigalliano et al., 2010).

Not all epidemiological studies show clear or consistent correlations between indicator levels and health outcomes. For example, in a 1989 PC epidemiological study at high-energy (surfing) marine beaches impacted by sewage outfalls and stormwater overflows in Sydney, Australia, GI, symptoms did not increase with increasing counts of fecal coliform or enterococci, however, swimmers did exhibit increasing respiratory, ear, and eye symptoms with increasing levels of FIB (Corbett et al., 1993). In a second independent study, respiratory and GI illnesses increased with increasing densities of enterococci (Harrington et al., 1993). In a PC epidemiological study at Mission Bay, California, impacted by non-point sources of fecal contamination, only male-specific coliphage had a correlation with illness (Colford et al., 2005).

3.2.4 Developing Enterococci Measured by Culture Criteria and Comparable Values for Culturable *E. coli* and *Enterococcus* spp. Measured by qPCR

The 2012 RWQC values for culturable levels of enterococci for marine and fresh waters and *E. coli* for fresh waters, if adopted in state WQS and approved by EPA, would be protective of the primary contact recreational use. The NEEAR study provided data to establish RWQC values for culturable enterococci and to help estimate an illness rate associated with those values. The NEEAR -based data were analyzed in several ways, some of which differed from the reported

NEEAR qPCR-based approach. EPA conducted these analyses, in part, to provide a comparison with the data analysis underlying the 1986 criteria for recreational waters.

The illness definition used in these analyses is consistent with those reported in the NEEAR study (i.e., NGI), rather than the illness definition (i.e., HCGI) used with the 1986 criteria (refer to section 3.2.2). To facilitate comparisons between the results from 1986 and the 2012 criteria, illness rates from 1986 (in terms of HCGI per 1,000 primary contact recreators) were translated to NGI rates using a translation (factor of 4.5) of the definition of NGI to HCGI (U.S. EPA, 2011). See section 3.2.2.

The following is a description of EPA's analytical approaches to develop recommended criteria values for enterococci measured by culture and comparable values for culturable *E. coli* and *Enterococcus* spp. measured by qPCR using EPA Method 1611 (U.S. EPA, 2012b). EPA was constrained to criteria values above the level of quantification (i.e., 20 cfu per 100 mL for culturable methods) (ASTM, 2012). Approach 1 analyzed the association between health and water quality for culturable enterococci using the NEEAR regression analysis. A statistically significant illness-exposure response relationship was not observed across the full range of exposures (Wade et al., 2008, 2010). Approach 2 evaluated NEEAR swimming-associated illness rates for exposures above and below the 1986 GM criteria values. These results indicated that illness rates were higher when the criteria were exceeded compared to when those criteria were not exceeded. Approach 3 compared the NEEAR study illness rates to those from 1986. This analysis confirmed that swimming-associated illness rates in NEEAR marine and fresh water studies were similar to each other and to those from the 1986 fresh water studies. Approach 4 analyzed the NEEAR data using the 1986 analytical approach. The results provided a linkage between NEEAR culturable enterococci data and GI illness. Approach 5 extended Approach 2 to consider whether there are significant differences in GI illness rates at enterococci densities lower than the 1986 criteria. The results indicate that water quality in the range of 30 to 35 enterococci cfu per 100 mL are the lowest water quality values reported to show statistically significant differences in swimming-associated illness rates.

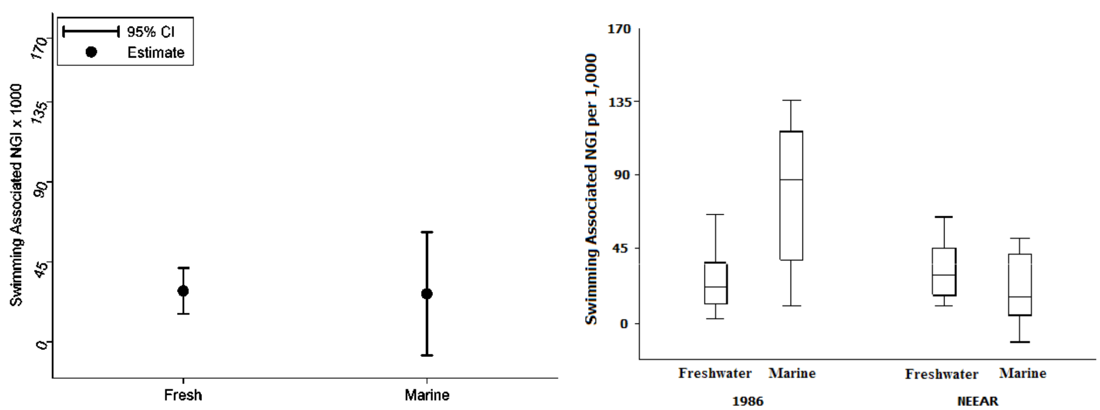
Taken together, these approaches along with the level of water quality described by the 1986 criteria provide the lines of evidence EPA is using to recommend either the culturable enterococci GM criteria values of 30 or 35 cfu per 100 mL. The mean illness rates associated with the 2012 RWQC water quality recommendations are approximately 32 cases of NGI per 1,000 primary contact recreators for a culturable enterococci GM criterion of 30 cfu per 100 mL and 36 cases of NGI per 1,000 primary contact recreators for a culturable enterococci GM criterion of 35 cfu per 100 mL, in both marine and fresh water. These illness rates were used to estimate equivalent criteria values for culturable *E. coli* and supplemental water quality values for enterococci using EPA's *Enterococcus* spp. qPCR Method 1611 (U.S. EPA, 2012b).

<u>Approach 1.</u>
Culture-based measures of enterococci collected in the NEEAR study were analyzed using the same rigorous statistical approach applied to the qPCR data (Wade et al., 2008, 2010). Although a weak association between illness and water quality for culturable enterococci was observed using this approach, the exposure-response relationship was not statistically significant over the entire range of observed water quality measured by culturable enterococci using the marine and

fresh water beach datasets (Wade et al., 2008, 2010). Therefore, EPA is not relying quantitatively on those exposure-response relationships for the 2012 RWQC because the regression coefficients would not have sufficient predictive value.

Approach 2.
EPA evaluated illness rates when swimmers are exposed to water quality levels either above or below the 1986 criteria values. Data from EPA's fresh water NEEAR study sites indicated that swimmers exposed above the 1986 criteria value of 33 cfu per 100 mL had higher risks than non-swimmers or swimmers exposed below this value (Wade et al., 2008). At EPA's marine water NEEAR study sites, approximately 16 percent of the marine study days exceeded the 1986 criteria enterococci GM value of 35 cfu enterococci per 100 mL. On those study days, the odds of diarrhea, respiratory illness and earache were elevated among swimmers compared to non-swimmers (Wade et al., 2010). EPA used the NEEAR study results (Wade et al., 2008, 2010) to compare the swimming-associated risk on days when enterococci levels were above and below 33 cfu per 100 mL and 35 cfu per 100 mL for fresh and marine sites, respectively. Those data also indicate that on days when the 1986 criteria GM values were exceeded, illness rates were similar at marine and fresh water sites (Figure 1a).

Approach 3.
EPA compared the full distribution of marine and fresh water swimming-associated illness rates observed in the NEEAR study to that of the corresponding 1986 criteria illness rates. The NEEAR study data (right side of Figure 1b) suggest that the marine swimming-associated illness rate and fresh water swimming-associated illness rate are similar to each other and to the 1986 fresh water rate. In contrast, the 1986 marine swimming-associated illness rate was considerably higher than the 1986 fresh water illness rate (left side of Figure 1b).



a) b)

Figure 1. Swimming-associated illness rates observed during EPA's epidemiological studies. a) risk on days with GM above 35 cfu per 100 mL at marine sites and above 33 cfu per 100 mL at fresh water sites; b) swimming-associated illness observed during 1986 and NEEAR study. Note**:** Boxes in Figure 1b represent the 25th to the 75th percentiles, the lines within the boxes indicate the median values, and the whiskers represent the 10th and 90th percentiles**.**

EPA then evaluated whether culturable enterococci data from the marine and fresh water NEEAR sites could be combined. The observed culturable enterococci data for each NEEAR beach were plotted and analyzed (Figure 2). There was substantial overlap in the densities of enterococci observed at beaches, even though there were statistically significant differences between beaches. However, statistically derived beach groups (represented by variations in shading in Figure 2) were not aligned strictly by their salinity classification, supporting the finding that there is not a compelling distinction between marine and fresh water (see Appendix C). The literature is consistent with this finding and indicates that of the factors influencing enterococci fate in the environment, there is evidence that sunlight, temperature and predation are more important in controlling enterococci concentrations than salinity (Noble et al., 2004).

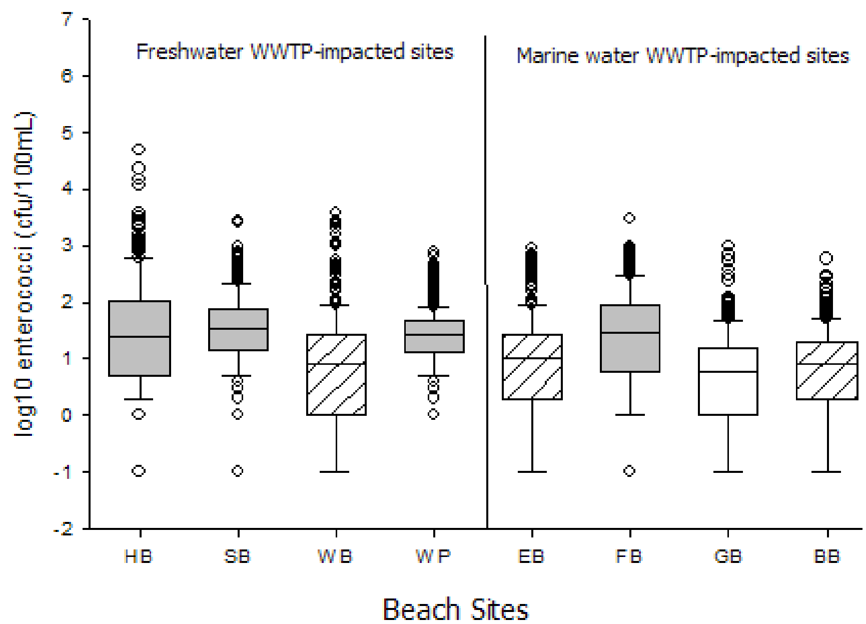


Figure 2. NEEAR marine and fresh water culturable water quality results. White, grey, and hatched boxes represent statistically different groups. Fresh water beach sites are Huntington Beach (HB), Silver Beach (SB), West Beach (WB), Washington Park (WP); marine water beach sites are Edgewater Beach (EB), Fairhope Beach (FB), Goddard Beach (GB), Boquerón Beach (BB). Note**:** Boxes in Figure 1b represent the 25th to the 75th percentiles, the lines within the boxes indicate the median values, and the whiskers represent the 10th and 90th percentiles.

Approach 4.

EPA conducted another analysis to develop a culture-based linkage between the NEEAR and 1986 studies. EPA could not reanalyze the 1980s data using the NEEAR statistical approaches because the raw data from those earlier studies are no longer available. Therefore, EPA analyzed the NEEAR culturable enterococci data using the same statistical approaches employed in the 1980s studies (Cabelli, 1983; Dufour, 1984).

In the 1986 criteria, quantitative relationships between the rates of swimming-associated illness and FIB densities were determined using regression analysis. Linear relationships were estimated from data grouped in two ways: (1) pairing the GM indicator density for a summer bathing season at each beach with the corresponding swimming-associated GI rate for the same summer (fresh water beaches), and (2) by sampling days with similar indicator densities from each study location (marine beaches). The second approach, grouping by sampling days with similar indicator densities, was not possible with the 1980s fresh water data because the variation of bacterial indicator densities in fresh water samples was not large enough to allow such groupings (U.S. EPA, 1986). For the 2012 RWQC, EPA evaluated both approaches (seasonal and days of similar water quality) with the NEEAR culture-based enterococci data to estimate the illness associated with the recommended levels of water quality.

EPA applied the 1986 fresh water analysis described above to the NEEAR culture-based enterococci data. This analysis summarized each NEEAR beach as a seasonal GM of water quality and its average seasonal illness rate estimate, using the entire body of culturable enterococci data from the NEEAR study. Consistent with the 1986 fresh water analysis, this approach did not account for covariates. These data points generally fell within the predicted range of the published epidemiological regressions (Cabelli, 1983; Dufour, 1984) after conversion to comparable GI case definitions (U.S. EPA, 2011). However, this analysis proved to be insufficient to estimate NEEAR study illness rates, because it generated only seven data points—one for each of the NEEAR beaches.

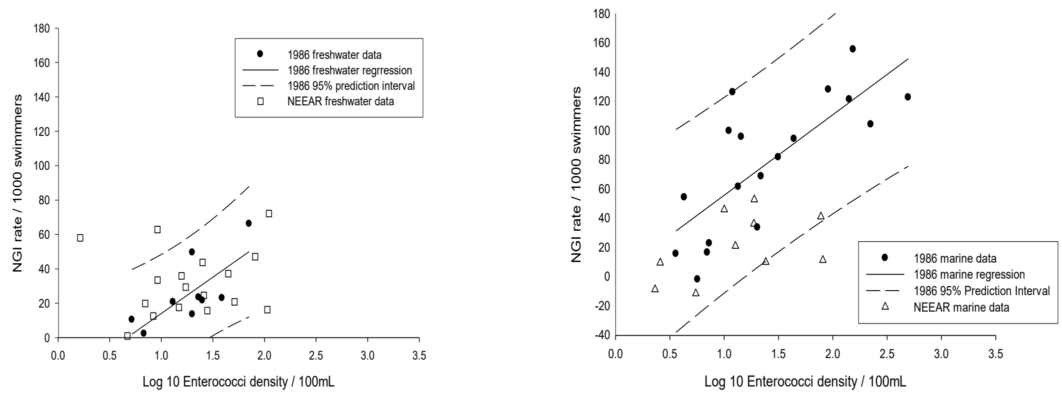
EPA then extended the seasonal analysis of the NEEAR culture-based enterococci data using the 1986 marine water analytical approach as described above. For this analysis, EPA aggregated data by days of similar water quality (bins) for each beach (Cabelli, 1983; U.S. EPA 1986). The NEEAR data were sorted by the observed GM for each beach day and the data for each beach were then grouped according to natural breaks in these data. Bins of beach days were established from these data to balance, to the extent feasible, the existence of natural breaks of days with similar culturable enterococci GM and the number of study participants represented in each bin (Table 3, Figures 3 and 4 - Illness rates in the 1986 criteria are presented as NGI equivalents for comparative purposes). This analysis resulted in a total of 27 data points as compared to the seven data points for the seasonal analysis. The raw data underlying these analyses are presented in Appendix B.

EPA compared the binned fresh water and marine culture-based NEEAR indicator and health data to the corresponding regressions in the 1986 criteria. Results indicated that the vast majority of these data points fall within the 95th percentile prediction intervals derived from the 1986 regression models (Figure 3[5]). It should be noted that the NEEAR marine culture-based data cluster at the lower end of the water quality and illness distribution, described by the 1986 criteria marine regression. Moreover, the NEEAR marine and fresh water culture-based data exhibited a similar correspondence between water quality and illness as observed in the freshwater studies (Figures 3 and 4).

[5] The prediction intervals can be used to assess whether these NEEAR data fall within an expected range based on the 1986 criteria data.

Table 3. NEEAR culture-based enterococci and illness rate data for each of the seven beaches.

Beach	Daily geometric mean *Enterococcus* density (cfu/100 mL)	Total number interviewed	Number reporting no water contact	Number reporting immersion	Number NGI cases no contact	Number NGI cases immersion	Excess illness (# NGI/1000 swimmers) above beach average non-swimmer illness rates
West Beach (fresh)	1.6	1122	360	556	21	60	58
	9.2	726	144	468	2	39	33.4
	25.1	463	101	299	8	28	43.7
	110.4	553	117	344	5	42	72.2
Huntington Beach (fresh)	4.7	731	426	186	43	18	1.0
	9.2	733	391	208	27	33	62.9
	15.7	526	251	167	31	22	35.9
	81.1	850	467	196	46	28	47.1
Silver Beach (fresh)	7.0	864	220	490	16	37	19.8
	14.8	2203	603	1215	36	89	17.6
	25.8	3128	900	1720	54	138	24.5
	51.3	2525	808	1281	46	98	20.8
	106.6	2152	843	945	36	68	16.3
Washington Park Beach (fresh)	8.4	722	198	398	15	30	12.6
	17.2	789	171	488	10	45	29.4
	27.9	1368	364	764	23	60	15.7
	44.6	1465	524	710	31	71	37.2
Edgewater Beach (marine)	2.3	555	135	173	10	13	-9.1
	10.0	239	66	77	7	10	45.7
	18.9	441	152	139	13	19	52.5
	77.7	108	27	40	2	5	40.8
Fairhope Beach (marine)	5.5	494	261	120	27	9	-11.8
	12.7	541	200	186	19	20	20.7
	24.1	351	126	114	5	11	9.7
	81	629	266	225	23	22	11.0
Goddard Beach (marine)	2.6	2433	1322	596	58	33	9.3
	18.8	535	262	183	15	15	35.9



a) b)

Figure 3. NEEAR study culture data aggregated by similar water quality and 1986 criteria data for (a) fresh water beaches and (b) marine water beaches.

EPA used these analyses to 1) provide a linkage to illness estimates associated with the 1986 criteria and the historically accepted level of water quality for protecting the primary contact recreation use, and to 2) estimate the potential levels of illness associated with the water quality levels recommended in the 2012 RWQC for marine and fresh waters. Based on this analysis and results illustrating the consistency between the culturable NEEAR epidemiological data to the 1986 fresh water studies, the corresponding mean estimate of illness associated with the 2012 RWQC recommendations is approximately 27 to 36 cases of NGI per 1,000 primary contact recreators for both marine and fresh water (Figures 3 and 4). See section 3.2.2 for discussion of illness rate conversion.

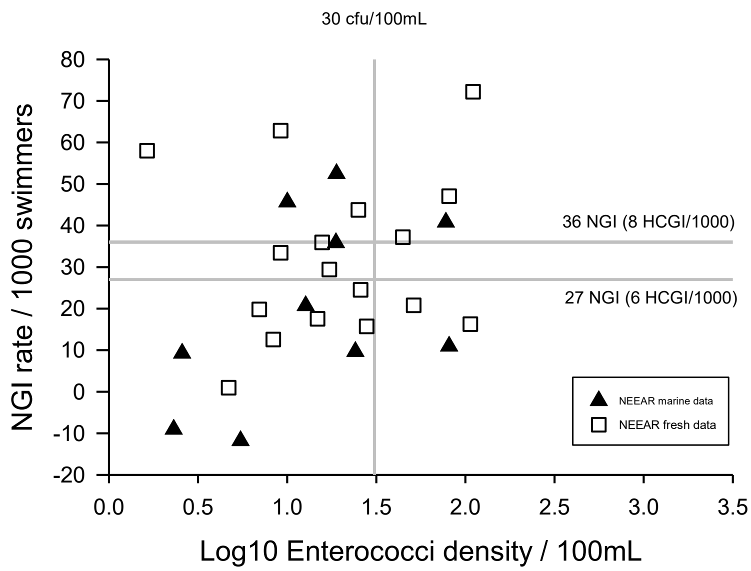


Figure 4. NEEAR marine and fresh water culture-based enterococci and illness rate data aggregated by days of similar water quality.

<u>Approach 5</u>

Based on public comments received on the draft RWQC document, EPA conducted an additional analysis to determine if similar results to those found in Approach 2 would occur at lower (i.e. below 35 cfu per 100 mL) enterococci densities. To achieve this, EPA extended the published approaches by developing and conducting cut-point analyses, similar to those described by Wade et al. (2003, 2008, 2010) and Colford et al. (2012), at multiple enterococci densities.

In this approach, EPA considered the daily GM culture-based enterococci data from the seven NEEAR study sites by conducting cut-point analyses at multiple enterococci densities, ranging from 5 cfu per 100 mL to 35 cfu per 100 mL, in five cfu increments and an NGI health end point. Points above 35 cfu per 100 mL are not recommended because these values would be less protective than the 1986 criteria values.

Adjusted risk estimates were developed for each of the individual cut-points, comparing swimmers in the NEEAR study exposed above and below the selected enterococci cut-points. Figure 5 presents odds ratios (and the corresponding 95% confidence intervals [CI]) for the probabilities of GI illness for swimming in water with enterococci GM levels above each of the cut-points compared to swimming in waters with enterococci GM levels below that cut-point. These odds ratios were computed as the adjusted risk of NGI among swimmers above the cut-point divided by the adjusted risk of NGI among swimmers below the cut-point. The adjusted odds ratios account for important covariates from the NEEAR epidemiological model and were calculated at the means of the covariate values (this approach is called the marginal average effects approach). The adjusted risk of NGI for non-swimmers was 56 cases per 1,000 primary contact recreators; the adjusted risk of NGI for swimmers was approximately 75-90 cases per 1,000 primary contact recreators depending on the level of water quality evaluated.

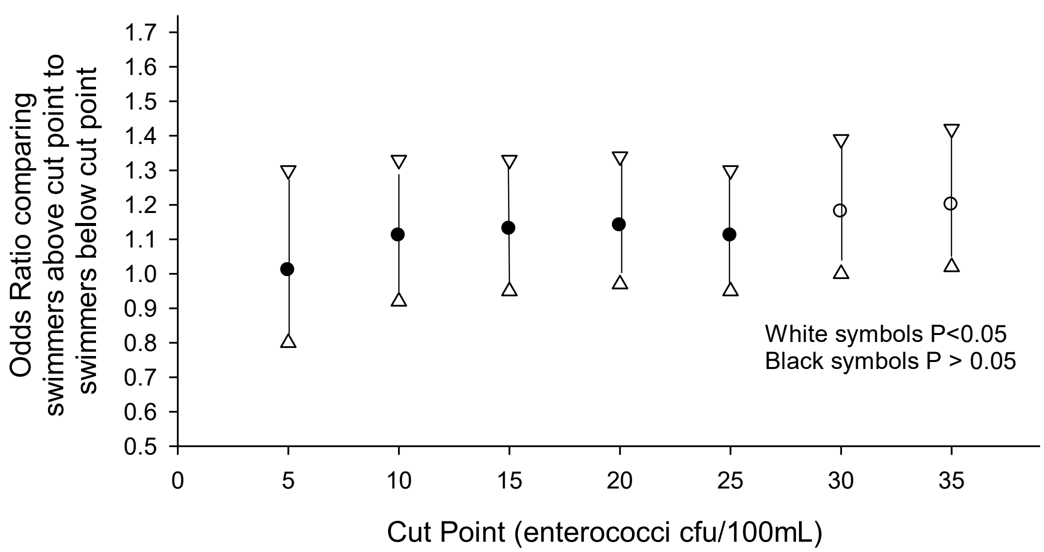


Figure 5. Adjusted odds ratios of GI illness for swimming above specific cut-points in NEEAR marine and fresh water study sites.

The odds ratios for swimming-associated GI illness are statistically significant (that is, $p \leq 0.05$) at enterococci densities of 30 cfu per 100 mL and 35 cfu per 100 mL. None of the other individual cut-points exhibited odds ratios that were statistically significant (lower 95% CI values are less than one in all other cases). These results indicate that the illness rates for swimming in waters with GMs in the narrow range of 30 to 35 cfu per 100 mL were significantly greater than the illness rates for swimming in waters with GMs below those levels. Similar illness rate changes are not seen outside this range.

Culturable *Enterococcus* conclusion

Taken together, the set of approaches described above provide lines of evidence to support the recommendation of a GM criterion value of 30 or 35 cfu per 100 mL. These approaches also provide evidence that the recommended RWQC are similarly protective of the designated use of primary contact recreation in both marine and fresh water. EPA is presenting two sets of criteria (consisting of a GM and related STV) associated with two different illness rates. EPA recommends that states make a risk management decision to choose one or the other set.

Derivation of an equivalent *E. coli* value

Using the results from the culturable enterococci analyses described above, EPA derived criteria values for culturable *E. coli* that are comparable to the two recommended enterococci GM culture-based values. First, using the preceding approaches, 35 cfu per 100 mL culturable enterococci corresponds to 36 NGI per 1,000 primary contact recreators. From the 1986 fresh water relationship between swimming-associated illness (see equation below) and water quality, 36 NGI per 1,000 primary contact recreators (8 HCGI per 1,000 primary contact recreators) corresponds to an *E. coli* density of 126 cfu per 100 mL.

$$\text{Swimming-associated HCGI illness} = -\,11.74 + 9.397\ (\text{mean } \log_{10} \textit{E. coli} \text{ per 100 mL})$$

Similarly, EPA derived an *E. coli* density comparable to 30 cfu enterococci per 100 mL by solving the above equation at an illness rate of 7 HCGI per 1,000 primary contact recreators (translated from approximately 32 NGI per 1,000 primary contact recreators which was the estimated midpoint of the illness range derived in Approach 4) to yield an estimated *E. coli* density of 99 cfu per 100 mL. EPA rounded this estimated density to 100 *E. coli* cfu per 100 mL. EPA believes this rounding was appropriate, given the uncertainty surrounding the predicted illness range of the recommended 2012 RWQC enterococci culture-based value. This recommended criterion value (100 *E. coli* cfu per 100 mL) is consistent with the threshold suggested by Wiedenmann et al. (2006) based on an E.U. RCT epidemiological study using completely different data and statistical methods (as summarized in section 3.2.3).

Derivation of an equivalent qPCR value

EPA derived values for enterococci measured using EPA's *Enterococcus* spp. qPCR Method 1611 (U.S. EPA, 2012b) in a manner similar to the derivation for *E. coli* at 32 NGI per 1,000 primary contact recreators described above. The qPCR values were computed from the combined NEEAR epidemiological regression model (Figure 6) (see Appendix A; U.S. EPA, 2011). This model was preferred over separate models for marine and fresh waters because EPA's analysis indicated that there was little evidence for differences in illness rate estimates obtained from separate models from marine and fresh water beaches and because the beach-specific separate models showed no statistical improvement over a single combined model (U.S. EPA, 2011). The statistically significant relationship between swimming-associated illness in terms of NGI per 1,000 primary contact recreators and water quality developed from the combined marine and fresh water data is defined as follows:

$$\text{Swimming-associated NGI} = -27.31 + 23.73\ (\text{mean } \log_{10} \text{ qPCR cce per 100 mL})$$

Based on the regression model, the following equation was used to derive the qPCR value:

$$\text{qPCR Value} = 10^{\frac{NGI+27.31}{23.73}}$$

where:

qPCR = qPCR value in units of cce per 100 mL
NGI = NGI rate[6] in illnesses per 1,000 primary contact recreators

[6] See U.S. EPA (2011) for translation information of HCGI illness rate into the NEEAR illness rate.

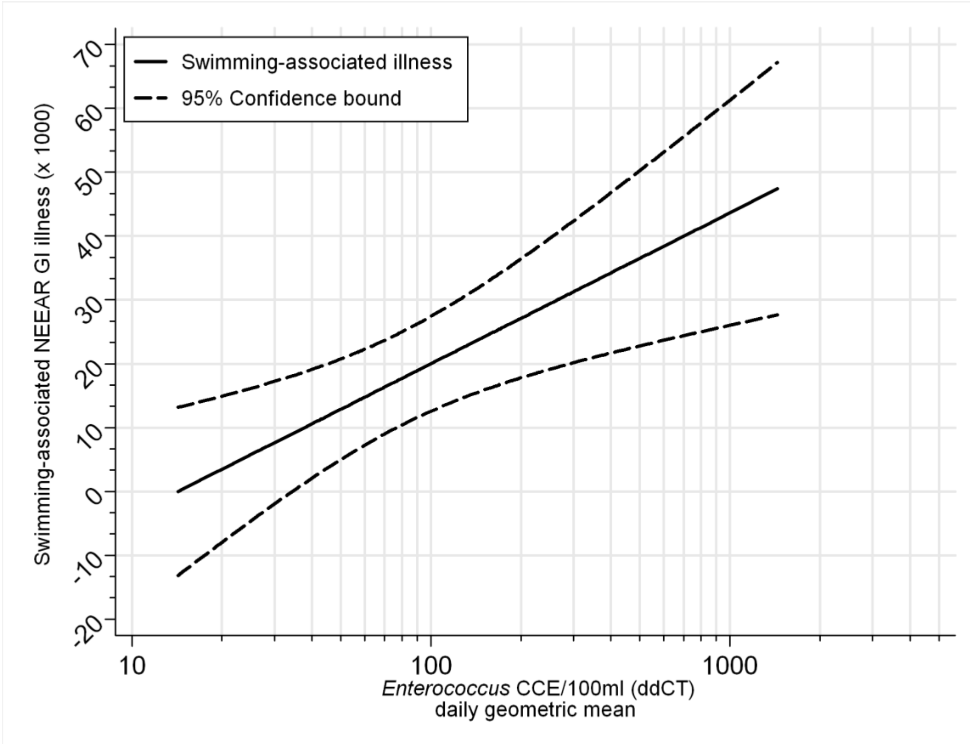


Figure 6. Swimming-associated NGI and daily average *Enterococcus* spp. measured by qPCR (cce per 100 mL). All subjects, marine and fresh water beaches combined.

Thus, qPCR-based GM values of 301 and 466 cce enterococci per 100 mL correspond to approximately 32 and 36 cases of NGI per 1,000 primary contact recreators, respectively. EPA rounded 301 to 300 cce per 100 mL, and 466 to 470 cce per 100 mL to obtain a comparable *Enterococcus* spp. measured by qPCR density to the enterococci measured by culture-based value described above.

3.3 Scope of Protected Population

EPA's 1986 criteria recommendations are supported by epidemiological studies that were conducted in the late 1970s and early 1980s. Those studies enrolled participants according to the following criteria: "Whenever possible, family units were sought because information on multiple individuals could be obtained from one person, usually an adult member of a family. During this initial contact, the following information was obtained on each participant: sex, age, race and ethnicity" (Dufour, 1984). This enrollment strategy ensured that children were highly represented in those epidemiological studies. Thus, the illness rates corresponding to the 1986 criteria recommendations are based on the epidemiological relationship for the general population that is inclusive of children. EPA used a similar epidemiological approach for deriving illness rates for the 2012 RWQC.

As in the previous EPA epidemiological studies, children were well represented in EPA's NEEAR study population. The proportions of individuals in the under five-year and five to ten-year age categories that were enrolled in the epidemiological studies were greater than in the U.S. demographic. According to the U.S. Census data for 2009, children younger than ten years of age make up approximately 14 percent of the U.S. population (Census, 2010). At West Beach, the proportion of children aged ten years and under made up 20 percent of the study sample. A similar over-representation of children compared to the U.S. population is true for studies at the other beaches, including Huntington (20 percent of the study sample), Washington Park (22 percent), Silver Beach (22 percent), Edgewater (17 percent), Fairhope (30 percent), and Goddard (20 percent).

EPA conducted statistical analyses of the data from each of EPA's epidemiological studies at fresh water, marine, and tropical beaches to evaluate whether children at these sites were at an increased risk of illness following exposure to recreational waters. The results for children were compared to adults and other age groups. The age groups used for comparison included the following: ten years and under, 11 to 55 years, and over 55 years of age. Other age groups for children were not separately analyzed due to small sample sizes. Data for children (i.e., ten years and under) were specifically analyzed to evaluate whether they exhibit different illness rates compared to the general population.

In the NEEAR marine epidemiological studies, the association between water quality as measured by qPCR and illness in children was not different from that observed for the general population, despite a higher proportion of children age five to ten years (75 percent) immersed their bodies or head in the water compared with adults over age 55 years (26 percent) (Wade et al., 2010). Elevated GI illness rates were, however, observed among swimmers of all age groups compared with non-swimmers on days that exceeded the enterococci GM value of 35 cfu per 100 mL (Wade et al., 2010). In the NEEAR fresh water epidemiological studies, the association between GI illness and water quality, as measured by EPA's *Enterococcus* spp. qPCR Method 1611 (U.S. EPA, 2012b), was stronger among children (age ten years and under) compared with the NEEAR general population, which also included children. The reason for the stronger association in children compared to the general population is not known. However, there are several possible explanations. Relative to body size, children breathe more air and ingest more food and water than adults (U.S. EPA, 2003). Children also exhibit behaviors that increase their exposure to environmental contaminants, including increased head and body immersion in recreational waters (U.S. EPA, 2010a; Wade et al., 2006, 2008) and hand-to-mouth contact (Xue et al., 2007). The immature immune systems of children can also leave them particularly vulnerable to the effects of environmental agents (Pond, 2005). Children also stay in the water longer than adults (Wade et al., 2006, 2008) and often times ingest more water (Dufour et al., 2006).

In data from the NEEAR fresh water study sites, there was considerable overlap in the CIs associated with the estimated mean illness responses between children and the general population. The CIs for the children's curve were wider than the CIs for the general population. When health effects were compared with water quality, as measured by culturable enterococci, differences between children (age ten years and under) and the general population were not observed (Wade et al., 2008). As indicated previously, swimmers exposed to water qualities above densities of 33 enterococci cfu per 100 mL had an elevated risk of developing GI illness compared with non-swimmers and swimmers exposed to water having densities less than 33 enterococci cfu per 100 mL. Both cohorts, including children (age ten years and under) and the general population, demonstrated similar responses to water having more than 33 enterococci cfu per 100 mL.

The epidemiological studies conducted by EPA in tropical regions (Boquerón Beach, Puerto Rico) and temperate marine water that were impacted by urban runoff (Surfside Beach, South Carolina) showed no evidence of increased illness in children or the general population associated with increasing levels of FIB in the recreational waters (U.S. EPA, 2010a).

EPA considered developing criteria based specifically on the results for children. The collective results of the NEEAR study, however, provide inconclusive evidence that children (age ten years and under) exhibited a significantly different illness response given the range of water qualities measured in these studies.

Participants over the age of 55 years were studied, but in numbers that were too low to be evaluated separately. For example, in the fresh water studies, this subgroup represented seven percent of the study population. This small sample size did not allow EPA to make any conclusions about risk in the subpopulation over 55 years old. Additionally, EPA's NEEAR study were not designed to evaluate the effects on groups with compromised immune systems or other vulnerable subpopulations.

EPA considered all the demographic data and results presented above and concluded that the robustness of the estimates for the general population data provide a significant advantage over the more uncertain and smaller sample set that consisted only of children. Importantly, the general population data are weighted to include children in a robust manner. Thus, the general population data provide an appropriate basis for deriving EPA's recommended values for the 2012 RWQC.

This RWQC document includes information regarding several additional ways to protect children at beaches through use of a lower value in beach notification programs (i.e., BAV), rapid indicator methods, and predictive modeling. The BAVs are values that correspond to the 75th percentile of a water quality distribution based on these criteria, and can be used by states to make precautionary beach management decisions before there is an excursion of the applicable WQS (see section 5.1). Rapid indicator detection methods, such as qPCR can allow beach managers to make real-time decisions to protect families and their children, in contrast to traditional culture methods, which provide estimates of water quality a day or two after the actual exposure. The qPCR method can be performed in 2–6 hours and has been shown to be successful when implementing same-day beach management decisions (Griffith and Weisberg, 2011). Predictive models can also be used for rapid notification of potential water quality problems. These models have been demonstrated to be useful tools for implementing beach notification programs in the Great Lakes (Francy, 2009; Frick et al., 2008; Ge and Frick, 2009). Because children may be more exposed and/or more sensitive to pathogens in recreational waters, it is imperative that effective risk communication and health outreach be done to effectively mitigate exposure to contaminated waters. Alerting families with children to the level of water quality on a given beach day, in real time, will allow for better protection of children.

3.4 Waterbody Type

EPA's 2012 RWQC recommendations are scientifically defensible for all surface waters of the U.S. designated by a state for primary contact recreation. Historically, the scientific evidence used to generate criteria recommendations has been based on data collected mostly from coastal, temperate and Great Lakes fresh waters. The stakeholder community asked EPA to consider whether EPA's criteria recommendations could be used to develop state WQS for other types of waters.

In response, EPA conducted a review of the available information comparing coastal (including Great Lakes and marine) and non-coastal (including flowing and non-flowing inland waters, such as streams, rivers, impoundments, and lakes) waters to evaluate whether EPA should include recommendations in the 2012 RWQC for all waterbody types (U.S. EPA, 2010f). Additionally, EPA considered the WERF Inland Water Workshop report (WERF, 2009) and subsequent meeting report publication (Dorevitch et al., 2010). These publications concluded that the inclusion of non-coastal waters in the 2012 criteria will result in public health protection, by preventing illnesses associated with exposure to non-coastal waters. Specifically, these studies found the distinction of non-coastal waters versus coastal waters is of less importance than more fundamental variables, such as the source of fecal contamination, scale of the body of water, and the effects of sediment, which translate into differences in the densities, transport, and fate of indicators and pathogens (Dorevitch et al., 2010). Further, epidemiological studies in non-coastal waters also support the inclusion of all waterbody types into the criteria. Outbreaks from recreational exposure to non-coastal waters indicate a need for public health protection in such settings. Historical use of culturable *Enterococcus* spp. and *E. coli*, paired by the recommended 1986 criteria, have been used to prevent the occurrence of outbreaks of severe illness as well as the sporadic cases of illness that occur among swimmers. The next two subsections describe the data that EPA considered in determining which waterbody types are covered by the 2012 RWQC. For additional information see the WERF Inland Water Workshop report (WERF, 2009).

<u>Waterbody type and sources of fecal contamination.</u>
EPA's literature review identified the source of fecal pollution as a factor when considering the potential differences between EPA epidemiological study sites and non-coastal waters (U.S. EPA, 2010f). More information specifically concerning the source of fecal contamination is found in section 3.5. Sources of fecal contamination are discussed in this section only insofar as they potentially impact FIB in coastal versus non-coastal settings.

All surface waters may potentially receive FIB from point sources, diffuse sources (which may consist of point source and non-point source pollution), direct deposition, and resuspension of FIB contained in sediments. FIB loadings in WWTP-impacted coastal and non-coastal waters are generally similar. WWTP discharges, which are known sources of human-derived pathogens and indicators from fecal pollution, are relatively steady. Differences exist in FIB loadings between waters that are WWTP-impacted and waters impacted by sources other than treated sewage effluent. Due to differences in the physical and biological characteristics, FIB survival compared to pathogen survival may differ between coastal and non-coastal waters. Some of the potential differences between coastal and non-coastal waters that may impact survival include extent of shading, hydrodynamics, potential for sedimentation, and microbial ecology.

Epidemiological studies in non-coastal waters.

EPA also evaluated the available epidemiological evidence in non-coastal waters. Only a handful of studies have been conducted in small lakes and even fewer in inland flowing waters. Among those, one of the epidemiological sites for earlier EPA studies (Dufour, 1984) was a small inland lake in Oklahoma, which helped provide the basis for the 1986 criteria.

Ferley et al. (1989) conducted a retrospective study in the French Ardèche basin to determine the relationship between swimming-related morbidity and the bacteriological quality of the recreational water. Tourists (n = 5,737) in eight holiday camps were questioned about the occurrence of illness and their bathing habits during the week preceding the interviews. GI illness was higher in swimmers than in non-swimmers. Fecal streptococci were best correlated to GI illness. Direct linear regression models and fecal coliforms did not predict risk as well. The concentration of fecal streptococci above which bathers exhibited higher illness rates than non-bathers was 20 fecal streptococci cfu per 100 mL.

A series of RCT epidemiological studies was conducted in Germany to establish the association of illness with recreational use of designated fresh recreational waters (four lakes and one river) (Wiedenmann et al., 2006). All study sites were in compliance with the European standards for total coliform and fecal coliform for at least the three previous bathing seasons. Sources of fecal contamination at the study sites included treated and untreated municipal sewage, non-point source agricultural runoff, and fecal contamination from water fowl. Based on the water quality measured as levels of *E. coli*, enterococci, somatic coliphages, or *Clostridium perfringens* and observed health effects, the authors recommended guideline values for each of these fecal indicator organisms. Their recommended guideline values for enterococci and *E. coli* are very similar to the 2012 RWQC recommendations.

Epibathe evaluated the health effects of swimming in E.U. fresh and Mediterranean marine waters (European Commission-Epibathe, 2009). Four riverine recreational sites were examined in Hungary in 2007, which were in compliance with the European standards specified in the E.U. bathing Water Directive (EP/CEU, 1976). For these fresh water studies, *E. coli* provided the best indicator-illness relationship between GI symptoms and water quality. These data support the use of *E. coli* as an effective fecal indicator for use in inland waters.

A PC study was recently conducted at a small inland lake in Ohio (Marion et al., 2010). The study was undertaken to examine the illness rates among inland recreational water users. It also evaluated the effectiveness of *E. coli* as an effective predictor of an increased GI illness rate among recreators. Human health data were collected during the 2009 swimming season at East Fork Lake, Ohio and adverse health outcomes were reported eight to nine days post-exposure. The authors concluded that *E. coli* was significantly associated with an elevated GI illness rate among swimmers compared to non-swimmers. The predicted illness rate increased among swimmers with increasing densities of *E. coli*.

Based on the information summarized above, EPA has determined that the 2012 RWQC recommendations are scientifically defensible and protective of the primary contact recreation use in both coastal and non-coastal waterbodies. Although some differences may exist between coastal and non-coastal waters, those differences were not significant enough to justify the development of different WQC recommendations for non-coastal waters. States wishing to address site-specific conditions or local waterbody characteristics in their WQS should refer to section 6 of this document for suggestions on approaches.

3.5 Sources of Fecal Contamination

In §on 303(i)(2)(A) of the CWA, EPA was required to promulgate criteria that are as protective of human health as EPA's 1986 criteria where states had failed to do so for their coastal and Great Lakes waters. When EPA promulgated WQS for those states based on the 1986 criteria in 2004, EPA evaluated the scientific understanding of the human health risks associated with nonhuman sources of fecal contamination and concluded that although "[the] EPA's scientific understanding of pathogens and pathogen indicators has evolved since 1986, data characterizing the public health risk associated with nonhuman sources is still too limited for the [EPA] to promulgate [WQS for states based on] another approach." Thus, the federally promulgated criteria values in the 2004 BEACH Act Rule applied regardless of origin, unless a sanitary survey shows that the sources of the indicator bacteria are nonhuman and an epidemiological study shows that the indicator densities are not indicative of a human health risk. In addition, in evaluating whether state standards were as protective of human health as EPA's 1986 criteria, EPA concluded that state WQS with exemptions for nonhuman sources were not as protective of human health as EPA's 1986 criteria (see 69 FR at 67228).

EPA has continued to examine the potential for illness from exposure to nonhuman fecal contamination compared to the potential for illness from exposure to human fecal contamination. One of the key topics discussed at the *Experts Scientific Workshop on Critical Research Needs for the Development of New or Revised Recreational Water Quality Criteria* (U.S. EPA, 2007a) was different sources of FIB, including human sources, and a variety of nonhuman sources (such as agricultural animals). EPA further investigated sources of fecal contamination in *Review of Published Studies to Characterize Relative Risks from Different Sources of Fecal Contamination in Recreational Waters* (U.S. EPA, 2009b) and *Review of Zoonotic Pathogens in Ambient Waters* (U.S. EPA, 2009a). EPA recognizes the public health importance of waterborne pathogens that can affect both human and other species (zoonotic). However, the state of the science has only recently allowed for the characterization of the potential health impacts from recreational exposures to zoonotic pathogens relative to the risks associated with human sources of fecal contamination. Overall, the aforementioned reviews indicate that both human and animal feces in recreational waters do pose potential risks to human health, especially in immunocompromised persons and vulnerable individuals. EPA has conducted analyses to characterize the potential differences in magnitude of illness arising from different fecal sources. These analyses indicate that the human health risk associated with exposure to waters impacted by animal sources can vary substantially. In some cases these risks can be similar to exposure to human fecal contamination, and in other cases, the risk is substantially lower. The criteria recommendations do not address pollutants in sand, except to the degree that sand may serve as a source of FIB in recreational waters.

3.5.1 Zoonotic Potential

Zoonotic diseases are those that are communicable from animals to humans. Fecal contamination from nonhuman sources can transmit pathogens that can cause GI illnesses, such as those reported in EPA's NEEAR and other epidemiological studies.
Livestock and wildlife carry both human pathogens and FIB, and can transmit these microbes to surface waters and other bodies of water (CDC, 1993, 1996, 1998, 2000, 2002, 2004, 2006, 2008; USDA, 2000). Additionally, many documented outbreaks of potential zoonotic pathogens, such as *Salmonella, Giardia, Cryptosporidium,* and enterohemorrhagic *E. coli* O157:H7 could be of either human or animal origin, although providing proper source attribution for these outbreaks can be quite difficult. U.S. Centers for Disease Control and Prevention (CDC) reports have documented instances of *E. coli* O157:H7 infection resulting from exposure to surface waters, but the source of the contamination is not specified (CDC, 2000, 2002). Other studies have linked recreational water exposure to outbreaks caused by potentially zoonotic pathogens, but the sources of fecal contamination in these waters were not identified (Roy et al., 2004; U.S. EPA, 2009a; Valderrama et al., 2009). Although formal surveillance information is not comprehensive, Craun et al. (2005) estimated that 18 percent of the 259 recreational water outbreaks reported to the CDC from 1970 to 2000 were associated with animals.

One study documenting a 1999 outbreak of *E. coli* O157:H7 at a lake in Vancouver, Washington suggested that duck feces were the source of the pathogen causing the outbreak (Samadpour et al., 2002). More than 100 samples of water, soil, sand, sediment, and animal feces were collected in and around the lake and tested. *E. coli* O157:H7 was detected in both water and duck fecal samples. Genetic analyses of the *E. coli* isolates demonstrated similar results in the water, duck feces, and patient stool samples. Duck feces could not be confirmed as the primary source of the zoonotic pathogens, however, because the ducks could have been infected by the same source of contamination that was present in the lake. Other notable outbreaks are discussed in EPA's *Review of Published Studies to Characterize Relative Risks from Difference Sources of Fecal Contamination in Recreational Water* (U.S. EPA, 2009b).

3.5.2 Differential Health Risks from Human versus Nonhuman Sources

EPA's research indicates that the source of contamination appears to be an important factor for understanding the human health risk associated with recreational waters and that the potential human health risks from human versus nonhuman fecal sources can vary (Schoen and Ashbolt, 2010; Soller et al., 2010b).

Researchers have documented human health impacts in numerous epidemiological studies in marine and fresh water primarily impacted by human sources of fecal contamination (see sections 3.2 and 3.4 for a discussion of these studies). The cause of many of the illnesses, particularly those resulting from exposure to WWTP effluent, is thought to be viral (Soller et al., 2010a; U.S. EPA, 1986; WERF, 2011). These human viruses are generally unlikely to occur in animal feces although pigs and birds may periodically carry zoonotic viruses.

Nonhuman sources of fecal contamination and the associated potential human health risks can vary from site-to-site depending on factors such as: the nature of the nonhuman source(s), the fecal load from the nonhuman source(s), and the fate and transport characteristics of the fecal contamination from deposition to the point of exposure. Nonhuman fecal sources can contaminate recreational bodies of water via direct fecal loading into the body of water, and indirect contamination can occur via runoff from the land. The fate and transport characteristics of the zoonotic pathogens and FIB present under these conditions can be different (such as, differences in attachment to particulates or differences in susceptibility to environmental parameters affecting survival) (U.S. EPA, 2011l). For more information on pathogenic risks from nonhuman sources, see *Review of Zoonotic Pathogens in Ambient Waters* (U.S. EPA, 2009a).

However, only a few epidemiological studies have been conducted in waters impacted by nonhuman sources of fecal contamination. The results of these studies are less clear than those conducted in waters impacted by human sources, particularly as related to conventionally enumerated FIB in those types of waters. For example, Calderon et al. (1991) found a lack of a statistical association between swimmers' illness risk and FIB levels in a rural fresh waterbody impacted by animal fecal contamination; however, other researchers have commented that this lack of statistical association may have been due to the small study size and not a lack of potential human health risks (McBride, 1993). Another epidemiological study conducted at a nonhuman, nonpoint source impacted beach at Mission Bay, California documented an increase in diarrhea and skin rash in swimmers versus non-swimmers, but the incidence of illness was not associated with any of the traditional FIB levels tested (Colford et al., 2007). On the other hand, McBride et al. (1998) conducted an analysis of the impact on human sources versus animal sources on New Zealand beach sites and concluded that the illness risks posed by animal versus human fecal material were not substantially different. These studies collectively suggest that waterbodies with substantial animal inputs may potentially result in human health risks that vary based upon the relative proportion of the human and nonhuman fecal input and the nature of the nonhuman source of infective agent(s).

Microbial risk assessment approaches are available to assist in characterizing potential human health risks from nonhuman sources of fecal contamination (Roser et al., 2006; Soller et al., 2010b; Schoen and Ashbolt, 2010; Till and McBride, 2004). For example, New Zealand, where roughly 80 percent of the total reported illnesses are zoonotic and potentially waterborne, recently updated its recreational fresh water guidelines based on a risk analysis of campylobacteriosis (accounting for over half of the reported total notifiable disease burden in that country) and using *E. coli* as a pathogen indicator (Till and McBride, 2004). Since those waters were highly impacted by fecal contamination, in this case from agricultural sources, a predictable relationship between the pathogen and the FIB could be developed. The correlation between the occurrence of *Campylobacter* and *E. coli* is unlikely to hold in all waters, but this relationship was demonstrated in parts of New Zealand, particularly in waters with high levels of *Campylobacter* and *E. coli*.

The risk presented by fecal contamination from nonhuman sources has been shown in some cases, to be potentially less than the risk presented by fecal contamination from human sources (Schoen and Ashbolt, 2010; Soller et al., 2010a, b; WERF, 2011). EPA's research also indicates that some nonhuman fecal sources (cattle in particular) may pose risks comparable to those risks from human sources (Soller et al., 2010a, b; U.S. EPA, 2010g). Human pathogens are present in animal fecal matter, and there is, therefore, a potential risk from recreational exposure to human pathogens in animal-impacted waters that must be accounted for in the 2012 RWQC. For waters dominated by nonhuman sources and in the absence of site-specific criteria, EPA recommends that the national criteria be used to develop WQS for all waters including those impacted by point and nonpoint sources.

Because there have been few epidemiological studies, with mixed findings, in waters impacted by nonhuman sources and QMRA shows that risks from some animals may be comparable to humans, EPA is not developing separate national criteria for nonhuman sources. However, since some studies have site-specifically shown less risk in waters impacted by nonhuman sources, states interested in addressing the potential human health risk differences from different sources of fecal contamination on a site-specific basis should refer to section 6.2.2 of this document for suggestions on approaches.

Naturally occurring environmental sources of traditional FIB, another nonhuman source, may exist, particularly under tropical conditions. Results of the EPA epidemiological beach study at Boquerón, Puerto Rico did not refine EPA's understanding of risk enough to justify a different criteria recommendation for tropical waters. In addition to the epidemiological study at Boquerón, Puerto Rico, EPA conducted a literature search and reported the results in the *Review of Fecal Indicator Organism Behavior in Ambient Waters and Alternative Indicators for Tropical Regions* (U.S. EPA, 2009c). The literature indicates that FIB, fecal coliforms, enterococci, and *E. coli* are endemic to tropical, subtropical, and temperate regions. Studies conducted in the tropics and subtropics show proliferation of *E. coli*, enterococci, and/or fecal coliforms (Boehm, 2007; Byappanahalli, 2012; U.S. EPA, 2009c). Changing environmental conditions in tidally-influenced sediments help support proliferation and elevated FIB in water (U.S. EPA, 2009c).

Overall, EPA believes that the state of the science is not developed sufficiently to distinguish environmental sources from other sources of FIB on a national basis. In some circumstances, the presence of FIB in water is not necessarily an indication of recent fecal contamination or potential health risk. Therefore, EPA has concluded that states adopting the 2012 RWQC would result in WQS protective of the designated use of primary contact recreation. States wishing to consider alternative indicators should refer to section 6.2 for information on how to develop alternative criteria.

3.6 Expression of Criteria

EPA identified a number of opportunities to improve clarity and to enhance implementation of the 2012 RWQC, which are discussed in the sections below.

3.6.1 EPA's 1986 Ambient Water Quality Criteria for Bacteria

In 1986, EPA recommended criteria for enterococci and *E. coli* that contain two components: a GM and an SSM. EPA derived the 1986 criteria values from beach water quality datasets that were collected as part of EPA's epidemiological studies conducted during the late 1970s and early 1980s. The GM values were computed as described in section 3.2.1. The SSM values were derived from upper percentiles of the water quality distribution around the GM criteria values. Together, the 1986 criteria GM and SSM described a water quality distribution that would be protective of primary contact recreation, based on the epidemiological studies conducted during that period. Thus, the GM and SSM values in the 1986 criteria corresponded to the same illness rate because they are both derived from the same water quality distribution.

The 1986 criteria contained four different SSM values corresponding to the 75^{th}, 82^{nd}, 90^{th}, and 95^{th} percentiles of the expected water quality sampling distribution at the GM criteria value. EPA recommended using different SSM values on the basis of the use intensity of the recreational water. However, treating the SSM as a never to be exceeded value for such an evaluation would impart a level of protection much more stringent than intended by the 1986 criteria GM value. For example, a marine beach that is in compliance with the 1986 GM criteria for enterococci (GM = 35 cfu per 100 mL) would be expected to have 25% of the sample values above 104 cfu per 100 mL (the 75^{th} percentile of the expected water quality sample distribution) because of expected variability in individual water quality measurements. Expecting that beach to never exceed 104 cfu per 100 mL would require an actual GM much lower, associated with a lower illness rate, than the recommended GM criterion value.

3.6.2 The 2012 RWQC

In the 2012 RWQC, EPA is recommending the criteria magnitude be expressed as a GM value corresponding to the 50^{th} percentile and a STV corresponding to the 90^{th} percentile of the same water quality distribution, and thus associated with the same level of public health protection. EPA's criteria recommendations are both for a GM and STV (rather than just a GM or just an STV) because used together they would indicate whether the water quality is protective of the designated use of primary contact recreation.. Using the GM alone would not reflect spikes in water quality because the GM alone is not sensitive to them.

EPA is recommending that the GM of a waterbody be calculated in the same way as recommended in the 1986 criteria by taking the $\log_{10}$ of sample values,[7] averaging those values, and then raising that average to the power of 10. The STV is also derived in a manner similar to how the 1986 criteria SSM was derived by estimating the percentile of the expected water quality distribution around the GM criteria value.

EPA believes that the STV, used in conjunction with the GM, can help ensure the FIB densities in recreational waters correspond to a water quality level protective the designated use of primary contact recreation by constraining the number of high water quality values. The distribution of FIB in water is highly variable and can generally be represented as a $\log_{10}$ normal distribution (Bartram and Rees, 2000; Kay et al., 2004; Wyer et al., 1999). EPA derived the STV from the observed pooled variance of the FIB data reported in EPA's epidemiological studies. The computed pooled variances represent a wide range of weather and hydrological conditions because monitoring was conducted over the full course of the set of epidemiological studies. EPA stratified the epidemiological data by beach and water depth (14 subgroups) because FIB

[7] For data points reported below detectable limits, the GM calculation should be based on the assumption that those observations were present at the detection limit.

distributions are known to differ systematically for these factors (Wade et al., 2008), and the pooled variance was then calculated. For EPA's *Enterococcus* spp. qPCR Method 1611, the pooled variance resulted in a log standard deviation (the standard deviation of the base 10 logarithms of the data) of 0.49. From the NEEAR study sites, the pooled variance estimates for culturable enterococci are 0.44 (the pooled variance for culturable *E. coli* was reported previously (U.S. EPA, 1986) as 0.40).

For the STV, EPA selected the estimated 90^{th} percentile of the water quality distribution to take into account the expected variability in water quality measurements, while limiting the number samples allowed to exceed the STV, before deciding water quality is impaired. In addition, the approach encourages monitoring because once an exceedance is observed, at least ten more samples need to be below the STV before water quality is considered unimpaired.

Further, EPA is no longer utilizing the concept of "use intensity" as a basis for recommending multiple SSM criteria. EPA's recommends instead that states adopt both the GM and STV into their WQS for all primary contact recreation waters.

EPA now specifically recommends a duration period over which the GM of samples should be calculated and over which the STV should be compared against a recommended limit on the frequency of excursions. EPA is recommending that states use a duration for the GM and STV of 30 days. The duration and frequency of excursion should be explicitly included in the state's WQS as it is a component of the WQS.

EPA understands that a longer duration would typically allow for more samples to be collected and that including more samples in calculation of the GM and STV improves the accuracy of the characterization of water quality. However, because the designated use protected by this criterion is primary contact recreation, EPA believes that a shorter duration (i.e., 30 days), used in a static or rolling manner, coupled with limited excursions above the STV, allows for the detection of transient fluctuations in water quality in a timely manner. In the development of their monitoring program, EPA recommends that states consider the number of samples evaluated in order to minimize the possibility of incorrect use attainment decisions (see section 3.6.4).

3.6.3 Criteria Magnitude, Duration, and Frequency for CWA Purposes

EPA recommends that RWQC consist of a magnitude, duration and frequency. Magnitude is the numeric expression of the maximum amount of the pollutant that may be present in a waterbody that supports the designated use. Duration is the period of time over which the magnitude is calculated. Frequency of excursion describes the maximum number of times the pollutant may be present above the magnitude over the specified time period (duration). A criterion is set in a WQS such that the combination of magnitude, duration and frequency protect the designated use (such as primary contact recreation).

EPA's 2012 RWQC recommendations to protect primary contact recreation consist of a magnitude, duration and frequency of exceedance.

- **Magnitude**: GM and the STV (regardless of the sample size).
- **Duration and Frequency**: The waterbody GM should not be greater than the selected GM magnitude in any 30-day interval. There should not be greater than a ten percent excursion frequency of the selected STV magnitude in the same 30-day interval.

3.6.4 Application of State WQS based on EPA's 2012 RWQC for NPDES Permitting, 303(d) Listing, TMDL Development, and Beach Notification Programs

WQC in state WQS are used: to derive water quality-based effluent limits (WQBELs) for National Pollutant Discharge Elimination System (NPDES) permits; to identify impaired and threatened waters for waterbody assessments; to develop waste load allocations and load allocations for TMDLs; and for beach notification programs under §406 of the CWA.

NPDES permitting purposes
The NPDES regulation at 40 CFR 122.44(d) requires the development of WQBELs as necessary to attain WQS. Under §122.45(d), permit limits for continuous dischargers must include both short- and long-term WQBELs unless there is a specific finding of "impracticability". EPA recommends that permitting authorities use an effluent limit derivation approach that considers both the GM and STV in the limit calculations, and which results in short- and long-term effluent limits that derive from and comply with all applicable criteria expressions. Once established, pathogen indicator-based limits for continuous dischargers are applied and enforced in a manner consistent with all other water quality parameters.

For non-continuous or episodic discharges, 40 CFR 122.45(e) requires WQBELs to reflect the frequency of discharge; total mass; maximum discharge rate; and prohibition or limitation of specified pollutants by mass, concentration, or other measure. Wet weather-related events influence episodic discharges such as combined sewer overflows (CSOs). The 1994 CSO Control Policy (reflected in §402(q) of the CWA) describes various approaches for addressing CSO discharges in NPDES permits and should be consulted when establishing WQBELs for intermittent dischargers. The CSO Policy also recommends WQS review and revision, as appropriate, to reflect the site-specific wet weather impacts of CSOs. In conjunction with an approved long-term CSO control plan, a WQS review could involve a use attainability analysis (40 CFR 131.10(g)) and subsequent modification of a designated use.

Detailed approaches for deriving WQBELs to meet WQS based on EPA's final 2012 RWQC will be further explained in upcoming TSM.

Identification of Impaired and Threatened Waters
Under §303(d) of the CWA and EPA's implementing regulation (40 CFR 130.7), states, territories, and authorized tribes (hereafter referred to as states) are required to develop lists of impaired and threatened waters that require TMDLs. Impaired waters are those waters for which effluent limitations and other pollution control requirements are not stringent enough to implement any WQS applicable to the waterbody. EPA recommends that states consider as

threatened those waters that are currently attaining WQS, but which are expected not to meet WQS by the next listing cycle (every two years). Consistent with EPA recommendation, many states consolidate their §303(d) and §305(b) reporting requirement into one "integrated" report.

For making these water quality attainment determinations, a state that adopts WQS consistent with the 2012 RWQC would evaluate all readily available data and information to determine whether a waterbody meets the WQS (i.e., whether the waterbody is in attainment). Both the GM and the STV would be part of the WQS and therefore both targets would be used to determine whether a waterbody meets the WQS for primary contact recreation. The waterbody condition would need to be evaluated based on all existing and readily available data and information for the specified duration. EPA's regulation defines "all existing and readily available water quality related data and information" at 40 CFR 130.7(b)(5). EPA expects that water quality attainment determinations would include water quality monitoring data collected as part of a beach notification program, as well as information regarding beach closures and advisories.

Beach Notification Programs
WQC in state WQS are the applicable targets for EPA grant funded state beach notification programs under §406 of the CWA. The BAV is not a component of EPA's recommended criteria, but a tool that states may choose to use, without adopting it into their WQS as a "do not exceed value" for beach notification purposes (i.e., advisories). While the GM and STV would be the applicable WQS, a BAV could be used at the state's discretion as a more conservative, precautionary tool for beach management decisions. Similarly, states could also choose to use the STV as a "do not exceed value" for the purposes of their beach notification program, without adopting it as a "do not exceed value" in their WQS.

3.6.5 Practical Considerations for Implementing State WQS based on the 2012 RWQC

The number of samples, to be collected by a state in determining if WQS have been exceeded, is not an approvable element of a WQS package (Florida Public Interest Research Group vs. EPA, 2007). Therefore states should not include a minimum sample size as part of their criteria submission. When identifying sampling frequency as part of a state's monitoring plan, a state may consider that, typically, a larger dataset will more accurately characterize the water quality in a waterbody, which may result in more meaningful attainment determinations. Therefore, EPA is recommending that states conduct at least weekly sampling to evaluate the GM and STV over a 30-day period and encourages more frequent sampling at more densely populated beaches.

4.0 Recreational Water Quality Criteria

EPA evaluated the available information and the results of the analyses presented above (section 3.2.4) and determined that the primary contact recreation designated use would be protected if one of the following criteria sets consisting of a GM and an STV were adopted into a state's WQS and approved by EPA (see Table 4).

Table 4. Recommended 2012 RWQC.

Criteria Elements	**Estimated Illness Rate (NGI): 36 per 1,000 primary contact recreators**			**Estimated Illness Rate (NGI): 32 per 1,000 primary contact recreators**	
	Magnitude			**Magnitude**	
Indicator	GM (cfu/100 mL)[a]	STV (cfu/100 mL)[a]	OR	GM (cfu/100 mL)[a]	STV (cfu/100 mL)[a]
Enterococci – marine and fresh	35	130		30	110
OR					
E. coli – fresh	126	410		100	320
Duration and Frequency: The waterbody GM should not be greater than the selected GM magnitude in any 30-day interval. There should not be greater than a ten percent excursion frequency of the selected STV magnitude in the same 30-day interval.					

[a] EPA recommends using EPA Method 1600 (U.S. EPA, 2002a) to measure culturable enterococci, or another equivalent method that measures culturable enterococci and using EPA Method 1603 (U.S. EPA, 2002b) to measure culturable *E. coli*, or any other equivalent method that measures culturable *E. coli.*

EPA believes both criteria sets outlined above are protective of the designated use of primary contact recreation. EPA recommends that states make a risk management decision regarding illness rate to determine which set of criteria values (both a GM and related STV) to adopt into their WQS and that this risk management decision should be applied statewide. In order to ensure downstream protection of estuarine and marine swimming waters, upstream inland waters should have WQS based on the same illness rate as those downstream waters. Note that either enterococci or *E. coli* can be selected for fresh waters, as adopting one of the indicators is sufficient and only enterococci can be selected for marine waters. Adopting criteria based on one illness rate for some waters and criteria based on the other illness rate for remaining waters is not recommended. The criteria that correspond to an illness rate of 36 NGI per 1,000 primary contact recreators correlate to water quality levels associated with the 1986 criteria. Accordingly, the illness rate has a history of acceptance by the public. The criteria that correspond to an illness rate of 32 NGI per 1,000 primary contact recreators would encourage an incremental improvement in water quality.

5.0 Supplemental Elements for Enhanced Protection of Recreational Waters

In addition to the RWQC values described above, EPA is providing supplemental elements for states' consideration and possible use. These elements include the BAV and values for *Enterococcus* spp. as measured by qPCR. The BAV can be used as a precautionary tool for making beach notification decisions, and use enterococci measured using EPA's *Enterococcus* spp. qPCR Method 1611 (U.S. EPA, 2012b) qPCR is anticipated to provide increased public health protection by facilitating timely notification to swimmers from elevated levels of FIB. Details for these supplemental elements are described below.

5.1 Beach Action Value (BAV)

EPA suggests that states use a BAV as a conservative, precautionary tool for making beach notification decisions. The BAV is not a component of EPA's recommended criteria, but a tool that states may choose to use, without adopting it into their WQS as a "do not exceed" value for beach notification purposes (such as advisories). The BAV was developed from the same water quality distribution (section 3.6.2) as the criteria values in section 4.0 and corresponds to the estimated 75th percentile of the enterococci and *E. coli* water quality distributions.

For states that choose to use a BAV (see Table 5), any single sample above the BAV could trigger a beach notification until another sample below the BAV is collected. While the GM and STV would be the applicable WQS, a BAV could be used at the state's discretion as a more conservative, precautionary tool for beach management decisions. This applies to all states, including those with grants under §406 of the CWA.

EPA suggests that the state's chosen criterion illness rate be used to determine the corresponding BAV. For states that do not use a BAV, EPA suggests using the criteria STV values (provided in Table 4) as "do not exceed" values for beach notification or retaining their current beach notification values in their WQS. Additionally, if a state is not sampling during or immediately after a rain event, the state should consider advising the public of the potential additional risk of primary contact recreation when sources such as urban runoff or CSOs may be impairing water quality.

Table 5. Beach Action Values (BAVs).

	Estimated Illness Rate (NGI): 36 per 1,000 primary contact recreators		**Estimated Illness Rate (NGI): 32 per 1,000 primary contact recreators**
Indicator	**BAV (Units per 100 mL)**		**BAV (Units per 100 mL)**
Enterococci – culturable (fresh and marine)[a]	70 cfu		60 cfu
E. coli – culturable (fresh)[b]	235 cfu	**OR**	190 cfu
Enterococcus spp. – qPCR (fresh and marine)[c]	1,000 cce		640 cce

[a] Enterococci measured using EPA Method 1600 (U.S. EPA, 2002a), or another equivalent method that measures culturable enterococci.
[b] *E. coli* measured using EPA Method 1603 (U.S. EPA, 2002b), or any other equivalent method that measures culturable *E. coli.*
[c] EPA *Enterococcus* spp. Method 1611 for qPCR (U.S. EPA, 2012b). See section 5.2.

5.2 Rapid Method: *Enterococcus* spp. as measured by qPCR (EPA Method 1611)

EPA has developed a qPCR method to detect and quantify enterococci more rapidly than the culture method for ambient waters. Introduction of EPA *Enterococcus* spp. qPCR Method 1611 is anticipated to provide increased public health protection by facilitating timely notification[8] to swimmers from elevated levels of FIB. Importantly, enterococci as measured by EPA *Enterococcus* spp. qPCR Method 1611 have shown a stronger relationship to GI illness in the recent EPA NEEAR epidemiological study compared to other methods tested (Wade et al., 2008; U.S. EPA, 2010a, 2012b).

While EPA *Enterococcus* spp. qPCR Method 1611 (U.S. EPA, 2012b) offers some advantages, EPA has limited experience with its performance across a broad range of environmental conditions. States should be aware of the potential for qPCR interference (see section 3.1.1) in various waterbodies, which may vary on a site-specific basis. Thus, EPA encourages a site-specific analysis of the method's performance prior to use in a beach notification program or adoption of WQS based on the method. A "site" may be a beach, a waterbody, a particular watershed, or a larger area (such as a state) that is shown to have uniform water quality characteristics throughout. Considerations for determining how a qPCR-based WQS could be developed will be provided in additional TSM. EPA's *Enterococcus* spp. qPCR Method 1611 (U.S. EPA, 2012b) is not currently suggested for NPDES permitting or effluent-related monitoring purposes because this method may not reflect the efficacy of WWTP disinfection since it detects and enumerates both live and dead enterococci.

A state may adopt a WQS based on EPA's *Enterococcus* spp. qPCR Method 1611 (U.S. EPA, 2012b) if it would be scientifically defensible and protect the designated use. As noted above, prior to adoption EPA recommends a site-specific evaluation of the method's performance. For states interested in adopting a value for enterococci using EPA's *Enterococcus* spp. qPCR Method 1611 into their WQS, EPA is providing GM and STV values for use in marine and fresh waters based on its epidemiological study data as shown in Table 6. The state's chosen criterion illness rate would determine the suggested corresponding qPCR values to be used by the state. States may also choose a qPCR-based BAV for beach notification purposes (see Table 5).

This document includes only supplementary information about a WQS for *Enterococcus* spp. measured by EPA's *Enterococcus* spp. qPCR Method 1611 (U.S. EPA, 2012b) because of the concerns discussed in section 3.1.1 of this document.

[8] See section 5.2.1 for a discussion on the use of predictive models as an additional approach for achieving timely notification.

Table 6. Values for qPCR in marine and fresh waters.

Element	Estimated Illness Rate (NGI): 36/1,000 primary contact recreators		OR	Estimated Illness Rate (NGI): 32/1,000 primary contact recreators	
	Magnitude			Magnitude	
	GM (cce per 100 mL)	STV (cce per 100 mL)		GM (cce per 100 mL)	STV (cce per 100 mL)
qPCR[a]	470	2,000		300	1,280
Duration and Frequency: The waterbody GM should not be greater than the selected GM magnitude in any 30-day interval. There should not be greater than a 10 percent excursion frequency of the selected STV magnitude in the same 30-day interval.					

[a] EPA *Enterococcus* spp. Method 1611 for qPCR (U.S. EPA, 2012b).

6.0 Tools to Support States and Tribes in Evaluating and Managing Recreational Waters and for Considering Alternative Water Quality Criteria

EPA's implementing regulations for §303 of the CWA provide that "states must adopt those WQC that protect the designated use. Such criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use" (40 CFR §131.11(a)). EPA's regulation stated in 40 CFR §131.11(b)(1) provides that "In establishing criteria, states should (i) Establish numerical values based on (i) 304(a) Guidance; or (ii) 304(a) Guidance modified to reflect site-specific conditions; or (iii) Other scientifically defensible methods." WQS can be established for waterbodies or a portion of a waterbody and therefore they could be established for a specific site. A "site" may be a beach, a waterbody, a particular watershed, or a larger area (such as a state) that is shown to have uniform water quality characteristics throughout. When EPA reviews state WQS for approval or disapproval under the CWA, EPA must ensure that the WQC in the standard (regardless of whether they are "site-specific") are scientifically defensible and protective of the designated use.

The tools discussed in this section fall into two main categories: (1) tools that states can use to further evaluate and manage their waterbodies (see section 6.1); and (2) tools that can be used by states in the development of WQC that differ from EPA's recommended criteria ("alternative criteria") (see section 6.2). Alternative criteria could be developed on a site-specific basis, or they could be developed using different indicators and analytical methods. State WQS including alternative criteria would need to be scientifically defensible and protective of the use. Because some alternative criteria for primary contact recreation could be based in part on assumptions regarding the current state of a watershed such as current land uses, they should be revisited no less frequently than triennially to ensure the site-specific criteria remain protective of the primary contact recreation use. This section does not provide details on how to implement these tools. Rather, detailed information on these tools will be provided in upcoming TSM.

The tools discussed below (and the corresponding subsections) include: (1) sanitary surveys (section 6.1.1); (2) predictive models (section 6.1.2); (3) epidemiological studies (section 6.2.1); (4) QMRA (section 6.2.2); and (5) approaches for developing criteria using alternative fecal indicators and/or methods (section 6.2.3).

6.1 Tools for Evaluating and Managing Recreational Waters

EPA recognizes that advancements have been made since the publication of the 1986 criteria in the area of managing recreational waters. This section discusses tools that states can use to further evaluate and manage their waterbodies, which can aid in identifying days of poor water quality on a site-specific basis. Specifically, this section discusses the use of sanitary surveys as a tool for identifying sources of fecal contamination and the use of predictive models for timely beach notification. EPA encourages the use of sanitary surveys by beach managers to better understand and potentially control sources of fecal contamination and pathogens. EPA also encourages the use of predictive models to supplement a sound beach notification program. Predictive modeling has the potential to identify days of poor water quality in time to inform the public of the potential risks. Together, the tools for evaluating and managing waters in this section could be used by a state or locality to assess and communicate the risks associated with fecally contaminated recreational waters. These tools would not be part of the adopted WQS and do not result in different numerical criteria values.

6.1.1 Sanitary Survey

Water quality managers often use sanitary surveys to evaluate waters for fecal contamination potential and to prioritize clean-up and remediation efforts. Sanitary surveys involve collecting information about the surrounding watershed for the purpose of cataloging physical conditions that may influence water quality in a watershed or at a beach. A sanitary survey is a detailed process that compiles information on pollution sources (such as streams or stormwater outfalls), physical features on or near a site, land use in adjacent areas and in the watershed that drains to the site, and other information that could regularly influence water quality. Additional observations may include the presence or absence of sanitary facilities or the nature of existing management activities (such as beach cleaning). Molecular source tracking tools may also be useful in verifying the results of the sanitary survey by confirming the presumed sources of fecal contamination in the watershed.

A sanitary survey collects information that relates to the specific conditions at a site at a particular time. Sanitary surveys are a snapshot of the conditions in a waterbody, which can change due to factors including those listed above. Sanitary surveys help state and local water quality managers and public health officials identify sources of fecal contamination, assess the magnitude of the contamination, and designate priority locations for water testing. Observations taken daily or at the time of water quality sampling can not only assist managers in evaluating water quality conditions (such as, turbid water conditions, rainfall, source flow), but sanitary survey data and measured FIB densities can be used to develop models to predict water quality. Other information such as molecular source tracking and watershed information may be needed to effectively delineate sources within the watershed.

Information on EPA's sanitary survey approach is available at: http://water.epa.gov/type/oceb/beaches/sanitarysurvey_index.cfm. EPA plans to include additional information on developing and using sanitary surveys in TSM.

6.1.2 Predictive Models

EPA recognizes that, at some locations and under some conditions, use of culturable or molecular enumeration methods, such as qPCR, are not feasible or are unlikely to provide timely information for making a same-day beach notification decision (i.e., in locations where water samples cannot be transported to laboratories for analysis in a timely manner). This section describes predictive modeling, an approach that may supplement water quality monitoring results to allow for timely beach notification decisions. Typically, states would use site-specific predictive models, such as statistical models, rainfall threshold levels, or notification protocols (U.S. EPA, 2010h, 2010i), to supplement monitoring using culture-based methods.

Predictive models are currently used in areas such as the Great Lakes and have proven to be an effective means of implementing beach notification programs. These models draw on existing culture-based monitoring data, are inexpensive to use, and allow for rapid water quality management decisions (U.S. EPA, 2010h, 2010i).

Predictive modeling tools fall into the following categories: statistical regression models, rainfall-based notifications, decision trees or notification protocols, deterministic models, and combinations of tools. There are various considerations for developing and selecting predictive models, and each has its own set of challenges (Boehm et al., 2007). To be effective, these models should reflect site-specific conditions (i.e., inter-seasonal variations). Development of predictive models typically requires monitoring data for establishing and maintaining statistical relevance.

EPA conducted research and published a two-volume report to advance the use of predictive models (U.S. EPA, 2010h, 2010i). Volume I summarizes the basic concepts for developing predictive tools for coastal and non-coastal waters (U.S. EPA, 2010h). Volume II provides the results of EPA's research on the development of statistical models at research sites. It also presents Virtual Beach, a software package designed to build statistical multivariate linear regression predictive models (U.S. EPA, 2010i). EPA is expanding the Virtual Beach tool to include other statistical approaches. Beyond these Virtual Beach improvements, other efforts, such as linking watershed and statistical models, Cyterski's temporal synchronization approach to incorporate time lags, and process-based transformations are being pursued to improve predictive modeling efforts. More information on developing and using predictive models for water quality management purposes will be provided in upcoming TSM.

6.2 Tools for Developing Alternative Criteria

States could adopt site-specific alternative criteria to reflect local environmental conditions and human exposure patterns. An alternative WQS may involve the adoption of different numerical value(s) that are based on: (1) an alternative health relationship derived using epidemiology with or without QMRA; (2) QMRA results to determine water quality values associated with a specific illness rate; or (3) a different indicator/method combination. EPA recommends that these alternative criteria reflect the same risk management decision regarding illness rate, as discussed in section 4.0. Such alternative criteria may be adopted into a state WQS provided that the resulting site-specific WQS are scientifically defensible, protective of the use, and reviewed and approved by EPA under CWA §303(c).

6.2.1 Epidemiological Studies

Recreational water epidemiological studies describe the risks associated with exposure to fecal contamination as measured by FIB. Epidemiological studies with or without QMRA could be used to develop an alternative health relationship for a waterbody. This alternative health relationship could be used to develop site-specific alternative criteria.

EPA's NEEAR epidemiological study were conducted in water primarily impacted human fecal contamination, with the exception of one site that was impacted by urban runoff (U.S. EPA, 2010a; Wade et al., 2006, 2008, 2010). Statistically significant associations between water quality, as determined using EPA's *Enterococcus* spp. qPCR Method 1611 (U.S. EPA, 2012b), and reported GI illness were observed in the temperate marine water and fresh water WWTP-impacted beaches. Other agencies have also conducted recreational water epidemiological studies. For example, epidemiological studies of recreational water exposures have been conducted recently in Southern California (Colford et al., 2012), Southern Florida (Fleming, 2006; Sinigalliano, 2010), and Ohio (Marion et al., 2010).

Several factors can influence the potential epidemiological relationship between indicator density and relative human health risk. Some of the potentially important factors include the source of fecal contamination, age of the fecal contamination, solar radiation, water salinity, turbidity, dissolved organic matter, water temperature, and nutrient content. Additionally, numerous factors also affect the occurrence and distribution of FIB and pathogens, including but not limited to: predation of bacteria by other organisms; differential interactions between microbes and sediment, including the release and resuspension of bacteria from sediments in the water column; and differential environmental effects on indicator organisms versus pathogens (U.S. EPA, 2010a; WERF, 2009).

States or local agencies may choose to conduct epidemiological studies in their waterbodies and use the results from those studies to derive alternative criteria, site-specifically. To derive scientifically defensible alternative WQC for adoption into state standards, ideally the epidemiological studies should be rigorous, comparable to those used to support the 2012 RWQC, and peer-reviewed. However, smaller scale epidemiological studies may also provide a scientifically defensible foundation for alternative criteria. Additionally, QMRA (see section 6.2.2) has been identified as potentially useful for developing alternative criteria by enhancing the interpretation and application of new or existing epidemiological data (Boehm et al., 2009; Dorevitch et al., 2011). QMRA can supplement new or existing epidemiological results by characterizing various exposure scenarios, interpreting potential etiological drivers for the observed epidemiological results, and accounting for differences in risks posed by various types of FIB sources.

Epidemiological studies are resource intensive and logistically difficult, although the results can provide the data necessary for a scientifically defensible basis to allow the adoption of WQS based on fecal indicator/methods that are not part of EPA's national §304(a) recommendations. Such studies may also support the development and adoption of alternative criteria based on different health endpoints, such as respiratory illnesses, than EPA has used in its current recommendations (i.e., GI illnesses). When the studies demonstrate a statistically significant correlation between levels of water quality measured using particular FIB(s) and adverse health outcomes, they may be scientifically defensible and, as such, could be used to develop and adopt alternative criteria.

The epidemiological information underlying the recommended 2012 RWQC used a PC study design. If a state wishes to develop alternative criteria using their own epidemiological studies, EPA advises that the studies also be of the PC design to facilitate the interpretation of the alternative health relationship and potential resulting alternative criteria. EPA will provide additional information on the use of epidemiological studies in development of alternative criteria in upcoming TSM.

6.2.2 Quantitative Microbial Risk Assessment

QMRA is a formal process, analogous to chemical risk assessment, of estimating human health risks due to exposures to selected infectious pathogens (Haas et al., 1999; NRC, 1983). To the greatest possible extent, the QMRA process should include the evaluation and consideration of quantitative information; however, qualitative information is also used when appropriate (WHO, 1999). In general, QMRA can be initiated for a variety of reasons, including but not limited to, the following:

- To assess the potential for human risk associated with exposure to a known pathogen;
- To determine critical points for control, such as watershed protection measures;
- to evaluate specific treatment processes to reduce, remove, or inactivate various pathogens;
- To predict the consequences of various management options for reducing risk;
- to determine appropriate criteria (regulatory) levels that will protect individuals and/or populations to a specified risk level or range;
- To identify and prioritize research needs; and
- To assist in interpretation of epidemiological investigations.

QMRA methodologies have been applied to evaluate and manage pathogen risks for a range of scenarios, including those from food, sludge/biosolids, drinking water, recycled water, and recreational waters. Moreover, chemical risk assessment in general has been used extensively by EPA for decades to establish human health criteria for a wide range of pollutants in water and other media, and QMRA specifically has been used to inform EPA's policy making for microbiological pollutants in drinking water and biosolids, and by other U.S. and international governmental agencies (such as, U.S. Department of Agriculture, U.S. Food and Drug Administration, and WHO) to protect public health from exposure to microbial pollutants in food and water.

Although EPA believes the 2012 RWQC are appropriate for waterbodies impacted by all sources, QMRA can be used to develop alternative site-specific criteria, where sources are characterized predominantly as nonhuman or nonfecal (U.S. EPA, 2009b). EPA's research indicates that understanding the predominant source of fecal contamination could help characterize the human health risks associated with recreational water exposure. Various epidemiological investigations, including EPA's have documented human health effects in waters impacted by human fecal contamination. QMRA studies have demonstrated that the potential human health risks from human and nonhuman fecal sources could be different due to the nature of the source, the type and number of pathogens from any given source, as well as variations in the co-occurrence of pathogens and fecal indicators associated with different sources (Roser et al., 2006; Schoen and Ashbolt, 2010; Soller et al., 2010b; Till and McBride, 2004; WERF, 2011). Additional information and case studies of QMRA for recreational waters will be provided in upcoming TSM.

Further, research demonstrates that swimming-associated illnesses are caused by different pathogens, which depend on the source of fecal contamination. For example, in human-impacted recreational waters, human enteric viruses appear to cause a large proportion of illnesses (Soller et al., 2010a). In recreational waters impacted by gulls and agricultural animals such as cattle, pigs, and chickens, bacteria and protozoa are the etiologic agents of concern (Roser et al., 2006; Schoen and Ashbolt, 2010; Soller et al., 2010b). The relative level of predicted human illness in recreational waters impacted by nonhuman sources can also vary depending on whether the contamination is direct or via runoff due to a storm event (U.S. EPA, 2010g). EPA is developing TSM for QMRA to assist states in developing site-specific criteria to account for local scale, nonhuman sources that are protective of the designated use of primary contact recreation.

To derive site-specific criteria that are considered scientifically defensible and protective of the designated use, QMRA studies should be well documented, follow accepted practices, and rely on scientifically defensible data. A sanitary characterization can provide detailed information on the source(s) of fecal contamination in a waterbody to determine whether the predominant source is human or nonhuman. EPA developed a QMRA-specific sanitary survey application, which could be included in a sanitary characterization, to capture information directly applicable to a QMRA. This sanitary characterization process will be described in upcoming QMRA TSM.

EPA's QMRA framework can also be useful for informing human health relationships with alternative FIBs (MFE, 2003; Viau et al., 2011) and may help to clarify epidemiological results in scenarios where waterbodies are impacted by nonhuman sources or the epidemiological results are inconclusive (see section 6.2.1).

6.2.3 Alternative Indicators or Methods

EPA anticipates that scientific advancements will provide new technologies for enumerating fecal pathogens or FIB. New technologies may provide alternative ways to address methodological considerations, such as rapidity, sensitivity, specificity, and method performance. As new or alternative indicator and/or enumeration method combinations are developed, states may want to consider using them to develop alternative criteria for adoption in WQS.

Previously, EPA has used the evaluation of multiple indicators and enumeration methods to describe a common level of water quality. For example, the derivation of the 1986 criteria values was fundamentally based on the comparison of multiple indicators: fecal coliform, enterococci, and *E. coli*. In those specific cases, comparisons were made among membrane filtration methods specific to each target organism. Another example of this occurred when EPA approved the use of the IDEXX-based methods for the detection of enterococci and *E. coli*. In this comparison, results from a membrane-filtration method were compared to another method that relied on substrate-utilization and MPN enumeration. Rapid methods, such as *E. coli* enumerated by qPCR, have already been evaluated against culturable methods and demonstrated utility on a site-specific basis (Lavender and Kinzelman, 2009).

Some examples of new enumeration methods for FIB include: immunomagnetic separation/adenosine triphosphate (IMS/ATP), propidium monoazide (PMA) qPCR, reverse transcriptase (RT) qPCR, covalently linked immunomagnetic separation/adenosine triphosphate (COV-IMS-ATP), and transcription mediated amplification (TMA-RNA). New methods and additional improvements to currently available methods, platforms and chemistries may also be developed in the future.

Examples of possible alternative indicators include, but are not limited to: *Bacteroidales*, *Clostridium perfringens*, human enteric viruses, and coliphages. These possible alternative indicator organisms could be used with new methodologies or methodologies similar to those recommended by the 2012 RWQC. For example, in one case, *Bacteroidales* measured by qPCR were highly correlated with *Enterococcus* spp. and *E. coli* when either culture-based methods or qPCR methods were used (WERF, 2011). The pathogens norovirus GI and GII have also been shown to be predictors of the presence of other pathogens such as adenovirus measured by qPCR (WERF, 2011).

If a state adopts WQS using alternative indicator/method combinations, EPA will review those standards, including any technical information submitted to determine whether such standards are scientifically defensible and protective of the primary contact recreation use. To facilitate consideration of such standards, states may gather water quality data over one or more recreational seasons for the indicator/method recommended in the 2012 RWQC and the proposed alternative indicator/method combination. A robust relationship need not be established between EPA's recommendation and alternative indicator(s) for the whole range of indicator densities (U.S. EPA, 2010e). It is, however, important that a consistent and predictable relationship exist between the enumeration methods and an established indicator/health relationship in the range of the recommended criteria. EPA will provide information on demonstrating the relationship between two indicator/method combinations in upcoming TSM.

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Exhibit 69

Comprehensive Assessment and Listing Methodology (CALM):

Procedures for Assessing Water Quality Standards attainment for the State of New Mexico CWA §303(d) /§305(b) Integrated Report

New Mexico Environment Department
Surface Water Quality Bureau

September 3, 2019

2020 TR LANL-01363

TABLE OF CONTENTS

Appendices

List of Common Acronyms

4Q3	4-Day, 3-Year Low Flow
ATTAINS	EPA's Assessment, TMDL Tracking and Implementation System
AU	Assessment Unit
CALM	Comprehensive Assessment and Listing Methodology
CHL-A	Chlorophyll *a*
CWA	Clean Water Act
DO	Dissolved Oxygen
EPA	United States Environmental Protection Agency
HP	Hydrology Protocol
LM	Listing Methodology
MASS	Monitoring, Assessment, and Standards Section
M-SCI	Mountain Stream Condition Index
MDL	Method Detection Limit
NHD	National Hydrographic Dataset
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMSA	New Mexico Statues Annotated
NPDES	National Pollutant Discharge Elimination System
PAH	Poly Aromatic Hydrocarbon
PCBs	Polychlorinated Biphenyls
PQL	Practical Quantification Limit
QA	Quality Assurance
QAO	Quality Assurance Officer
QC	Quality Control
QAPP	Quality Assurance Project Plan
RBP	Rapid Bioassessment Protocols
ROD	Record of Decision
SDL	Sample Detection Limit
SEV	Severity of Ill Effects
SLD	State Laboratory Division
SOPs	Standard Operating Procedures
SQUID	Surface water QUality Information Database
SSC	Suspended Sediment Concentration
STORET	STOrage and RETrieval System
SWQB	Surface Water Quality Bureau
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UAA	Use Attainability Analysis
USGS	United States Geological Survey
WQCC	New Mexico Water Quality Control Commission
WET	Whole Effluent Toxicity
WQC	Water Quality Criterion
WQS	Water Quality Standard(s)
WQX	Water Quality Exchange

1.0 ASSESSMENT PROCESS OVERVIEW

Pursuant to Section 106(e)(1) of the federal Water Pollution Control Act (Clean Water Act or CWA), 33 U.S.C. § 1251 *et seq.* [1], the New Mexico Environment Department (NMED) Surface Water Quality Bureau (SWQB) has established appropriate monitoring methods, quality assurance/quality control (QA/QC) procedures, and listing methodologies in order to compile and analyze data on the quality of the surface waters of New Mexico.[2] The SWQB has developed and implemented a water quality monitoring strategy for surface waters of the state in accordance with the New Mexico *Water Quality Act* (NMSA 1978, §§ 74-6-1 to -17)[3]. The monitoring strategy establishes methods of identifying and prioritizing water quality data needs, specifies procedures for acquiring and managing water quality data, and describes how these data are used toward three basic monitoring objectives to: develop water quality-based controls, evaluate the effectiveness of such controls, and conduct water quality assessments (NMED/SWQB 2016a).

From approximately 1998 to present, the SWQB has primarily utilized a rotating basin system approach to water quality monitoring similar to several other states (WERF 2007). Using this approach, a select number of watersheds are monitored for two years with an established return frequency of approximately eight years (NMED/SWQB 2016a). Revisions to the schedule are necessary based on staff and monetary resources that fluctuate on an annual basis. It should also be noted that a watershed is not necessarily ignored during the years in between sampling. The rotating basin strategy is supplemented with other data collection efforts such as data from United States Geological Survey (USGS) water quality monitoring stations and other external sources that meet SWQB's QA/QC requirements. The SWQB has revised their approaches to monitoring and total maximum daily load (TMDL) prioritization in accordance with the Unites States Environmental Protection Agency's (EPA's) "New 303(d) Vision" program (EPA 2013a).

The SWQB maintains current quality assurance and quality control plans that cover all monitoring activities. This document, called the *Quality Assurance Project Plan for Water Quality Management Programs* (QAPP), is revised as substantial technical or programmatic changes occur and approved by the EPA for three-year periods. When an intensive survey is completed, all data are checked against QA/QC measures identified in the QAPP and assessed to determine whether designated uses detailed in the current *State of New Mexico Standards for Interstate and Intrastate Surface Waters* (WQS)[4] are being met. Therefore, these methodologies cover the decision-making process for both listing and de-listing causes of impairment. In New Mexico, surface water data are assessed according to this document and associated appendices – referred to as the comprehensive assessment and listing methodology or "CALM." This document was previously referred to as the "Assessment Protocol." The name was changed to better align with similarly-named EPA guidance documents and other states' titles for their respective listing methodologies. The results of application of New Mexico's listing methodologies are then made available to the public through the *State of New Mexico CWA §303(d) /§305(b) Integrated Report* (Integrated Report). Use attainment decisions are summarized by assessment unit (AU) in New Mexico's Integrated List, which is Appendix A of the Integrated Report and the primary focus of the report. The intent is to prepare the Integrated Report by April 1st of every even-numbered calendar year as required by the CWA. Category 5 water bodies on the Integrated List (see Section 4.0 for category definitions) constitute the *CWA §303(d) List of Impaired Waters*.

Although EPA does not officially approve individual state's listing methodologies, they do provide review and comment and consult the protocols when reviewing New Mexico's draft Integrated List. The CALM is reviewed every odd-numbered calendar year and is generally based on current EPA assessment guidance. For development of the Integrated Report and List, the EPA recommends that states follow the 2006 Integrated Report guidance (EPA 2005), supplemented by biennial memoranda (EPA 2006a, 2009, 2011,

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[1] Full text at https://www.gpo.gov/fdsys/browse/collectionUScode.action?collectionCode=USCODE. Summary at https://www.epa.gov/laws-regulations/summary-clean-water-act.

[2] All available at https://www.env.nm.gov/swqb/.

[3] https://nmonesource.com/nmos/nmsa/en/nav_date.do?page=4.

[4] Available at https://www.env.nm.gov/surface-water-quality/wqs/.

2013b, 2015, and 2017, respectively). The main CALM document and related appendices are opened for 30-day public comment when significant revisions are proposed.

Assessment results are tracked and maintained by water body or AU (WERF 2007). The EPA first suggested the use of the term "assessment unit" (AU) in their 2002 listing guidance (EPA 2001). AUs can represent a single lake or reservoir, length of a stream reach or river, or surface waters within a delineated area such as a watershed. AUs are generally defined by various factors such as hydrologic or watershed boundaries, water quality standards (WQS) found in 20.6.4 New Mexico Administrative Code (NMAC), geology, topography, incoming tributaries, surrounding land use/land management, etc. Assessment units are intended to represent surface waters with assumed homogenous water quality (WERF 2007). With respect to 40 C.F.R. 130.2, New Mexico's use of AU is equivalent to "water quality-limited segment." New Mexico specifically defines the term "segment" within the state WQS at 20.6.4.7.S(2) NMAC. In New Mexico, there are generally many AUs within any particular New Mexico WQS segment (20.6.4.97 through 20.6.4.899 NMAC).

The EPA listing and reporting guidance requires states to organize their respective lists by AUs and electronically report specific assessment information to the EPA's Assessment, TMDL Tracking and Implementation System (ATTAINS). The NMED's Information Technology Bureau merged SWQB's in-house water quality database (NMEDAS) with assessment information previously housed in New Mexico's version of the EPA's Assessment Database (ADB) during the 2014 listing cycle. The merged Oracle-based Surface water Quality Information Database (SQUID) now houses attainment data as well as SWQB-collected chemical, biological, and habitat data used to make attainment decisions. SQUID is also used to generate New Mexico's Integrated List and upload attainment data directly to EPA ATTAINS[5].

ATTAINs was significantly re-designed, with input from states, for the 2018 listing cycle forward. Part of the re-design included nationwide standardization of a variety of database fields, including parameter names/causes of impairment, probable sources, water body types, etc. SQUID was updated accordingly to accommodate these changes. As a result, some of the pre-2018 terminology in the Integrated List has been modified. Notable modifications will be further explained in the preface to the Integrated List.

Assessment of quantitative data creates the basis of designated use attainment decisions. These assessments are based on data that reasonably reflect current surface water quality conditions given sampling limitations. These data are compared with current EPA-approved WQS for the state of New Mexico (20.6.4 NMAC) regardless of what WQS were in effect at the actual time of sampling. Data types may include chemical/physical, biological, habitat, bacteriological, or toxicological data. The vast majority of data used for assessments are collected by the SWQB during rotational water quality surveys. The SWQB will also utilize data collected by other entities (partially listed below), provided the entity's sampling methods and data analysis procedures meet QA/QC requirements as detailed in the most recent QAPP. Appendix A contains data quality and rigor information for aquatic life use determinations.

In general, previously assessed datasets will not be re-assessed and existing assessment conclusions will be carried over onto the new draft list) unless there are 1) more recent available data to add to the assessment dataset, or 2) assessment methodology for a specific parameter has significantly changed. All readily available data that were not assessed for a previous listing cycle will first be collated and assessed (Figure 1.1). Assessment conclusions will be compared to the conclusions of the previous list. If they have not changed for a given water quality parameter within a particular AU, the conclusions of the current assessment will carry over to the current list. If the current assessment indicates a change in attainment status, the new data for that particular water quality parameter at that site will be combined with the most

[5] https://www.epa.gov/waterdata/assessment-and-total-maximum-daily-load-tracking-and-implementation-system-attains

recent five years of data (WERF 2007).

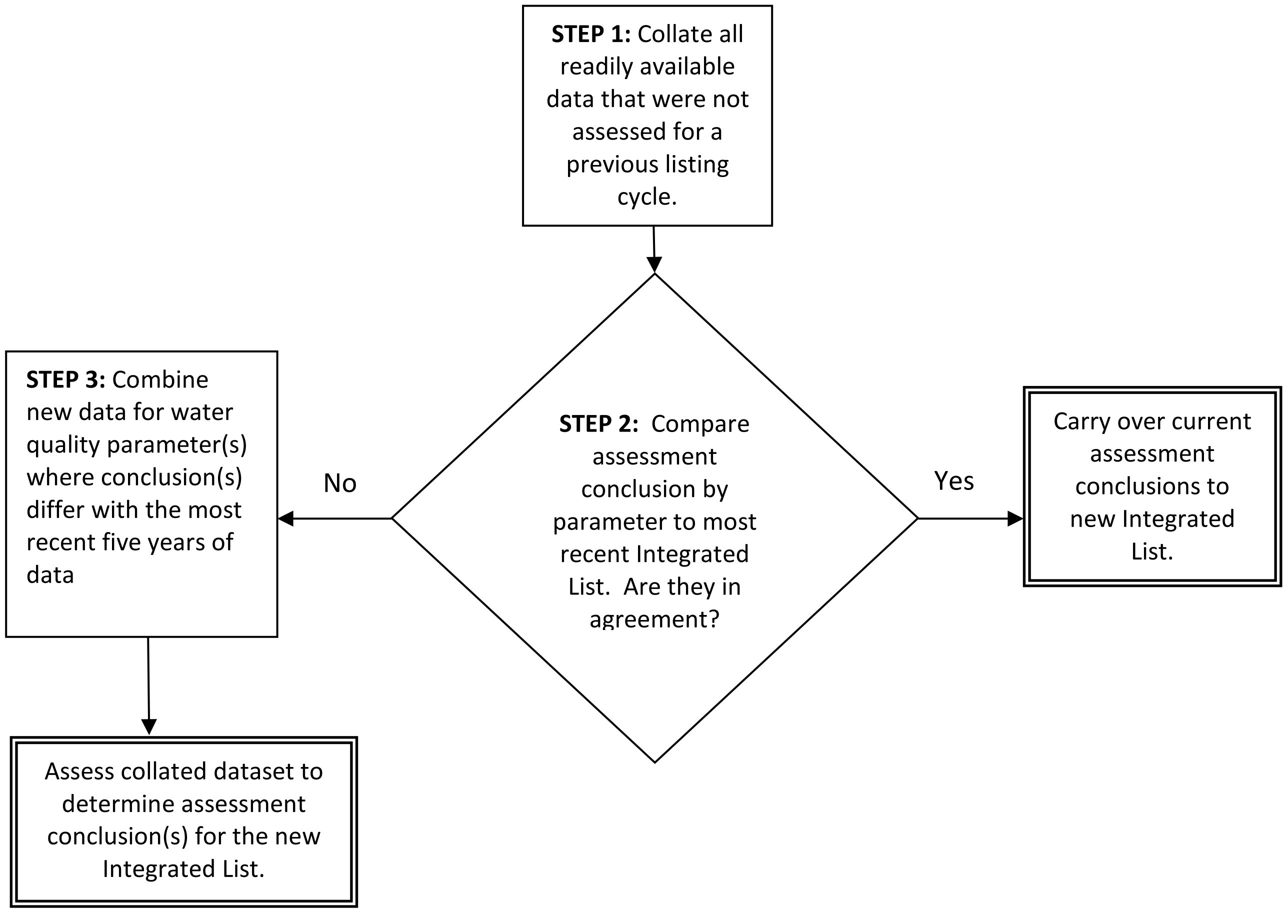


Figure 1.1. Decision process for determining assessment dataset

The specific years of data to use are defined from the date data were collated for the upcoming listing cycle, typically May 1 of the year before the list is due. For example, verified and validated data from May 1, 2014 through May 1, 2019, would be collated for development of the draft 2020 Integrated List. This collated dataset will primarily form the basis of final impairment decision. Data older than five years must meet data requirements and will only be considered on a case by case basis for the following reasons:

- No newer data exists for the waterbody segment/parameter or the existing data does not meet the requirements of this listing methodology;
- The data are part of a larger dataset or long-term monitoring which includes data younger than five years old for the same waterbody/parameter; or
- Information or rationale is provided with the data to show that the data reflects current conditions and adheres to acceptable protocols.

Data older than five years may also be used when necessary to determine historical conditions if the data met QA requirements for assessment purposes at the time of its collection. When decisions must be partially based on historical data, only past data that meet QA requirements for assessment purposes will be used.

The CWA requires that WQS protect designated uses during critical conditions such as years with below average stream flow. This distinction is important because it may not satisfy the intent of the CWA to use data collected in non-drought conditions to draw a conclusion of no impairment when available data collected during low flow conditions indicate impairment. Recent data may take precedence over older data if new data indicate a change in water quality or the older data fail to meet data quality requirements. If there was a temporary disturbance, such as a wildfire, or unintentional spill or discharge, and several consecutive years of data before and after the disturbance are available, the SWQB may also consider data trends when determining attainment status. This is consistent with recommendations in EPA guidance (EPA 2005). If there are only data greater than five years old available for a particular AU, the assessment conclusions based on these older data will be carried over to the next list without being re-assessed until more current data are available to assess.

The Integrated Report and List are opened for a minimum 30-day public comment period. Response to Comments are prepared by SWQB and submitted to the EPA for review. The SWQB also updates and submits an assessment rationale (formerly known as the "record of decision" or ROD). The assessment rationale is an additional, non-required document that SWQB provides to EPA, NMED personnel, and the public that explains when and why a particular cause of impairment was added to or removed from the Integrated List. All the above-mentioned documents developed and maintained by the SWQB are available on the SWQB web page: https://www.env.nm.gov/surface-water-quality/.

Outside sources of available data are specifically solicited via public notice, usually at the same time as significant CALM revisions are public noticed, for a minimum 30-day period before the draft Integrated List of surface waters is prepared (see Section 5.0 below). All data submissions from outside sources will be reviewed by the SWQB Quality Assurance Officer (QAO) to ensure the suitability of the QA/QC procedures under which the data were collected. Specifically, submitted documentation associated with the dataset will be reviewed to determine: (1) if there is documentation of QA/QC procedures that, at a minimum, meet the QA/QC requirements described in the SWQB's most recent QAPP; and (2) if there is reasonable evidence or assurance that these procedures were followed. See https://www.env.nm.gov/surface-water-quality/data-submittals/ for additional information regarding how and what to submit. Although data generally must be received before the end of public notice comment period to be considered for the upcoming listing cycle, data submittals for consideration on planning purposes or future list may be submitted at any time.

Data meeting QA/QC requirements received through this solicitation may be used to confirm a listing of impairment, confirm the absence of impairment, or initiate a new listing of impairment of a particular AU. Data that do not meet these requirements may be used for screening purposes to determine if additional data collection is warranted. Other water quality related data (e.g., habitat conditions, field observations, and fish communities) are also solicited and may be useful for characterizing water quality conditions and for WQS development and refinement. Data packages submitted after the solicitation period and/or related to other watersheds in the state may be considered during development of subsequent Integrated Lists.

Quality data sources could include, but are not limited to, the following. These data would need to meet QA/QC requirements to be used for assessment, as stated above. Provisional data shall not be used to make designated use support determinations:

- Chemical/physical, biological, habitat, and bacteriological data collected by the SWQB during watershed surveys or other recent studies using SWQB's standard operating procedures (SOPs) or otherwise accepted methods;

- Chemical/physical, biological, habitat, and bacteriological data collected by other organizations (including citizen and volunteer groups), contractors, tribes, or individuals during watershed surveys or other recent studies using SWQB's SOPs or otherwise accepted methods;

- Chemical/physical, biological, habitat, and bacteriological data collected by the USGS;
- Chemical/physical, biological, habitat, and bacteriological data collected by EPA or their contractors as part of National Aquatic Resources Surveys (NARS);
- In-stream (i.e., receiving water) data collected during National Pollutant Discharge Elimination System (NPDES) storm water or effluent permit monitoring efforts;
- In-stream water quality data from other NMED bureaus such as the Drinking Water Bureau (DWB), Ground Water Quality Bureau (GWQB), or the Department of Energy (DOE) Oversight Bureau.

2.0 DATA USABILITY AND QUALITY DETERMINATIONS

2.1 Data Management Rules

2.1.1 Data qualifiers and validation codes

SQUID houses water and fish tissue chemical data, as well as biological and habitat data. These data are available upon request. This database also contains lab data qualifiers and internal validation codes that are added during the data validation process. Validated chemical/physical data collected by the SWQB are uploaded to EPA's Water Quality Exchange (WQX) database. Any data with a qualifier code or data validation code that are used in an assessment should be noted in the assessment documentation. Refer to the current version of the QAPP and SWQB's Data Verification and Validation[6] for the current definition of SWQB data qualifier and data validation codes.

- Lab Qualifier Codes – In the past, sets of qualifier codes have varied between the individual sections at the State Laboratory Division (SLD). The SWQB has encouraged SLD to determine a unified set of codes that will be reported consistently by all SLD sections. Standard lab qualifier codes for SLD and contract labs, as well as the SWQB data validation codes are defined in the most recent QAPP. All data flagged as "rejected" during internal laboratory QA procedures will not be used for assessment purposes. Other flagged results are usable provided the appropriate caveats are documented in the assessment files and uncertainties in the data are discussed.

  Results from samples that are flagged by the laboratory as "below the minimum quantification or reporting limit" (generally referred to as "minimum reporting limit" or MRL in SQUID) may only be used during the assessment process if the MRL is less than the applicable water quality criterion (WQC) or numeric threshold being assessed. For this listing methodology, the following terms related to analytical method sensitivity are considered synonymous and will be evaluated on a case-by-case basis depending on the particular analytical lab because reporting practices can vary: "quantitation limit," "reporting limit," "level of quantitation," and "minimum level." Parameters detected above the method detection limit (MDL) but below the MRL are typically flagged with a J qualifier that indicates any reported quantitative concentration is an estimate. The concentration is estimated because the concentration being detected is below the lowest quantifiable concentration on the calibration curve. There is certainty as to the detection of the chemical but uncertainty as to the exact concentration. These reported values may be used in an assessment when the J flagged data is part of a summed parameter, or if the MRL is less than the applicable WQC. Otherwise, J flagged data will not be assessed. For example, it is common laboratory practice to include J flagged values for individual when summing congeners to determine total PCB concentration using EPA Method 1668A, B, or C congener methods.

  Results from samples that are flagged by the laboratory as "exceeded holding time" will be considered estimates and may be used during the assessment process unless the result is deemed

6 Available at https://www.env.nm.gov/surface-water-quality/sop/

"rejected" based on best professional judgment in accordance with the QAPPs and SOPs. Method holding times are different for each sample parameter. Sample analysis after the allowable holding time for a sample or sample set may be a result of laboratory oversight, delayed sample shipment, need for reanalysis, or poor planning. The data validator will take into account the nature of the analysis, the extent of the noncompliance (e.g., considering the method holding time limit, whether the holding time was exceeded for one day vs. one month, and stability of the parameter in question), the sample matrix, any supporting data, and the purpose and goals of the sampling and analysis program (EPA 2002d). From the EPA's perspective, the time and expense associated with the sample collection and processing is forfeited when data exceeding the holding time are rejected even though the analytical results may in fact be accurate and usable (EPA 2002e). Therefore, data exceeding holding time may be considered for use in assessments, but any listings as a result of these qualified data will be noted as Category 5C – needing more data (see Section 4.0 for details).

SWQB Data Validation Codes (internal) – The SWQB validates all data for a particular water quality survey. Internal data validation procedures are detailed in the most recent QAPP. All data with internal SWQB validation codes will still be used for assessment purposes except data flagged as "rejected" (typically R1, R2, R3, RB1, or Er data validation codes). Also, SWQB bacteria results that are marked Ea due to incubation temperatures between 35.5 and 38 degrees C will be rejected with respect to CWA §303(d)/§305(b) assessment.

2.1.2 Duplicates, compliance monitoring sampling data, and temporal independence

Studies designed to determine ambient conditions in surface waters should consider temporal independence. For the purposes of CWA §303(d)/§305(b) assessment, grab data or water chemistry data collected within a seven-day period are considered duplicate samples except in cases where the data are from distinct hydrologic events. The maximum (or minimum if the criterion is expressed as a minimum) value should be used in the assessment dataset. Examples include when QA/QC duplicates or multiple compliance monitoring samples for human health criteria are taken within a one-hour time frame. Assessing the maximum/minimum value of duplicate samples guarantees that any criterion exceedence is considered, thus avoiding the risk of incorrectly disregarding an exceedence (i.e., Type II error).

2.1.3 Continuous recording equipment (thermographs, data loggers, and sondes)

Periodic instantaneous data do not provide information on maximum or minimum daily parameter values, duration of exceedences, or diurnal fluctuations of water temperature and DO. These aspects of water quality are pertinent to aquatic life use. Because of the limitations of grab data and the increasing availability data loggers and sondes to collect long-term datasets, assessments using data logger and sonde datasets are preferred.

The SWQB has been deploying thermographs in streams and applying the temperature assessment protocol since 1998. Continuously recording temperature data loggers (i.e., thermographs) are relatively inexpensive, readily available, and provide an extensive multiple-day record of hourly temperatures over the period when temperatures are generally highest. Monitoring staff program thermographs to record at least hourly (typically 15-minute data), and deploy them long enough to capture the summer season maximum temperature. The use of continuous data is more technically sound than simply applying percentages to limited instantaneous temperature data and allows consideration of magnitude, frequency and duration into water quality monitoring and listing methods. The use of thermographs eliminates the biases introduced when using instantaneous data to assess water quality parameters with significant diurnal fluctuation. Starting with the 2010 listing cycle, the temperature listing methodology covers all temperature assessment scenarios, including procedures for both instantaneous grab and thermograph data for all types of aquatic life uses in either lotic (e.g., streams or rivers) or lentic (e.g., lake or reservoir) water bodies (see Appendix B).

The SWQB has been deploying multi-parameter sondes at select stations since 2000. In addition, DO and specific conductance data loggers have been deployed in recent years. Monitoring staff program these devices to record, at least hourly, dissolved oxygen (DO), pH, specific conductance, temperature, or turbidity values for a minimum of three days (72 hours). Longer deployments are preferred; the SWQB typically deploys for sondes and single parameter loggers for three to fourteen days, and thermographs for four to six months. Based on the success of the thermograph-based listing methodology, additional large dataset listing methodologies were developed to address parameters with known diurnal fluxes, namely DO and pH (Appendices E and F, respectively). Starting with the 2012 listing cycle, these protocols cover all assessment scenarios, including procedures for both instantaneous grab and sonde data for all types of aquatic life uses in either lotic (e.g., streams or rivers) or lentic (e.g., lake or reservoir) water bodies.

2.1.4 Limited datasets

As stated above, SWQB also uses thermographs, multi-parameter sondes, and data loggers to generate large datasets for temperature, pH, DO, specific conductance, and turbidity. Regarding chemical data, the SWQB strives for a minimum of four to twelve data points for core parameters such as metals and nutrients during rotating watershed surveys to make designated use determinations. Resource constraints typically limit data collection for radionuclides and organic parameters to four sampling events over a two-year monitoring period. The actual number of data points collected depends upon available resources, specific water quality concerns in the watershed, and the hydrologic characteristics of a given water body during the particular survey year. For example, the SWQB has observed an increasing number of streams with very low to no flow as the survey year progresses from March through October. The EPA does not recommend the use of rigid, across the board, minimum sample size requirements in the assessment process (EPA 2009). Target sample sizes should not be applied in an assessment methodology as absolute exclusionary rules (EPA 2003, 2005). The use of limited datasets is acceptable to the EPA, as limited financial, field, and laboratory resources often dictate the number of samples that can be collected and analyzed (EPA 2002a).

Generally, a minimum of four data points for field and chemical parameters is necessary to apply the procedures in Section 3.0 in order to determine and confirm attainment status for an associated AU parameter pair. The primary purpose of requiring four data points is to protect against the occurrence of false positives and to provide a high probability of detecting endemic impairments. Increased numbers of data points improve the statistical power for detecting lower probabilities of impairment. During the survey year, the SWQB monitoring staff review data as they are received from the laboratory. As needed, staff investigate questionable results by contacting laboratory personnel directly to confirm the results and/or scheduling appropriate modifications to survey sampling plans in order to acquire a minimum of four seasonally-distributed data points for each parameter sampled.

If data from fewer than four sampling events are available ($n \leq 3$) to assess an applicable designated use, there are insufficient data to determine attainment status for that particular designated use. The use will be noted as "Not Assessed" on the list. If there are no data at all, the AU would fall under category 3A (i.e., no data). If data do not exceed any applicable criteria, the AU would fall under Category 3B (i.e., limited data, no exceedences). If data from one or more sampling events exceeds one or more applicable criteria, the AU will be assigned Category 3C (i.e., limited data, exceedences) and the parameter(s) of concern will be noted in the AU Comments field. Additional data will be collected as resources allow in order to determine attainment status. See Section 4.0 for a description of the categories described above.

2.1.5 Application of WQS during low flow conditions

In terms of assessing designated use attainment in ambient surface waters, the WQS apply at all times under all flow conditions unless a flow qualifier is specified in a particular section of the WQS. Therefore, data collected during all flow conditions (except data collected during unstable conditions when assessing for chronic aquatic life use — see section 3.1.2.2 below for additional details), including low flow conditions, will be used to determine designated use attainment status during the assessment process. For a description of critical low flow calculations used to develop point source discharge requirements, see 20.6.4.11.B.

2.1.6 Multiple stations in one AU

As stated in Section 1.0 above, AUs are designed to represent waters with assumed homogenous water quality (WERF 2007). Section 1.0 also describes the relationship between AUs and "segments" as defined in 20.6.4.7.S(2) NMAC. The SWQB typically does not have the resources to establish more than one monitoring station in any particular river or stream AU during rotational watershed surveys, but there are occasions where more than one station with available data (typically chemical/physical data) is either established by the SWQB or some other data collection agency.

When this occurs in rivers or streams, the assessor will first assess data from each station individually to determine impairment(s) (Figure 2.1). Assessment units with homogenous landscape features are likely to have homogenous water quality. However, multiple stations within an AU may indicate otherwise due to point source discharges and/or lack of adequate, or no, best management practices (BMPs) that address non-point source pollution. If conflicts arise and the attainment conclusions for every station in the AU are not in agreement (i.e., either all **Fully Supporting** or all **Not Supporting**), the AU as currently defined may not represent homogeneous water quality. In this case, the AU breaks should be examined and may be split appropriately, including special consideration of NPDES point source discharges, non-point source BMPs, and available water quality and GIS data. The data will then be re-assessed based on the newly-defined AUs. In the rare event that there are two or more stations less than one tenth of a mile (approximately 200 yards) apart, and grab data or chemical data for the same parameter are collected within a seven-day period from these stations, these data are considered replicates for the purpose of assessment and the maximum (or minimum if criterion is expressed as a minimum) value should be used for assessment purposes.

When multiple stations exist on a lake or reservoir (e.g., one "shallow" and one "deep" station), they are usually sampled on the same day or within the same seven-day period. The applicable listing methodology shall be applied to the shallow and deep station datasets separately. If one or both datasets indicate impairment, the impairment conclusion for the AU is **Not Supporting**. If there are conflicting assessment conclusions, it will be noted in the Record of Decisions. The approach in this section is applicable to all impairment determination procedures detailed in this document, as well as all appendices unless otherwise stated.

2.1.7 Blank-correction for constituents measured using ultra low-level procedures

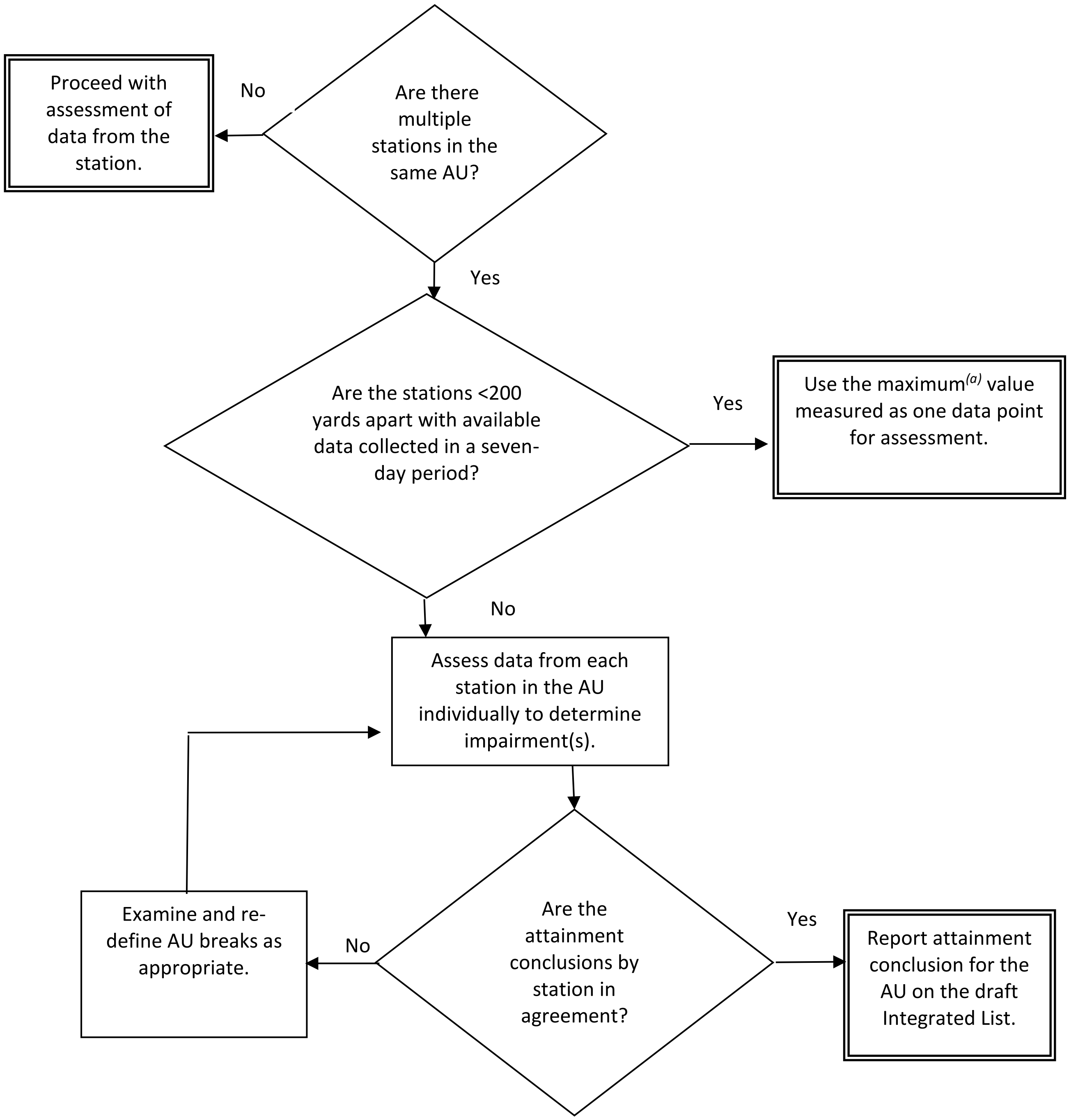
When a constituent concentration is determined using ultra low-level methods which recommend blank-correction (such as EPA Method 1668A, B, or C for analysis of PCBs), the result will first be blank-corrected using the procedures in the method (preferred) assuming adequate data are available to perform the recommended procedure. Other acceptable, documented blank-correction procedures will be considered when the procedures recommended in the method are not used, and the resulting data will be used for assessment if approved by the SWQB QAO. These blank-corrected values will then be compared against New Mexico's WQS to determine impairment.

2.1.8 Non-representative data

Non-representative data include data collected within the mixing zone of a discharge. If available water chemistry data from an existing station appears highly influenced by groundwater from a nearby seep or spring, the data and associated sampling procedures will be reviewed to determine appropriateness for surface water assessment. If the data are from a SWQB sampling station, the station will be relocated when possible to ensure future sampling is representative of the stream water chemistry or the equal-width increment sampling method[7] may be utilized.

In addition, data collected during or immediately after temporary catastrophic events influencing the waterbody that are not representative of normal conditions are typically not used to make CWA §303(d) listing decisions. For example, biological or habitat data collected soon after scouring storm flows which indicate the temporary diminished presence of aquatic life or chemical data collected immediately after accidental spills would not be a basis upon which to list a water body as impaired.

[7] https://pubs.usgs.gov/of/2000/ofr00-213/manual_eng/collect.html#width



NOTES: [a] or minimum if criterion is expressed as a minimum value.

Figure 2.1. Decision process for multiple stations in same assessment unit

For example, wildfires can produce significant water quality changes that may impact fish and other aquatic organisms, drinking water supplies and wastewater treatment systems. These impacts are cumulative as a result of pollutants mobilized by the fire, chemicals used to fight the fire, and the post-fire response of the surrounding environment. Responses include immediate / short-term responses as well as long-term (decade or more) impacts.

The magnitude of the effects of fire on water quality is primarily driven by fire severity (how much of the fuel is consumed) and fire intensity (how hot the fire burned) coupled with subsequent seasonal weather events (e.g., monsoon rainfall). In other words, the more severe the fire, the greater the amount of fuel consumed, the more nutrients released, and the more susceptible the watershed is to erosion of soil and nutrients into the stream, which could negatively impact water quality. In addition, fire intensity affects the formation of hydrophobic soils that repel water and increase the probability of storm water runoff in the watershed. In New Mexico, severe fires most commonly occur on forested lands managed by the U.S. Forest Service (USFS). They have a special taskforce known as the Burned Area Emergency Response (BAER) Team who are responsible for undertaking rapid post-fire assessments. BAER is an emergency program whose purpose is to identify potential threats to life, property and infrastructure, along with potential threats to water quality and recreational resources, wildlife, vegetation, fisheries, and cultural resources.

In New Mexico, wildfires have become more frequent in recent years. In addition, some have occurred mid-way through the SWQB's rotational watershed surveys, making it impossible to continue monitoring impacted AUs that particular survey year due to unsafe conditions, restricted access, or severe flooding. If the planned sampling in a particular AU was less than 50% complete based on the Field Sampling Plan (FSP), this AU will be noted as "Not Assessed" and scheduled for additional data collection as resources, access, and recovery allow. These additional data will be collated with data from the original sampling year and assessed for the subsequent draft Integrated List.

Data collected during or immediately after fires, floods, extreme drought, or other catastrophic events will generally not be used to make attainment decisions if the data are not representative of conditions prior to the event or new stable conditions. When determining if an event is considered substantial enough to impact or alter the conditions that existed prior to the event, the following factors should be considered: severity of event, size of the affected area, distance of sampling sites from the event, hydrology, geomorphic effects that include soil types and slope. In the absence of data that characterize the conditions before an event, the SWQB will work with all available resources to try and determine those conditions.

Catastrophic events may be considered as a basis for listing in instances where nonattainment of standards arises from an irreversible source of pollutants. The decision regarding whether or not data collected during or after an event are representative of normal conditions, as well as a determination of irreversibility, will be evaluated in collaboration with stakeholders and EPA Region 6, on a case by case basis, as each event is unique with varying severity and longevity of impacts.

2.1.9 Temporary water quality standards

During New Mexico's 2013 triennial review, the WQCC adopted a temporary standards provision at Subsection F of 20.6.4.10 NMAC. Per Paragraph (3), designated use attainment as reported in the IR shall be based on the underlying designated use and applicable criterion, not on any temporary variances. This requirement is consistent with federal regulations[8].

[8] https://www.gpo.gov/fdsys/pkg/FR-2015-08-21/pdf/2015-19821.pdf, page 51036.

2.2 Data Quality Levels

As stated in Section 1.0 above, data must, at a minimum, meet the QA/QC requirements described in the SWQB's most recent QAPP to be considered for development of the IR. In some cases, more than one type of data may be used to determine aquatic life use attainment. It is recognized that not all data are of equal quality or rigor. The tables in Appendix A describe defined levels of data quality for biological, chemical/physical, and habitat data types that may be used to determine aquatic life support. These tables contain both elements of data quality as well as quantity. These tables are adapted from the *Consolidated Assessment and Listing Methodology: Towards a Compendium of Best Practices* guidance document (EPA 2002a), as modified with respect to the SWQB's SOPs. It is important to evaluate data quality when an assessment performed with more than one data type results in conflicting use attainment decisions (see Section 3.1.5 for more detail). These tables are included only for aquatic life use determinations because it is the only use for which multiple data types are currently recognized and utilized.

3.0 INDIVIDUAL DESIGNATED USE SUPPORT DETERMINATIONS

The WQS are a triad of elements that work in concert to provide water quality protection. These three elements are: designated uses, numeric and narrative criteria, and an antidegradation policy. Designated uses are the defined uses of a particular surface water body. Each water body will have one or more designated uses. For example, Domestic Water Supply is a designated use. Designated use definitions and their assignment to various stream segments in New Mexico can be found in the *Standards for Interstate and Intrastate Surface Waters (*20.6.4 NMAC). The New Mexico Water Quality Control Commission (WQCC) adopted numeric and narrative criteria to protect these designated uses. There are both segment-specific criteria (detailed in 20.6.4.97 through 20.6.4.899 NMAC) and designated use-specific criteria (detailed in 20.6.4.900 NMAC) in New Mexico's WQS. All references to narrative or numeric criteria throughout this document refer to criteria found in 20.6.4 NMAC. The antidegradation policy ensures that existing uses[9] and levels of water quality necessary to protect these uses will be maintained and protected (20.6.4.8 NMAC).

WQS segments described in 20.6.4.97 through 20.6.4.899 NMAC are further divided into AUs for use impairment determination and linked to the National Hydrographic Dataset (NHD) for national electronic reporting requirements. AUs are stream reaches, lakes, or reservoirs defined by various factors such as hydrologic or watershed boundaries, WQS, geology, topography, incoming tributaries, surrounding land use/land management, etc. Assessment units are designed to represent waters with assumed homogenous water quality (WERF 2007). As stated in Section 1.0, data collected at representative stations during the SWQB water quality surveys along with acceptable external data form the basis of use support determinations for each AU. Stream or river AU total length is typically no more than 25 miles, unless there are no tributaries or land use changes to consider along or within the reach or delineated area. Multiple stations in one AU warrant special consideration as detailed in Section 2.1.6 above.

Numerous classified segments in 20.6.4 NMAC include only perennial waters, without specifically identifying which reaches are perennial. For example, the description of 20.6.4.109 NMAC states, "…all other perennial reaches of tributaries to the Rio Puerco…" Therefore, non-perennial reaches of these tributaries do not fall under this WQS segment. If the perennial nature of a stream reach is unclear, the Hydrology Protocol (HP) can be used as described in New Mexico's Water Quality Management Plan (WQCC 2011, update in progress[10]) to determine whether a particular AU is perennial, and therefore included in this classified segment, or non-perennial and therefore subject to the designated uses and criteria in 20.6.4.98 NMAC. Such a determination does not require a use attainability analysis (UAA). If a non-perennial AU is found to

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[9] "Existing use" (defined at Subsection Y of 20.6.4.7 NMAC) means "a use actually attained in a surface water of the state on or after November 28, 1975, whether or not it is a designated use." An existing use may be identified by SWQB staff or other sources based on observation, data, and/or documentation.

[10] An update to the entire WQMP is in progress and will include a public comment period.

be ephemeral, then the UAA process must be followed as described in 20.6.4.15.C NMAC to place the AU under 20.6.4.97 NMAC in the Integrated Report.

The following subsections provide guidelines used to interpret available data. These guidelines will be used to make determinations of use support for each designated use in each AU, utilizing the previously described datasets. Some level of flexibility is built into these guidelines to account for uncertainties such as the natural variability of water quality, the lack of extensive data necessary to make more definitive assessments, and the transitory nature of many pollutants. Each designated use has one or more tables with specific requirements for determining use attainment based on the type of data being evaluated. When determining aquatic life use support, each type of data is first evaluated separately. Guidance on how to reconcile two or more data types with differing aquatic life use attainment determinations, as well as guidance on how to handle assessment units where both cause and response variables are determined to be impaired, is found in Section 3.1.6. In addition to the following subsections, several specific listing methodologies for temperature, excessive nutrients, DO, pH, sedimentation/siltation (this habitat variable is also referred to as "stream bottom deposits"), and turbidity to assess specific use attainment have been developed. See Appendices B through H, respectively, for details regarding aquatic life uses and stream types currently covered by these specific assessment protocols.

Integrated listing guidance from EPA recommends the following use attainment categories (EPA 2005 and subsequent biennial guidance): **Fully Supporting, Not Supporting, Insufficient Information,** and **Not Assessed.** For every AU detailed in the Integrated List, an attainment category is assigned to every designated use as stated in the applicable section of 20.6.4 NMAC or identified existing use. New Mexico does not use the **Insufficient Information** category because it is redundant with **Not Assessed**, meaning if there are insufficient data to assess, the AU is not assessed.

A determination of **Fully Supporting** or **Not Supporting** should not be made in the absence of data. It is understood that any assessment may involve some level of best professional judgment (BPJ). However, evaluations based on BPJ, literature statements, or public comments without data to support the decision shall not be the only basis for a listing or de-listing. To those AUs for which there are no available data that meet the QA/QC requirements for any criteria within an applicable designated or existing use, a designation of **Not Assessed** will be assigned that use.

3.1 Assessing Aquatic Life Use (ALU) Support

Use assessment decisions should consider and integrate, whenever possible and appropriate, results of various data types. These include biological, chemical/physical, and toxicological data. Data quality associated with these types can be found in Appendix A.

3.1.1 Biological data

In 2010, the WQCC adopted the following General Criteria (20.6.4.13.M NMAC):

> *Biological integrity: Surface waters of the state shall support and maintain a balanced and integrated community of aquatic organisms with species composition, diversity and functional organization comparable to those of natural or minimally impacted water bodies of a similar type and region.*

Prior to the 2012 listing cycle, benthic macroinvertebrate sampling had been the primary form of biomonitoring utilized by New Mexico. The extensive data set generated through these sampling efforts was a crucial component towards development of numeric translators for both narrative biological and sediment WQS. The SWQB also monitors fish assemblages and algae in an increasing number of water bodies to improve understanding of these biological communities, improve numeric translators for narrative nutrient standards, and better assess potential impairment to aquatic communities.

3.1.1.1 *Benthic macroinvertebrate communities*

Two biological assessment approaches utilizing benthic macroinvertebrate communities are currently used in New Mexico for determining aquatic life use attainment, namely the reference site approach (i.e., comparing an individual water body to an appropriate individual reference site), and the reference condition approach (i.e., comparing an individual water body to a reference condition for class or group of water bodies to which that water body belongs). Currently, New Mexico has only defined a reference condition for wadeable, perennial streams in the Mountain ecoregions. Wadeable, perennial streams located outside of the Mountain ecoregions continue to be assessed using the reference site approach from the original Rapid Bioassessment Protocol (RBP) (Plafkin et al. 1989) as modified by Jacobi (2009) when a suitable reference site has been identified and sampled as well. The SWQB does not apply either method to large non-wadeable rivers, lakes and reservoirs, or non-perennial streams at this time.

Reference Site Approach

After the study site is selected, a specific reference site must be selected for comparison. The first step in determining a reference site is to identify a pool of best available sites in the same geographic region that have the lowest amount of anthropogenic impacts to the stream's ecosystem. The reference and study sites should share analogous characteristics, to the extent possible, such as elevation, gradient, geology, hydrology, watershed size, in-stream habitat, and riparian vegetation. In particular, characteristics that cannot change over time should be used as primary attributes of similarity between reference and study sites. For this reason, the study site and the reference should at a minimum be in the same ecoregion (Griffin et. al 2006).

Based on identification and enumeration of the benthic macroinvertebrates present in the two samples, biological response indicators (i.e., benthic macroinvertebrate metrics) are calculated and compared between the two sites. Under this approach, the reference site serves as a quantitative control or yardstick to which a site may be compared and evaluated. The eight metrics and scoring criteria New Mexico uses for the reference site approach are recommended in Plafkin et al. (1989) Figure 6.3-4 as modified in Jacobi (2009), excluding the Standing Crop and Community Loss metrics. The ratio between the score for the study site and the reference site provides a percent comparability measure for each study site. The study site is therefore assessed on the basis of its similarity to the reference site and its apparent potential to support an acceptable level of biological health. The resulting score is placed in a condition category based on percent of reference: Non Impaired (>83%), Slightly Impaired (54-79%), Moderately Impaired (21-50%), Severely Impaired (<17%). Sites in any of the impaired condition categories are considered to "Not Supporting" with respect to aquatic life use (see Table 3.3). Plafkin et al. (1989) recommends leaving 4% between each category to account for subjective judgment (e.g., BPJ) as to correct placement. Figure 3.1 provides two examples using the reference site approach.

Reference Condition Approach

The reference condition approach expands on the original RBP methods to acknowledge the reality of a wider range of aquatic conditions that reflect more than minimal impacts, including historic and dominant land and water use activities (Barbour et al. 1999, Stoddard et al. 2006). This broader concept of reference condition allows for the definition of reasonable and attainable targets or goals by class or group in order to assess potential impairment to the aquatic community at a larger number of study sites.

In order to determine reference condition, data from a continuum of reference to stressed sites in the ecoregion(s) of interest must be available. The SWQB has been collecting benthic macroinvertebrate data since 1979. The formal process of developing numeric biological translators began in 2002 with assistance from the EPA and Tetra Tech, Inc. In 2006, the SWQB, in collaboration with Dr. Jacobi and Tetra Tech, Inc., developed a regional Mountain Stream Condition Index (M-SCI) to determine aquatic life use attainment for the Mountain biological region which consists of Ecoregions 21 and 23 (Southern Rockies and AZ/NM Mountains) (Jacobi et al. 2006, Griffith et al. 2006). This approach is similar to the approach currently utilized in Wyoming and Colorado.

The M-SCI was developed based on reference condition as determined by a number of reference sites. The Jacobi et al. (2006) report describes indices for three classes (bioregions) of streams based on elevation and watershed size. However, the SWQB uses only the High Small (elevation and watershed, respectively) Index applied to the Mountain biological region which consists of Ecoregions 21 and 23 (Southern Rockies and AZ/NM Mountains). The available dataset, stream classification system, and reference site selection process did not sufficiently partition the variability and select an adequate number of sites to define the reference condition and a departure from this condition for the other biological region. Application of the High Small SCI in the report places study reaches in the same condition category for all tested streams in the Mountain region regardless of elevation or watershed size. Therefore, the SWQB applies the "High Small SCI" in the report to determine Aquatic Life Use attainment of all wadeable, perennial streams in the Mountain region, and refers to this as the M-SCI. Any study site within approximately 20 kilometers of the boundary of ecoregions 21 and 23 should be compared to the definitions for the various ecoregions to determine the proper bioregion designation for that site.

	Fish Creek 10 m abv confluence with Trout Creek	Sunshine Creek immed abv USGS gage 0123456	Falls Creek 5m abv confluence with Rock Creek
Metrics	Reference Site	Study Site 1	Study Site 2
Diversity [Shannon Weiner (Log Base 2]	4.42	2.60	3.78
Total No. of Taxa	42	35	39
Total No. of EPT Taxa	7	4	6
Ratio EPT/EPT + Chironomidae	0.445	0.202	0.355
Ratio of Scrapers/Scrapers + Filterers	0.432	0.667	0.520
Ratio of Shredder/Total No. of Ind.	0.043	0.408	0.225
Percent Dominant Taxa	18.7	38.9	20.2
Hilsenhoff Biotic Index	5.7	5.7	5.4
% Comparison to Reference			
Total No. of Taxa	100	83	93
Total No. of EPT Taxa	100	57	86
Ratio EPT/EPT + Chironomidae	100	45	80
Ratio of Scrapers/Scrapers + Filterers	100	154	120
Ratio of Shredder/Total No. of Ind.	100	948	523
Hilsenhoff Biotic Index	100	100	106
Bioassessment Score (based on Plafkin et al 1989 Figure 6.3-4, as modified by Jacobi 2009)			
Diversity [Shannon Weiner (Log Base 2]	6	4	6
Total No. of Taxa	6	6	6
Total No. of EPT Taxa	6	0	4
Ratio EPT/EPT + Chironomidae	6	2	6
Ratio of Scrapers/Scrapers + Filterers	6	6	6
Ratio of Shredder/Total No. of Ind.	6	6	6
Percent Dominant Taxon	6	2	4
Hilsenhoff Biotic Index	6	6	6
Total	48	32	44
Bioscore % Comparison to Reference		**66.7**	**91.7**
ATTAINMENT STATUS ---->		**Non Support**	**Full Support**

NOTES: Ratio EPT/EPT + Chronomidae is calculated as EPT/(EPT+Chironomidae).

Figure 3.1. Examples of reference site approach to determine attainment

The M-SCI is composed of twelve individual metrics from five metric categories, representing community and species attributes such as Taxonomic Composition, Taxonomic Richness, Tolerance, Habit, and Functional Feeding Group. Individual metrics are listed in Table 3.1. For descriptions of these metrics, see Plafkin et al. 1989, Barbour et al. 1999, and Jacobi et al. 2006. % Sensitive EPT is an uncommon metric that was defined during the Jacobi et al. 2006 study. It is percent of individuals within orders Ephemeroptera, Plecoptera, or Trichoptera that have tolerance values of 0, 1, 2, 3, or 4 as determined by available references and best professional judgement at the time of the M-SCI determination (Jerry Jacobi, personal communication, 12/7/18).

Table 3.1 Metrics included in the M-SCI by metric categories

TAXONOMIC COMPOSITION	TAXONOMIC RICHNESS	TOLERANCE	HABIT	FUNCTIONAL FEEDING GROUP
Shannon Diversity ($\log_2$)	Ephemeroptera Taxa	% Sensitive EPT	Clinger Taxa	% Scraper
Pielou's Evenness	Plecoptera Taxa	% Intolerant	Sprawler Taxa	Scraper Taxa
% Plecoptera			Swimmer Taxa	

M-SCI scores are normalized according to the formulas in Table 3.2 utilizing the 95th percentiles associated with each metric. Each metric is first calculated and normalized. All metrics are then summed and averaged to produce an M-SCI score between 0 and 100. The resulting score is then placed in a condition category of Very Good (100 – 78.36), Good (78.35 – 56.71), Fair (56.70 – 37.21), Poor (37.20 – 18.89), or Very Poor (18.90 – 0) based on the distribution of reference site index scores. Index scores above the 25th percentile threshold were rated as "Very Good" or "Good"; below the 25th percentile threshold scores were divided into three categories: "Fair", "Poor", or "Very Poor". Therefore, sites with M-SCI ranking below the 25th percentile of reference sites (i.e., fair, poor, or very poor) are considered **Not Supporting** with respect to aquatic life use.

Table 3.2. Metric formulas and 95th percentiles for calculating the M-SCI score

METRIC	95th PERCENTILE	FORMULA[a]
Shannon Diversity ($\log_2$)	3.89	if $X > X_{95,}$ score = 100 if $X \leq X_{95,}$ score = $100 \times X/X_{95}$
Pielou's Evenness	0.50	
% Plecoptera	26.67	
Ephemeroptera Taxa	7.00	
Plecoptera Taxa	7.00	
% Sensitive EPT	78.46	
% Intolerant	57.17	
Clinger Taxa	17.00	
Sprawler Taxa	6.00	
Swimmer Taxa	4.00	
% Scraper	43.78	
Scraper Taxa	4.00	

NOTES: [a] X = metric value; X_{95} = 95th percentile of respective metric

Table 3.3 explains how to interpret macroinvertebrate data to assess aquatic life use support. Biological regions outside of the Mountains region will be assessed using the RBP approach as detailed in Plafkin et al. (1989) until SCIs can be developed for the Xeric and Plains regions. Additional data are needed to determine the specific pollutant or "pollution" of concern. If one or more pollutant(s) are identified, IR Category 5a is assigned and the identified pollutant(s) are listed as cause(s) of impairment. If a form of "pollution" (for example, flow alteration by EPA's definition) and no concurrent pollutant(s) are determined to be the reason for the biological impairment, IR Category 4c may be assigned. Otherwise, the AU is assigned IR Category 5c (more data needed). See Section 4.0 for more detail.

Table 3.3. Interpreting benthic macroinvertebrate data to determine Aquatic Life Use Support in wadeable, perennial streams

TYPE OF DATA	FULLY SUPPORTING		NOT SUPPORTING	NOTES
Macroinvertebrate assemblages in Ecoregions 22, 24, 25, and 26[a]	Reliable data indicate functioning, sustainable macroinvertebrate assemblages not modified significantly beyond the natural range of reference condition (>83% of reference site(s)). [a]	[a]	Reliable data indicate macroinvertebrate assemblage with moderate to severe impairment when compared to reference condition (≤79% of reference site(s)). [a]	Reference condition is defined as the best situation to be expected within an ecoregion. Reference sites have balanced trophic structure and optimum community structure (composition & dominance) for stream size and habitat quality.
Macroinvertebrate assemblages in Ecoregions 21 and 23 using M-SCI[b]	Reliable data indicate functioning, sustainable macroinvertebrate assemblages not modified significantly beyond the natural range of reference condition (> 56.7 score).		Reliable data indicate macroinvertebrate assemblage with impairment when compared to reference condition (≤56.7 score).	

NOTES:
[a] Percentages and recommended 4% gap for BPJ are based on Plafkin et al. (1989).
[b] Percentages based on Jacobi et al. (2006).

3.1.1.2 Algae composition and blooms

Algae are an important biological component of surface waters as they provide a food source for fish and other organisms. Although some forms of algae are toxic, algae do not have to be toxic to be considered a harmful nuisance. Nontoxic algae can reproduce, or bloom, at such a high rate that they reach concentrations that reduce the amount of available oxygen, which can result in fish kills and other detrimental impacts to aquatic organisms. Likewise, some algae have spines or other protrusions that may cause fish kills simply by getting caught in or otherwise irritating fishes' gills.

New Mexico has been collecting periphyton and phytoplankton community data from select streams, lakes, and reservoirs since about 1975. Periphyton is an assemblage of organisms that grow on underwater surfaces and includes a complex matrix of algae and heterotrophic microbes including bacteria, fungi, protozoa, and other organisms (Allaby 1985). Phytoplankton is the assemblage of free-floating, photosynthetic organisms, including diatoms, desmids, and dinoflagellates. Periphyton and phytoplankton data from lentic systems have also been collated and explored as response variables for the nutrient lake and reservoir assessment protocol (see Appendix D). Nutrient protocols for large rivers are under development.

Blue-green algae (also known as cyanobacteria) are one of the largest and oldest groups of photosynthetic bacteria and form a portion of the planktonic community in New Mexico surface waters. Blooms can be blue, bright green, brown or red and may appear as green paint floating on water or washed on shore, foam or scum, or mats on the surface of fresh water lakes and ponds. Some blooms may not affect the appearance of the water but as algae in the blooms die, the water may have a noticeable odor. As single cells, large colonies and filaments, blue-green algae grow in a wide variety of conditions and can become the dominant algae in nutrient-rich lakes, ponds, and slow-moving streams when water is warm and stagnant. Some forms, but not all, can produce toxins that are poisonous to humans, fish, and wildlife that ingest water contaminated with the toxins. Additional information regarding blue-green algae can be found at: https://www.env.nm.gov/wp-content/uploads/2017/03/BlueGreenAlgaeFAQ.pdf.

Prymnesium parvum, a golden alga found worldwide in estuarine waters and in some freshwater bodies that have relatively high salt content, had its first confirmed freshwater blooms in North America in the Pecos River basin in Texas in 1985. This microscopic flagellated alga is a relatively new invasive species and has appeared in some waters of New Mexico where salinity and nutrient conditions provide suitable habitat for periodic blooms. Physicochemical conditions, including excessive nutrients, can stimulate growth of *P. parvum* which can produce toxins that cause significant fish and bivalve (i.e. clams and mussel) kills resulting in ecological and economic harm to the affected waterbodies; however, there is no evidence these toxins harm other wildlife, livestock or humans. Research is under way to better understand, detect and manage *P. parvum* blooms. Additional information regarding this toxic golden alga can be found at: https://www.env.nm.gov/swqb/documents/swqbdocs/GoldenAlgae/GoldenAlgaeFactSheet.pdf.

20.6.4 NMAC does not contain any specific criteria related to the presence of toxic algae or fish kills. The SWQB currently does not list water bodies as impaired due to these occurrences. Documented occurrences are noted in AU Comments on the Integrated List and the corresponding Record of Decision entries for these particular waterbodies. The SWQB will also continue to post information regarding these blooms on our web site.

3.1.1.3 Fish assemblages

The SWQB has been collecting fish community data from select streams, lakes, and reservoirs since 2000. The SWQB has collated available data to begin exploring the feasibility of biological assessment techniques using fish assemblages in select water body types. Cold water streams tend to be lacking in variety of species, making development of fish assemblage-based biological assessment challenging. The SWQB, EPA, and TetraTech are currently working together to develop a Biological Condition Gradient (BCG) for the Middle Rio Grande using both fish and benthic macroinvertebrate assemblages.

3.1.2 Chemical/physical data

20.6.4.900 NMAC provides numeric criteria related to various chemical/physical parameters. Table 3.4 explains how to interpret chemical/physical grab data relative to these standards to assess aquatic life use support. This table is divided into conventional parameters, which includes field measurements as well as major ions and nutrients, and toxic substances such as trace metals and priority pollutants. Refer to the appropriate water quality standard segment number (20.6.4.97 through 20.6.4.899 NMAC) of the WQS for numeric criteria for conventional chemical/physical parameters that may differ from those listed in 20.6.4.900 NMAC.

Conventional parameters monitored to determine aquatic life use support include: temperature, turbidity, pH, DO, specific conductance (SC), and total phosphorus (TP) (Table 3.4).

Assessment protocols for temperature, DO, and pH, are found in Appendices B, E, and F respectively. Prior to the 2005 triennial review, New Mexico had established segment-specific numeric turbidity values for all water quality standard segments detailed in 20.6.4 NMAC. In 2005, the WQCC amended 20.6.4 NMAC to remove all the segment specific turbidity values and revise the turbidity subsection under the General Criteria section (20.6.4.13.J NMAC). Because of this WQS change, an interim protocol with numeric translators for turbidity was developed to assess turbidity data from listing cycles 2006, 2008, and 2010. The SWQB has since developed a revised turbidity assessment protocol for the 2012 cycle forward. Sedimentation/siltation and turbidity assessments are described in Appendices G and H, respectively. All other parameters are detailed in Table 3.4 and discussed below.

3.1.2.1 Hardness-dependent metal criteria

Hardness-dependent acute and chronic aquatic life criteria for metals are calculated using the hardness-dependent equations in 20.6.4.900.I NMAC. Hardness values from the same sampling event are required for the assessment of hardness-dependent metals. However, in EPA's April 30, 2012, triennial review approval letter[11], EPA disapproved the hardness-dependent equations for total recoverable aluminum in waters when concurrent pH is less than 6.5. According to EPA, the previously approved CWA 304(a) aquatic life criteria for dissolved aluminum are the applicable water quality criteria for purposes of the CWA in waters when concurrent pH is below 6.5. Therefore, the benchmark to be used to determine aluminum exceedences will be 87 ug/L when concurrent pH is less than 6.5.

Assessment units (AUs) determined to be impaired prior to the 2018 listing cycle due to exceedences of the previous dissolved aluminum criteria when concurrent pH was greater than 6.5 were delisted with a delisting rationale of "WQS no longer applicable." If total recoverable aluminum data are not available to assess, an AU Comment will be added indicating the change in WQS and need to prioritize the collection of total recoverable aluminum data.

20.6.4.900.J(1)(e) NMAC states that total recoverable aluminum criteria are based on samples that were filtered to minimize mineral phases. The SWQB's study of this issue concluded that a filter of 10-micron pore size minimizes mineral-phase aluminum without restricting amorphous or colloidal phases (NMED/SWQB 2012). Therefore, if the turbidity of a sample is less than 30 NTU, no filtration is needed to minimize mineral phases. Samples from waters with turbidity greater than 30 NTU must be filtered with 10-micron disposable in-line capsule filters (rather than paper filters that are designed for use in plate or funnel-type filter holders) prior to analysis in order to determine impairment.

Total aluminum results less than the applicable water quality criterion may be used for assessment in the absence of concurrent turbidity data and/or filtering because filtering the sample prior to analysis would have resulted in a value even further below the applicable criterion. Similarly, samples filtered with a 10-micron filter regardless of turbidity levels that exceed the applicable criterion are assessable because unfiltered samples would have resulted in an even higher magnitude of exceedance. In addition, exceedences determined with concurrent total 'total hardness' vs. dissolved 'total hardness' as defined in 20.6.4.900.I NMAC are allowable because higher hardness values result in higher applicable water quality criterion.

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[11] https://www.env.nm.gov/swqb/documents/swqbdocs/Standards/2012/WQS2010-EPAApprovalLetter.pdf

Table 3.4 Interpreting chemical/physical data to assess Aquatic Life Use Support

TYPE OF DATA*	FULLY SUPPORTING	NOT SUPPORTING	NOTES
•**Conventional parameters** (e.g., specific conductance, total phosphorus[(a)]) **A)** 4 to 10 samples **B**) >10 samples	**A**) For any one pollutant, no more than one exceedence of the criterion. **B**) For any one pollutant, criterion exceeded in <10% of measurements.	**A**) For any one pollutant, more than one exceedence of the criterion. **B**) For any one pollutant, criterion exceeded in ≥ 10% of measurements.	All **temperature, pH**, and **DO** listing methodologies are described in Appendices B, E, and F respectively. Sampling biases in these parameters (such as diel flux) should be addressed by sampling with continuously-recording sondes, data loggers, and thermographs during the specified index period whenever possible. **Sedimentation/siltation (habitat)** and t**urbidity** assessments are described in Appendices G and H, respectively.
•**Toxic substance** (e.g., priority pollutants, ammonia[(b)], chlorine, metals[(c)], cyanide) ≥ 4 samples	For any one pollutant, no more than one exceedence of the **acute** criterion in three years, and no more than one exceedence of the **chronic** criterion in three years.	For any one pollutant, more than one exceedence of the **acute** criterion in three years, or more than one exceedence of the **chronic** criterion in three years.	Samples should be taken during hydrologically stable conditions to be representative of the averaging period (see Section 3.1.2.2 below for additional discussion).

NOTES: * Less than 4 samples = not assessed. See Section 2.1.4 for details.

(a) Only for segment-specific total phosphorus values. Otherwise, see the nutrient listing methodologies in Appendices C and D.

(b) New Mexico's WQS require consideration of the presence of salmonids to assess against acute ammonia criteria, and the presence of fish in early life stages to assess against chronic ammonia criteria. To apply Table K of 20.6.4.900 NMAC for assessment purposes, all waters designated as high quality coldwater aquatic life (HQCWAL) or coldwater aquatic life (CWAL) will be assumed "Salmonids Present," while all other aquatic life (AL) uses will be assumed "Salmonids Absent." If actual or historic fisheries documentation indicates the presence of salmonids, the "Salmonids Present" column will be used regardless of the designated AL use. To decide whether to apply Table L or M 20.6.4.900 NMAC for assessment purposes, "Fish Early Life Stages" will be assumed present from November 1 to June 30 for HQCWAL and CWAL. "Fish Early Life Stages" will be assumed present from March 1 to August 31 for all other AL uses. If actual fisheries documentation generated during the time of ammonia sample collection, or historic fisheries documentation generated during the same date in a previous year, indicate the presence of early life stages outside of these date ranges, the criteria in Table L of 20.6.4.900 NMAC will be applied regardless of the date of collection. If the applicable uses translate to different criteria values, the most stringent criteria is used per 20.6.4.11 NMAC Subsection F.

(c) See section 3.1.2.1 for additional information on assessment of hardness-dependent metal criteria.

3.1.2.2 Assessing chronic aquatic life WQS

The acute and chronic aquatic life criteria established in the WQS are based upon the nationally recommended criteria developed by the EPA (EPA 2006b). The acute criteria are intended to protect against short-term effects and are derived from tests of lethality or immobilization. The chronic criteria are intended to protect against long-term effects and are derived based upon longer term tests that measure survival, growth or reproduction. The EPA recommends a one-hour averaging period for the acute criteria and a four-day averaging period for the chronic criteria. That is, the 4-day average exposure of aquatic life to a pollutant should not exceed the chronic criterion (EPA 1994).

During SWQB's watershed surveys, water chemistry samples are generally collected 4-12 times (depending on the parameter and site) over a two-year period in order to 1) better characterize the waterbody throughout the annual hydrograph, and 2) acquire data points that are more likely to be statistically independent with respect to time. Because of this sampling design, consecutive-day data are not available to calculate 4-day averages. Few states and tribes are obtaining composite data over a 4-day sampling period for comparison to chronic aquatic life criteria due primarily to budget and staff time constraints. The EPA believes that 4-day composites are not an absolute requirement for evaluating whether chronic criteria are being met (EPA 1997). Grab and composite samples can be used in water quality assessments if taken during stable conditions (EPA 1997) and should be representative of average conditions over the 4-day period for assessment of chronic aquatic life.

New Mexico has developed a two-step process for assessing attainment of chronic aquatic life criteria based on four or more samples after the dataset has been assembled following the data management rules in Sections 2 and Figure 3.2. The first step is to collate available data and assessed against the chronic aquatic life WQS. If four or more samples include two or more exceedences of a given criterion, these data then are evaluated to determine if the samples were collected during hydrologically stable conditions considered to be representative of the 4-day averaging period; this process is detailed below. If conditions were unstable during the time of sampling, the data are not assessed. If sample collection methodology was specifically designed to capture data from storm flow events (e.g., through the use of single stage or automated samplers deployed to capture storm events only), these data should not be used to assess chronic aquatic life criteria.

In addition, potential outliers are also identified while assessing against chronic conditions. An outlier is defined as a measurement greater than the 75th percentile (Q3) of the all measurements of a particular parameter at a site, plus three times the inter-quartile range (IQR). The IQR is defined as the difference between the 25th percentile (Q1) and Q3 (Tukey 1977, Seo 2006). This approach is intended to 1) demonstrate the repeatability of an observation meant to represent chronic conditions; 2) screen for potential field equipment, collection, or laboratory analysis errors; and 3) take into consideration potential anomalies in the data set due to extreme deviations from seasonal norms, the natural consequences of spring runoff conditions, and the influence of storm events or other anomalous events such as runoff from catastrophic fire areas. Note that the above statements and data process only apply to chronic criteria and that all grab samples will be used to assess acute criteria regardless of hydrologic or anomalous conditions.

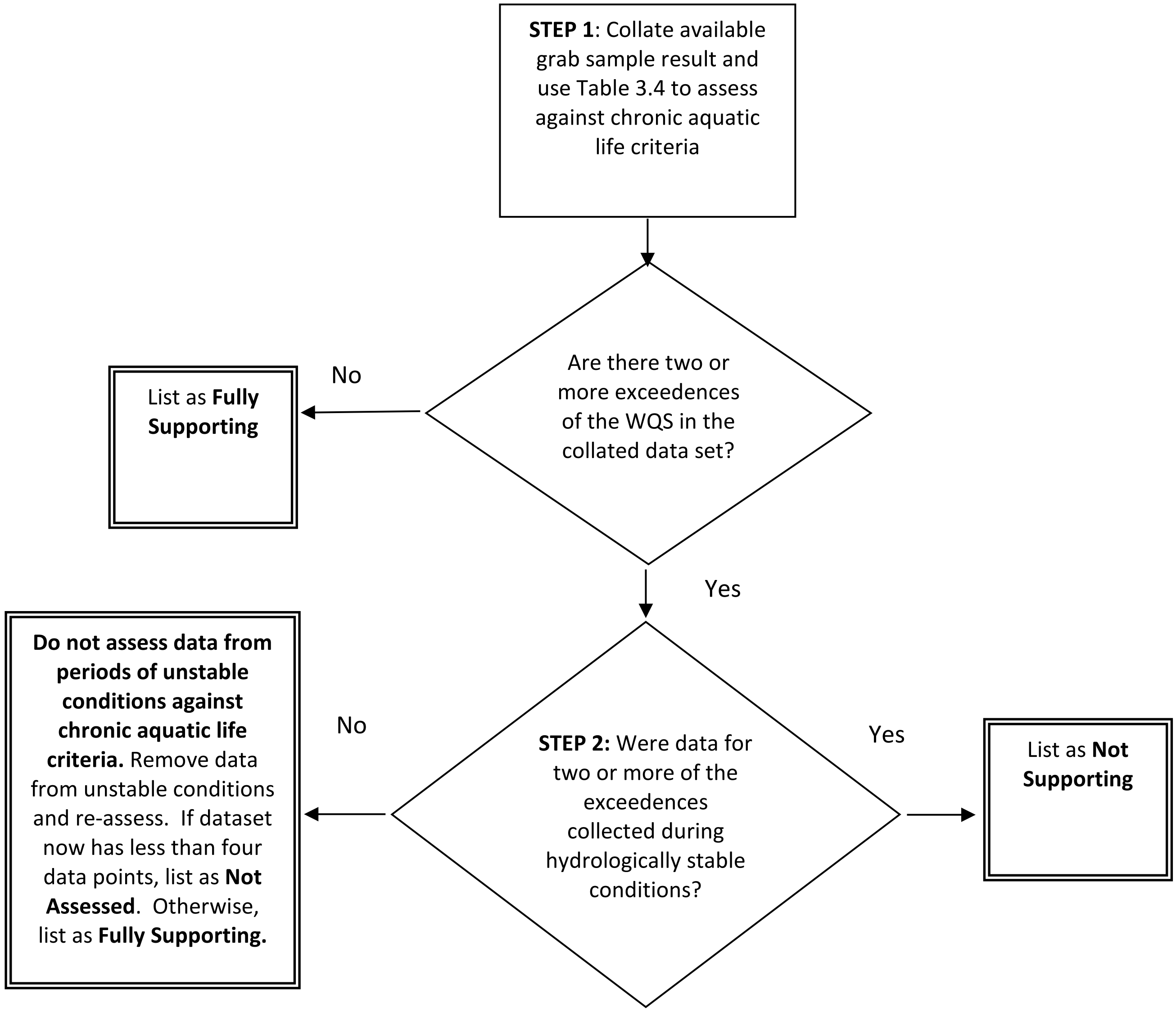

Figure 3.2 Decision process for assessing against chronic aquatic life criteria

Determining the representativeness of a sample is a qualitative assessment and is addressed primarily in the sample design, through the selection of sampling sites, and through use of procedures that reflect the project goals and environment being sampled (NMED/SWQB 2016b). These procedures ensure that a given sample represents a characteristic of a population, in this case the water in a given AU at the time of sampling. The assessment of chronic aquatic life criteria adds an additional constraint that the sample(s) must be representative of a 4-day period. As such, these samples must be collected during periods when the water is well mixed and reasonably expected to represent conditions during the averaging period. Specifically, lakes or reservoirs, as stated in 20.6.4.14.C(3) NMAC, will be assessed for attainment of criteria for toxic pollutants using data that were collected during periods of complete vertical mixing. With respect to stream or river chronic aquatic life assessments, grab samples are deemed representative for this application when there is an absence of contextual information indicating unstable hydrologic conditions. Examples of contextual information to be considered include but are not limited to: 1) stream flow measurements or flow rating, 2) precipitation, 3) location of point source discharges in relationship to the monitoring site, and 4) the occurrence of a chemical spill or other unusual event (EPA 2005).

Specifically, if there are two or more exceedences of applicable chronic aquatic life criteria, the SWQB will consider the following information to determine whether conditions were stable at the time of data collection:

- Point source discharge records in the reach or immediately upstream (if one or more point source discharges provide a significant contribution to the receiving water)
- Field notes and weather records regarding precipitation and runoff
- Flow measurements taken at the time of sampling
- Flow condition rating recorded at the time of sampling
- Gage station records (when available)
- Land uses in the vicinity
- Records of chemical spills or other unusual events
- Historic patterns of pollutant concentrations when available

If readily available contextual information indicates that the pollutant concentration and the stream flow likely remained generally constant over a four-day period surrounding the sampling event, the SWQB will conclude that the result of the grab sample, or the average of multiple day sampling events, is valid for assessing chronic aquatic life criteria.

Alternatively, these data will not be used for assessing attainment of chronic aquatic life criteria when contextual data indicate unstable conditions. Examples of unstable conditions may include, but are not limited to, samples being collected during:

- A precipitation event with runoff lasting shorter than 4-days
    - NOTE: If the data were collected during several days of high flow, the sample would be assumed representative of the 4-day average condition to assess chronic aquatic life uses. If continuous gage data are available, the procedure in the below paragraph would be performed vs. making assumptions about the longevity of the storm event
- The first flush of a precipitation event
- A short-lived but high flow monsoon event

One way to determine stable conditions is to examine the coefficient of variation (CV). When exceedences occur at or near a continuous flow gaging station and mean daily flow data are available, a stream may be considered hydrologically stable if the CV of the mean daily flow for a 4-day period surrounding the sampling collection is at or below 0.2. The CV is determined by dividing the standard deviation of the values by the mean of the values. This is a common statistical method to evaluate variability in datasets relative to the mean, and 0.2 is a common threshold below which data are considered to have minimal variability (ADEQ 2008).

The 4-day window that produces the lowest CV should be determined instead of always using a predetermined number of days before or after the sampling event. See Table 3.5 below for an example using available gage data for a grab sample collected on 8/2/07. In this example, the CV of the mean daily flows from 7/30/07 to 8/2/07 produced the lowest CV and is below 0.2, so this 4-day period surrounding the sampling event is determined to be stable. The hydrologic stability inference is about the entire 4-day period vs. just the sampling event. Utilizing the mean daily flow from 7/31/07 to 8/3/07 produces a CV of 0.22.

Table 3.5 Example of stable flow determination using gage data

Date	Mean Daily Flow (cfs)	Mean [a]	Standard Deviation (SD) *	CV (SD / Mean) [a]
7/30/07	6.0	**7.7**	**1.3**	**0.17**
7/31/07	7.5			
8/1/07	9.2			
8/2/07	**8.1**			
8/3/07	12.0			
8/4/07	11.3			

NOTES: [a] for mean daily flow data collected 7/30/07 – 8/2/07

If one or more point source discharges provide a significant contribution to the receiving water, the facility discharge record(s) should be reviewed to determine whether flow and associated pollutant discharges were relatively consistent during the four-day period when the exceedence occurred. Other evidence concerning unstable flow or pollutant discharges can be provided by the facility.

3.1.2.3 Assessing human health criteria

Human health is not defined as a designated use according to the current version of 20.6.4 NMAC. Instead, human health criteria apply to all waters with a designated, existing or attainable aquatic life use. Human health criteria for persistent toxic pollutants as identified in 20.6.4.900.J NMAC also apply to all tributaries of waters with a designated, existing, or attainable aquatic life use (20.6.4.11.G NMAC). Refer to Subsection 20.6.4.900.J NMAC for the numeric criteria related to human health. Human health criteria proposed by the EPA are presumed to have exposure durations of a year or more (EPA 2005), and were generally established to protect for exposure over the period of a human lifetime so a percentage-based assessment approach is appropriate when the sample size is greater than 10 samples. Table 3.6 explains how to interpret chemical/physical data to determine if these criteria are met.

Table 3.6 Interpreting chemical/physical data to assess human health criteria

TYPE OF DATA*	FULLY SUPPORTING	NOT SUPPORTING	NOTES
•Toxic substance (e.g., cyanide, PAHs, pesticides, PCBs, metals)			
A) 4 to 10 samples	**A)** For any one pollutant, no more than one exceedence of the criterion.	**A)** For any one pollutant, more than one exceedence of the criterion.	
B) >10 samples	**B**) For any one pollutant, criterion exceeded in <10% of measurements.	**B**) For any one pollutant, criterion exceeded in ≥ 10% of measurements.	

NOTES: * Less than 4 samples = not assessed. See Section 2.1.4 for details.

3.1.3 Toxicological data

Table 3.7 explains how to interpret toxicological data to assess aquatic life use support with respect to the narrative general standard found at 20.6.4.13.F NMAC, which states "Surface waters of the state shall be free of toxic pollutants from other than natural causes in amounts, concentrations or combinations which affect the propagation of fish…" Results from ambient toxicity testing are a valuable indicator for assessing and protecting against impacts on water quality and designated uses caused by the aggregate toxic effect of pollutants. Contaminants may flow directly from industrial and municipal waste dischargers, may come from polluted runoff in urban and agricultural areas, or may collect in the sediments. Toxicity evaluations can be used to assess the type and extent of degraded water quality (EPA 2002a). Acute toxicities of substances are determined using at least two species, one vertebrate and one invertebrate, tested in whole effluent and/or ambient stream water as well as a series of dilutions. The reason for two distinctly different species is to account for the diverse species that inhabit waterbodies. In general, fish and other vertebrates are sensitive to many compounds such as those similar to their waste material, namely ammonia or ammonium complexes. Although ammonia is toxic to invertebrates, not all invertebrates are as sensitive as fish species in general. Similarly, invertebrates are generally more sensitive to pesticides than fish.

Toxicological data for New Mexico can be downloaded from: https://www.epa.gov/regionallabs/epa-region-6-laboratory-biomonitoring-lab.

While ambient toxicity testing results are a valuable indicator, they are only the first step towards identification of a water quality concern. These listings were noted as Category 5C on previous listing cycles (see Section 4.0) because the particular pollutant(s) leading to the toxicity must be identified in order to take the next steps, such as development of TMDL documents to develop a plan to address the problem. In past surveys, the SWQB collected water and sediment samples that were subjected to the EPA toxicity tests during the survey year for a particular watershed, while concurrently sampling surface waters for a variety of chemical constituents. The SWQB has found that where there is nothing in the chemical data to indicate the source of toxicity, a false positive result from the toxicity test must be considered. There are also instances where toxicity tests fail in receiving waters due to a known issue with an upstream discharger. Once the permittee corrects the issue/malfunction, repeat toxicity testing is necessary to determine whether the impairment still exists. For these reasons, available benthic macroinvertebrate data indicating non-support using the factors in Table 3.3 must also be available to determine impairment.

Table 3.7 Interpreting toxicological data to assess Aquatic Life Use Support

Type of Data	Fully Supporting	Not Supporting	Notes
•Acute and/or chronic toxicity testing	Significant effect noted in no more than one acute water test as compared to controls or reference conditions, and in no more than one chronic water test in three years as compared to controls or reference conditions.	Significant effect noted in more than one acute water test as compared to controls or reference conditions, or in more than one chronic water test in three years as compared to controls or reference conditions, and available benthic macroinvertebrate data indicate non-support per Table 3.3.	Significant effect refers to a statistically significant difference in a primary endpoint as defined in the latest EPA procedures documents for acute and chronic toxicity testing in water (EPA 2002b, 2002c). Reference controls will be used to compensate for possible toxic effects from naturally occurring conditions (i.e. high salinity). If toxicity testing results are from multiple years, the most recent results will be used to make the final impairment determination for the reasons stated in Section 3.1.3.

For lakes and reservoirs, impairment may be demonstrated where acute conditions (typically low DO levels) result in significant fish kills. Fish kills associated with accidental spills or isolated unauthorized discharges of toxics, or due to runoff after catastrophic wildfire, will not typically be considered a basis for CWA 303(d) listings because other regulatory or restorative actions are typically utilized.

3.1.4 Fish consumption advisories

Per guidance, the EPA considers fish or shellfish consumption advisories with supporting fish tissue data to be existing and readily available data that demonstrate non-attainment of CWA goals stating that waters should be "fishable" (CWA Section 101(a)(2), EPA 2000, EPA 2005). The EPA also acknowledges that in some cases, fish and shellfish consumption advisories may not demonstrate that a section 101(a)(2) "fishable" use is not being attained in an individual segment when, for example, a state uses a higher fish consumption value in determining the need for an advisory compared to the value used in establishing water quality criteria for the protection of human health (EPA 2000, EPA 2005). Therefore, all water bodies for which an advisory has been issued are listed as impaired due to the specific fish tissue contaminant on the Integrated List except in cases where there is a consumption advisory due to mercury but fish tissue data indicate the methylmercury criterion of 0.3 mg/kg in fish tissue is not exceeded. In acknowledgement of the need for data to support the listing, the impairment listing will be applied to the AU where fish tissue data are available, noting that, especially for stream/river AUs, the advisory may include different geographic extents.

The majority of New Mexico's current fish consumption advisories are based on mercury levels in fish (NMDOH et al. 2010); however, there are also listings for PCBs, DDT, or some combination thereof, in fish tissues. The current fish consumption advisory, as well as additional information on how New Mexico develops these advisories, can be found at: https://www.env.nm.gov/surface-water-quality/fish-consumption-advisories/. Fish tissue advisories for other parameters of concern may be forthcoming. The Integrated List will be updated whenever the advisory is revised.

3.1.5 Special considerations for lake data

Lentic waterbodies in New Mexico have historically been, and continue to be, studied using the methods and approaches specified in the *Clean Lakes Program Guidance Manual* (EPA 1987). For purposes of consistency and comparability, classic limnological methods for WQS attainment continue to be used in monitoring practices. For purposes of this document, the term "lake" shall include natural lakes as well as reservoirs, impoundments, and any other human-made lentic waterbodies.

Lake water quality surveys should at least contain a station in the deepest portion of the lake. Additional sample locations may be needed if the reservoir is large, contains multiple arms with multiple inflows, or the lake is divided by narrow connectors resulting in pools with unique characteristics. Additional stations may be established as needed to evaluate conditions of concern. During periods of lake stratification, 20.6.4 NMAC requires depth-integrated composite samples for assessment of toxic pollutants (e.g., organic compounds, ammonia, metals, cyanide, radionuclides, etc.). Water quality measurements taken at intervals are averaged for the epilimnion, or in the absence of an epilimnion, for the upper one-third of the water column of the lake to determine attainment of criteria per 20.6.4.14.C(3) NMAC. When multiple stations exist on a lake, they are usually sampled on the same day or within the same seven-day period. The applicable listing methodology shall be applied to the shallow and deep station datasets separately. If one or both datasets indicate impairment, the impairment conclusion for the AU is **Not Supporting**. If there are conflicting assessment conclusions, it will be noted in the Record of Decision.

3.1.6 Conflicting or duplicative aquatic use support determinations

For aquatic life use assessments, it is possible that data of differing types may lead to differing use attainment determinations for the same assessment unit. For example, there may be chemical/physical data that indicate **Not Supporting** and biological data that indicate **Fully Supporting**. If two or more data types are available for assessment, a weight-of-evidence approach is adopted when conventional parameter data (for example, non-toxic substances such as temperature, pH, or specific conductance), or habitat parameters such as sedimentation/siltation, indicate impairment. This approach considers data type, quality, quantity, and confidence of assessment methods in reaching a final aquatic life use determination. Data types with higher data quality are given more weight (see Appendix A for data quality descriptions). Typically, data quality of level 3 or 4 are used to make listing determinations. Chemical/physical data with quality level 2 may be used to list as impaired under IR Category 5c (e.g., needs more data to confirm). Chemical/physical of data quality 1, and biological or physical data of quality 1 or 2, will not be used to make designated use attainment decisions. Figure 3.3 displays a generalized flowchart for considering different data types and their quality when determining aquatic life use support. Biological assessments provide an integrated assessment of ecological health and have the potential to provide a direct measure of the designated goal of providing for the protection and propagation of aquatic life uses, especially when evidence of impairment due to non-toxic chemical/physical parameters is weak or based on low data quality. In the case of toxic substance chemical data (e.g., priority pollutants, ammonia, chlorine, metals, cyanide), the weight-of-evidence approach is not applied.

In addition, if there are one or more causal variables (such as nutrients, temperature, or turbidity) as well as related response variables (such as DO, pH, or benthic macroinvertebrate) identified, the AU will be listed for the causal variable(s). For example, if an AU is determined to be impaired due to excessive nutrients following the procedures in Appendix C for streams or D for lakes or reservoirs, the AU will be listed for nutrients vs. the individual response variables. However, if only the response variable with established water quality criteria has been identified as impaired, the AU will be listed for that particular variable.

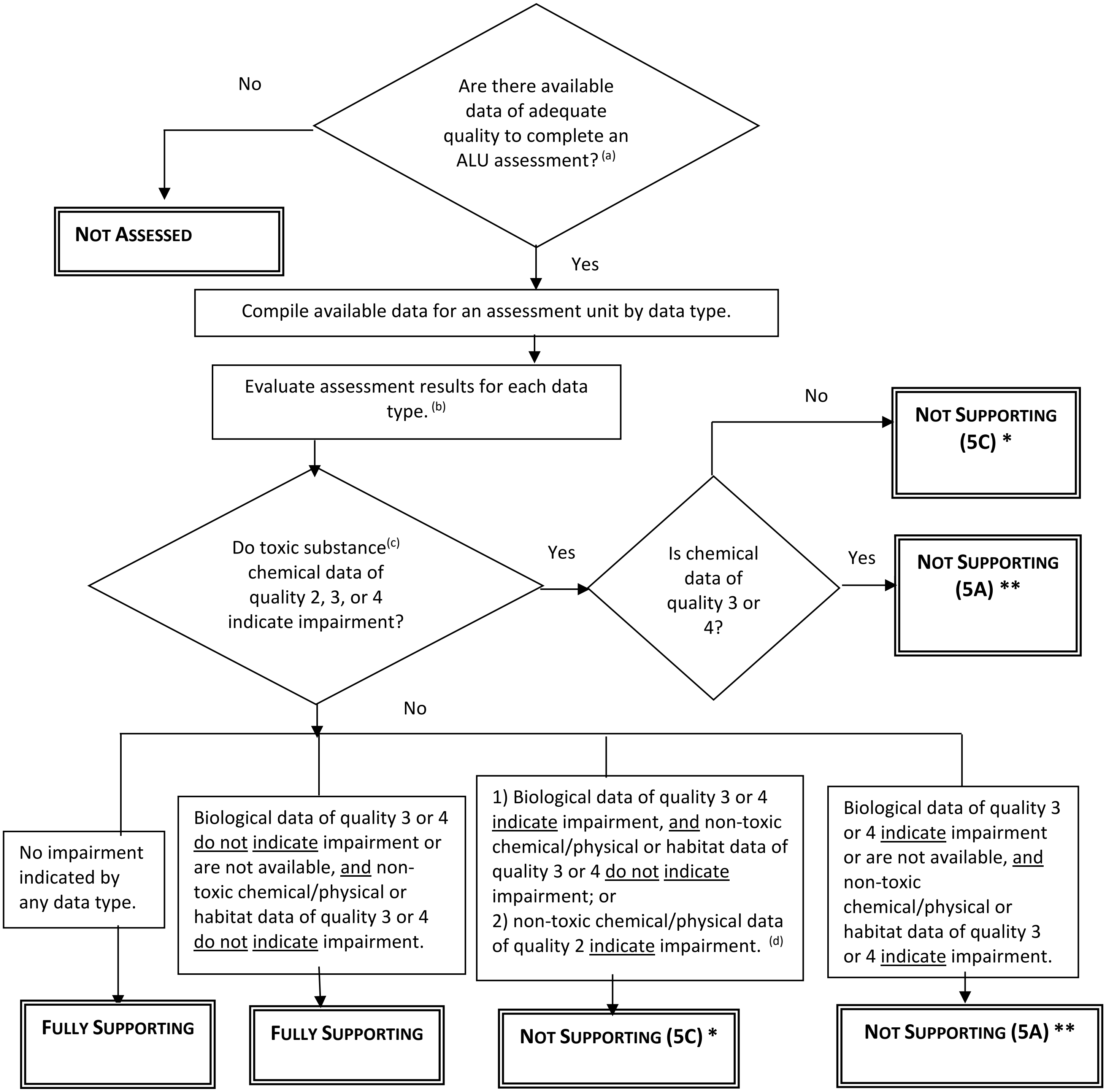

Figure 3.3 Generalized flowchart for determining Aquatic Life Use Support

NOTES: * Additional data are needed to determine the specific pollutant or "pollution" of concern. If a form of "pollution" (for example, flow alteration by EPA's definition) and no concurrent pollutant(s) are determined to be the reason for the biological impairment, IR Category 4c may be assigned. Otherwise, the AU is assigned IR Category 5c (more data needed). See Section 4.0 for more detail.

** TMDL or TMDL alternative ready to be scheduled for the cause(s) of impairment. See Section 4.0.

[a] Data quality determined per Appendix A. Chemical/physical of data quality 1, and biological or habitat data of quality 1 or 2, will not be used to make designated use attainment decisions. Data collected via SWQB SOPs are generally between data quality 3 and 4.

[b] Per Tables 3.3 through 3.6, and referenced associated appendices.

[c] Toxic substances include parameters such as priority pollutants, ammonia, chlorine, metals, cyanide (Table 3.4).

3.2 Assessing Domestic Water Supply Use Support

Table 3.8 explains how to interpret chemical/physical data to assess domestic water supply use support. Refer to 20.6.4.900.B and 20.6.4.900.J NMAC for numeric domestic water supply criteria.

Table 3.8 Interpreting chemical/physical data to assess Domestic Water Supply Use Support

TYPE OF DATA*	FULLY SUPPORTING	NOT SUPPORTING	NOTES
•**Toxic substance** (e.g., radionuclides[(a)], priority pollutants, metals, cyanide) •**Nitrate** ≥ 4 samples	For any one pollutant, no more than one exceedence of the criterion.	For any one pollutant, more than one exceedence of the criterion.	

NOTES: * Less than 4 samples = not assessed. See Section 2.1.4 for details.
[(a)] When radionuclides are analyzed using SM7110 B or EPA Method 900.0 (recommended, and equivalent to SM7110 B according to SLD), gross alpha and gross beta results generated using an Am-241 reference and a Sr/Y-90 reference, respectively, are preferred for purposes of assessing WQS attainment because these references are prescribed in the method description. If the reference type information is not available and multiple reported values are provided, the highest reported value available will be used for assessment. Also, the water quality criterion in 20.6.4.900.J NMAC is for "adjusted gross alpha." Therefore, gross alpha data should be adjusted by subtracting contributions from natural uranium, as well as any measured special nuclear and by-product material, as called for in 20.6.4.7.B NMAC, prior to assessment. To convert uranium concentrations reported in ug/L to pCi/ug prior to subtraction, a conversion factor of 0.67 is used. In the absence of uranium data to subtract in order to adjusted gross alpha, U-238 data can be used because this is the most common form of uranium in the natural environment. In the event that negative values are reported for special nuclear materials, zero will be substituted as the subtraction value used to adjust gross alpha.

3.3 Assessing Primary and Secondary Contact Use Support

Table 3.9 explains how to interpret bacteriological data to assess recreational contact use support. Refer to Subsection B under the appropriate WQS segment number (20.6.4.97 – 20.6.4.899 NMAC) and of 20.6.4.900 NMAC Subsections D and E for numeric primary and secondary contact use criteria.

Table 3.9 Interpreting bacteriological data to assess Contact Use Support

TYPE OF DATA*	FULLY SUPPORTING	NOT SUPPORTING	NOTES
•**Bacteria** **A)** 4 to 10 samples **B**) > 10 samples	**A**) No more than one exceedence of the single sample criterion. **B**) Single sample criterion is exceeded in <10% of samples or geometric mean criterion is met.	**A**) More than one exceedence of the single sample criterion. **B**) Single sample criterion exceeded in ≥ 10% of measurements or geometric mean criterion is not met.	The monthly geometric mean shall be used in assessing attainment of criteria when a minimum of five samples is collected in a 30-day period (20.6.4.14.B NMAC).

NOTES: * Less than 4 samples = not assessed. See Section 2.1.4 for details. Also, SWQB bacteria results that are marked "Ea" due to incubation temperatures between 35.5 and 38 degrees C will not be used to make assessment conclusions.

3.4 Assessing Irrigation Use Support

Table 3.10 explains how to interpret chemical/physical data to assess irrigation use support. Refer to 20.6.4.900.C and 20.6.4.900.J NMAC for numeric irrigation use criteria.

Table 3.10 Interpreting chemical/physical to assess Irrigation Use Support

TYPE OF DATA*	FULLY SUPPORTING	NOT SUPPORTING	NOTES
•Toxic substance (e.g., metals) ≥ 4 samples	For any one pollutant, no more than one exceedence of the criterion.	For any one pollutant, more than one exceedence of the criterion.	
•Salinity parameters (e.g., total dissolved solids, sulfate, chloride) **A)** 4 to 10 samples **B**) > 10 samples	**A**) For any one pollutant, no more than one exceedence of the criterion. **B**) For any one pollutant, criterion exceeded in <10% of measurements.	**A**) For any one pollutant, more than one exceedence of the criterion. **B**) For any one pollutant, criterion exceeded in ≥ 10% of measurements.	Salinity parameters are segment-specific criteria included in a few individual WQS segments based on flow qualifiers.

NOTES: * Less than 4 samples = not assessed. See Section 2.1.4 for details.

3.5 Assessing Wildlife Habitat Use Support

Table 3.11 explains how to interpret chemical/physical data to assess wildlife habitat use support. Refer to 20.6.4.900.G NMAC for narrative criteria and 20.6.4.900.J NMAC for numeric criteria with respect to wildlife habitat use.

Table 3.11 Interpreting chemical/physical data to assess Wildlife Habitat Use Support

TYPE OF DATA*	FULLY SUPPORTING	NOT SUPPORTING	NOTES
•Toxic substance (e.g., PCBs, DDT, cyanide, chlorine, metals) ≥ 4 samples	For any one pollutant, no more than one exceedence of the criterion.	For any one pollutant, more than one exceedence of the criterion.	

NOTES: * Less than 4 samples = not assessed. See Section 2.1.4 for details.

3.6 Assessing Livestock Watering Support

Table 3.12 explains how to interpret chemical/physical data to assess livestock watering use support. Refer to 20.6.4.900.F and 20.6.4.900.J NMAC for the numeric livestock watering use criteria.

Table 3.12 Interpreting chemical/physical data to assess Livestock Watering Use Support

TYPE OF DATA*	FULLY SUPPORTING	NOT SUPPORTING	NOTES
•**Conventional parameters** (e.g., nitrite + nitrate) **A)** 4 to 10 samples	**A**) For any one pollutant, no more than one exceedence of the criterion.	**A**) For any one pollutant, more than one exceedence of the criterion.	
B) > 10 samples	**B**) For any one pollutant, criterion exceeded in <10% of measurements.	**B**) For any one pollutant, criterion exceeded in ≥ 10% of measurements.	
•**Toxic substance** (e.g., radionuclides[a], priority pollutants, metals) ≥ 4 samples	For any one pollutant, no more than one exceedence of the criterion.	For any one pollutant, more than one exceedence of the criterion.	

NOTES: * Less than 4 samples = not assessed. See Section 2.1.4 for details.
[a] When radionuclides are analyzed using SM7110 B or EPA Method 900.0 (recommended, and equivalent to SM7110 B according to SLD), gross alpha and gross beta results generated using an Am-241 reference and a Sr/Y-90 reference, respectively, are preferred for purposes of assessing WQS attainment because these references are prescribed in the method description. If the reference type information is not available and multiple reported values are provided, the highest reported value available will be used for assessment. Also, the water quality criterion in 20.6.4.900.J NMAC is for "adjusted gross alpha." Therefore, gross alpha data should be adjusted by subtracting contributions from natural uranium, as well as any measured special nuclear and by-product material, as called for in 20.6.4.7.B NMAC, prior to assessment. To convert uranium concentrations reported in ug/L to pCi/ug prior to subtraction, a conversion factor of 0.67 is used. In the absence of uranium data to subtract in order to adjusted gross alpha, U-238 data can be used because this is the most common form of uranium in the natural environment. In the event that negative values are reported for special nuclear materials, zero will be substituted as the subtraction value used to adjust gross alpha.

3.7 Assessing Fish Culture, and Public or Industrial Water Supply Uses

Per applicable assessment unit, all Fish Culture, Public Water Supply, and Industrial Water Supply designated uses have been assigned "Not Assessed" because no numeric criteria apply uniquely to these uses (see 20.6.4.900.A NMAC). The Rio Grande from Cochiti Pueblo boundary to Rio Pueblo de Taos (20.6.4.114 NMAC) includes public water supply radionuclide concern levels for monitoring and disclosure only. Available data will be compared to these concern values and noted in the AU Comments on the Integrated List.

3.8 Assessing Numeric Criteria Under Multiple Use Designations

40 C.F.R. 131.11(a)(1) addresses instances where there are different water quality criteria for a particular parameter for two or more uses applicable to an AU. In these cases, the criteria used to make the final impairment decision for the AU should support the most sensitive use. In New Mexico, 20.6.4.11.F NMAC correspondently states:

> ***Multiple Uses***: *When a surface water of the state has more than a single designated use, the applicable* <u>*numeric*</u> *criteria shall be the most stringent of those established for such water.*

For example, surface waters with both wildlife habitat and livestock watering designated uses are assessed against the lower 0.77 µg/L wildlife habitat total mercury criterion instead of only the 10 µg/L livestock watering criterion to make a total mercury impairment determination.

4.0 ASSESSMENT UNIT CATEGORY DETERMINATIONS FOR INTEGRATED LIST

The determination of individual use support using Section 3.0 and other specified protocols are combined to determine the overall WQS attainment category for each AU (EPA 2001, Figure 4.1).

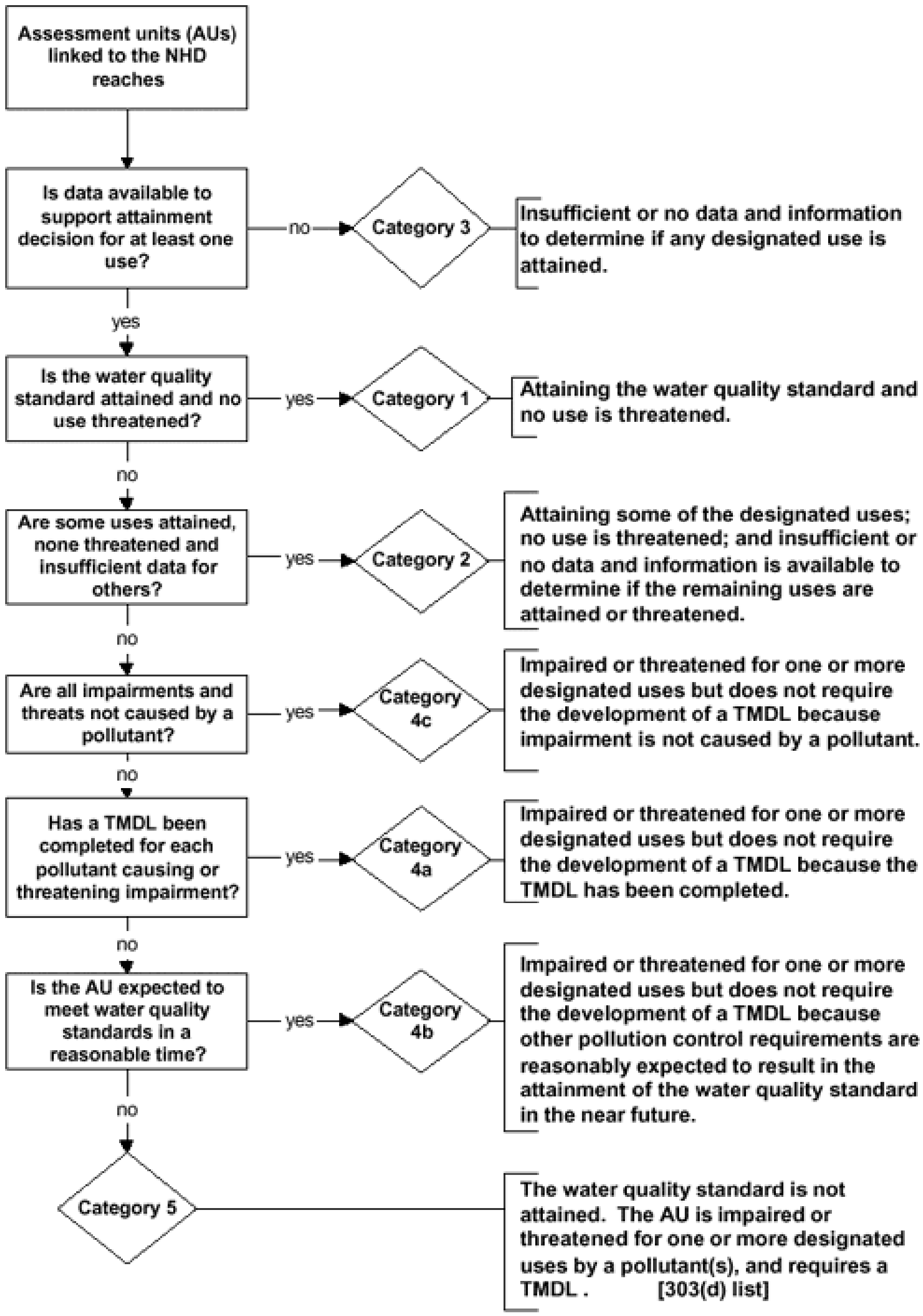

Figure 4.1. Attainment category logic (EPA 2001).

Several states, including New Mexico, further divide the EPA's recommended integrated reporting categories. New Mexico's specific reporting category interpretations are described below.

1. **Attaining the WQS for all designated and existing uses.** AUs are listed in this category if there are data and information that meet all requirements of the assessment and listing methodology and support a determination that the water quality criteria are attained based on numeric and narrative water quality criteria that were tested.

2. A**ttaining some of the designated or existing uses based on numeric and narrative parameters that were tested, and no reliable monitored data are available to determine if the remaining uses are attained or threatened.** AUs are listed in this category if there are data and information that meet requirements of the assessment and listing methodology to support a determination that some, but not all, uses are attained based on numeric and narrative water quality criteria that were tested. Attainment status of the remaining uses is unknown because there is no reliable monitored data with which to make a determination.

2A. **Attaining with prior action still in place**. Parameters are assigned this category when the current data and listing methodology indicate the water body is no longer impaired for this parameter, and a previously-developed action (e.g., Approved TMDL, Alternative Restoration Approach, etc.) exists.

3. **Insufficient or no reliable data and/or information to determine if any designated or existing use is attained.** AUs are listed in this category where sufficient data to support an attainment determination for any use are not available, consistent with requirements of the assessment and listing methodology. In order to relay additional information to stakeholders including SWQB staff, Category 3 is further broken down in New Mexico into the following categories:

3A. **No data (n = 0) available**. AUs are listed in this subcategory when there are no available data to assess. These are considered high priority for follow up monitoring.

3B. **Limited data (n = 1 to 3) available, no exceedences**. AUs are listed in this subcategory when there are no exceedences of any applicable criteria in the limited data set. Their priority for follow up monitoring depends on the parameter and concentration (for example, measurements near the criteria would increase the priority for additional sampling).

3C. **Limited data (n = 1 to 3) available, exceedence(s)**. AUs are listed in this subcategory when there are exceedences of one or more applicable criteria in the limited data set. These are considered high priority for follow up monitoring.

4. **Impaired for one or more designated uses, but does not require development of a TMDL because:**

4A. **TMDL has been completed and approved.** AUs are listed in this subcategory once all TMDL(s) have been developed and approved by the WQCC and the EPA that, when implemented, are expected to result in full attainment of the standard. Where more than one pollutant is associated with the impairment of an AU, the AU remains in Category 5 (see below) until all TMDLs for each pollutant have been completed and approved by the WQCC and the EPA.

4B. **Other pollution control requirements are reasonably expected to result in attainment of the water quality standard in the near future**. Consistent with the regulation under the CWA section 130.7(b)(i),(ii), and (iii), AUs are listed in this subcategory where other pollution control measures required by local, state, or federal authority are stringent enough to implement any WQS applicable to such waters. Details regarding the specific documentation and timeline needed to propose a Category 4b listing can be found in Appendix I.

4C. **Impairment is not caused by a pollutant.** AUs are listed in this subcategory if available data and information demonstrate that the use impairment is not associated with one or more pollutants, and is attributable only to other types of "pollution" (e.g., flow or habitat alteration). For example, if the narrative biological water quality criterion found at 20.6.4.13.M NMAC is demonstrated to not be met due to pollution and no concurrent pollutant(s) are identified, the AU may be assigned Category 4c.

5. **Impaired for one or more designated or existing uses**. The AU is not supporting one or more of its designated uses because one or more WQS are not attained according to current WQS and assessment methodologies. **This category constitutes the *CWA §303(d) List of Impaired Waters*.** In order to relay additional information to stakeholders including SWQB staff, Category 5 is further broken down in New Mexico into the following categories:

5A. **A TMDL is underway or scheduled.** AUs are listed in this category if the AU is impaired for one or more designated uses by a pollutant. Where more than one pollutant is associated with the impairment of a single AU, the AU remains in Category 5a until TMDLs for all pollutants have been completed and approved by the EPA.

5B. **A review of the water quality standard will be scheduled.** AUs are listed in this category when it is likely that WQS are not being met because one or more current designated uses are not existing or attainable, or if available data indicate background processes are causing criteria exceedences. AUs in this category usually also have additional data needs as well.

5C. **Additional data will be collected before a TMDL is scheduled.** AUs are listed in this category if there is not enough data and information to determine the specific pollutant of concern (for example, AUs with biological impairment but inadequate data to determine the cause of this response, n<4, etc.), complete a weight-of-evidence assessment, or determine if the impairment falls under the exemption in 20.6.4.11.I NMAC.

5ALT. **Alternative restoration approach is in progress or under development.** EPA created this optional subcategory as an organizing tool to clearly articulate which impaired water bodies have or will have alternative approaches to attain WQS (EPA 2015). The alternative restoration approach needs to clearly demonstrate how the WQS will be achieved. The description of the alternative restoration approach and the waters to which it applies will be included during public review of the draft Integrated Report, so that the public has an opportunity to view the proposed alternative restoration approaches. Additional details on what must be included in the description are found in EPA's listing guidance (EPA 2015).

This present reporting approach was developed in response to a recent National Research Council (NRC) report and a desire to provide a clearer summary of the nation's water quality status and management actions necessary to protect and restore them (NRC 2001, EPA 2001, WERF 2007). With a few additions and minor changes in terminology, the information requested in the *Integrated Listing* guidance (EPA 2001) and Consolidated Assessment and Listing Methodology guidance (EPA 2002a) were previously suggested in earlier section 305(b) reporting guidance (EPA 1997). The earlier guidance formed the basis of previous SWQB listing methodology.

Assessment information is housed in the SWQB's in-house database SQUID. This database was designed to implement suggestions in the *Integrated Listing* guidance (EPA EPA 2006a, 2009, 2011, 2013b, 2015, 2017, draft 2019), and to provide a means to directly upload New Mexico's use attainment information to the EPA's ATTAINs database. SQUID is first populated with AU information, associated designated uses, comments, and any supporting documentation. Individual use attainment decisions (i.e., **Fully Supporting**, **Not Supporting**, or **Not Assessed**) are then assigned for each AU based on assessment of data following these listing methodologies. SQUID then automatically determines the integrated reporting category for each AU based on the information entered for each applicable use.

The CWA §303(d)(1) requires states to establish a priority ranking for AUs determined to be impaired, and to schedule TMDL development in accordance with the priority ranking. New Mexico expresses this ranking, including indicating which waters bodies are targeted for TMDL development in the next two years, in the form of an estimated TMDL completion year per the EPA's recommendation (EPA 2005). This information is housed in SQUID and reported under "TMDL Date" for all AU-pollutant pairs noted as **Not Supporting** on the Integrated List. If a TMDL has already been completed and approved, the EPA approval date is displayed.

5.0 PUBLIC PARTICIPATION

The listing methodologies are periodically revised based on new EPA guidance, changes to the WQS, and the need to clarify various assessment procedures for staff. When the protocols are significantly revised, a draft is first sent to the EPA for initial review and comment. If significant changes to the overall assessment procedures and/or format of the document are being proposed, the SWQB also releases a public comment draft to solicit public review and comment. For example, a draft of this listing methodology was opened for a 30-day public comment period from June 26 to July 25, 2019. Consequent revisions to the main listing methodology are noted in the revision history below. See individual appendices for revisions histories related to those respective methodologies.

The final version of this protocol is provided to the EPA Region 6, who then considers the listing methodologies in its review and approval of Category 5 waters in the Integrated Report. The listing methodology is also posted on the SWQB website: https://www.env.nm.gov/surface-water-quality/calm/.

REVISION HISTORY:

2014 listing cycle – Pre-public comment: Moved aquatic life use data quality tables from main document to attachment. Added description of SQUID (SWQB's merger of ADB and NMEDAS databases). Added link to new data submittal website. Added information regarding assessment of hardness-dependent metals criteria (specifically, clarified that samples from waters with turbidity greater than 30 NTU must be filtered with 10-µm disposable in-line capsule filters prior to analysis). Minor revision to wording in Figure 3.3 - Generalized flowchart for determining Aquatic Life Use Support. Added protocols for determining nutrient impairment in lakes/reservoirs, and for proposing IR Category 4b. **Post- public comment:** Several minor wording and flowchart clarifications. Revisions to Limited Dataset section and associated addition of Integrated Report subcategories 3A and 3B. Added description of reference site approach to Bioassessment section. Clarified when Category 5C would be assigned. Additional clarification to Figure 3.3, clarified relationship between Data Quality Levels (Attachment A) and aquatic life use attainment decisions when conflicting conclusions from various data types, and indicated SWQB's general data quality level.

2016 listing cycle – Pre-public comment: Moved List of Common Acronyms (previously Appendix A) to the beginning of Main AP. Moved Data Quality Levels (previously Attachment A) to Appendix A. Re-named all appendices Added section regarding wildfire. Clarified assessing when multiple applicable numeric WQC for the same parameter. Added additional clarification to Integrated Report category descriptions. Removed reference to "unclassified" segments to match proposed triennial review clarification.

2018 listing cycle – Pre-public comment: Changed "Assessment Protocol" to "Listing Methodology" throughout. Clarified how to handle data reported below the MRL when data are part of an additive parameter, and when MRL is greater than the applicable WQC. Clarified when J flagged data would be used. Added additional information regarding non-representative data, and when data older than five years would be assessed. Clarified the relationship between temporary standards and the Integrated Report listing process. Added IR Category 5-alt, and expanded IR Category 3 to 3a, 3b, and 3c to better explain handling of n=1. Changed Tables 3.4 to 3.12 from "1 to 10" to "2 to 10" because n=2 is a minimum data requirement for assessment. Updated impairment determination logic in Table 3.8 for consistency with other assessment tables. **Post- public comment:** Clarified that this document was previously referred to as the "Assessment Protocol." Added the following footnote to Tables 3.4 – 3.12 to refer the reader to the appropriate section detailing the handling of limited datasets (n=1) with respect to assessment: "* Less than 2 samples = not assessed. See Section 2.1.4 for details." Clarified how SWQB will assess aluminum in waters with concurrent pH < 6.5 in Section 3.1.2.1. Based on this additional discussion, SWQB will also delist old dissolved aluminum listings for waters with concurrent pH >6.5 because the dissolved aluminum criterion is no longer applicable as stated in this revised section.

2020 listing cycle – Pre-Public Comment: Changed minimum n for assessment to 4; revised the assessment tables in Section 3, as well as IR Category 3B, 3C, and 5C accordingly. Added temporal independence language. Clarified the handling of temporary WQS. Added outlier identification to chronic ALU assessments. Clarifies the handling of concurrent hardness and turbidity data for total recoverable aluminum exceedance determination. Removed intermediate Not Assessed confirmation requirement category for biological assessments. Clarified the "Ea" validation code for bacteria assessments. Clarified how adjusted gross alpha is determined in assessment table footnotes. **Post-Public Comment:** In Section 1.0 clarified that data will be re-assessed if the assessment methodology for a specific parameter has significantly changed, and clarified which data older than five years old will be considered for assessment purposes. In Section 2.1.2, clarified that data from distinct hydrologist events collected within a seven-day period are not considered duplicates. In Section 2.1.4, added addition discussion regarding setting the minimum number of data points needed to assess. In Section 2.1.5, added reference to the critical low flow calculations used to develop point source discharge requirements. In Section 2.1.6, clarified that available water quality and GIS data may be used to help determine AU breaks. In Section 2.1.8, added a discussion of the handling of surface water highly influenced by groundwater input with respect to assessment, as well as adding “extreme drought” to the list of catastrophic events. In the beginning of Section 3.0, clarified that the entire WQMP update in progress will have a separate public participation process, and that Appendices B through H contains regarding the specific aquatic life uses and stream types covered in these respective appendices. The assessment step regarding to the handling of consecutive-day sampling data in Table 3.4 and Section 3.1.2.2 was removed because it was confusing and these types of data sets have never been, and are not anticipated to be, available for assessment in New Mexico.

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Exhibit 70

STATE OF NEW MEXICO

STATEWIDE WATER QUALITY MANAGEMENT PLAN
AND
CONTINUING PLANNING PROCESS

NEW MEXICO
WATER QUALITY CONTROL COMMISSION

P.O. Box 5469
Santa Fe, New Mexico 87502

https://www.env.nm.gov/surface-water-quality/wqmp-cpp/
public.facilitation@state.nm.us

WQCC Approval Date: September 21, 2020
EPA Approval Date: October 23, 2020

Copies of this document and the incorporated documents are available through the State library, the New Mexico Environment Department Surface Water Quality Bureau, Harold Runnels Building, 1190 St. Francis Drive, Santa Fe, NM 87502 in Santa Fe, or online at https://www.env.nm.gov/surface-water-quality/.

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LIST OF ACRONYMS AND ABBREVIATIONS

BPJ	Best Professional Judgment
BLM	Bureau of Land Management
BMPs	Best Management Practices
BOR	United States Bureau of Reclamation
CFR	Code of Federal Regulations
CPB	Construction Programs Bureau of NMED
CPP	Continuing Planning Process
CWA	Clean Water Act (33 U.S.C. 1251 et seq.)
CWSRF	Clean Water State Revolving Fund
DMA	Designated Management Agency
EMNRD	Energy, Minerals and Natural Resources Department
EPA	United States Environmental Protection Agency
GWQB	Ground Water Quality Bureau of NMED
LA	Load Allocation
MOS	Margin of Safety
NM	New Mexico
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMIP	Procedures for Implementing NPDES Permits in New Mexico
NMSA	New Mexico Statutes Annotated
NPDES	National Pollutant Discharge Elimination System
NPS	United States National Park Service
NPSMP	Nonpoint Source Management Program
OCD	Oil Conservation Division of EMNRD
ONRW	Outstanding National Resource Water
PIP	Public Involvement Plan
POTWs	Publicly Owned Treatment Works
QAPP	Quality Assurance Project Plan
RIP	Rural Infrastructure Revolving Loan Program
SDWA	Safe Drinking Water Act
SOP	Standard Operating Procedure
SWQB	Surface Water Quality Bureau of NMED
TAS	Treatment in a Similar Manner
TBEL	Technology Based Effluent Limit
TMDL	Total Maximum Daily Load
UAA	Use Attainability Analysis
UIC	Underground Injection Control
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service

USGS	United States Geological Survey
WLA	Waste Load Allocation
WQA	New Mexico Water Quality Act (Chapter 74, Article 6 NMSA 1978)
WQBEL	Water Quality Based Effluent Limit
WQCC	New Mexico Water Quality Control Commission
WQMP	Water Quality Management Plan
WQS	Water Quality Standards

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I. INTRODUCTION

A. Purpose

New Mexico's Statewide Water Quality Management Plan and Continuing Planning Process (WQMP/CPP) provides a concise summary of the water quality management system in New Mexico (NM) and the roles of the major participants in that system, as required by Sections 208 and 303 of the federal Clean Water Act (CWA) and New Mexico Statutes Annotated (NMSA) 1978, Section 74-6-4(B) of the New Mexico Water Quality Act (WQA).

In accordance with Section 303(e) of the CWA and 40 CFR 130.5, states are required to have a CPP which describes the processes used to manage the state's water quality programs. The state may determine the format of its CPP as long as it meets the minimum requirements, as described in Section 303(e)(3)(A)-(H) of the CWA and 40 CFR 130.5, but it may also include other processes at its discretion.

In accordance with 40 CFR 130.6(b), the WQMP is used to direct implementation and draw upon the water quality assessments to identify priority point and nonpoint water quality problems, consider alternative solutions and recommend control measures, including the financial and institutional measures necessary for implementing recommended solutions. The WQMP/CPP addresses nine (9) elements to implement water quality management planning, in accordance with 40 CFR 130.6(c) and as described under Section 205(j) of the CWA; areawide Waste Treatment Management under Section 208 of the CWA; and Water Quality Standards (WQS) and implementation plans as described under Section 303 of the CWA.

The Statewide WQMP/CPP is used to direct implementation of New Mexico's water quality programs. The WQMP/CPP is intended to provide a consistent approach to preserve, protect, and improve water quality by ensuring that WQS are established to protect designated uses, the quality of water in the environment is periodically assessed, and point and nonpoint pollution sources that may adversely impact water quality are identified, prioritized, and controlled.

B. Significant Challenges to Water Quality Management in New Mexico

There are many challenges in meeting the objectives of the CWA and the WQA. This section highlights some of the more significant surface water quality issues in New Mexico.

Climate Change

The impact of climate change on the state's water resources should be acknowledged because the science shows that these changes will lead to further problems and uncertainties. Droughts are predicted to increase in both frequency and severity in many regions of the world, including the southwestern U.S., due to climate change. In general, droughts and the immediate recovery period have substantial water quality effects on the waterbody and its watershed. For example, decreases in stream flow typically increase pollutant concentrations due to evaporation and less dilution. Other water quality impacts associated with climate change and drought include higher water temperatures, enhanced algal production, toxic algal blooms, and lower dissolved oxygen levels, all of which are stressors to aquatic life. As temperature and precipitation patterns undergo extreme cycles, more frequent and more powerful storms will increase pollutant runoff from the watershed, physically modify and erode riparian habitat, and disrupt biological communities that depend on these habitats. In addition, shifting temperature and precipitation patterns affect vegetation composition and density and increase the propensity for wildfire in non-fire adapted ecosystems.

As waters become stressed by climate change, drought, wildfires, overuse, and groundwater mining, many perennial and intermittent streams and springs will fade. Currently, many perennial "rivers" and "tributaries" in New Mexico contain non-perennial sections. As a result of climate change, these "perennial" waters will likely diminish and the need for clean water will strain these systems even further.

To address some of these concerns, in 2019 Governor Lujan Grisham signed executive order 2019-003 on Addressing Climate Change and Energy Waste Prevention. EO 2019-003 directs all State agencies to evaluate the impacts of climate change on their programs and operations and integrate climate change mitigation and adaptation practices into their programs and operations. The WQMP/CPP ties in directly with various initiatives for resource management in the State of New Mexico, including EO 2019-003. The long-term water quality monitoring programs under the State's Water Quality Management Plan are designed to identify trends in water quality and evaluate project effectiveness. In addition, watershed restoration projects enhance the natural environment and improve watershed resilience to climate change.

Stormwater and MS4s

Controlling stormwater runoff and its impact is a serious issue facing communities across New Mexico. Urban and highway stormwater runoff is rainfall or snowmelt that runs off the ground or impervious surfaces such as buildings, roads, and parking lots, and drains into natural or man-made drainage systems. In most cases, it drains directly into streams, river, lakes, or wetlands without receiving any treatment to remove pollutants. Because of this, stormwater is a leading cause of water pollution.

Changes in land use have a major effect on both the quantity and quality of stormwater runoff. Urbanization, if not properly planned and managed, can dramatically alter the natural hydrology of an area because it increases impervious cover, decreases the amount of rainwater that can naturally infiltrate into the soil, and consequently increases the volume and rate of stormwater runoff. Stormwater runoff also typically contains elevated concentrations of a variety of constituents that exceed water quality standards (e.g., copper, lead, and zinc; polyaromatic hydrocarbons (PAHs) and pesticides; oil and grease; nutrients (nitrogen and phosphorus); sediment; and *E. coli* bacteria). Untreated stormwater entering our waterways can kill aquatic life and result in the contamination of fish tissue and drinking water supplies; prohibit or limit swimming, fishing or boating; present dangers to public health and safety; and increase the frequency and magnitude of flooding.

Polluted stormwater runoff also is commonly transported through municipal separate storm sewer systems (MS4s) in urbanized areas to local waterbodies. To prevent harmful pollutants from being washed or dumped into MS4s, certain operators are required to obtain National Pollutant Discharge Elimination System (NPDES) permits and develop stormwater management programs (SWMPs). The SWMP describes the stormwater control practices that will be implemented consistent with permit requirements to minimize the discharge of pollutants from the urbanized area. Furthermore, effective water quality protection requires the "treatment" of stormwater through the use of various preventive and control measures (e.g., best management practices, low impact development, structural controls) to reduce the impact of impervious surfaces and minimize increases in stormwater runoff.

The U.S. Environmental Protection Agency's (EPA) "Procedures for Implementing NPDES Permits in New Mexico – NMIP" establishes procedures to effectively incorporate state water quality standards and total maximum daily loads (TMDLs) into NPDES permits. EPA Region 6 is the NPDES permitting authority in New Mexico. As such, EPA R6 uses the NMIP to explain NPDES permitting decisions in New Mexico. The EPA developed the NMIP in coordination with the NMED Surface Water Quality Bureau. Specific measures to ensure permitting effectiveness and appropriate implementation of New Mexico's water quality standards and TMDLs are contained in the NMIP.

Navigable Waters Protection Rule and "Waters of the U.S."

In 2019, the EPA and the Department of the Army proposed the Navigable Waters Protection Rule to define "waters of the U.S." and delineate which waters are protected under the federal CWA. The rule was finalized in April 2020 and went into effect on June 22, 2020. The new rule interprets the term "waters of the U.S." to encompass the following four categories of waters:

1. Territorial seas and traditional navigable waters;
2. Perennial and intermittent tributaries to territorial seas and navigable waters;
3. Certain lakes, ponds and impoundments of jurisdictional waters; and
4. Wetlands adjacent to other jurisdictional waters.

The new rule identifies 12 categories that are not "waters of the U.S." and therefore, not federally regulated or protected under the CWA, including ephemeral features that flow only in response to rainfall, groundwater, wetlands that do not abut a jurisdictional water, many farm and roadside ditches, certain artificial lakes and ponds, and waste treatment systems.

Under the new rule, at least 89 percent of the state's rivers and streams and approximately 40 percent of the state's wetlands lose federal regulation and protection from pollution. New Mexico is one of three states in the U.S., and the only state in the West, that does not have authority (aka "delegation") from the EPA to administer and implement the NPDES program under Section 402 of the CWA. The NPDES program regulates facilities that discharge pollutants into "waters of the U.S." and includes permit issuance, compliance, and enforcement activities.

This federal rollback of environmental protections for streams and wetlands will put more burden on the State's water quality management agencies, especially the New Mexico Environment

Department (NMED), to ensure continued protection of surface waters of the state and adequate resources to maintain and improve water quality. Without a state permitting program to authorize discharges to surface waters of the state including waters of the U.S., NMED is unable to fill the regulatory gap created by the new rule.

Currently, NMED is actively investigating available options. This includes conducting a NPDES gap analysis that (1) evaluates statutory, regulatory, and programmatic gaps associated with potential pursuit of NPDES program authorization for the State of New Mexico and (2) identifies actions necessary to eliminate the gap and assume authority over the program.

Watershed Management and Water Quality

Interagency collaboration has always played a significant role in managing watersheds on public lands within New Mexico. There are many federal and state agencies with varying missions and priorities for utilizing and protecting New Mexico's natural resources. In part, these activities include habitat restoration, water quality management, water rights management, mining, grazing, silviculture, conservation management, wildlife management, outdoor recreation, hunting, and fishing. As discussed in further detail under subsection F of this Section, this Water Quality Management Plan identifies some of those entities the State engages with to ensure continued water quality protection for the State of New Mexico.

C. Cross-walk of Sections in the WQMP/CPP and the Federal Requirements

The nine (9) federal requirements of a WQMP are found in 40 CFR 130.6(c), and the nine (9) federal requirements of a CPP are found in 40 CFR 130.5(b). Table I-1 shows how this document is organized to incorporate requirements of both the WQMP and the CPP. Any reference to the State's WQMP or CPP in statutes, regulations, standards or other documents refers to this document.

Table I-1: Federal Requirements for WQMP and CPP

WQMP/CPP Section	40 CFR 130.6 WQMP Requirements	40 CFR 130.5 CPP Requirements
I. Introduction	Not required by 40 CFR 130.6	**40 CFR 130.5(b)(4)** *The process for updating and maintaining WQMPs, including schedules for revision;* **40 CFR 130.5(b)(5)** *The process for assuring adequate authority for intergovernmental cooperation in the implementation of the State's WQMP.*
II. Water Quality Standards	Not required by 40 CFR 130.6	**40 CFR 130.5 (b)(6)** *The process for establishing and assuring adequate implementation of new or revised water quality standards.*
III. Assessment, Monitoring and Reporting	Not required by 40 CFR 130.6	Not required under 40 CFR 130.5

WQMP/CPP Section	40 CFR 130.6 WQMP Requirements	40 CFR 130.5 CPP Requirements
IV. Total Maximum Daily Loads (TMDLs)	**40 CFR 130.6 (c)(1)** *A list of approved TMDLs.*	**40 CFR 130.5(b)(3)** *The process for developing TMDLs and individual water quality-based effluent limitations for pollutants.*
V. Effluent Limitations	**40 CFR 130.6 (c)(2)** *Effluent limitations including water quality-based effluent limitations and schedules of compliance.*	**40 CFR 130.5 (b)(1)** *The process for developing effluent limitations and schedules of compliance;* **40 CFR 130.5(b)(9)** *The process for determining the priority of permit issuance.*
VI. Municipal and Industrial Waste Treatment	**40 CFR 130.6 (c)(3)** *Identification of anticipated municipal and industrial waste treatment works; programs to provide necessary financial arrangements for such works; establishment of construction priorities and schedules for initiation and completion of such treatment works including an identification of open space and recreation opportunities from improved water quality.*	**40 CFR 130.5(b)(7)** *The process for assuring adequate controls over the disposition of all residual waste from any water treatment processing;* **40 CFR 130.5(b)(8)** *The process for developing an inventory and ranking, in order of priority of needs for construction of waste treatment works.*
VII. Nonpoint Source Management and Control	**40 CFR 130.6 (c)(4)** *The regulatory and non-regulatory programs, activities, and Best Management Practices (BMPs) to control nonpoint source pollution where necessary to protect or achieve approved water uses.*	Not required by 40 CFR 130.5
VIII. Management Agencies	**40 CFR 130.6 (c)(5)** *Identification of agencies necessary to carry out the WQMP and provision for adequate authority for intergovernmental cooperation.*	Not required by 40 CFR 130.5
IX. Implementation Measures	**40 CFR 130.6(c)(6)** *Identification of implementation measures necessary to carry out the WQMP.*	Not required by 40 CFR 130.5
X. Dredge and Fill Program	**40 CFR 130.6(c)(7)** *Identification and development of programs for the control of dredge and fill material.*	Not required by 40 CFR 130.5.
XI. Basin Plans	**40 CFR 130.6(c)(8)** *Identification of any relationship to applicable basin plans developed under Section 209 of the CWA.*	**40 CFR 130.5(b)(2)** *The process for incorporating elements of any applicable areawide waste treatment plans under Section 208, and applicable basin plans under Section 209 of the CWA.*
XII. Groundwater	**40 CFR 130.6(c)(9)** *Identification and development of programs for control of ground-water pollution.*	Not required by 40 CFR 130.5

WQMP/CPP Section	40 CFR 130.6 WQMP Requirements	40 CFR 130.5 CPP Requirements
XIII. Determination of Compliance with WQS – Human Health Criteria	Not required by 40 CFR 130.6 (required by 20.6.4 NMAC)	Not required by 40 CFR 130.5
XIV. Public Participation	Not required by 40 CFR 130.6	**40 CFR 130.5(b)(4)** *The process for updating and maintaining the WQMP.*

D. History and updates to the WQMP/CPP

The New Mexico Water Quality Control Commission (WQCC) first adopted the WQMP and the CPP in 1979, under the statutory authority of Section 74-6-4(B) of the WQA. Prior to 2011, the WQMP and the CPP were maintained independently of each other. Beginning in 2011, the New Mexico Environment Department's (NMED's) Surface Water Quality Bureau (SWQB) consolidated the WQMP and CPP into one document.

The chronological summary of the subsequent updates are as follows:

- March 1976 CPP initially adopted
- October 1978 WQMP initially adopted
- May 1979 WQMP
  - Initially adopted Work Elements 2.5 (Trout Hatcheries), 4.3 (Sediment Study) 8.0 (Industrial Waste Treatment System Needs: Toxic Substance Study) and 9.5 (Development of Statewide Groundwater Monitoring System)
- October 1979 WQMP
  - Updated Work Element 3 (Population Projections)
- October 1980 WQMP
  - Initially adopted Work Element 13 (Designation of Management Agencies)
  - Updated Work Element 3 (Population Projections)
- May 1982 WQMP
  - Updated Work Element 6 (Point Source Load Allocations)
- September 1983 WQMP
  - Updated Work Element 4.1 (Irrigated Agriculture)
- August 1984 WQMP
  - Initially adopted Work Element 14 (Implementation Schedules)
  - Updated Work Elements 4.1 (Irrigated Agriculture), 4.2 (Silviculture), 4.3 (Sediment Study), 13 (Designation of Management Agencies)
- October 1985 WQMP
  - Updated Work Elements 6 (Point Source Load Allocations) and 13 (Designation of Management Agencies)
- April 1986 WQMP
  - Updated Work Element 3 (Population Projections)
- September 1988 WQMP

  - Updated Work Element 13 (Designation of Management Agencies)
- September 1989 WQMP
  - Updated Work Element 6 (Point Source Load Allocations)
- July 1998 CPP
- December 2002 WQMP
  - Approved December 17, 2002
  - Restructured for comprehensiveness, accessibility, and usability
  - Reorganized to track current federal requirements
  - Removed outdated or non-applicable elements
  - Consolidated partial updates
- May 2003 WQMP
  - Updated Introduction to provide background on how water quality is managed and Work Element 11 (Public Participation Program) (now Section XIV) to include outreach protocols and strategies
- December 2004 CPP
  - Initially adopted Antidegradation Policy Implementation Procedure
- November 2010 WQMP
  - Updated the Antidegradation Policy Implementation Procedure (Appendix A)
- May 2011 WQMP/CPP
  - Consolidated WQMP and CPP
  - Initially adopted the following new elements:
    - Developed Wetlands Program
    - Adopted Underground Injection Control (UIC) regulations
    - Created Water Cabinet for Water and Wastewater Infrastructure
    - Added Hydrology Protocol for determining water body type (ephemeral, intermittent, perennial)
  - Updated and revised:
    - References and citations
    - Program descriptions
    - WQS amendments
    - Completion of the TMDL settlement agreement requirements
    - Process for establishing TMDLs
    - Nonpoint Source Management Program
    - Provided a format that supported opportunity for future growth of the WQMP

The primary goals of this 2020 update include the following:

- Incorporate changes and new developments that have occurred since the last revision in 2011;
- Update the antidegradation policy implementation procedure (Appendix A);
- Incorporate the Wetland Program (Previously Section XV) into regulatory mandated portions of the WQMP/CPP primarily under the Nonpoint Source Management and Control (Section VII); and
- Update program descriptions and citations to referenced documents.

E. The process for updating and maintaining the WQMP/CPP including schedules for revision

[As required by 40 CFR 130.5(b)(4) for CPP]

To ensure that the WQMP/CPP continues to provide an effective framework for water quality management, updates may be developed for reasons such as: changes in population, economic development, changing water quality conditions, results of implementation activities, new and revised effluent limitations, and new requirements, including new laws, regulations, and standards.

The WQMP/CPP is periodically reviewed and revised in accordance with 40 CFR 130.5 and 40 CFR 130.6(e) to ensure the processes are current and adequately reflect the State's water quality management system. Any updates and revisions to the WQMP/CPP must be approved by the WQCC and the United States Environmental Protection Agency (EPA).

Following an identification for the need to update the WQMP/CPP, NMED proceeds with outreach efforts to Tribal counterparts in accordance with NMED's 2009 Tribal Collaboration and Communication Policy. Identification of potential stakeholders is also conducted to engage individuals or entities that may be impacted by the actions under the WQMP/CPP. Following outreach to Tribes and Stakeholders, the public notice process is driven primarily by various Federal and State regulations as well as NMED policies as outlined in Section XIV of this WQMP/CPP. After public comments are received, NMED reviews and incorporates necessary revisions, as applicable. NMED then presents the proposed revisions to the WQCC for consideration and approval. NMED may submit a proposed update to EPA for technical review before presentation to the WQCC. The WQCC considers the proposed update at one of its public meetings. At the WQCC meeting, the WQCC allows all interested persons reasonable opportunity to provide comment before deciding whether to approve the update.

After adopting an update, the WQMP/CPP is sent to the Governor or designee by the Department on behalf of the WQCC for review and certification that the update is consistent with all other parts of the plan. The WQCC sends the approved WQMP/CPP, along with the Governor's certification, to EPA Region 6 for approval. Once approved by EPA Region 6, the approved WQMP/CPP is maintained within NMED and filed as a State publication with the New Mexico State Library.

Updates to the appendices of the WQMP/CPP, including the Antidegradation Policy Implementation Procedure and the Hydrology Protocol for the Determination of Uses Supported by Ephemeral, Intermittent and Perennial Waters (Appendix A and C, respectively), are done in accordance with the process to update the WQMP/CPP. Updates to the TMDL List (Appendix B) are made once a TMDL has been adopted or removed in accordance with the process described in Section IV of this WQMP/CPP.

Several documents that relate to components of this WQMP/CPP are incorporated by reference. Documents incorporated by reference may be revised and updated independently, but in accordance with the WQMP/CPP. The context of each reference should be used to determine if a specific version or the most current version of the document is being referenced. The regulations and documents incorporated by reference into the WQMP/CPP include the following:

Ground and Surface Water Protection regulations *(20.6.2 NMAC)*

New Mexico Nonpoint Source Management Plan

Standards for Interstate and Intrastate Surface Waters regulations *(20.6.4 NMAC)*

State of New Mexico Integrated Clean Water Act §303(d)/§305(b) Integrated Report

Surface Water Quality Bureau Quality Management Plan (QMP)

Surface Water Quality Bureau Quality Assurance Project Plan for Water Quality Management Programs (QAPP)

F. Process for assuring adequate authority for intergovernmental cooperation in the implementation of the State's Water Quality Management Program
[As required by 40 CFR 130.5(b)(5) for CPP]

The creation of the WQCC as the control agency for all purposes of the WQA and, in turn, the federal CWA, are established under NMSA 1978, Section 74-6-3 of the WQA. The duties and powers of the WQCC under Section 74-6-4 of the WQA assure adequate authority for intergovernmental cooperation in the implementation of the WQMP/CPP.

Intergovernmental cooperation in the implementation of the WQMP/CPP programs is provided by four factors:

Factor 1: The composition of the WQCC.

The WQCC is the water pollution control agency for New Mexico. It is responsible for developing specific water quality policy in NM, in a manner that implements the broader policies set forth by the NM Legislature in the WQA. In accordance with Section 74-6-3 of the WQA, the WQCC is comprised of fourteen (14) members; nine (9) of which are representatives of State agencies involved in some aspect of water quality management; one (1) member is a representative of county or municipal government; and the other four (4) members are representatives of the public that are appointed by the Governor. Thus, the WQCC itself serves as a forum for exchange of information, coordination, and cooperation. The fourteen members of the WQCC include:

- Secretary of the Environment Department*
- Secretary of the Department of Health*
- Director of the Department of Game and Fish*

- State Engineer*
- Chair of the Oil Conservation Commission*
- Director of the State Park and Recreation Division of the Energy, Minerals and Natural Resources Department (EMNRD)*
- Director of the New Mexico Department of Agriculture*
- Chair of the Soil and Water Conservation Commission or a Soil and Water Conservation District Supervisor designated by him/her
- Director of the Bureau of Geology and Mineral Resources at the New Mexico Institute of Mining and Technology*
- Representative of County or Municipal Government
- Four representatives of the public to be appointed by the governor for terms of four years

*indicates that a Commissioner can appoint a designee.

The WQCC is the entity with authority to approve the WQMP/CPP, adopt WQS to protect waters of the State, as well as various regulations aimed at achieving compliance with those standards. In addition to its formal rulemaking role, the WQCC serves as a forum to facilitate and advance a statewide policy dialogue on a variety of important water quality topics. In accordance with NMSA 1978, Section 74-6-4(F), the WQCC shall also hear and decide disputes between constituent agencies as to jurisdiction concerning any matters within the purpose of the WQA. Additional duties and powers of the WQCC are defined in the WQA at NMSA 1978, Section 74-6-4.

Factor 2: The delegation of responsibilities to constituent agencies by the WQCC.

Under Section 74-6-4(F) of the WQA the WQCC has the authority to delegate responsibility for administering its regulations to constituent agencies to assure adequate coverage and prevent duplication of effort. The WQCC reviews, adopts, and records such delegations at its regular open meetings. As the WQCC has no staff of its own, responsibilities for administering its regulations are assigned among eight (8) constituent agencies identified in the WQA at NMSA 1978, Section 74-6-2(K). Those agencies, along with any applicable responsibilities pertaining to this WQMP/CPP, are as follows:

New Mexico Environment Department (NMED)

The Secretary of NMED is delegated as a member of the WQCC. Under the WQCC's delegation of Responsibilities to Environmental Improvement Division (now NMED) and Oil Conservation Division (OCD) dated July 21, 1989, NMED is the primary constituent agency responsible for administering and enforcing all programs implemented by the state under the CWA. Such actions include implementing the WQMP/CPP, as well as administering regulations adopted by the WQCC for discharges to surface and ground water. NMED is the principal source of technical expertise available to the WQCC in its rulemaking and other policy-setting activities. The WQCC, in accordance with NMSA 1978, Section 74-6-3(F), is administratively attached to NMED.

On July 21, 1989, through the Water Quality Control Commission's "Delegation of responsibilities to Environmental Improvement Division and Oil Conservation Division "the WQCC delegated NMED as the constituent agency to administer the following duties:

- Maintain, restore and improve the quality of the State's waters;
- Regulate discharges for compliance with regulations and standards;
- Develop water quality classifications and standards;
- Perform site application and design and specification reviews of new or expanding domestic wastewater treatment facilities;
- Undertake monitoring and enforcement of the statutes and permits;
- Coordinate water quality management planning;
- Manage state and federal construction grant and loan assistance programs which provide financial support to municipalities for construction or improvement of wastewater treatment facilities;
- Manage the groundwater quality protection program with the goal of protecting the public health and beneficial ground water uses; and
- Provide technical assistance to local governments regarding water and wastewater treatment.

Section 74-6-4(F) of the WQA also specifically assigns the following duties to NMED:

- Provide technical services, including certification of permits pursuant to the federal CWA, and
- Maintain a repository of the scientific data required by the WQA.

The following describes specific NMED bureaus and their responsibilities relating to the implementation of the WQMP/CPP. For additional information visit: https://www.env.nm.gov/.

Construction Programs Bureau (CPB): The CPB is involved in implementing portions of the WQMP/CPP as they pertain to prioritizing water, wastewater, and solid waste planning, design, and construction funding through the administration of the following programs: New Mexico Clean Water State Revolving Fund (CWSRF), also known as the Wastewater Facility Construction Loan Fund; Rural Infrastructure Program (RIP); and Capital Outlay Special Appropriations Program (SAP). As part of these programs, the CPB:

- Administers low interest loan and grant programs for water, wastewater and other environmental infrastructure projects that protect surface and groundwater;
- Manages the timely construction and administrative completion of publicly funded water, wastewater, and solid waste projects; and
- Ensures that projects are environmentally sound, of high quality, and free of waste, fraud, and abuse.

Ground Water Quality Bureau (GWQB): The GWQB protects the quality of NM's groundwater resources in accordance with the WQMP/CPP and as mandated by the WQA, the federal Safe

Drinking Water Act (SDWA), Ground and Surface Water Protection Regulations (20.6.2 NMAC), Ground Water Protection-Supplemental Permitting Requirements for Dairy Facilities (20.6.6 NMAC), and Ground Water Protection-Supplemental Permitting for Copper Mine Facilities (20.6.7 NMAC). The GWQB:

- Develops standards and regulations pertaining to groundwater quality;
- Issues groundwater pollution prevention discharge permits;
- Implements the Department's responsibilities under the New Mexico Mining Act to ensure that environmental issues are addressed, and standards are met;
- Implements NM's underground injection control (UIC) programs;
- Oversees groundwater investigation and remediation activities; and
- Identifies, investigates and remediates contaminated sites that pose significant risks to human health and the environment through implementation of the Bureau's Voluntary Remediation Program, Brownfields Program, and the federal Superfund program.

GWQB also strives to increase industry and public understanding and awareness of the importance of safe groundwater supplies in sustaining the quality of life in New Mexico for this and future generations, and the importance of protecting groundwater quality through pollution prevention initiatives.

Surface Water Quality Bureau (SWQB): The SWQB protects and improves NM's surface water quality by controlling pollution from both discrete point sources and dispersed nonpoint sources. The SWQB maintains and revises the WQMP/CPP and is the primary bureau within NMED that is responsible for implementing the majority of the sections under the WQMP/CPP. Operating under the CWA, the SDWA, the WQA, the Standards for Interstate and Intrastate Surface Waters (20.6.4 NMAC), and Ground and Surface Water Protection regulations (20.6.2 NMAC) the SWQB:

- Administers the Nonpoint Source (NPS) Program through the federally funded Program under Section 319 of the CWA and the state-funded River Stewardship Program;
- Administers the Wetlands Program;
- Certifies federal permits issued under Section 402 of the CWA pertaining to National Pollutant Discharge Elimination System (NPDES) and Section 404 of the CWA pertaining to Dredge and Fill;
- Assists the WQCC in developing surface WQS and regulations for the State;
- Conducts monitoring and assessment activities to report on water quality status and identify impairments of NM's surface waters; and
- Develops water quality planning documents identifying pollutant load reductions necessary to attain WQS.

Other NMED Bureaus and Programs: Other Bureaus and Programs also contribute to water quality protection and may work indirectly under the WQMP/CPP from time to time. Some of which are listed as follows:

- Utility Operator Certification Program ensures adequate training and certification for drinking water and wastewater operators.
- The Liquid Waste Program regulates individual on-site liquid waste systems to protect public health and to prevent contamination of ground and surface water.
- The Petroleum Storage Tank Bureau reduces, mitigates and eliminates the threats to the environment posed by petroleum products or released from underground and above ground storage tank systems.
- The Solid Waste Bureau assures that solid waste is managed in such a way as to minimize impact on the environment and public health.
- The Drinking Water Bureau assists communities in protecting the sources of their drinking water supplies from contamination.
- The Hazardous Waste Bureau regulates hazardous waste treatment, storage and disposal facilities, oversees cleanup of contaminated sites, and implements Federal Facility Compliance Orders at Los Alamos and Sandia National Laboratories.

Office of the State Engineer and Interstate Stream Commission

The State Engineer is delegated as a member of the WQCC. No other applicable responsibilities pertaining to this WQMP/CPP have been identified.

New Mexico Department of Game and Fish

The Director of the New Mexico Department of Game and Fish is delegated as a member of the WQCC. The Department of Game and Fish has also been delegated authority through the WQCC to enforce the regulation for disposal of refuse in a watercourse. No other applicable responsibilities pertaining to this WQMP/CPP have been identified.

New Mexico Oil Conservation Commission

The chair of the New Mexico Oil Conservation Commission is delegated as a member of the WQCC. In accordance with NMSA 1978, Section 70-2-4, the chair of the Oil Conservation Commission is elected from one of the three Commission members; a designee of the commissioner of public lands, a designee of the secretary of New Mexico's Energy, Minerals and Natural Resources Department (EMNRD), and the Director of the Oil Conservation Division (OCD).

In accordance with NMSA 1978, Section 70-2-6, the Oil Conservation Commission has concurrent jurisdiction and authority with the Oil Conservation Division (OCD). The WQCC's delegation of Responsibilities to Environmental Improvement Division (now NMED) and Oil Conservation Division (OCD), dated July 21, 1989, outlines the division of responsibilities between the agencies for administering WQCC regulations to protect water quality and abate water pollution (*see generally* 20.6.2 NMAC). The OCD administers these regulations as they pertain to "discharges from facilities for the production, refinement, pipeline transmission of oil and gas or products thereof, the oil field service industry as related to oil and gas production activities, oil field brine production wells, geothermal installations and carbon dioxide facilities" (*see* Subsection A(1) of 20.6.2.1201 NMAC).

The disposition by use of produced water not for drilling, completion, producing, secondary recovery, pressure maintenance or plugging of wells pursuant to 19.15.34 NMAC requires prior approval from the OCD (see Subsection A *of* 19.15.34.8 NMAC), and also requires the submission of a Notice of Intent to NMED and/or EPA if the use includes a potential discharge to ground or surface waters (*see* 20.6.2.1201 NMAC and Section 402 of the CWA, respectively). Discharges from other types of facilities that could affect groundwater quality are regulated by NMED's Ground Water Quality Bureau. No other applicable responsibilities pertaining to this WQMP/CPP have been identified.

New Mexico State Parks Division of the Energy, Minerals and Natural Resources Department

The Director of the New Mexico State Parks Division of the Energy, Minerals and Natural Resources Department is delegated as a member of the WQCC. The State Parks Division of the EMNRD has been delegated authority to enforce the WQCC regulation for disposal of refuse in a watercourse. No other applicable responsibilities pertaining to this WQMP/CPP have been identified.

New Mexico Department of Agriculture

The Director of the New Mexico Department of Agriculture is delegated as a member of the WQCC. No other applicable responsibilities pertaining to this WQMP/CPP have been identified.

New Mexico Soil and Water Conservation Commission

The Chair of the New Mexico Soil and Water Conservation Commission is delegated as a member of the WQCC. No other applicable responsibilities pertaining to this WQMP/CPP have been identified.

New Mexico Bureau of Geology and Mineral Resources at the New Mexico Institute of Mining and Technology

The Director of the Bureau of Geology and Mineral Resources at the NM Institute of Mining and Technology is delegated as a member of the WQCC. No other applicable responsibilities pertaining to this WQMP/CPP have been identified.

Factor 3: The authority of the WQCC to enter into or authorize its constituent agencies to enter into agreements with federal or state agencies for purposes consistent with the WQA.

Under the WQA at NMSA 1978, Section 74-6-4(G), the WQCC has the authority to enter into, or authorize constituent agencies to enter into, agreements with the federal government or other state governments. This provides the WQCC with a means of formally coordinating with agencies outside of the WQCC and allows the WQCC to use the expertise of those agencies in fulfilling its responsibilities.

Factor 4: The designation of management agencies to carry out specific responsibilities under the WQMP/CPP.

The WQCC designates management agencies to carry out specific responsibilities. Designated Management Agencies (DMAs) are generally municipal or public entities that must satisfy the requirements of 40 CFR 130.6(c)(5), including demonstration that the agencies have the legal, institutional, managerial, and financial capability, as well as programmatic capacity, to carry out the designated responsibilities. The designation must be formally accepted by the management agency and adopted by the WQCC before it is certified by the Governor.

Pursuant to Section 208 of the CWA, the governor of a state must identify areas of the state which, as a result of urban or industrial concentration or other significant factors, have substantial water quality problems. The governor may designate regional planning agencies for these areas, after consultation with local governmental officials having jurisdiction over the area, to conduct the planning required by Section 208. As specified at 40 CFR 130.12(b), Section 201 of the CWA funding can only be awarded to DMAs that are in conformance with the statewide WQMP/CPP. A list of approved DMAs can be found in Section VIII of this WQMP/CPP.

G. Other Entities participating in water quality management

A multi-agency approach is implemented to carry out the directives of the CWA, the State's WQA and the mission of NMED. Numerous entities at the local, state and federal level participate in water quality management. The following describes the entities and their identified roles and responsibilities as they pertain to water quality management and planning in New Mexico.

Other State Agencies

Several other state agencies conduct activities that impact water quality and are considered in the coordination and implementation of this WQMP/CPP as appropriate. These include, but are not limited to:

- Department of Transportation
- Department of Health
- State Forestry Division
- State Land Office
- Energy, Minerals and Natural Resources Department (specifically, Mining and Minerals Division)

Other Watershed-Based Water Quality Authorities/Associations/Forums

Increasing interest in a watershed-based approach to water quality management has led to the development of a number of local and regional initiatives in NM. These initiatives reflect a great diversity of organizational models and functional roles. The various initiatives focus on a number of different priorities such as: implementation of site-specific control regulations adopted by the WQCC, information sharing (outreach and education), or implementation of remediation and restoration projects. The number and nature of these local and regional watershed initiatives in New Mexico is evolving rapidly. No effort is made in this WQMP/CPP to comprehensively catalogue or describe such initiatives.

U.S. Environmental Protection Agency (EPA)

In addition to providing a significant amount of programmatic funding through CWA grant programs, EPA has several roles with respect to NM's water quality control programs:

- WQS In accordance with Section 303(c)(3) of the CWA, EPA is required to review state water quality standards and either approve WQS as being compliant with the federal act, or to disapprove and promulgate classifications and standards for NM.

- TMDLs - EPA reviews and approves the State's CWA §303(d) List of Impaired Waters. States are required to develop TMDLs for impaired waterbodies (Per Section 303(d) of the CWA, 33 U.S.C. §1313). TMDLs that are first adopted by the WQCC are then reviewed and approved by EPA under the CWA.

- Discharge Permits - EPA issues NPDES discharge permits in New Mexico which are certified by SWQB under Section 401 of the CWA.

- EPA is responsible for approving Section 208 of the CWA plans (regional WQMPs) submitted by states, as well as state CPPs prepared in accordance with Section 303(e) of the CWA.

- Guidance - In addition to adopting regulations establishing water quality program requirements that must be met by states, EPA frequently issues guidance documents or policy statements on a variety of water quality topics.

Other Federal Agencies

Several other federal agencies involved in water quality management in NM, including the U.S. Forest Service (USFS), U.S. Bureau of Land Management (BLM), and National Park Service (NPS), consider water quality protection in their management programs. The U.S. Army Corps of Engineers (USACE) administers the permit program under Section 404 of the CWA, which regulates the discharge of dredged and fill material that may adversely impact waters of the United States, including wetlands. The U.S. Bureau of Reclamation (BOR) has increasingly included environmental protection considerations into its management of federal water projects. The U.S. Department of Agriculture (USDA) administers an Environmental Quality Incentive Program under the federal Farm Bill. The U.S. Fish and Wildlife Service (USFWS) consults with other federal agencies under Section 7 of the Endangered Species Act regarding activities that may adversely impact threatened or endangered species. EPA consults with USFWS to evaluate potential impacts from water quality program activities on threatened and endangered species. The U.S. Geological Survey (USGS) undertakes a variety of studies regarding water quality, including the National Water Quality Assessment program.

Tribes

Although the State's water quality regulations are not applicable to tribal waters within the exterior boundaries of a tribe or those lands to which the Tribe has incorporated into federal trust; many waters cross boundaries and jurisdictional protections, and as such there is a shared interest in the protection of water quality between the Tribes and the State of New Mexico. The State recognizes the importance of communication and collaboration with Tribes to ensure water quality across boundaries.

The State has memorialized this sentiment through Executive Order 2005-004, The State-Tribal Collaboration Act, NMSA 1978, Section 11-18-1, and subsequently NMED's *Tribal Consultation and Collaboration Policy* (NMED Office of the Secretary 2020). It is through the *Tribal Consultation and Collaboration Policy* that NMED engages Tribes during any action(s) that may impact the natural, cultural and environmental resources of a Tribe. Tribes are recognized as sovereign entities. Therefore, the State interacts accordingly with them in a government-to-government capacity. These actions with Tribes are independent of stakeholder and public outreach efforts.

The 23 federally recognized Tribes throughout the State of New Mexico include:

- *Acoma Pueblo
- Pueblo de Cochiti
- *Pueblo of Isleta
- Jemez Pueblo
- *Laguna Pueblo
- *Nambe Pueblo
- *Ohkay Owingeh
- *Picuris Pueblo
- *Pojoaque Pueblo
- *Pueblo of Sandia
- Pueblo of San Felipe
- Pueblo de San Ildefonso
- *Pueblo of Santa Ana
- *Santa Clara Pueblo
- Santo Domingo Pueblo
- *Taos Pueblo
- *Pueblo of Tesuque
- Pueblo of Zia
- Zuni Pueblo
- Mescalero Apache
- Jicarilla Apache
- Fort Sill Apache
- *Navajo Nation

*Indicates that as of the approval date of this WQMP/CPP, tribe was identified by EPA to have Treatment in a Similar Manner as a State ("TAS") under Section 303(c) of the CWA allowing them to develop their own water quality standards for waters within the exterior boundaries of their Tribe. Please note this is a designation through the EPA and is independent of the State of New Mexico and the status, as listed here, may change at any time. For current status of TAS and WQS for tribes refer to EPA's website (https://www.epa.gov/wqs-tech/epa-actions-tribal-water-quality-standards-and-contacts).

In addition, the State also recognizes the Ysleta del Sur Pueblo near El Paso, Texas which also has critical interest in the protection of water quality along the Rio Grande as it enters Texas from New Mexico. The State also recognizes the Southern Ute Indian Tribe of the Southern Ute Reservation and Ute Mountain Ute Tribe in Colorado along the New Mexico Colorado border.

Stakeholders and the General Public

Stakeholder and public participation are an integral part of water quality management in NM. All regulatory actions of the WQCC and NMED are required to follow appropriate public comment, notice, and hearing requirements. In addition, with respect to policy-related and non-regulatory activities of the WQCC and NMED, an opportunity for public input is often provided through informational public meetings.

II. SURFACE WATER QUALITY STANDARDS

A. Extent of Authority

New Mexico's Standards for Interstate and Intrastate Surface Waters (20.6.4 NMAC) establish surface WQS that consist of designated uses for surface waters of the State, the water quality criteria necessary to protect the designated uses, and an Antidegradation Policy. These standards are not applicable to tribal waters within the exterior boundaries of a tribe or those lands to which the tribe has incorporated into federal trust. Section 518 of the CWA authorizes EPA to treat eligible Indian tribes with reservations in a similar manner to states (TAS) for administering each of the principal CWA regulatory programs. Therefore, protection of these waters is administered under the individual tribe's WQS as approved by EPA or by EPA for those tribes that have not received TAS under Section 518(e) of the CWA. The State of New Mexico does not have jurisdiction to adopt or impose WQS for tribal waters within NM's borders.

B. Objective

The Standards for Interstate and Intrastate Surface Waters state the following objective:

> *The State of New Mexico is required under the New Mexico Water Quality Act … and the federal Clean Water Act … to adopt water quality standards that protect the public health or welfare, enhance the quality of water, and are consistent with and serve the purposes of the New Mexico Water Quality Act and the federal Clean Water Act. It is the objective of the federal Clean Water Act to restore and maintain the chemical, physical, and biological integrity of the nation's waters, including those in New Mexico. This part is consistent with Section 101(a)(2) of the federal Clean Water Act, which declares that it is the national goal that wherever attainable, an interim goal of water quality that provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983. Agricultural, municipal, domestic and industrial water supply are other essential uses of New Mexico's surface water; however, water contaminants resulting from these activities will not be permitted to lower the quality of surface waters of the state below that required for protection and propagation of fish, shellfish and wildlife and recreation in and on the water, where practicable.* (20.6.4.6(B) NMAC).

C. Components of New Mexico's Surface Water Quality Standards

The federal WQS regulation (40 CFR 131) establishes the requirements for states and tribes to review, revise and adopt WQS. It also establishes the procedures for EPA to review, approve, disapprove and promulgate WQS pursuant to Section 303 (c) of the CWA. As such, WQS are designed to protect the public health or welfare, enhance the quality of water and serve the purposes of the Act. New Mexico's WQS (20.6.4 NMAC), as required under the CWA, define water quality goals by designating uses for surface waters of the State, setting criteria to protect those uses, and establishing an Antidegradation Policy and implementation plan to preserve water quality. Each of these components is described in more detail below.

Designated Uses

In accordance with 40 CFR 131.10, the State is required to specify goals and expectations for how each water body is used. The system for designating these uses is through development of surface WQS. Numeric criteria are adopted to protect each designated use. It is through the designation of a use for a specific waterbody that water quality protections are implemented.

Designated uses include fish culture, public water supply, industrial water supply, domestic water supply, irrigation and irrigation storage, primary contact, secondary contact, livestock watering, wildlife habitat, and several aquatic life subcategories. The full list of designated uses is specified in 20.6.4.900 NMAC.

Within each river basin, waters are divided into individual "segments" for classification and standard-setting purposes (20.6.4.101 through 20.6.4.899 NMAC). Most of the state's perennial water segments and many non-perennial segments have designated uses listed under 20.6.4.101 to 899 NMAC. All other "non-classified" waters are assigned default designated uses under 20.6.4.98 to 99 NMAC; however, some waters that have been characterized through a use attainability analysis have designated uses specified under 20.6.4.97 NMAC.

Water Quality Criteria

Water quality criteria are established to sustain and protect designated uses of surface waters of the State. States typically adopt both narrative criteria (e.g., general criteria that describe the desired condition of a surface water) and numeric criteria (e.g., maximum allowable pollutant concentration in a surface water).

The State of New Mexico has adopted narrative, or general, criteria under 20.6.4.13 NMAC. General criteria apply to all surface waters of the state and declare that:

> *"…surface waters of the State shall be free of any water contaminant in such quantity and of such duration as may, with reasonable probability, injure human health, animal or plant life or property, or unreasonably interfere with the public welfare or the use of property."*

As identified under Subsections A to M of 20.6.4.13 NMAC, New Mexico's general criteria include: bottom deposits and suspended or settleable solids; floating solids, oil and grease; color; organoleptic quality (odor and taste of fish and water); plant nutrients; toxic pollutants; radioactivity; pathogens; temperature; turbidity; total dissolved solids (TDS); dissolved gases; and biological integrity.

Numeric criteria are specific quantitative limits for pollutants established to protect specific designated uses and specific WQS segments. Use-specific numeric criteria are provided in 20.6.4.900 NMAC and apply to all waters with the applicable designated uses, unless otherwise specified in 20.6.4.101 through 20.6.4.899 NMAC as segment-specific criteria. The WQS also include numeric "human health-organism only" criteria established to protect human health when aquatic organisms are consumed from waters containing pollutants.

Antidegradation Policy

New Mexico's Antidegradation Policy, which is based on requirements in 40 CFR 131.12, describes how waters are to be protected from degradation (Subsection A of 20.6.4.8 NMAC). At a minimum, the policy protects existing instream uses. Water quality that exceeds the levels necessary to support the propagation of fish, shellfish, and wildlife, and recreation in and on the water is to be maintained unless the WQCC finds that allowing lower water quality is necessary to accommodate important economic and social development. Waters designated as Outstanding National Resource Waters (ONRWs) are to receive the highest level of antidegradation protection. Designated ONRWs are listed in 20.6.4.9 NMAC.

D. Process for Establishing and Updating Water Quality Standards

[As required by 40 CFR 130.5(b)(6) for CPP]

General Process for Establishing or Revising Water Quality Standards

Under the State's WQA, NMSA 1978, Section 74-6-2(H), the duties and powers of the WQCC include adoption of standards for surface and groundwaters of the state. Anyone may propose new or revised standards to the WQCC at any time in accordance with the rulemaking procedures for the WQCC (20.1.6 NMAC) and the State's WQS (20.6.4 NMAC). These regulations specify requirements for pre-hearing procedures and petitions for regulatory changes, hearing notices, hearing participation, post-hearing actions and appeals. It is recognized that notification and engagement of the public prior to petition is vital to the rule-making process and, therefore, additional requirements have been identified under this WQMP/CPP to encourage participation, allow effective presentation of evidence and points of view, allow participants an opportunity to submit information, and assure that hearings are conducted in a fair and equitable manner. For all proposed changes to the State's WQS, the WQCC bases its decision on evidence presented at the public hearing.

The process to adopt new or amended surface WQS conforms to requirements under numerous federal and state acts including, but not limited to, the CWA (33 U.S.C. § 1251 *et seq)*, the Endangered Species Act (16 U.S.C. §1531 *et seq*), the Civil Rights Act (18 U.S.C. § 241 *et seq*), the Americans with Disabilities Act (42 U.S.C. 12101 *et seq*), the Freedom of Information Act 5 U.S.C. § 552, the WQA (NMSA 1978, Section 74-6-4), the New Mexico State Rules Act (NMSA 1978, Section 14-4-1), and the New Mexico Open Meetings Act (NMSA 1978, Section 10-15-1).

New or amended WQS codified under 20.6.4 NMAC, as adopted by the WQCC, are filed with the State Records Center pursuant to the regulatory provisions under the State's WQA (NMSA 1978, Section 74-6-1 *et seq*.) and the State Rules Act (NMSA 1978, Section 14-4-1 *et seq*.), and in accordance with the State's regulations for rules filed under 1.24.1 NMAC. The new or amended standards become effective for state purposes thirty (30) days after filing.

New or revised surface WQS adopted by the WQCC are certified by the State Attorney General as being duly adopted pursuant to state laws and then submitted by the WQCC to the EPA Region

6 Administrator. In accordance with the CWA Section 303(c)(3), the EPA Administrator must determine, within sixty days of submission, if the new or amended WQS meet the requirements of the CWA. If the Administrator determines that any such revised or new standard is not consistent with the applicable requirements of the CWA, the Administrator shall notify the State and specify the changes to meet such requirements no later than the ninetieth day after the date of submission. If the State does not remedy the deficiencies, EPA will publish proposed regulations and promulgate a standard to supersede the disapproved State standard.

Establishing or Revising Water Quality Standards through the Triennial Review

Section 303(c)(1) of the CWA requires the State to hold public hearings for the purpose of reviewing WQS including standards that do not include the uses specified in section 101(a)(2) of the Clean Water Act and, as appropriate, amend and adopt standards at least once every three years. This review is referred to as a "Triennial Review." The WQCC conducts a Triennial Review of the State's surface WQS as required by Section 303(c)(1) of the CWA and 20.6.4.10 NMAC. NMED is delegated the responsibility for organizing and presenting the Triennial Review at the required intervals. The general process for establishing or revising water quality standards described above are followed for Triennial Review proceedings.

Establishing or Revising a Designated Use through a Use Attainability Analysis

The process for establishing or revising a designated use occurs through the development of a Use Attainability Analysis (UAA). The UAA is a scientific study that assesses the factors affecting the attainment of a designated use. In accordance with 20.6.4.15 NMAC, the UAA is required to be conducted before a designated use specified in Section 101 (a)(2) of the CWA may be removed or changed to a subcategory requiring less stringent criteria. The uses specified in Section 101(a)(2) of the CWA "provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water." The established designated uses meeting this goal in the State's WQS include the wildlife habitat use, the primary and secondary contact use, and all aquatic life use subcategories except the limited aquatic life use.

In order for a state to designate a use, or remove a use that is not an existing use, the UAA must demonstrate that attainment of the use is not feasible based on one of the factors identified at 40 CFR 131.10(g):

(1) Naturally occurring pollutant concentrations prevent the attainment of the use; or

(2) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or

(3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or

(4) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or

(5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or

(6) Controls more stringent than those required by sections 301(b) and 306 [technology-based effluent limitations] of the Act would result in substantial and widespread economic and social impact.

A UAA may be conducted by the Department or, in accordance with Subsection D of 20.6.4.15 NMAC, by any person who submits notice to the Department with intent to conduct a UAA. A UAA must rely on a scientifically defensible method and the result, should it support a designated use change under one of the six factors under 40 CFR 131.10(g), must undergo the same administrative review and hearing process as that for the Triennial Review.

Prior to commencement of any investigation, third-parties seeking to conduct a UAA, shall submit a work plan to the Department and EPA for review. Upon approval of the work plan by the Department, the proponent may then conduct the UAA. Upon completion, data, findings and conclusions will be submitted to the Department and either the proponent or the Department may proceed with the administrative review and hearing process for the designated use change. As with the Triennial Review process, the change shall not be considered effective for State purposes until approved by the WQCC and published with an effective date in the New Mexico Register. For CWA purposes, the designated use change shall only be considered effective following EPA review and approval process described above.

For a designated use change that is being proposed based on evidences of the natural, ephemeral, intermittent or low flow conditions as identified under 40 CFR 131.10(g)(2), the *Hydrology Protocol* method under Appendix C of this WQMP/CPP is recommended. The *Hydrology Protocol* was designed as a multi-parameter evaluation to determine the natural hydrologic conditions of a waterbody and the associated designated uses that should be attainable. For studies investigating a possible designated use change due to hydrologic conditions under 40 CFR 131.10(g)(2), consideration must be taken for any supplemental flows attributed to permitted effluent discharges.

Existing uses, defined in the WQS as "a use actually attained in a surface water of the state on or after November 28, 1975, whether or not it is a designated use", may not be removed regardless of the outcome of a UAA unless a use with more stringent criteria is added. (40 CFR 131.10(h) and Subsection A of 20.6.4.15 NMAC).

Establishing or Revising a Designated Use using the *Hydrology Protocol*

There are three primary types of hydrologic conditions defined under the WQS in New Mexico, each of which has established designated uses for protections under Section 101(a)(2) of the CWA. These include listed ephemeral waters (20.6.4.97 NMAC), general intermittent waters (20.6.4.98 NMAC), and general perennial waters (20.6.4.99 NMAC). In addition, the State's WQS also identify many classified waters by their hydrology, e.g., "perennial tributaries to" or "perennial reaches of" (20.6.4.101 to 899 NMAC).

The *Hydrology Protocol,* attached as Appendix C, is primarily used to provide scientific technical support for a designated use change through a UAA based on natural, ephemeral, intermittent or low flow conditions or water levels that prevent the attainment of the designated use. Since the *Hydrology Protocol* is done in support of a UAA, it can be conducted either by the Department, or by an entity other than the Department. If an entity other than the Department conducts this type of analysis, a UAA workplan for the use of the *Hydrology Protocol* must be submitted to the Department for review and approval in accordance with Subsection D of 20.6.4.15 NMAC before proceeding with the survey.

For waterbodies that are classified under 20.6.4.101 to 899 NMAC, the State asserts protections for these waters under the classified segment. A survey using the *Hydrology Protocol* can be used to confirm or delineate segment-specific hydrological regimes that may or may not lead to a revision to the State's WQS. For example, numerous classified segments in the WQS include only perennial waters, without specifically identifying which reaches are perennial (e.g., "perennial reaches of…", "perennial tributaries to…"). In such cases, the *Hydrology Protocol* can be used to determine whether a waterbody in whole, or a segment of the waterbody is perennial and therefore included in the classified segment, or non-perennial and therefore subject to the designated uses and criteria for general non-perennial waters in 20.6.4.98 NMAC. Such determinations do not require a UAA or a hearing because they do not change the designated uses or criteria but merely allow for the applicable uses to be properly identified. However, if a revision to incorporate the results of the *Hydrology Protocol* survey are needed to further refine, delineate or re-classify a waterbody under 20.6.4.101 to 899 NMAC this must be done through the UAA process.

For waterbodies that are perennial but have not been classified under 20.6.4.101 to 899 NMAC, the State asserts perennial protections for these waters under 20.6.4.99 NMAC. A survey using the *Hydrology Protocol* may be used to verify the hydrological regime for these unclassified perennial waters. A revision to incorporate the results of the *Hydrology Protocol* survey to classify a waterbody under 20.6.4.101 to 899 NMAC is done through the UAA process.

For the waterbodies in the State that are non-perennial but have not undergone an in-depth investigation to determine the hydrologic regime (i.e., intermittent, ephemeral), the State asserts intermittent protections for these waters under 20.6.4.98 NMAC, consistent with the goals in Section 101(a)(2) of the CWA. If the results of the *Hydrology Protocol* survey indicate that the waterbody is in fact intermittent, no further action is required because it is protected, by default, under 20.6.4.98 NMAC for intermittent waters.

For those cases in which the results of the *Hydrology Protocol* survey demonstrate that an unclassified non-perennial waterbody is ephemeral, designated uses that are not existing uses may only be changed if a UAA is conducted according to 40 CFR 131.10(g) and 20.6.4.15 NMAC in order for the State to assert protections for the ephemeral waterbody under 20.6.4.97 NMAC.

In some cases, an expedited UAA process outlined under Subsection C of 20.6.4.15 NMAC and illustrated in Figures II-1 and II-2 may be pursued. The expedited UAA process is not applicable for entities other than the Department. However, this does not preclude third-parties from developing and executing a workplan for the use of the *Hydrology Protocol* and submitting the UAA to the Department for use in the expedited process. The expedited UAA process facilitates the efficient application of the limited aquatic life and secondary contact uses to ephemeral waters where appropriate. As described under Subsection C of 20.6.4.15 NMAC, it is the Departments' role and responsibility to post the use attainability analysis on its water quality standards website, notify its interested parties of a 30-day public comment period, submit to EPA and if given technical approval, petition and testify regarding the standards changes before the WQCC periodically.

The *Hydrology Protocol* can also be used to support other factors under 40 CFR 131.10(g), such as those attributed to hydrological modifications, and provide additional evidence that "it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use." 40 CFR 131.10(g)(4).

Persons or entities proposing to conduct a UAA using the *Hydrology Protocol* must submit a UAA workplan for the use of the *Hydrology Protocol* to the SWQB for review and approval before proceeding (Subsection D of 20.6.4.15 NMAC). Such an approach will help ensure that the *Hydrology Protocol* and UAA process proceed smoothly, without delay, and that the study will comply with applicable statutes and rules.

Figure II-1. The *Hydrology Protocol* can be used to evaluate an unclassified water, an unnamed waterbody within a classified segment, or a classified waterbody. This flow chart depicts the primary pathways to determining or amending the applicable water quality standards based on the *Hydrology Protocol* results.

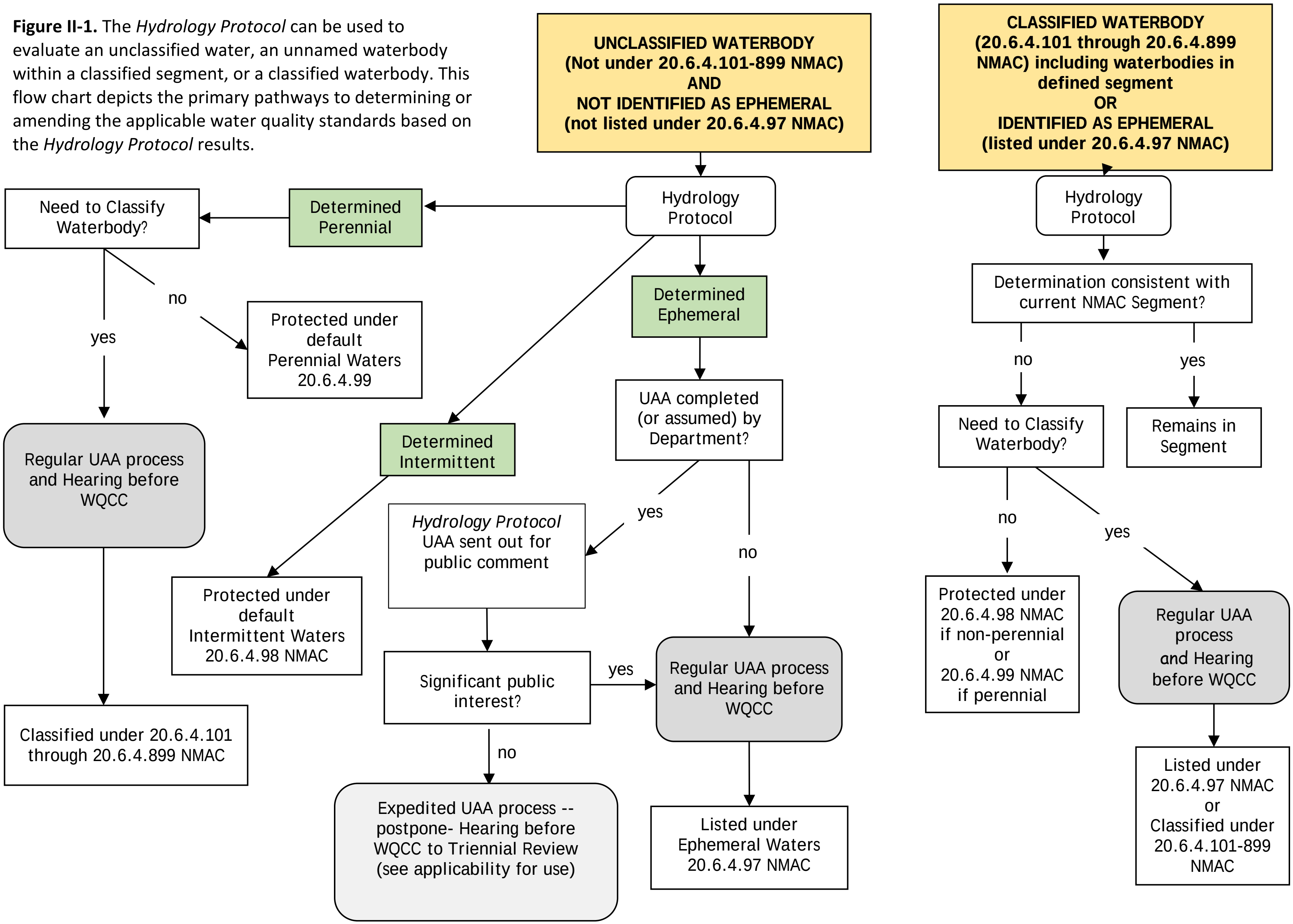
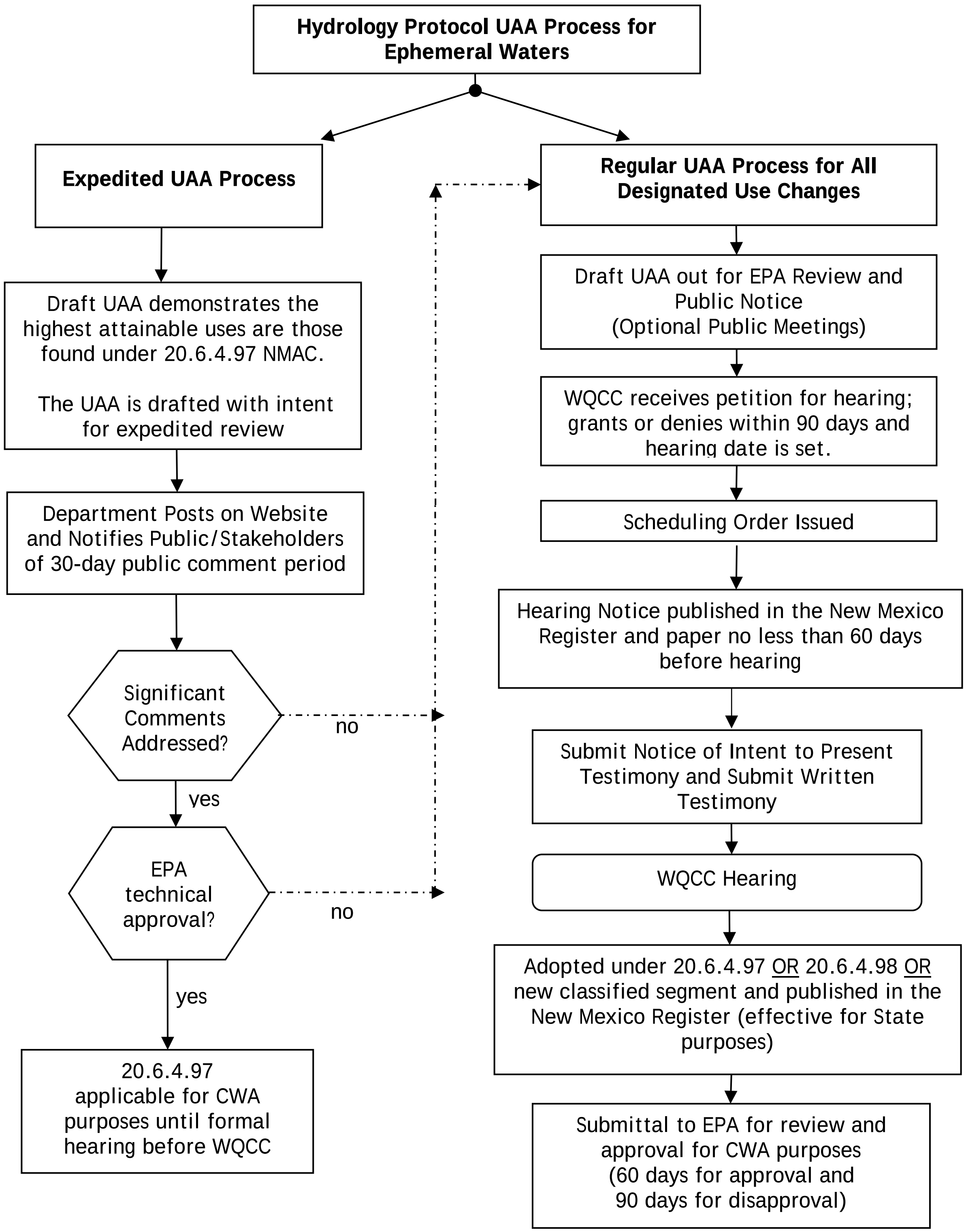


Figure II-2. Flow chart compares the expedited UAA process for an ephemeral stream determined through a hydrology protocol with the UAA process.



Establishing or Revising a Site-Specific Standard

In accordance with 20.6.4.10 NMAC, there are circumstances such as species sensitivity; site specific physical, chemical or biological conditions that alter bioaccumulation of a chemical; or natural background concentrations that exceed a particular numeric criterion for an established designated use that warrants inclusion or updating due to site specific conditions. The commission may adopt site-specific numeric criteria based on relevant site-specific conditions pertaining to those conditions listed under 20.6.4.10(D)(1).

Any person may petition the commission to adopt site-specific criteria, giving a thorough explanation of the rational for the proposal that justifies the proposed criteria and relying on scientifically defensible methods that demonstrate the site-specific criteria fully protects the designated use, such as those listed under Subsection D(4) of 20.6.4.10 NMAC. In the same process for establishing or revising designated uses for waterbodies, establishing site-specific standards requires the petitioner (the State or other party) to submit demonstration of the supporting evidence for the standard. The process to petition for a site-specific criteria is a rulemaking under 20.6.4 NMAC and requires adherence to rulemaking processes by the WQCC under 20.1.6 NMAC.

Process for Establishing or Revising a Temporary Standard

When a waterbody has been determined to have the appropriate designated use, but specific limiting conditions prevent the attainment of that use in the short-term, the WQCC may adopt a temporary standard. A temporary standard is a time-limited designated use and criterion for a specific pollutant(s) or water quality parameter(s) that reflects the highest attainable condition during the term of the temporary standard. A temporary standard is a change in a designated use, and therefore, must be adopted by the WQCC and EPA under rule-making procedures, just as with any other water quality standard amendment. A temporary standard may be granted if the petitioner can meet the applicability and demonstration requirements identified under 20.6.4.10(F) NMAC. .

Water Quality Standards for Wetlands

Wetlands in New Mexico are protected as “surface waters of the state.” However, wetland-specific designated uses and criteria associated with those uses have not been developed. Wetlands designated and protected as ONRWs are identified in the *Maps and List of Wetlands Within United States Forest Service Wilderness Areas Designated as Outstanding National Resource Waters* (Subsection D(3)(h) of 20.6.4.9 NMAC). Other wetlands not identified as ONRWs and not identified as a classified water in sections 20.6.4.101 through 20.6.4.899 NMAC are protected through the designated uses identified in 20.6.4.98 and 20.6.4.99 NMAC, depending on their hydrology.

SWQB is working toward increasing wetlands protection through monitoring and strengthening WQS that pertain to the State’s wetlands resources. To achieve these goals the SWQB is currently:

- developing a Rapid Assessment Methodology for New Mexico (NMRAM) for a range of environments and wetland types;
- mapping wetland resources in New Mexico; and,
- ranking the condition of existing wetlands.

SWQB will utilize the information gathered from the monitoring effort to propose wetland-specific state WQS to the WQCC. This information and data will also be used to assess the effectiveness of wetland restoration and mitigation activities.

E. Process for Assuring Adequate Implementation of Water Quality Standards

[As required by 40 CFR 130.5(b)(6) for CPP]

NMED, acting under the authority delegated by the WQCC, implements the WQS by establishing and maintaining controls on the discharge of point source and non-point source pollutants to surface waters of the state. This occurs through ongoing monitoring and assessment of water quality to the State's approved WQS (*see* Section III of this WQMP/CPP); evaluation of proposed discharges in accordance with the Implementation Plan described at Subsection B of 20.6.4.8 NMAC and the State's *Antidegradation Policy Implementation Procedure* (Appendix A of this WQMP/CPP); establishment of controls on point source pollutant discharges as described under Section V of this WQMP/CPP; and through Best Management Practices (BMPs) applied to nonpoint sources of pollution, as outlined under the State's Nonpoint Source Management Program (NPSMP) and Section VII of this WQMP/CPP. Violations of the WQS are enforceable through civil and/or criminal actions pursuant to the WQA at NMSA 1978, Section 74-6-10.

III. SURFACE WATER QUALITY MONITORING, ASSESSMENT & REPORTING

Monitoring, assessment, and reporting are ongoing throughout the state. This WQMP/CPP relies upon these activities to identify priorities and recommend control measures.

A. Monitoring

Monitoring of surface water quality is an important component of the State's Water Quality Management Program and is essential to identify and characterize water quality problems, revise WQS, and develop and evaluate the results of control actions. Additionally, water quality monitoring data can be used for pollutant allocation computer modeling and as evidence for enforcement actions. The goal of the Monitoring Program is to provide information to assess the quality of surface waters and direct water quality management activities. The surface water monitoring strategy implemented by SWQB focuses on collecting chemical, physical, and biological data from rivers, streams, lakes, reservoirs, and other aquatic habitats. The comprehensive strategy is described in the *State of New Mexico Surface Water Quality 10-Year Monitoring and Assessment Strategy* (NMED SWQB 2016 or most current revision). In the last major revision to the *Strategy*, the state incorporated wetlands monitoring and assessment. The monitoring goal of the New Mexico Wetlands Program is to provide the information and data necessary to create a baseline inventory and condition of existing wetlands, facilitate wetland protection, develop WQS for wetlands, assess wetland mitigation activities, and monitor wetland restoration activities for efficacy.

The monitoring strategy establishes methods of identifying and prioritizing water quality data needs, specifies procedures for acquiring and managing water quality data, and describes how these data are used toward three basic monitoring objectives. These objectives include conducting water quality assessments, developing water quality-based controls to minimize pollutants, and evaluating the effectiveness of such controls. From approximately 1998 to present, the SWQB has primarily utilized a rotating basin system approach to water quality monitoring similar to several other states. Using this approach, a select number of watersheds are monitored for two years with an approximate return frequency of eight to ten years depending on available staff, watershed conditions, and financial resources. SWQB will continue to pursue additional funding to increase the frequency of monitoring in New Mexico's surface waters. The rotating basin strategy is supplemented with other data collection efforts and external data sources that meet SWQB's quality assurance and quality control requirements.

The SWQB has established sampling and analytical techniques under 20.6.4.14 NMAC and maintains a Quality Management Plan (QMP), Quality Assurance Project Plans (QAPPs), Field Sampling Plans (FSPs) and Standard Operating Procedures (SOPs) that cover all monitoring activities. The Bureau's QMP and QAPPs must be approved by EPA prior to work being conducted under them. The QAPPs and SOPs are key elements in implementing this WQMP/CPP. SWQB staff conducting activities specified in the QAPP and SOPs must sign acknowledgement pages indicating they are familiar with the processes outlined in the document and will adhere to its procedures.

B. Assessment

Assessment is the process by which water quality data are analyzed to determine if WQS are being attained. Assessments are based on surface water quality data collected by the SWQB and also by other federal, state, and local agencies and groups, when available. All data used for assessment must meet the Bureau's quality assurance and quality control requirements.

Water quality data are assessed every other year according to the most recent version of the Comprehensive Assessment and Listing Methodology (CALM) and associated appendices, which are reviewed and updated as appropriate. The water quality assessment results are then used as a basis for water quality management decisions, such as:

- Determining whether proposals to make changes to the standards are needed;
- Identifying the need for water quality-based effluent limitations in NPDES permits;
- Conducting an antidegradation review of proposed new or increased permitted discharges as prescribed in the *Antidegradation Policy Implementation Procedure*, found in Appendix A of this WQMP/CPP;
- Developing TMDLs that identify pollutant reduction targets designed to improve water quality and meet standards;
- Developing source water protection plans designed to reduce pollutants and provide safe drinking water quality;
- Determining efficacy of projects for watershed protection and restoration under Section 319 of the CWA; and,
- Certifying federal permits under Section 401 of the CWA.

C. Reporting

The CWA has two primary requirements for reporting water quality in a state: The "303(d) List," and the "305(b) Report." These requirements have been combined into the *State of New Mexico CWA §303(d)/§305(b) Integrated Report* (IR; NMED SWQB 2018, or most recent approved version), which is incorporated into this WQMP/CPP by reference. The IR is designed to satisfy the statutory requirements of Section 303(d), Section 305(b), and Section 314 of the CWA, and must be approved by the WQCC and EPA. The two elements are described below. An explanation of assessment and listing methods, as well as definitions of Integrated Reporting categories, can be found in the current version of the CALM, available at: https://www.env.nm.gov/surface-water-quality/calm/.

303(d) List

Section 303(d) of the CWA requires states to submit to EPA a list of water bodies that do not meet applicable WQS. Waterbodies and segments are included on the 303(d) list of impaired waters, based on an evaluation of biological, chemical and/or physical data that demonstrate nonattainment of applicable numeric or narrative standards resulting in designated use impairment. Once a water body is listed as impaired, several management decisions can be made to improve water quality including development of TMDLs or watershed-based plans (WBPs); proposing changes to the standards; identifying appropriate effluent limits in NPDES permits; and prioritizing where restoration projects should be implemented. If the data indicate that a previously impaired stream segment is meeting applicable WQS, the waterbody would be delisted, i.e., removed from the 303(d) list.

305(b) Report

Section 305(b) of the CWA requires states to prepare and submit a report biennially to EPA on the status of water quality within the state. The report provides an assessment of water quality in a state, a summary of water quality management programs, and an estimate of the environmental, social, and economic impacts associated with achieving the objectives of the CWA. EPA uses the information contained in the Section 305(b) Report to update the U.S. Congress on: progress toward meeting the goals of the CWA; the costs and benefits of working towards these goals; program plans and needs in areas such as permits, grants, effluent guidelines, etc.; and mechanisms to implement needed changes.

IV. TOTAL MAXIMUM DAILY LOADS (TMDLs)

[As required by 40 CFR 130.6(c)(1) for WQMP]

A. Background

Pursuant to Section 303(d) of the CWA, TMDLs or TMDL alternatives must be developed for water quality limited segments (also known as "impaired" waterbodies). Water quality limited segments are those segments where water quality does not meet, or is not expected to meet, applicable WQS. TMDLs are established on a pollutant by pollutant basis for each assessment unit or watershed. A TMDL establishes the amount of a pollutant a waterbody can assimilate without causing a violation of WQS. The target load is generally determined by multiplying the applicable water quality criterion by the critical flow and a pollutant-specific conversion factor.

Per 40 CFR §130.2(i), TMDLs are the sum of the following three components: 1) the individual Waste Load Allocations (WLA) for point sources; 2) the Load Allocations (LA) for nonpoint sources and background conditions; and 3) the Margin of Safety (MOS) to account for uncertainty:

$$TMDL = \Sigma WLA + \Sigma LA + MOS$$

Where Σ= sum

In practical terms, a TMDL is a water quality planning document that establishes specific goals to meet surface WQS. Once the required TMDL calculations are documented, probable sources of pollutants are examined, and a brief outline of a potential implementation plan is described.

B. TMDL Prioritization

From 1997 to 2007, the development of TMDLs was prioritized according to the terms and schedule set forth in a consent decree and settlement agreement negotiated between EPA and Forest Guardians/Southwest Environmental Center. The consent decree TMDLs have been completed, and the consent decree was dismissed in 2009.

Following completion of the settlement agreement schedule, SWQB prioritizes TMDL development based on the results of ongoing monitoring and assessment. SWQB developed the *Prioritization Framework and Long-Term Vision for Water Quality in New Mexico* (NMED SWQB 2015a), and as a result the TMDL program in New Mexico was revised to allow a greater focus on state water quality priorities, encourage TMDL alternatives, and emphasize the value of protecting waterbodies that are not impaired. Additionally, SWQB will develop TMDLs as outlined under the current Section 106 and 604(b) of the CWA work plans. TMDLs may also be developed, reviewed, and updated in response to changed conditions, new data, or revised standards.

C. Process for TMDL Development

[As required by 40 CFR 130.5(b)(3) for CPP]

TMDLs are incorporated into the WQMP/CPP upon approval by EPA. The process SWQB uses for developing a TMDL is as follows:

- Develop a list of Category 5 assessment units and pollutants from the most recent *State of New Mexico CWA §303(d)/§305(b) Integrated Report* . Identify those Category 5 assessment units that may be candidates for TMDL alternatives, such as a Watershed Based Plan.
- Collate all existing and readily available data necessary to draft TMDLs, including field and laboratory data (chemical, physical and biological) from the assessment process, and critical flow data. In addition, identify point sources covered by individual and general NPDES permits, NPDES permit numbers, and expiration dates.
- Plan a sampling effort to collect any additional data that are needed.
- Draft the TMDL document; solicit and incorporate comments from SWQB, NMED Office of General Counsel, and EPA staff.
- Conduct public participation for the TMDL in accordance with Section XIV of the WQMP/CPP. This includes a public comment period of at least 30 days. SWQB issues a public notice for distribution via email and the SWQB website. The public notice must include:
    - a description of the watershed and parameters for which the TMDL is proposed;
    - a brief explanation of the TMDL;
    - the start and end dates of the public comment period;
    - how and where to submit comments for inclusion in the record;
    - a description of the process for requesting approval of the TMDL before the WQCC;
    - how to obtain a copy of the TMDL document or request additional information;
    - the location, date, time, purpose, and format of any proposed public meeting or other forum for obtaining information;
    - contact information for persons with disabilities to obtain assistance in participating in the public process.
- After the public comment period closes, collate all comments, prepare a response to comments, and make appropriate changes to the draft TMDL based on those comments. The response to comments is added as an appendix to the draft TMDL and provided to those stakeholders who submitted written comments.
- Post the final draft TMDL on NMED website no less than 10 days before the WQCC meeting.
- Present the final draft TMDL at a WQCC meeting and request approval. WQCC comments are incorporated into the TMDL as necessary.
- Following adoption by the WQCC as an amendment to Appendix B of the WQMP/CPP, submit the TMDL to EPA Region 6 for approval. The submittal to EPA shall be certified by the Governor or the Governor's designee (e.g., NMED Secretary) that the WQMP/CPP update is consistent with all other parts of the plan as required by 40 CFR 130.6(e).

- Post the approved TMDL document, the response to comments, the WQCC approval document, and EPA approval document on SWQB's website, and update the administrative record accordingly.
- Update Appendix B of this WQMP/CPP to include the approved TMDL. (Available at https://www.env.nm.gov/surface-water-quality/wqmp-cpp/)

TMDLs may be revised as necessary, following the process outlined above, based on changes to WQS or other factors influencing the TMDL calculation or distribution between the WLA and LA in the TMDL. TMDLs may be removed from the WQMP with WQCC approval if the waterbody is no longer impaired and meets the requirements for TMDL removal.

D. TMDL Implementation

As TMDLs are developed and approved, they are incorporated into Appendix B-1 of this WQMP/CPP and used as the basis for implementation of water pollution control activities. For point sources, TMDLs are implemented through NPDES permits (see Section V), whereas for nonpoint sources, TMDLs are implemented through the Nonpoint Source Management Program (NPSMP; see Section VII).

Point Sources

The process for incorporating WLAs as individual effluent limitations in NPDES permits is described in Section V.B of this WQMP/CPP.

Nonpoint Sources

The NPSMP seeks voluntary solutions to address nonpoint source water quality problems and provides funding opportunities for implementation projects. The NPSMP, funded through Section 319 of the CWA, prioritizes watershed-based planning and on-the-ground implementation projects where TMDLs have been developed. Priority watersheds for watershed-based planning are defined in the current NPS management plan as 12-digit hydrologic unit codes (HUCs, or watersheds) (see https://www.env.nm.gov/surface-water-quality/nps-plan). The large majority of these priority watersheds are where TMDLs have been developed. Watershed-based plans (WBPs) are, in essence, TMDL implementation plans (US EPA 2013). Completed WBPs are available at https://www.env.nm.gov/surface-water-quality/accepted-wbp/.

V. EFFLUENT LIMITATIONS

[As required by 40 CFR 130.6(c)(2) for WQMP]

A. Introduction

The primary mechanism for controlling point source discharges to "waters of the United States" (as defined under 40 CFR 122.2) in New Mexico is the NPDES permit program established under Section 402 of the CWA. The State of NM is not currently delegated authority for issuing NPDES permits; therefore, EPA Region 6 is the permitting authority responsible for issuing NPDES permits in New Mexico and specifying the amount and concentration of pollutants (i.e. effluent limitations) that a permittee may discharge to a surface water. The permitting authority is also responsible for the enforcement of effluent limitations stipulated by NPDES permits.

Two types of effluent limitations are developed by EPA for NPDES permits: technology based effluent limitations (TBELs) and water quality-based effluent limitations (WQBELs). TBELs are defined in federal regulations and are applicable across a category of effluent discharge. The applicability of effluent limitations is summarized in Table V-1.

Table V-1. Effluent Limitations for NPDES Permits

Technology Based		Water Quality Based	
Publicly Owned Treatment Works (POTWs) – Secondary Treatment (40 CFR 133)	Industry – Effluent Limitation Guidelines (40 CFR Subchapter N, or Best Professional Judgment (BPJ))	WLA from approved TMDL	If there is no TMDL or WLA, a WQBEL may be developed on a case by case basis to protect water quality
Additional State-adopted control strategies for protection of public health or environment		WQBELs may be expressed as chemical specific limitations (e.g., phosphorus), narrative limitations (e.g., visible sheen, BMPs, etc.), or as whole effluent toxicity requirements (e.g., biomonitoring).	

Federal regulations require that NPDES permits include TBELs and other necessary effluent limitations for toxic pollutants and sewage sludge. EPA is responsible for development and promulgation of TBELs pursuant to Sections 301, 304, 306, 307, and 316 of the CWA. Federally promulgated TBELs for each industry are published by EPA in 40 CFR Chapter I Subchapter N - *Effluent Guidelines and Standards*. If TBELs have not been established by regulation for a particular industry, a permit writer may establish effluent limitations based on "best professional judgment" with the rationale should be documented in the permit's fact sheet (major facilities) or statement of basis (minor facilities).

If TBELs are not adequate to protect applicable WQS, then NPDES permits must contain WQBELs (40 CFR 122.44(d)). WQBELs may be calculated as part of a WLA in a TMDL (see Section IV) and incorporated into an NPDES permit; WQBELs may be based on reasonable potential calculations drafted by EPA; or WQBELs may be based on an antidegradation review in accordance with the *Antidegradation Policy Implementation Procedure* in Appendix A of this WQMP/CPP. EPA will evaluate all three scenarios and, in coordination with NMED through the 401 Certification process, choose the most protective effluent limitation.

If a WLA has been developed in a TMDL, the permitting authority is required to incorporate it into the NPDES permit. A TMDL details the assumptions and processes used to develop the WLA. EPA's Technical Support Document (TSD) procedures should be used by the permitting authority to incorporate the WLA into the NPDES permit. However, if no TMDL has been established, the permitting authority reviews effluent discharge data to ensure that NPDES permits are protective of WQS. For all pollutants that have a reasonable potential to cause or contribute to a violation of a water quality standard, the permitting authority performs calculations or modeling to determine effluent limitations for those pollutants. This review is done in accordance with applicable federal regulations and guidance. Specific evaluations for NPDES permits issued in New Mexico are discussed in the EPA Region 6 document *Procedures for Implementing NPDES Permits in New Mexico* (NMIP) developed by EPA in consultation with NMED.

In addition, the WQCC previously adopted additional control strategies for the protection of public health and the environment. This strategy was originally adopted by the WQCC in 1989 in the WQMP's Work Element 6 and retained in the 2002 WQMP update in Work Element 2. In the 2011 update, the previously included fecal coliform limitation of 500 colony forming units (cfu)/100 milliliters (mL) was dropped because the WQS now apply *E. coli* bacterial criteria to all waters. These strategies are as follows:

- NMED will review NPDES permit actions for purposes of state certification in accordance with Section 401 of the CWA, WQA NMSA 1978, 74-6-5(E), and 20.6.2.2001 NMAC. NMED will assure through appropriate review and communication with the permitting authority that permit requirements and effluent limitations are compatible with appropriate state law, protect WQS and implement this WQMP/CPP.

- NMED will use a pH limitation of 6.0-9.0 for state certifications of NPDES permits except when:
    a. more stringent effluent limitations are needed to meet the antidegradation policy and implementation plan of the New Mexico WQS, (20.6.4 NMAC);
    b. the WQCC has adopted a more stringent effluent limitation in a point source WLA.

  In all cases, state-certified effluent limitations for pH shall be stringent enough so that receiving waters meet WQS.

For effluent discharges that are not addressed by an NPDES permit or that are in extended violation of an NPDES permit, Sections 20.6.2.2100 through 2102 NMAC of the *Ground and*

Surface Water Protection regulations specify additional effluent limitations for the protection of surface water quality.

Compliance schedules for NPDES permits are allowed by 20.6.4.12 NMAC and 40 CFR 122.47. Compliance schedules are established by EPA per the NMIP. Compliance schedules may be included in NPDES permits at the time of renewal or modification and are written to require compliance at the earliest practicable time. Compliance schedules include milestone dates and provisions for submitting progress reports and a final report detailing activities conducted toward meeting compliance schedule provisions. Other uses of compliance schedules by the NPDES permitting authority may also be allowable.

The permitting authority may not issue an NPDES permit that is in conflict with this WQMP/CPP (40 CFR 130.12(a)). Effluent limitations, including WQBELs and compliance schedules where applicable, are contained in NPDES permits, which can be viewed at: https://www.env.nm.gov/surface-water-quality/npdes-permits/.

B. Process for Development and Certification of Effluent Limitations and Schedules of Compliance for NPDES Permits

[As required by 40 CFR 130.5(b)(1) for CPP]

As the current NPDES permitting authority for NM, EPA Region 6 develops effluent limitations and schedules of compliance in accordance with the NMIP, which is based on applicable federal regulations and guidance. NPDES permits may not be issued until the State is provided an opportunity to review and certify the permit. The WQA assigns the responsibility for certifying permits issued under the CWA to NMED (NMSA 1978, Section 74-6-4(F)), and also specifies the conditions under which a certification shall be denied (NMSA 1978, Section 74-6-5(E)). NPDES regulations at 40 CFR § 124.53(e) require that state certification shall include conditions which are necessary to assure compliance with the applicable provisions of CWA and appropriate requirements of state law. For each more stringent condition, NMED must cite WQA or State law references upon which the condition is based. Failure to provide such a citation waives the right to certify (and require) the condition.

Section 20.6.2.2001 NMAC of the *Ground and Surface Water Protection* regulations sets forth procedures for state certification of NPDES permits. The procedures specify public notice requirements, a public comment period, the content and distribution of a certification or denial, timeframes, and appeal requirements. NMED also evaluates outreach needs for the affected community during the process of permit reissuance and evaluates the need for document translation and other access needs during the public comment period. A public involvement plan (PIP) will be developed for each action and a link posted on NMED's website. If an affected party or the public needs additional assistance to participate in the permitting process, they must make the request to the Point Source Regulation Program Manager - contact information is listed at: https://www.env.nm.gov/surface-water-quality/point-source-regulation-section/.

C. Incorporating TMDL Waste Load Allocations into NPDES Permits

Pursuant to 40 CFR 130.12(a), NPDES permits must be consistent with the WQMP. Each NPDES permit issued must contain requirements necessary to achieve WQS (40 CFR 122.4(d)). Therefore, where a WLA has been assigned through the TMDL process, the WLA must be incorporated into the permit as specific effluent limitations. All WLA (original and revised) are documented in Appendix B-2 of this WQMP/CPP.

If an application for a new or revised permit is received for a discharge into an impaired waterbody with an approved TMDL but with no previously developed WLA, the permit may be issued without revision of the TMDL provided the discharge is at or less than the in-stream TMDL target concentration. In the case of a new permit, the WLA will be calculated using the TMDL target concentration and applicable flow value as specified in EPA's NMIP. In the case of a revised permit for which there is already an existing WLA but there has been a change to the design flow, the TMDL will be revised to include a revised WLA calculated using the TMDL target concentration and the change in design or production flow. In the case of a new or revised stormwater WLA, the jurisdictional area approach will be used to calculate the WLA unless another method is determined to be more appropriate. All new and revised WLA will be tracked in Appendix B-2 of this WQMP/CPP and the associated TMDL will be revised during the next scheduled TMDL development.

D. Process for Determining the Priority of Permit Issuance

[As required by 40 CFR 130.5(b)(9) for CPP]

As the current permitting authority for New Mexico, EPA Region 6 determines the priority of NPDES permit issuance.

E. Process for Deriving WQBELs based on Narrative Standards in NPDES Permits

[As required by 40 CFR 130.5(b)(1) for CPP]

EPA derives numeric permit limitations from effluent limitations guidelines in the federal regulations at 40 CFR 405 through 471, or from numeric WQS at 20.6.4 NMAC. New Mexico also has narrative water quality standards at 20.6.4 NMAC, but because of the difficulty of deriving permit limits from narrative standards, this issue has largely been unaddressed. However, circumstances may arise that require narrative standards to be addressed in NPDES permits due to the issuance of a TMDL or the presence of a 303(d) impairment in the facility's receiving water.

Nutrients

There are no technology-based effluent limits for nutrients in EPA's *Effluent Guidelines and Standards* in the code of federal regulations (40 CFR Ch. 1 Sub. N), which has resulted in much discussion nationwide about the process for incorporating nutrient limits into NPDES permits. SWQB's listing methodology uses thresholds to determine what background levels of nutrients are expected in a healthy, reference stream. Consequently, these thresholds are also used in TMDL development, which has led to stringent effluent limitations in NPDES permits. The WQS have provisions for temporary standards, or Use Attainability Analyses, but these tools may not apply in some situations.

When SWQB reviews draft permits in accordance with the 401 Certification process, the approach that will be taken with respect to nutrient effluent limitations is the following:

- When an impairment exists in the waterbody without a TMDL and there are no data, SWQB will first require monitoring of effluent to collect nutrient data.

- When an impairment exists in the waterbody without a TMDL and there are available effluent data, SWQB will analyze the effluent data to determine an effluent limit that will be protective of the receiving waterbody based on the frequency of collection and confidence of the data. This approach is consistent with Tier One protection of SWQB's antidegradation policy, which states that no further degradation of existing water quality is permitted in a surface water where the existing water quality does not meet applicable WQS.

SWQB will evaluate other methods for deriving numeric nutrient limits as necessary.

TDS Salinity

As outlined in the Colorado River Salinity Control Forum, SWQB will adhere to the monitoring frequency outlined in that document for both municipal and industrial facilities.

Other Narrative Standards

As future numeric translators are developed, SWQB will utilize those translators as appropriate to evaluate protective water quality-based effluent limitations in the appropriate NPDES permits.

VI. MUNICIPAL AND INDUSTRIAL WASTE TREATMENT

[As required by 40 CFR 130.6(c)(3) for WQMP]

A. Clean Watersheds Needs Survey

Every four years EPA conducts the Clean Watersheds Needs Survey and submits a report to Congress in compliance with Section 516 of the CWA. The report is a comprehensive assessment of the capital needs to meet the water quality goals set in the CWA. The states and EPA collect information about publicly owned wastewater collection and treatment facilities; stormwater and combined sewer overflows control facilities; nonpoint source pollution control projects; and decentralized wastewater management.

The State of New Mexico participates in these surveys by collecting information and submitting it to EPA. The current version of the report is available at: http://www.epa.gov/cwns/.

B. Clean Water State Revolving Fund

The CWA, as amended in 1987, authorized EPA to make capitalization grants to the states to establish revolving loan funds with the condition that the states make 20% matching contributions. The Clean Water State Revolving Fund (CWSRF) provides affordable loans for the construction of wastewater treatment facilities and other water quality projects to prevent or abate water pollution. CWSRF monies can also be used for nonpoint source control (see Section VII). Combination loan/grants are available for projects that meet the criteria described in the CWSRF regulations. A portion of the available CWSRF funding may be targeted for projects that support green infrastructure, water or energy efficiency, and environmentally innovative projects.

NMED's CPB administers the loan program under 20.7.5, 20.7.6 and 20.7.7 NMAC and WQA NMSA 1978, Sections 74-6A-1 to 74-6A-15. In the 2018 session of the New Mexico Legislature, the CWSRF authorizing state statute (Wastewater Facility Construction Loan Act, WQA NMSA 1978, Sections 74-6A-1 to 15) was amended to expand the types of eligible projects and borrowers to bring it into alignment with the CWA and the 2014 Water Resources Reform and Development Act. The 2018 statutory change affected 20.7.5.6 NMAC and was therefore amended by the WQCC in August of 2018. The remaining NMAC sections are planned to be administratively amended within a year of approval of this document.

C. Process for Priority Rating of Wastewater Construction Loans Projects and Management of the Priority List

[As Required by 40 CFR 130.5(b)(8) for CPP]

As part of its administration of the CWSRF program, CPB follows a priority rating system compliant with 40 CFR 35.2015. The Priority Rating System Guidance document is available on CPB's website at: https://www.env.nm.gov/construction-programs/clean-water-state-revolving-fund-cwsrf/. The document establishes a systematic, fair and consistent approach for ranking funding applications. The results of each application cycle are published on the website above as the Integrated Project Priority list and the corresponding Intended Use Plan.

The priority rating process is summarized as follows:

- Determine the time frame for opening the priority list per federal requirements.
- Send out an invitation to eligible entities to apply.
- Receive applications.
- Review the applications for eligibility.
- Inform applicants if they are not eligible for the CWSRF and if they may be eligible for other funding programs.
- Perform a technical review of each application using the Priority Rating System.
- Compile the CWSRF Integrated Projects Priority List.
- Prepare the draft Intended Use Plan that identifies the intended uses of the CWSRF and describe how those uses support the goal of the fund and incorporates the Integrated Projects Priority List.
- Publish the draft Intended Use Plan and associated Integrated Projects Priority List on its website at: https://www.env.nm.gov/construction-programs/clean-water-state-revolving-fund-cwsrf/ for public comment.
- Submit the draft Intended Use Plan to EPA for comment and approval.

CPB reviews the Priority Rating System periodically and proposes any amendments deemed necessary for effective program implementation. Any revisions to the Priority Rating System are presented to WQCC for approval. The amended system must then be approved by EPA.

As part of the funding process, CPB reviews preliminary engineering reports or technical memorandum for projects requesting CWSRF funding. CPB follows USDA Guidance 1780-2 for preliminary engineering reports.

D. Rural Infrastructure Revolving Loan Program

The New Mexico Rural Infrastructure Act (NMSA 1978, Sections 75-5-1 to -6) created the Rural Infrastructure Revolving Loan Program (RIP) in 1988. The purpose of the RIP is to provide financial assistance to local authorities for the construction or modification of water supply facilities. The Rural Infrastructure Act was amended in 2001 to include construction or modification of wastewater facilities and solid waste facilities.

Any incorporated city, town, village, mutual domestic association, or water and sanitation district whose water supply facility serves a population of less than twenty thousand persons or a county that serves a population of less than two hundred thousand may be eligible. These types of projects can be financed through RIP:

- Eligible water, wastewater and water pollution control projects
- Water pipelines
- New sewer interceptors and collectors
- Infiltration/inflow correction
- Water and sewer system rehabilitation
- Treatment plant improvements
- Nonpoint source projects (e.g., septic tanks)
- Cost of water rights acquisition
- Eligible solid waste facilities including collection, disposal, storage and recycling
- Engineering studies and design
- Project inspection
- Easement and right-of-way
- Project legal costs
- Purchase of equipment

E. Special Appropriations Program

CPB provides oversight for water, wastewater and other environmental infrastructure construction projects funded through the Special Appropriations Program. These are state grants for special projects issued annually when authorized by the New Mexico Legislature during the legislative session and approved by the Governor. Since 1973 NMED has managed over $542 million in Special Legislative Appropriations for construction of community water supplies, wastewater facilities and other environmentally related projects.

F. Process for Controlling Disposition of Residual Waste from Wastewater Treatment Processing

[As required by 40 CFR 130.5(b)(7) for CPP]

Proper biosolids management to prevent ground and surface water pollution is important. State regulations allow several methods for the disposal of municipal sludge:

- The disposal of dry sludge in landfills, or composting and reuse, regulated under 40 CFR 503 and NM's *Solid Waste Management* regulations at 20.9.1 – 20.9.10 NMAC.
- Land application, including the injection of liquid sludge into subsurface soil, regulated under 40 CFR 503, Subpart B and NM's *Ground and Surface Water Protection* regulations under 20.6.2 NMAC.
- Surface disposal within an approved disposal unit, regulated under 40 CFR 503, Subpart C and NM's *Ground and Surface Water Protection* regulations under 20.6.2 NMAC.

VII. NONPOINT SOURCE MANAGEMENT AND CONTROL

[As required by 40 CFR 130.6(c)(4)]

A. Nonpoint Source Management Program

Nonpoint sources of water pollution are recognized as major contributors to water pollution in New Mexico as well as the nation. Principal sources of surface water nonpoint source pollution in New Mexico include on-site liquid waste disposal, roads, recreation, urban storm water run-off, erosion from rangelands, agricultural activities, construction, silviculture, wildfires, resource extraction and land disposal. Hydromodification may affect attainment of designated uses by diverting water out of stream channels, impounding waters, and channelizing or otherwise disturbing streambeds. Principal known sources of nonpoint source groundwater pollution in rural and suburban areas include household septic tanks, cesspools, hard rock mines, and agricultural activities.

B. Nonpoint Source Management Plan

NM's plan for management of nonpoint source pollution is described in the *New Mexico Nonpoint Source (NPS) Management Plan*. The purpose of the NPS Management Plan is to describe the regulatory and non-regulatory programs, programmatic actions, and best management practices (BMPs) necessary to reduce pollutants from nonpoint sources entering surface water and groundwater. Included in the plan are six objectives that facilitate achievement of program goals. Implementation of the plan will help New Mexico succeed in attainment of surface water quality criteria that will fully protect designated uses as described in the State's WQS, meet the goals of the federal CWA and ensure adequate groundwater quality for municipal, domestic, and agricultural uses.

The NPS Management Plan has established a process to develop programs and activities within watersheds that will facilitate the achievement of surface WQS. Watershed-based planning is emphasized as a means of coordinating watershed restoration efforts, fostering watershed associations, and encouraging partnership among agencies, nongovernmental organizations, and the public. The Plan supports local watershed-based implementation of TMDLs and also coordinates with other land and resource management agencies that have established resource protection programs and activities.

The NPS Management Plan uses a voluntary approach to achieve water quality improvements. Incentives to voluntarily implement projects and restoration efforts include competitive grant funding through Section 319(h) of the CWA and technical support and guidance through SWQB. EPA has provided watershed planning guidance in the *Nonpoint Source Program and Grants Guidelines for States and Territories* (USEPA 2013). Completion of watershed planning per the guidelines is a requirement for Section 319 funds to be used for water quality restoration activities.

In order to fund water quality improvement projects, SWQB issues annual requests for applications for projects to be considered for funding from the federal NPS program grant under

Section 319(h) of the CWA. The requests identify impaired waters with TMDLs describing the impairments, and a smaller category of impaired waters which do not require TMDL development because the impairments are thought to be caused by insufficient flow rather than excessive pollutant loading (Category 4C waters). Proposed projects must address impairment issues in these waters through planning or implementation.

Low-interest loans through the CWSRF are another potential source of funding for nonpoint source control projects. Both public and private entities as defined in the CWA are eligible for funding for non-point source projects.

SWQB has reviewed, upgraded, and will continue to implement all Section 319(b) management program components. These components include:

- Identification of BMPs appropriate to nonpoint source pollution problems in NM, as well as appropriate application and implementation of these BMPs;
- A schedule of milestones that provides focus, traceable events, and deadlines for program implementation;
- Identification of funding sources and potential partnerships based on available funding programs; and
- Identification of federal financial assistance programs and development projects.

Another important element of the NPS Management Plan is coordination with government agencies. Many of the stream segments which have been or are water quality limited due to nonpoint source pollution pass through public lands. A number of the federal agencies involved have agreed, formally or informally, to ensure that all new and renewed land use authorizations, easements, rights-of-way documents, allotment management plans, term-grazing permits, and other agreements involving permitted activities on properties administered by the federal agency would have enforceable provisions for compliance with WQS. Efforts under these agreements have resulted, and are expected to continue to result, in the implementation of BMPs and mitigation measures at many sites.

C. Wetlands Program

The SWQB Wetlands Program administers wetland restoration and program development grants received from EPA under Section 104(b)(3) of the CWA. The overall goals of the Wetlands Program are to protect and restore NM's wetlands and riparian areas and to increase self-sustaining and naturally functioning wetlands and riparian areas. The Wetlands Program emphasizes the role of wetlands in prevention and reduction of water quality impairments and providing habitat for aquatic life and wildlife.

EPA identified four core components critical to effective, comprehensive wetland programs (EPA 2009). The components are regulatory actions; monitoring and assessment (*see* Section III of this WQMP/CPP); restoration and protection; and WQS (*see* Section II of this WQMP/CPP). A description of these components in NM's Wetlands Program are found in the *Wetlands Program*

Plan for New Mexico (NMED SWQB 2019). Regulatory actions/controls and restoration and protection are described in further detail below.

Regulatory Controls

The State's regulatory program, which applies to all surface waters of the state including wetlands, is described in Dredge and Fill Program and Effluent Limitations sections of this WQMP/CPP (Section X and V, respectively). Specifically, NPDES permits under Section 402 of the CWA regulate discharges to wetlands, and the Dredge and Fill Program under Section 404 of the CWA regulates other activities affecting wetlands.

Restoration and Protection

SWQB encourages wetland protection on a watershed basis. This approach involves assisting watershed groups throughout the state to develop "Wetland Action Plans" as a component of watershed-based plans. A Wetland Action Plan is a planning document designed specifically to address wetlands and riparian resources within the boundaries of a specific watershed. Participating watershed groups assess wetlands and riparian areas in their watershed and develop proposals to protect, restore, and create wetlands locally. This effort helps watershed groups incorporate wetland issues into their mission and promotes stewardship of wetlands through cooperative approaches involving agencies, local governments, tribes, nonprofit organizations, and the public.

In addition, SWQB promotes wetland restoration as an integral part of watershed restoration and health. A number of restoration projects are occurring statewide and are funded by EPA Region 6 Program Development grants under Section 104(b)(3) of the CWA. Project activities include restoration of wet meadows and waterfowl habitat on the Rio Grande along the central flyway, restoration of Bosque on private land parcels, re-establishment of natural flooding, increasing wetland plant diversity and habitat diversity, removal of exotic vegetation, restoration of springs, planning for open-space and conservation easements to protect wetlands resources including buffer zones, restoring beaver habitat, restoring high mountain fen wetlands, river restoration to address transportation maintenance issues, and conservation of playas and closed basin wetlands. The Wetlands Program maintains the New Mexico Statewide Wetlands Roundtable, consisting of state and federal agency and tribal participation. The wetland restoration and protection program also includes provisions for technical assistance to landowners or organizations carrying out wetland restoration projects, active research regarding effective wetland restoration techniques and methods to measure the success of restoration activities, and training and capacity-building for organizations interested in joining restoration partnerships.

VIII. MANAGEMENT AGENCIES

[As required by 40 CFR 130.6(c)(5) for WQMP]

A. Designated Management Agencies for Wastewater Management

Under Section 208 of the CWA, WQMPs are to include identification of Designated Management Agencies (DMAs) necessary to implement the WQMP and provisions for adequate authority for intergovernmental cooperation. DMAs must demonstrate legal, institutional, managerial, and financial capability, and specific activities necessary to carry out their responsibilities. Incorporated municipalities, counties, sanitation districts, and water and sanitation districts have the necessary authorities under state law to satisfy the requirements of Section 208(c)(2) of the CWA, which include the authority to:

- carry out appropriate portions of an areawide waste treatment management plan developed under Section 208(b)of the CWA;
- manage effectively waste treatment works and related facilities serving such area in conformance with any plan required by subsection (b) of this section;
- directly or by contract, design and construct new works, and to operate and maintain new and existing works as required by any plan developed pursuant to subsection (b) of this section;
- accept and utilize grants, or other funds from any source, for waste treatment management purposes;
- raise revenues, including the assessment of waste treatment charges;
- incur short- and long-term indebtedness;
- assure in implementation of an areawide waste treatment management plan that each participating community pays its proportionate share of treatment costs;
- refuse to receive any wastes from any municipality or subdivision thereof, which does not comply with any provisions of an approved plan under this section applicable to such area; and
- accept, for treatment, industrial wastes.

State law provides the designated agencies with the necessary authority to design, construct, operate, and maintain wastewater treatment plants and to accept and utilize state and/or federal funds for these purposes. As specified at 40 CFR 130.12(b), Section 201 of the CWA funding can only be awarded to DMAs that are in conformance with the statewide WQMP.

B. Process for Designating Wastewater Management Agencies

The WQCC has the responsibility of designating management agencies which are then certified by the Governor (40 CFR 130.6(e)). DMAs must demonstrate legal, institutional, managerial and financial capability necessary to carry out the entity's responsibilities in accordance with Section 208(c) of the CWA. EPA shall accept such designations unless it is found that the DMAs do not have adequate specified authorities required in Section 208(c)(2) of the CWA (40 CFR 130.9(d)).

As economic development and growth continue in NM, or as the need arises, additional DMAs for wastewater will be considered. The WQCC will consider new DMAs upon presentation of a petition requesting such designation. The petitioning DMA must demonstrate legal, institutional, managerial, and financial capability necessary to carry out the entity's responsibilities in accordance with Section 208(c) of the CWA. Designation of a management agency will occur only after appropriate public participation and presentation of relevant authorities by the petitioner.

C. Management Agencies for Point Source Management

The Governor certified the designation of ninety-seven (97) wastewater management agencies in 1980. Additional management agencies were certified in September 1983, August 1984, October 1985, April 1999, and May 2001. A total of eighty-four (84) municipalities, two (2) counties, eleven (11) sanitation or water and sanitation districts, four (4) state agencies, and two (2) Native American tribal entities have been designated wastewater management agencies.

Designated wastewater management agencies are listed in Table VIII-1. Each agency that has accepted this designation shall be responsible for wastewater management in its facility planning area and shall, if the agency satisfies applicable federal regulations, be able to receive construction program funding under Section 201 of the CWA.

D. Management Agencies for Nonpoint Source Management

The NPS Management Plan identifies specific federal, state and local agencies with a role in implementing nonpoint source pollution management and control. Unlike with the Wastewater Designated Management Agencies, a nonpoint source management agency can be entered into through interagency agreements, which are developed as needed to outline management responsibilities unique to each agency's area of responsibility and expertise.

For nonpoint source management, agencies or organizations participating through formal agreements under the NPS Management Plan will be considered a management agency for purposes of the WQMP/CPP.

Table VIII-1. Designated Management Agencies for Wastewater Management.

INCORPORATED MUNICIPALITIES Agency Designated	Accepted	Rejected
Alamogordo	X	
Albuquerque	X	
Artesia	X	
Aztec	X	
Bayard	X	
Belen	X	
Bernalillo	X	
Bloomfield	X	
Capitan	X	
Carlsbad	X	
Carrizozo	X	
Causey	X	
Chama	X	
Cimarron	X	
Clayton	X	
Cloudcroft	X	
Clovis	X	
Columbus	X	
Corona	X	
Cuba	X	
Deming	X	
Des Moines	X	
Dexter	X	
Dora	X	
Eagle Nest	X	
Elida	X	
Encino	X	
Espanola	X	
Estancia	X	
Eunice	X	
Farmington	X	
Floyd	X	
Folsom	X	
Fort Sumner	X	
Gallup	X	
Grady	X	
Grants	X	

INCORPORATED MUNICIPALITIES Agency Designated	Accepted	Rejected
Grenville		X
Hagerman	X	
Hatch	X	
Hobbs	X	
Hope		X
House	X	
Jal	X	
Jemez Springs	X	
Lake Arthur	X	
Las Cruces	X	
Las Vegas	X	
Logan	X	
Lordsburg	X	
Los Alamos County	X	
Los Lunas	X	
Loving	X	
Lovington	X	
Magdalena	X	
Maxwell	X	
Melrose	X	
Moriarty	X	
Mosquero	X	
Mountainair	X	
Pecos	X	
Portales	X	
Questa	X	
Raton	X	
Red River	X	
Reserve	X	
Rio Rancho	X	
Roswell	X	
Roy	X	
Ruidoso	X	
San Jon	X	
San Ysidro	X	
Santa Fe	X	
Santa Rosa	X	

INCORPORATED MUNICIPALITIES	Accepted	Rejected
Agency Designated		
Silver City	X	
Socorro	X	
Springer	X	
Sunland Park	X	
Taos	X	
Tatum	X	
Texico	X	
Truth or Consequences	X	
Tucumcari	X	
Tularosa	X	
Vaughn	X	
Virden		X
Wagon Mound	X	
Willard		X

COUNTIES	Accepted	Rejected
Agency Designated		
Valencia	X	
Dona Ana	X	

SANITATION DISTRICTS / WATER & SANITATION DISTRICTS	Accepted	Rejected
Agency Designated		
Alpine Village Sanitation District	X	
Anthony Sanitation District	X	
Bluewater Water & Sanitation District		X
El Valle de los Ranchos Water & Sanitation District	X	
Lakeshore City Sanitation District	X	

SANITATION DISTRICTS / WATER & SANITATION DISTRICTS	Accepted	Rejected
Agency Designated		
Pena Blanca Water & Sanitation District	X	
Ranchos de Placitas Sanitation District	X	
San Rafael Water & Sanitation District	X	
Thoreau Water & Sanitation District	X	
Twining Water & Sanitation District	X	
Williams Acres Water & Sanitation District	X	
Yah-ta-hey Water & Sanitation District	X	

STATE AGENCIES	Accepted	Rejected
Agency Designated		
Corrections Dept.	X	
Dept. of Finance and Administration	X	
Health and Environment Dept.	X	
Natural Resources Dept.	X	

NATIVE AMERICAN TRIBAL ENTITIES	Accepted	Rejected
Agency Designated		
Navajo Tribal Utility Authority (interim wastewater management agency)	X	
Pueblo of Pojoaque	X	

IX. IMPLEMENTATION MEASURES

[As required by 40 CFR 130.6(c)(6) for WQMP]

A. Overview

This section addresses implementation measures necessary to carry out those programs that are listed in this Statewide WQMP/CPP. Schedules that specify when pollution control programs are expected to be implemented are useful in tracking the progress of control programs incorporated into the WQMP/CPP. Implementation schedules inform management agencies responsible for the programs, and other interested or affected parties, when significant milestones leading to implementation are expected to occur.

Where appropriate or required, individual documents also contain additional implementation procedures specific to a program. For example, Appendix A describes the implementation procedure for the State's Antidegradation Policy. Another example is the NPS Management Plan that identifies implementation and financing of measures for nonpoint source pollution control.

Implementation schedules may also be affected by statutory or Court imposed orders. An example of a statutory schedule is Section 303(c) of the CWA which requires States to review their WQS every three years. An example of a Court imposed schedule is the consent decree and settlement agreement that resulted from *Forest Guardians and Southwest Environmental Center v. Carol Browner, Administrator, U. S. Environmental Protection Agency* (1997) and the resultant MOU between EPA and NMED for the development of TMDLs (see Section IV of this WQMP/CPP).

Measures for financing these programs arise from a variety of sources including federal grants (e.g., Sections 106, 201, and 319 of the CWA), state budgets authorized by the NM Legislature, state revolving funds, local governments, cost sharing with stakeholders (public and private) or other means as appropriate to the task.

B. Planning Strategy for Implementation Measures

Implementation measures will be completed by:

- Using the process descriptions in this WQMP/CPP as a reference guide to program implementation and scheduling.
- Adhering to statutory, regulatory and court sanctioned schedules.
- Using funding sources appropriate to the task.
- Posting on NMED's website anticipated or tentative review schedules. Examples include but are not limited to: Triennial Review of WQS and biennial review of the *State of New Mexico CWA §303(d)/§305(b) Integrated Report*.

X. DREDGE AND FILL PROGRAM

[As required by 40 CFR 130.6(c)(7) for WQMP]

A. Description of the Dredge and Fill Program

The U.S. Army Corps of Engineers (USACE) is responsible for issuing permits for activities involving the discharge of dredged or fill materials to waters of the U.S. pursuant to Section 404 of the CWA. New Mexico is not delegated authority for the issuance or enforcement of Section 404 permits, but NMED does review the permits for purposes of state certification or denial under Section 401 of the CWA.

In addition to the certification of permits, the Dredge and Fill Program includes consultation with applicants and USACE as needed, compliance site inspections, education, and outreach activities.

B. Process for Certification of Dredge and Fill Permits under Section 401 of the CWA

In accordance with Section 401 of the CWA, USACE may not issue permits for the discharge of dredged or fill materials to waters of the U.S. until the State is provided an opportunity to review and certify the permit. The WQA assigns the responsibility for certifying permits issued under the CWA to NMED (NMSA 1978, Section 74-6-4(F)), and also specifies the conditions under which a certification shall be denied (Section 74-6-5(E)).

Section 20.6.2.2002 NMAC of the *Ground and Surface Water Protection* regulations sets forth procedures for the state certification of dredge and fill permits. The procedures specify public notice requirements, a public comment period, the content and distribution of a certification or denial, timeframes, and appeal requirements.

C. Planning Strategy for the Dredge and Fill Program

NMED, through the SWQB, will review the Dredge and Fill Program annually to determine if improvements are required. SWQB will also review and certify, certify with conditions, or deny USACE individual, regional and nationwide permits under Section 404 of the CWA.

XI. BASIN PLANS

[As required by 40 CFR 130.6(c)(8) for WQMP]

A. Introduction

Basin plans were initially developed by the State for water quality planning in the early and mid-1970s. In the 1980s the State shifted to planning on a statewide basis rather than basin-by-basin. According to 40 CFR 130.6(c)(8), a WQMP must identify "any relationship to applicable basin plans developed under Section 209" of the CWA. Because New Mexico has chosen to do its planning on a statewide basis, no such basin plans are applicable to NM. For the same reason, the CPP requirement in 40 CFR 130.5(b)(2) to describe "the process for incorporating elements of any applicable areawide waste treatment plans under section 208, and applicable basin plans under section 209" does not apply to NM.

Although the State conducts water quality planning on a statewide level, implementation and restoration efforts focus on the watershed level. A successful watershed protection approach must be founded on cooperative interaction between the federal, state, and local levels of government, and between the public and private sectors.

Throughout the state, local government organizations and citizens are working to address local water issues relating to both quantity and quality. These organizations include voluntary watershed groups, soil and water conservation districts, county and municipal governments, and concerned citizens.

B. Strategy

The WQCC will continue water quality management planning on a statewide basis via this WQMP/CPP. SWQB will work with and encourage participation by local, state and federal organizations, watershed groups, other nongovernmental organizations, and concerned citizens in the development and implementation of strategies to address specific regional or watershed concerns.

XII. GROUNDWATER

[As required by 40 CFR 130.6(c)(9)]

A. Groundwater Pollution Prevention Program

The WQCC has adopted comprehensive regulations (20.6.1 through 20.6.7 NMAC), including ground WQS and a discharge permitting program, for the protection of groundwater quality under the authority of the WQA. The *Ground and Surface Water Protection* regulations are codified at 20.6.2 NMAC, with supplemental permitting requirements for dairy facilities at 20.6.6 NMAC and for copper mines at 20.6.7 NMAC. In accordance with the WQA at NMSA 1978, Section 74-6-4, the WQCC has delegated responsibility for administering its regulations regarding groundwater protection to NMED and OCD. The WQCC reviews and changes its regulations as it deems appropriate.

The GWQB reviews and approves discharge permits for discharges that have the potential to impact groundwater quality. Ground water discharge permits address discharges from a wide variety of facilities, including large and small-scale domestic wastewater treatment plants, septic tank/leachfields, industrial facilities, power generating plants, mining facilities, dairies, food processing plants, commercial landfarms for remediation of contaminated soil, UIC wells and groundwater remediation systems. The program also addresses unauthorized discharges such as spills; performs enforcement actions to ensure compliance with permit requirements; and requires abatement of groundwater contamination related to permitted facilities. The discharge permitting process includes public notification, a public comment period and a public hearing in situations where there is substantial public interest. Permits are issued for five-year terms and must be renewed to provide continuous coverage. Currently, GWQB manages approximately 675 active permits.

The Underground Injection Control (UIC) Program is a federal groundwater protection program established by the SDWA. The purpose of the UIC Program is to prevent groundwater contamination by regulating the discharge of wastes into UIC wells. New Mexico has authority for administration of the UIC Program, which is jointly implemented by GWQB and OCD. These divisions administer the UIC Program under authority granted by the WQA (NMSA 1978, Section 74-6-4), the *Ground and Surface Water Protection* regulations (20.6.2 NMAC), the New Mexico Oil and Gas Act (NMSA 1978, Section 70-2-12(B)), OCD's *Oil and Gas Injection* regulations (19.15.26 NMAC), and the New Mexico Geothermal Resources Act (NMSA 1978, Sections 71-9-1 to 71-9-11).

UIC wells include:

- Any dug hole or well that is deeper than its largest surface dimension, where the principal function of the hole is emplacement of fluids,
- Any septic tank or cesspool used by generators of hazardous waste, or by owners or operators of hazardous waste management facilities, to dispose of fluids containing hazardous waste, or

- Any subsurface distribution system, cesspool or other well which is used for the injection of wastes.

EPA has grouped UIC wells into five classes (Class I, II, III, IV and V), according to the type of fluid they inject and where the fluid is. *See* https://www.epa.gov/uic.

New Mexico administers the federal UIC Program through the groundwater discharge permits required by 20.6.2 NMAC. Facilities that discharge fluids into UIC wells are required to have groundwater discharge permits approved by either GWQB or OCD, depending on the type of operation. Discharge permits contain operational, monitoring, contingency, and closure plans with specific requirements to prevent and remediate any negative impacts that UIC wells may have on groundwater quality. GWQB permits and oversees the operation, monitoring, and closure of Class I, III, IV, and V wells. OCD regulates Class II wells, and also Class I, III, and V wells related to oil and gas development activities, geothermal activities, and brine solution mining.

B. Planning Strategy for Groundwater Protection

The WQCC will update its water protection regulations as necessary to address emerging issues. NMED and OCD will continue to administer the state regulations for groundwater protection in accordance with the WQCC's delegation of responsibilities.

XIII. DETERMINATION OF COMPLIANCE WITH WATER QUALITY STANDARDS FOR THE PROTECTION OF HUMAN HEALTH CRITERIA

[As required by 20.6.4.12 NMAC]

A. Background

In accordance with 20.6.4.12(D) NMAC:

> *Compliance with the human health-organism only criteria shall be determined from the analytical results of representative grab samples, as defined in the water quality management plan. Human health-organism only criteria shall not be exceeded.*

The procedures and methods used in the scientific studies necessary to make compliance determinations are found in several documents developed by SWQB. These documents include the WQS (20.6.4 NMAC) and the Surface Water Quality Bureau's QAPP for Water Quality Management Programs, which are reviewed and approved by EPA. The Water Quality Management Programs QAPP specifically addresses both laboratory and field procedures, including data interpretation approaches and field sampling techniques. The 2002 action by WQCC concerning human health priority toxic pollutants relies on grab sample techniques to determine standards compliance. Accordingly, specification of this technique is appropriate.

SWQB interprets a grab sample as a discrete, individual sample taken within a short period of time (usually less than 15 minutes) and is representative of the conditions at the time of sampling. This definition is operationally sufficient for perennial, intermittent and ephemeral waters. As stated in the Bureau's QAPP, SWQB relies on standard procedures and laboratory quality assurance to ensure the repeatability of the data. Procedures used for the evaluation of quality assurance and quality control are found in the QAPP. The analytical results of the representative grab samples shall be used for the determination of compliance with applicable human health criteria.

B. Process for Determination of Compliance

The following procedures apply to determining compliance for enforcement purposes; they do not apply for purposes of determining attainment of designated uses. Sampling for determination of compliance with WQS human health criteria shall be accomplished as follows:

- A minimum of three individual grab samples, separated in time by no less than 15 minutes each, shall be taken during the same sampling/storm event from the same location. For the purpose of determining non-compliance, the analytical results of two or more of these samples must be greater than the applicable human health criteria. Results of all grab samples shall be recorded and reported.

Sampling and analysis shall be in accordance with SWQB's current QAPP and SOPs.

XIV. PUBLIC PARTICIPATION

A. Requirements for Public Participation

This section applies to the CWA and WQA programs administered by SWQB described herein.

General public awareness and stakeholder involvement is crucial to the successful implementation of CWA programs. By seeking and considering invaluable public input and involvement, SWQB can more effectively promote best management practices and increase public involvement to produce better decisions, as well as greater public acceptance and support for these decisions.

Public participation requirements under the CWA are specified in 40 CFR 25.4. The rule requires agencies to "…conduct a continuing program for public information and participation in development and implementation of activities…" and includes the following provisions:

- Design informational documents and activities to encourage and facilitate public participation for meaningful involvement (40 CFR 25.4(b)(1));
- Provide at least one central location of reports, studies, plans, and other documents (40 CFR 25.4(b)(3));
- Develop and maintain a list of potentially affected and interested parties and engage with them under public consultation as outlined under 40 CFR 25.4(d) (40 CFR 25.4(b)(5);
- Provide notification generally within no less than 30 days of any action to allow time for public response (40 CFR 25.4(c)).

The specifics for adhering to these requirements are outlined in greater detail for each section in Table XIV-1. In addition to the federal requirements identified above, the agency has additional outreach requirements, which include:

- Tribal engagement in accordance with NMED's *Tribal Consultation and Collaboration Policy* (NMED Office of the Secretary 2020),
- Development of PIPs in accordance with *NMED's Limited English Proficiency (LEP) Accessibility and Outreach Policy 07-11, Non-Employee Disability Accessibility and Outreach Policy 07-10* and *Public Participation Policy 07-13*.
- Provide public notification consistent with the public participation and outreach activities outlined in the associated PIP.

Table XIV-1. Public Participation Requirements

Program Element	Public Participation Actions
WQMP/CPP - All Updates	• Stakeholder identification and outreach to gather information and identify potential updates • Conduct public meetings (Optional*) • Minimum 30-day public comment period • Publish notice of public comment period and meetings in newspaper(s) or alternative media in affected area(s) (Optional*) • Email notice to SWQB mailing list (Optional*) • Post on NMED website (Optional*) • Present updates/revisions at a WQCC meeting which is open to public participation • Post WQCC and EPA approved WQMP/CPP on NMED website
Water Quality Standards at 20.6.4 NMAC & Ground and Surface Water Protection regulations at 20.6.2 NMAC	• Stakeholder identification and outreach to gather information and identify potential updates • Conduct public meetings (Optional*) • Minimum 30-day public comment period for draft proposal • Petition the WQCC at a public meeting to request a hearing for the proposed changes to the regulations (NMSA 1978, Section 74-6-6(A)) • Publish hearing notice in the New Mexico Register, in one newspaper of general circulation, in one newspaper in the affected area (as applicable) and mailed to the WQCC mailing list (NMSA 1978, Section 74-6-6(C)) 60 days prior to hearing date; (45-day notice requirement in 40 CFR 25.5, 30-day notice requirement in NMSA 1978, Section 74-6-6, 60-day notice requirement in 20.1.6.201 NMAC) • Publish hearing notice in additional newspapers or through alternative media in affected area(s) (Optional*) • Email hearing notice to SWQB mailing list (Optional*) • Post rulemaking information on NMED website (State Rules Act, NMSA 1978, § 14-4-2(E)) • Post rulemaking information on State's Sunshine Portal (State Rules Act) • Provide electronic mail notification of hearing notice with links to supporting documentation for proposed rulemaking to NMED's district managers to make available at NMED field offices (State Rules Act) • Send rulemaking information and notice of hearing by electronic mail (if provided) to persons who have identified as a stakeholder, participated in the rulemaking, or specifically made a request for notice (State Rules Act)

Program Element	Public Participation Actions
	• Send written notice that includes, at a minimum, an internet and street address where the information may be found to persons who provide a postal address (State Rules Act) • Provide notice of hearing to the New Mexico legislative council for distribution to appropriate legislative committees (State Rules Act) • Public hearing before WQCC (20.1.6 NMAC) • Publication of approved regulation in the New Mexico Register with effective date of rule (1.24.10 NMAC) • Post WQCC and EPA approved regulations on NMED website •
Water Quality Surveys	• Conduct pre-monitoring community meetings prior to conducting the study to inform stakeholders in affected area about upcoming study plan, obtain contacts, and obtain watershed specific information from those living/working within the watershed (Optional*) • Post field sampling plans on NMED website (Optional*)
TMDL Documents	• Minimum 30-day public comment period (40 CFR 130.7) • Conduct public meeting(s) in affected watershed(s) (Optional*) • Publish notice of public comment period and meetings in newspaper(s) and/or alternative media in affected area(s) (Optional*) • Email notice to SWQB mailing list (Optional*) • Post on NMED website (Optional*) • Present updates/revisions at WQCC meeting which is open to public participation • Post WQCC and EPA approved TMDL on NMED website
Appendix B-2 of this WQMP/CPP	• Post on NMED website as new TMDLs with WLA are approved, existing WLA are revised, or new WLA are added to existing TMDLs.
State of New Mexico CWA §303(d) List (Appendix A of the §303(d)/§305(b) Integrated Report)	• Minimum 30-day public comment period (40 CFR 130.7) • Publish notice of comment period in newspaper(s) or alternative media in affected area(s) (Optional*) • Email notice to SWQB mailing list (Optional*) • Post on NMED website (Optional*) • Public participation at WQCC meeting • Post WQCC and EPA approved Integrated Report on NMED website

Program Element	Public Participation Actions
CWA §303(d)/§305(b) Listing Methodology	• Minimum 30-day public comment period (Optional*) • Publish notice of comment period in newspaper(s) or alternative media in affected area(s) (Optional*) • Email notice of comment period to SWQB mailing list (Optional*) • Post final listing methodology on NMED website (Optional*)
Nonpoint Source Management Plan	• Stakeholder identification and outreach to gather information and identify potential updates • Conduct public meetings (Optional*) • Minimum 30-day public comment period • Publish notice of public comment period and meetings in newspaper(s) or alternative media in affected area(s) (Optional*) • Email notice to SWQB mailing list (Optional*) • Post on NMED website (Optional*) • Present updates/revisions at public WQCC meeting • Post WQCC and EPA approved NPSMP on NMED website
Request for Proposals (RFPs)	• Publish notice in at least three newspapers of general circulation within the state at least 20 calendar days before proposals are due (1.4.1 NMAC). • NMED Press Release (Optional*) • Post on NMED website (Optional*) • Email notice to SWQB mailing list (Optional*)
Competitive Sub-Grant Awards: Solicitation for Applications (SFAs)	• NMED Press Release (Optional*) • Post on NMED website (Optional*) • Email to SWQB mailing list (Optional*)

Program Element	Public Participation Actions
401 Certifications of 402 Federal Permits (NPDES)	Joint Notice with EPA Region 6 (40 CFR 124.10(c) and 20.6.2.2001 NMAC): • Minimum 30-day public comment period • Publish notice in one newspaper of general circulation (in area of discharge if individual permit) • Send notice to the applicant; appropriate local, state, tribal and federal agencies; and all parties who have specifically requested copies of public notices. • Post notice on NMED website • Email notice to SWQB mailing list (Optional*) When joint notice is impractical, NMED shall provide notice according to 20.6.2.2001 NMAC: • Minimum 30-day public comment period • Publish notice in one newspaper of general circulation (in area of discharge if individual permit) • Post notice on NMED website • Email notice to applicant (except for general permits), SWQB mailing list, and affected government agencies or interested parties
401 Certifications of 404 Federal Permits (Dredge and Fill)	Joint Notice with US Army Corps of Engineers (33 CFR 325.3; 33 CFR 330.5; 20.6.2001 NMAC): • Minimum 15-day public comment period • Send notice to the applicant; adjoining property owners; affected local, state, tribal and federal agencies; and all parties who have specifically requested copies of public notices. • Post notice on NMED website • Email notice to SWQB mailing list (Optional*) When joint notice is impractical, NMED shall provide notice according to 20.6.2.2002 NMAC: • Minimum 15-day public comment period • Publish notice in one newspaper of general circulation (in area of discharge if individual permit) • Post notice on NMED website • Email notice to applicant (except for general permits); SWQB mailing list; and affected government agencies or interested parties

B. Planning Strategy for Fulfilling Public Participation Requirements

SWQB will satisfy public participation requirements in accordance with appropriate law/regulation/policy by:

- Developing PIPs that take into consideration the composition and English language proficiency of the affected community or area.
- Accommodating persons with a disability that desire to participate in NMED activities.
- Providing the public with the information necessary for meaningful involvement and informing the public of how they can obtain pertinent documents/information. This information is provided in public notices, at public meetings or hearings, available upon request, or can be obtained from the SWQB website at www.nmenv.state.nm.us/swqb. Brochures, newsletters, fact sheets, press releases, and other media are also utilized, as appropriate, to provide the public with the pertinent documents/information. This information includes appropriate information and documents as well as guidelines on how public meetings or hearings will be conducted.
- Providing a central location of reports, studies, plans, and other documents. SWQB maintains an administrative record, including all study plans and associated documentation (i.e. data, field sheets, etc.). A library of all intensive water quality survey reports is maintained, and reports are available to the public upon request.
- Maintaining a stakeholder list of affected/interested parties. SWQB maintains a database of affected/interested parties. This list includes the WQCC mailing list, environmental organizations, the regulated community, watershed groups, and numerous individuals who sign up to receive information. The list is currently operated through Govdelivery and individuals can subscribe to SWQB News at the bottom of every SWQB webpage.
- Properly notifying stakeholders and interested parties in accordance with laws/statutes/policies of any upcoming program activities. SWQB uses a variety of tools to disseminate information to the public, including publishing notices in the required newspapers (and the New Mexico Register, if necessary), emailing notices to the Bureau's interested parties list and encouraging them to post and/or forward to other interested parties, issuing NMED press releases, and posting pertinent documents and public notices on SWQB's website (https://www.env.nm.gov/surface-water-quality/).

Whenever practical and possible, SWQB will expand outreach efforts to maximize public participation by seeking out innovative ways of informing and involving the public such as through social media, webinars, etc. SWQB will provide the public with information on their role in the public participation process by documenting public input and providing a response to public input by explaining how the input was taken into consideration through the public participation process. This information is attached to final documents and provided individually to those who participated in the public comment process.

XV. REFERENCES

The following documents and regulations may be updated more frequently than the WQMP/CPP. The context of each reference should be used to determine if a specific version or the most current version of the document is being referenced.

A. Federal and State Acts

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- New Mexico Water Quality Act, NMSA 1978, §§ 74-6-1 through 74-6-17 (2009). https://laws.nmonesource.com/w/nmos/Chapter-74-NMSA-1978#!fragment/zoupio-_Toc40794290/BQCwhgziBcwMYgK4DsDWszIQewE4BUBTADwBdoAvbRABwEtsBaAfX2zgBYAGAdgE4OAJj5cAlABpk2UoQgBFRIVwBPaAHI14iHFzYANnoDCSNNACEyLYTC4ECpao1WbCAMp5SAIVUAlAKIAMn4AagCCAHKGfuKkYABG0KTsoqJAA. (last visited May 20, 2020)

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B. Federal and State Regulations

- Federal Water Quality Planning and Management 40 CFR § 130 (2019). https://www.ecfr.gov/cgi-bin/text-idx?SID=60c392d68c0ca8cec151679b1bce4b05&mc=true&tpl=/ecfrbrowse/Title40/40CIsubchapD.tpl. (last visited May 20, 2020)

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- New Mexico Ground and Surface Water Protection, 20.6.2 NMAC, December 21, 2018. http://164.64.110.134/parts/title20/20.006.0002.html. (last visited May 20, 2020)

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- New Mexico Ground Water Protection-Supplemental Permitting Requirements for Dairy Facilities, 20.6.6 NMAC. January 31, 2011. http://164.64.110.134/parts/title20/20.006.0006.html. (last visited May 20, 2020)

- New Mexico Standards for Interstate and Intrastate Surface Waters, 20.6.4 NMAC. February 28, 2018. http://164.64.110.134/parts/title20/20.006.0004.html. (last visited May 20, 2020)

C. Federal Guidance

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D. NMED Policies

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State of New Mexico
Continuing Planning Process

Appendix A

Antidegradation Policy Implementation Procedure for Regulated Activities

Originally Approved 2004
Approved Revision October 23, 2020

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Glossary

Alternatives Analysis: An evaluation of possible cost-effective, reasonable alternatives to regulated discharges that might degrade water quality, including less-degrading alternatives, non-degrading alternatives, and no-discharge alternatives, such as treatment process changes, relocated discharge facilities, land application, reuse, and subsurface discharges. The evaluation must provide substantive information pertaining to the cost and environmental impacts associated with the proposed discharge and the alternatives being evaluated, so that alternatives that are cost-effective and reasonable and least degrading are identified.

Antidegradation: A regulatory policy and implementation procedure approved by EPA and the WQCC to protect existing uses of surface waters and to specify how the WQCC will determine, on a case-by-case basis, whether and to what extent, existing water quality may be lowered in a surface water.

Assimilative Capacity: The difference between the baseline water quality concentration for a pollutant and the most stringent applicable water quality criterion for that pollutant.

Baseline Water Quality (BWQ): A characterization of selected pollutants in a perennial surface water as measured and expressed during a specified time period. Once established, baseline water quality is a fixed quantity/quality unless it is updated by NMED to reflect changes in water quality.

Bio-accumulative Pollutant: a pollutant, such as pesticides or other chemicals, that accumulates in aquatic organisms when ingestion and absorption rates are faster than metabolic and excretion rates (*see* human health-organism only criteria in 20.6.4.900 NMAC).

Degradation: A decline in the chemical, physical, or biological conditions of a surface water or other decline in water quality as measured on a pollutant-by-pollutant basis.

Detection Limit: The minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results.

Designated Use: A use of a surface water specified in the *Standards for Interstate and Intrastate Surface Waters* (20.6.4 NMAC). Designated uses include domestic water supply, irrigation and irrigation storage, primary contact, secondary contact, livestock watering, wildlife habitat, aquatic life, and fish culture and water supply.

Effluent-Dependent Water: An effluent-dependent water is a surface water that without the point source discharge of wastewater would be an ephemeral water.

Ephemeral Surface Water: A surface water that contains water briefly only in direct response to precipitation; its bed is always above the water table of the adjacent region.

Existing Use: A use and the water quality necessary to support the use that has been attained in a surface water on or after November 28, 1975, whether or not it is a designated use in the surface water quality standards (20.6.4 NMAC) or if it is currently attaining the quality required for that use.

Existing Water Quality: Baseline water quality.

High Quality Water: A surface water with water quality that is better than the applicable water quality standard as determined on a pollutant by pollutant basis.

Intermittent Surface Water: A surface water that contains water for extended periods only at certain times of the year, such as when it receives seasonal flow from springs or melting snow.

Less-Degrading Alternative: A cost-effective, reasonable alternative to a proposed discharge that would result in fewer detrimental changes to water quality as characterized by the baseline water quality evaluation.

Loading Capacity: total assimilative capacity of a waterbody for the pollutant of concern at critical flow. The loading capacity is the maximum amount of pollutant loading that a waterbody can receive and still meet water quality standards.

Minimal Degradation: A deterioration or decline in water quality that results in the consumption of less than 10 percent of the available assimilative capacity for a pollutant.

National Pollutant Discharge Elimination System [NPDES]: The point source discharge permit program established by Section 402 of the Clean Water Act (33 U.S.C. § 1342).

Non-Degrading Alternative: A cost-effective, reasonable alternative to a proposed discharge that would result in no significant degradation of water quality as characterized by the baseline water quality evaluation.

Outstanding National Resource Water (ONRW): A surface water that is classified as an outstanding national resource water under 20.6.4.9 NMAC.

Perennial Surface Water: A surface water that typically contains water throughout the year and rarely experiences dry periods.

Regulated Discharge: A point source discharge regulated under Section 402 of the CWA, a discharge for Dredge and Fill material regulated under Section 404 of the CWA, and any discharged authorized by a federal permit or license that is subject to state water quality certification under Section 401 of the CWA.

Relative Percent Difference (RPD): RPD is an expression of the degree of variation between two water quality samples taken under similar conditions. RPD is calculated using the following equation, where S represents the concentration of the pollutant in the original sample and D represents the concentration of the pollutant in the new sample.

$$\boldsymbol{RPD} = \frac{|\boldsymbol{S} - \boldsymbol{D}|}{(\boldsymbol{S} + \boldsymbol{D})/2}\ \boldsymbol{x}\ \mathbf{100}$$

Short-Term Degradation: Degradation that is six months or less in duration, i.e., water quality returns to baseline water quality within six months after the discharge commences.

Significant Degradation: The consumption of 10 percent or more of the available assimilative capacity for any pollutant of concern at critical flow conditions or any consumption of assimilative capacity that exceeds a cumulative cap of 50% of assimilative capacity.

Significantly Improved Water Quality: For purposes of a BWQ re-evaluation, significantly improved water quality compares the original baseline water quality data to new water quality data acquired or submitted to the Department and calculates the relative percent difference (RPD) between the two data points. If the RPD is greater than or equal to 20% and sampling technique, sample processing and transport, and laboratory analyses are comparable, a new baseline characterization may be warranted.

Surface Waters of New Mexico: All surface waters situated wholly or partly within or bordering upon the state, including lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, reservoirs or natural ponds. Surface waters of the state also means all tributaries of such waters, including adjacent wetlands, any manmade bodies of water that were originally created in surface waters of the state or resulted in the impoundment of surface waters of the state, and any "waters of the United States" as defined under the Clean Water Act that are not included in the preceding description.

Temporary Degradation: Degradation that is six months or less in duration, i.e., water quality returns to baseline water quality within six months after the discharge commences; short-term degradation.

Tier 1 Protection: Policies and procedures that prohibit degradation which results in the loss of an existing use, or violation of water quality criteria; and prohibit degradation of existing water quality where pollutants of concern do not meet applicable water quality standards. Tier 1 defines the minimum level of protection for all waters and requires that water quality be maintained such that the existing and designated uses of the water are supported. This applies to waters that do not meet or meet but are <u>not</u> better than the water quality standards for existing or designated uses. Surface waters with this protection may already be of lower quality.

Tier 2 Protection: Policies and procedures that prohibit significant degradation of a surface water unless a review of reasonable alternatives and social and economic considerations shows that the lowering of water quality is necessary for important social and economic considerations in the area where the water is located. Tier 2 protection level applies to perennial and intermittent waters where data confirm high quality water (i.e., where existing water quality is better than applicable water quality standards as determined on a pollutant-by-pollutant basis).

Tier 3 Protection: Policies and procedures that prohibit any lowering of water quality in Outstanding New Mexico Waters as identified under 20.6.4.9 NMAC unless impacts are minimized and temporary.

Toxic Pollutant: A pollutant or combination of pollutants, including disease-causing agents, that after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will cause death, shortened life spans, disease, adverse behavioral changes, reproductive or physiological impairment or physical deformations in such organisms or their offspring.

Translator: Methodologies to guide the calculation of site-specific numeric targets (not criteria) based on a given narrative standard.

Water Contaminant: Any substance that, if discharged or spilled, could alter the physical, chemical, biological or radiological qualities of water.

Water Pollutant: A water contaminant in such quantity and of such duration as may with reasonable probability injure human health, animal or plant life or property, or to unreasonably interfere with the public welfare or the use of property. Pollutants may include liquid, solid, gaseous, or hazardous substances such as contaminants, toxic pollutants, solid waste, chemicals, pesticides, herbicides, fertilizers, incinerator residue, sewage, garbage, sewage sludge, munitions, petroleum products, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, dirt, and mining, industrial, municipal and agricultural wastes.

Water Quality Criteria: Elements of water quality standards that are expressed as pollutant concentrations, levels, or narrative statements representing a water quality that supports a designated use.

1 Overview of New Mexico's Antidegradation Approach

Water quality standards (WQS) are the foundation for a wide range of programs under the Clean Water Act (CWA). WQS consist of designated uses such as aquatic life and recreation, water quality criteria necessary to protect those uses, and antidegradation requirements. Each State must develop, adopt, and retain a statewide antidegradation policy regarding water quality standards and establish procedures for its implementation through the water quality management process. Antidegradation implementation is based on a set of procedures to be followed when evaluating activities that may impact the quality of New Mexico's surface waters. Antidegradation implementation is an integral component of a comprehensive approach to protecting and enhancing surface water quality.

Antidegradation protections consist of three levels, or tiers, of protection defined by New Mexico's water quality standards in 20.6.4.8 NMAC. Tier 1 protections provide a floor of protection, ensuring that existing instream water uses and the level of water quality necessary to protect those existing uses are maintained and protected. Tier 2 protections maintain and protect water quality that exceeds water quality numeric and narrative criteria, prohibiting any lowering of water quality unless necessary to accommodate social or economic need. Tier 3 protections are afforded to waters designated by the Water Quality Control Commission (WQCC) as Outstanding National Resource Waters (ONRWs). In ONRWs, no degradation is permitted except in limited, specifically defined instances, such as to accommodate public health or safety activities or to enable activities to restore or maintain water quality.
Antidegradation applies to all activities with the potential to adversely affect water quality or existing or designated uses, including:

- Any proposed new or increased point source or nonpoint source discharge of pollutants that would lower water quality or affect the existing or designated uses.
- Any proposed increase in pollutant loadings to a waterbody when the proposal is associated with existing activities.
- Any increase in flow alteration over an existing alteration.
- Any hydrologic modifications, such as dam construction and water withdrawals.

This document has been drafted to provide guidance to persons responsible for regulated discharges that may degrade water quality in New Mexico. Regulated discharges include those that require a permit and/or a water quality certification under Section 401 of the Clean Water Act (CWA) pursuant to state or federal law. The Nonpoint Source Management Plan, a separate document incorporated by reference into the WQMP/CPP, describes antidegradation implementation procedures applicable to nonpoint source discharges. The information contained in this document is intended to provide guidance only and is not a substitute for the provisions of any other laws, rules, or regulations.

The guidance that follows addresses implementation procedures for New Mexico's antidegradation rule at 20.6.4.8 NMAC, and the federal antidegradation policy at 40 CFR 131.12. NMED is required by 40 CFR 131.12(a) to develop and adopt a statewide antidegradation policy and to identify methods for implementing that policy. The guidance generally includes:

- Processes for identifying the antidegradation protection level (i.e., the "*tier*") that applies to a surface water;
- Procedures for determining baseline water quality (BWQ);

- Approaches for evaluating water quality degradation;
- Procedures for identifying and evaluating less degrading or non-degrading alternatives;
- Procedures for determining the importance of economic or social development to support significant degradation of high quality surface waters; and,
- Information on intergovernmental coordination and public participation processes.

1.1 DESIGNATED USES AND WATER QUALITY CRITERIA

Water quality standards, including designated uses and associated water quality criteria can be found at 20.6.4 NMAC. Under the Clean Water Act (CWA) and New Mexico's surface water quality standards, various uses are assigned to surface waters. Designated uses include domestic water supply, irrigation and irrigation storage, primary contact, secondary contact, livestock watering, wildlife habitat, aquatic life, and fish culture and water supply. Designated uses are accompanied by an established set of *water quality criteria* designed to ensure that the designated uses are achieved. In accordance with state regulations, designated uses can be established or changed only through administrative rulemaking. Most surface waters have several designated uses. Where more than one use exists, or has been designated for a surface water, the use with the most stringent water quality criteria must be maintained and protected.

1.2 COVERAGE AND GENERAL APPLICABILITY

In general, the antidegradation implementation procedures described in this guidance apply to every proposal for a new or increased permitted discharge of a pollutant to a "surface water of the State." Permitted discharges are those discharges regulated under the authority of the CWA and discharges regulated pursuant to 20.6.2 NMAC that have the potential to impact surface water quality. These include National Pollutant Discharge Elimination System (NPDES) point source discharges regulated under Section 402 of the CWA; discharges which result in the placement of dredged or fill material into surface waters regulated under Section 404 of the CWA; and any discharge authorized by federal permits and licenses that are subject to state water quality certification under Section 401 of the CWA.

These procedures do not apply to non-point sources (NPS). In instances when significant degradation is determined to be a concern and NPS sources are impacting water quality, NMED will work with stakeholders to identify and implement best management practices, as described in the Nonpoint Source Management Plan.

These procedures also do not apply to other water quality-related actions, including revision of Commission documents (e.g., New Mexico Water Quality Standards, Continuing Planning Process, Statewide Water Quality Management Plan, and New Mexico Nonpoint Source Management Plan); the Commission's establishment of Total Maximum Daily Loads (TMDLs); or the conduct of studies, including use attainability analyses, by any party, including NMED. These types of water quality-related actions already are subject to extensive requirements for review and public participation, as well as various limitations on degradation imposed by state and federal law.

Section 3 summarizes the antidegradation review approach used in New Mexico, which is based on the type of regulated discharge under consideration (e.g., by permit type), the receiving water, and the BWQ for relevant pollutants of concern in the receiving surface water.

1.3 Coordination with Assessment and Impairment Listing

Section 305(b) of the CWA requires each state to prepare and submit to the U.S. Environmental Protection Agency (EPA) a biennial report describing water quality of all surface waters in the state. Each state must monitor water quality and review available data to determine if water quality standards are being met. From the assessment, the CWA Section 303(d) List ("303(d) list") is created which identifies surface waters that do not meet water quality standards. These waters are known as water quality limited waters or impaired waters. Identification of a surface water as impaired may be based on a violation of a numeric or narrative water quality criterion. NMED's antidegradation policy implementation procedure (i.e., this appendix) assigns a protection category for the receiving water based on whether water quality standards are being met.

To coordinate antidegradation reviews with the 305(b) reporting and 303(d) listing activities, NMED will implement the following protections:

- *Tier 1 Protection (applicable to all waters):* No further degradation is permitted in a surface water where the most current water quality for that criterion does not meet, or meets but is not better than, the applicable water quality standards. Impaired waters are identified on New Mexico's 303(d) list and targeted for future water quality management planning (e.g., TMDLs, Watershed Based Plans (WBPs), etc.) to improve water quality and attain WQS.
- *Tier 2 Protection (applicable to perennial and intermittent waters where data confirm high-quality water is present):* Where possible, NMED may award priority points for grant or other funding programs that target water quality protection and restoration and support actions needed to protect and restore water quality. NMED may also revise the BWQ based upon more recent water quality data included in the biennial assessment of surface waters.
- *Tier 3 Protection (applicable to all waters designated as an ONRW):* No degradation is allowed in an ONRW, except in limited, specifically defined instances, such as to accommodate public health or safety activities or to enable activities to restore or maintain water quality, as outlined in 20.6.4.8(A)(3) and 20.6.4.8(A)(4) NMAC. For activities that may cause short-term degradation, NMED may award priority points for grant or other funding programs that target water quality protection and support actions needed to protect and restore water quality.

In addition, NMED participates in reviews for Clean Water State Revolving Funding. Applications are reviewed for compliance with water quality standards for both surface and groundwater, and projects that directly implement a fix to a water quality problem are awarded priority points to allow more rapid implementation of those projects. This results in a more proactive approach from the Department to restore or maintain water quality in surface waters across the state.

1.4 Intergovernmental Coordination and Review Process

Federal and state regulations require intergovernmental coordination and public participation for Tier 2 reviews and public participation in decisions that may result in water quality degradation. Coordinating antidegradation reviews among various agencies and other interested parties will involve significant cooperation in gathering data, conducting evaluations, analyzing alternatives and evaluating potential social and economic impacts. A list of agencies that may be involved in the intergovernmental coordination and review process is included as Appendix A.5 of this document.

For comprehensive Tier 2 reviews on perennial waters, determining BWQ, evaluating projected impacts, analyzing possible alternatives, and evaluating economic or social benefits, if applicable, must occur prior to issuing an individual NPDES permit. Therefore, it is recommended that an applicant discharging into a perennial water meet with NMED in a pre-application conference at least one year prior to permit issuance. Timely notification and early consultation with NMED will help ensure that the issuance of permits can proceed without disruption to facility design, construction, or other activities planned by the applicant.

1.5 Public Notification and Participation

Information on BWQ, designated uses, water quality standards, applicability of protection tiers, impact analyses, alternatives analyses, agency decisions, and other matters related to antidegradation reviews will be documented by NMED and made part of the public record. Public notification of proposed actions and requests for public comment will be made in accordance with Chapter 8 of this appendix.

2 Tiered Protection Levels

2.1 Tier Definitions

Federal law requires that surface waters be protected from discharges that might degrade water quality. To implement this requirement, it is necessary to identify antidegradation protection levels, or tiers, appropriate to each surface water. The state antidegradation rule at 20.6.4.8 NMAC delineates three tiers of protection for New Mexico surface waters. These tiers are applied on a pollutant-by-pollutant basis. Although Tiers are defined on a pollutant-by-pollutant basis, ONRWs are identified on a waterbody basis as described further below in this section and in NMAC 20.6.4.9(D) NMAC. Under this approach, surface water quality might degrade for one or more pollutants of concern but be unaffected for other pollutants. Degradation may be further described as *de minimis* (consumption of less than 10% of the assimilative capacity for a pollutant of concern) or significant (consumption of 10% or more of the assimilative capacity for a pollutant). Minimal (*de minimis*) degradation is permitted under the antidegradation rule and does not trigger comprehensive Tier 2 antidegradation review requirements. Significant degradation triggers the comprehensive Tier 2 antidegradation implementation procedures described below. The tiered protection levels are applied as follows:

> **Tier 1** – Applies as the default protection level for all surface waters, including intermittent waters, ephemeral waters, effluent dependent waters, and other surface waters and requires that water quality be maintained such that the existing and designated uses of the water are supported. Tier 1 prohibits further degradation of existing water quality where a pollutant of concern does not meet or meets but water quality is not better than applicable water quality criteria. Tier 1 protection for impaired waters apply only to those pollutants that resulted in the 303(d) listing**.**
>
> **Tier 2** – Applies to perennial surface waters with high quality water (i.e., where existing water quality is better than applicable water quality standards as determined on a pollutant-by-pollutant basis). Tier 2 requires that existing high-quality water be maintained but allows for limited (*de-minimis*) degradation. The Tier 2 protection level prohibits significant degradation unless a review of reasonable alternatives and social and economic considerations supports a lowering of water quality. Tier 2 may also apply to intermittent waters if data are available and indicate a high-quality water (i.e., water quality better than applicable WQS). Tier 2 is the default protection level for all high-quality perennial and intermittent waters (i.e., water quality is better than the applicable WQS).
>
> **Tier 3** – Applies only to New Mexico Outstanding National Resource Waters (ONRWs) identified in 20.6.4.9(D) NMAC. Tier 3 prohibits any degradation and lowering of water quality in an ONRW unless impacts are minimal and temporary. Approval for any degradation must be obtained according to the process outlined in 20.6.4.8(A)(3) and 20.6.4.8(A)(4) NMAC.

Antidegradation is more about levels of protection than it is about levels of quality. In fact, for Tier 3 it could be said that antidegradation is all about protection, as the outstanding character may have little to do with actual water quality in the traditional sense of pollutant concentrations (e.g., waters may have particularly high ecological value). Numeric water quality criteria are considered in an antidegradation analysis, however NMED takes other considerations into account as warranted. For example, Tier 3 (ONRWs) analyses require consideration of the essential character or special use that makes the water an ONRW, such as high ecological or recreational value.

Most of the involvement in the antidegradation policy is regarding Tier 2 waters. This tier is where antidegradation procedures can work to maintain high quality water and is also where dischargers may have to expend extra effort to reduce their proposed degradation of water quality or demonstrate that allowing lower water quality is necessary to accommodate important economic and social development in the area in which the water is located.

2.2 DESIGNATION OF TIER CATEGORY

At a minimum, all surface waters in New Mexico are protected in accordance with Tier 1 antidegradation requirements. Tier 1 applies categorically to all intermittent and ephemeral streams, effluent dependent waters, and all surface waters on the 303(d) list on a pollutant-by-pollutant basis. Where a surface water is listed on the state's 303(d) list for one or more pollutants, and where existing water quality for other pollutants is better than water quality standards, the surface water will be afforded Tier 1 and Tier 2 protection on a pollutant-by-pollutant basis. That is, Tier 1 protection for the pollutants not meeting water quality standards and Tier 2 protection for pollutants that are better than water quality standards.

Perennial waters, and possibly some intermittent waters, that are found to have existing water quality better than applicable water quality standards are protected at the Tier 2 level. For Tier 2 protection, determinations regarding the significance of degradation are based on BWQ and the relative change in water quality projected to result from the discharge under review. In general, BWQ, as discussed in Chapter 4 of this appendix, defines existing water quality for purposes of antidegradation reviews. BWQ can be established for surface waters through monitoring and water quality assessments conducted by NMED, regulated entities, or by others (e.g., contractors). Tier 3 protection applies to ONRWs listed in 20.6.4.9(D) NMAC. Tier 3 protection will be afforded for all pollutants of concern in an ONRW.

Where a perennial water has been assessed but has <u>not</u> been listed as an impaired water or as an ONRW, the presumed antidegradation protection level is Tier 2 for all pollutants of concern. If a protection tier has not already been determined for a perennial surface water, NMED will establish the tier by identifying the use(s) of the segment, determining BWQ, and comparing the attributes of the surface water under study to the criteria for the tiers as cited above.

Upon establishing the appropriate tier(s) for a surface water, NMED will document its findings along with BWQ characterization and make this information available as part of the public record. Tier levels established by NMED may be revised, or alternate tier assignments may be assigned when waters are added or removed from the 303(d) list or are added to the list of ONRWs (see 20.6.4.9(D) NMAC).

Table 2-1 summarizes decision criteria for assigning protection tiers and the antidegradation requirements for each. More information on conducting the antidegradation reviews for waters requiring Tier 2 and Tier 3 protection can be found in Chapter 3 of this document.

Table 2-1. Tier Descriptions and Summary of Antidegradation Protection Requirements

Tier	Waters Included	Protection Requirements
1	All surface waters that meet but are not better than applicable water quality criteria, i.e., not considered "high quality," as determined on a pollutant by pollutant basis. All surface waters on the state's 303(d) list of impaired waters for the pollutant that resulted in the listing. Intermittent waters.[1] All ephemeral waters. All effluent dependent waters.	The minimum level of protection necessary to maintain the existing and designated uses of a surface water. Where a surface water is impaired or meets, but water quality is not better than, applicable water quality criteria, there shall be no lowering of the water quality with respect to the pollutant causing the impairment. Tier 1 protection applies regardless of any economic or social benefits associated with a proposed discharge.
2	For intermittent[1] and perennial waters reflecting high-quality waters, i.e., where the level of water quality is better than applicable water quality criteria as determined on a pollutant-by-pollutant basis. Tier 2 is the default protection level for high-quality perennial and intermittent waters that are not ONRWs or on the 303(d) list.	High-quality water in perennial and intermittent (if known) streams and lakes must be protected at a level that minimizes degradation of that water quality. No significant degradation of the Tier 2 pollutants in the surface water is allowed unless a comprehensive antidegradation review of reasonable alternatives demonstrates that the lowering of water quality is necessary for important social and economic considerations in the area in which the waters are located.
3	ONRWs.	No new or expanded direct discharges. No lowering of water quality allowed unless it is minimized and temporary, *and* degradation is approved according to 20.6.4.8 NMAC.

[1] For intermittent waters, if water quality data are available and assessable, and indicate a high-quality water (i.e., water quality better than applicable WQS), then Tier 2 protection applies on a pollutant-by-pollutant basis.

3 Antidegradation Review Requirements

The antidegradation review procedure is based on the protection tier assigned to the receiving water, the type of receiving water, existing (i.e., baseline) water quality in the receiving water, the projected impacts, and nature of the proposed discharge.

In general, the antidegradation review requirements described in this guidance apply to regulated discharges that have the potential to degrade water quality. These include NPDES point source discharges regulated under Section 402 of the CWA; discharges which result in the placement of dredged or fill material into surface waters regulated under Section 404 of the CWA; and any discharge authorized by federal permits and licenses that are subject to state water quality certification under Section 401 of the CWA.

3.1 ANTIDEGRADATION REVIEW REQUIREMENTS BY TIER

Tier 1: Reviews to Protect Existing Uses

Tier 1 reviews must ensure that the level of water quality necessary to protect existing uses is maintained and protected. In general, the "level of water quality necessary to protect existing uses" is defined by state-adopted surface water quality standards.

General Applicability

Tier 1 protection applies to all surface waters. In determining whether a surface water is afforded only Tier 1 protection, NMED will focus on whether the surface water meets or fails to meet applicable WQS.

Impaired Waters

For surface waters listed as impaired on the 303(d) list and for those waters that meet but are not better than the water quality criteria for a particular designated use, Tier 1 protection will be provided for the listed pollutants. Non-listed pollutants in 303(d) listed waters and those surface waters that are of high-quality may be afforded Tier 2 protection. Under Tier 1, no discharges will be permitted to cause further degradation for pollutants that do not meet applicable water quality standards. Where existing uses of a surface water are impaired, there will be no lowering of the water quality with respect to the pollutant(s) of concern causing the impairment.

Non-Perennial and Effluent Dependent Waters

Lack of flow in ephemeral and intermittent waters makes it difficult to characterize BWQ and conduct Tier 2 antidegradation reviews. Similarly, lack of flow and/or the nature of flow in effluent dependent waters also makes these waters difficult to characterize, other than simply characterizing the effluent being discharged. These non-perennial waters will receive Tier 1 protection for all pollutants of concern unless there is sufficient BWQ data to demonstrate a high-quality water for intermittent waters to which a Tier 2 evaluation would be appropriate. Applicable WQS must be maintained and protected for these surface waters.

For example, certain individual and general permit applicants will likely discharge to a non-perennial stream segment where there is no other existing discharge to the segment, little or no flow in the channel beyond the immediate area of the discharge, and no available ambient water quality data. No BWQ evaluation will be required for these discharges. Antidegradation reviews for most discharges to non-perennial waters will focus on requirements that applicable WQS be met end-of-pipe (unless ambient water quality data are available for a BWQ evaluation), and technology-based requirements, e.g., best available technology (BAT), are applied as required by permit conditions. Antidegradation review for NPDES individual municipal separate storm sewer system (MS4) and general permits as well as dredge or fill permits under Section 404 of the CWA for will focus on meeting WQS in receiving waters by ensuring compliance with the permit or state certification of the permit pursuant to Section 401 of the CWA.

General (Narrative) Criteria under 20.6.4.13 NMAC

Total Dissolved Solids (TDS) – NMED will follow the guidance laid out in the Colorado River Salinity Control Forum. Compliance with the Forum requirements will be considered to meet the intent of the narrative standard.

Plant Nutrients – NMED will evaluate nutrient discharges in accordance with available thresholds (i.e., translators) and will use applicable thresholds for the Tier 1 antidegradation review. A similar approach has been taken with Raton and Santa Fe WWTPs, capping the facilities at their current level of discharge/degradation. Depending on the data available, limits will be derived using a percentile of the data set (85th, 95th, etc.) that is reasonably achievable and still maintains and protects existing water quality. There are no technologically based effluent limits (TBELs) available for nutrients for publicly-owned treatment works (POTWs) at this time, but based on the type of treatment system available, NMED will work with the facility to incorporate limitations that maintain or reduce current levels of nutrient loading.

Other General Criteria – If a narrative standard does not have associated numeric thresholds or translators, NMED will not evaluate the narrative standard for antidegradation purposes due to the impracticality of such an evaluation.

Tier 2: Reviews to Protect High Quality Waters

Tier 2 protection applies to high quality perennial and intermittent (if data are available and assessable) waters with water quality better than applicable WQS, as determined on a pollutant-by-pollutant basis. Existing water quality in high quality surface waters must be maintained and protected. Tier 2 prohibits significant degradation unless a review of reasonable alternatives and social and economic considerations support a lowering of water quality, and after opportunity for intergovernmental review and public comment and hearing. If degradation is allowed, it must not result in a violation of applicable WQS.

General Applicability

Any regulated discharge to a high quality water is subject to Tier 2 antidegradation review to determine if the discharge will significantly degrade water quality. Determinations issued under these provisions will be made in accordance with the public notification process described in Chapter 8 of this appendix. If NMED determines after an initial evaluation that comprehensive Tier 2 review requirements do not apply to a proposed discharge, the discharge must still achieve the requirements of the permit or conditions of the water quality certification.

Basic vs. Comprehensive Tier 2 Review

A basic Tier 2 antidegradation review is used to determine whether or not significant degradation will occur from a regulated discharge, i.e., whether or not 10% or more of the available assimilative capacity for any pollutant of concern will be consumed as a result of the proposed discharge during critical flow conditions or any consumption of assimilative capacity that exceeds a cumulative cap of 50% of assimilative capacity. The BWQ and applicable WQS must be reviewed as part of a basic Tier 2 antidegradation review.

A comprehensive Tier 2 antidegradation review, which includes an alternatives analysis and social and economic demonstration for the degradation, is required for any new or expanded discharge that may significantly degrade a Tier 2 protected water.

No comprehensive Tier 2 antidegradation review is required for discharges regulated under a general NPDES permit or a Section 404 dredge or fill permit. These discharges will be required to meet the conditions of the general permit or Section 401 water quality certification.

Tier 3: Reviews to Protect Outstanding New Mexico Waters

Existing water quality in ONRWs must be maintained and protected. Any discharge that would degrade existing water quality in an ONRW is prohibited, unless the applicant demonstrates that the water quality impacts are temporary and necessary for public health and safety or restoration, and the applicant receives approval for the activity according to the process in 20.6.4.8 NMAC.

General Applicability

Tier 3 protection applies only to surface waters that are classified as ONRWs and identified under 20.6.4.9(D) NMAC.

Tier 3 Review

Discharges that impact ONRWs are subject to Tier 3 antidegradation review. New or expanded discharges that may cause degradation directly to an ONRW identified under 20.6.4.9(D) NMAC are prohibited, except in limited, specifically defined and temporary events, such as to accommodate public health or safety activities or to enable activities to restore or maintain water quality, as outlined in 20.6.4.8.A(3) and (4) NMAC. In general, temporary is defined as occurring for a period of six months or less and is not recurring. In addition, NMED will impose necessary controls on indirect discharges that occur upstream or to tributaries of an ONRW to maintain and protect existing water quality in the downstream ONRW.

Determinations regarding antidegradation reviews for activities that affect ONRWs, such as public health or safety activities or activities to restore or maintain water quality, will be made on a case-by-case basis after consideration of the following factors outlined in 20.6.4.8(A)(3) and 20.6.4.8(A)(4) NMAC:

- The degradation shall be limited to the shortest possible time and shall not exceed six months;
- The degradation shall be minimized and controlled by best management practices or in accordance with permit requirements as appropriate; all practical means of minimizing the duration, magnitude, frequency and cumulative effects of such degradation shall be utilized;
- The degradation shall not result in water quality lower than necessary to protect any existing use in the ONRW; and
- The degradation shall not alter the essential character (e.g., exceptional recreational or ecological significance) or special use (e.g., state special trout water; national or state park, monument, wildlife refuge; designated wilderness or wild river) of the ONRW, as supported by the proceedings and final decision establishing the water as an ONRW.

Prior to the WQCC's decision, NMED will provide a written recommendation to the commission. This recommendation will take into account the following factors:

- Change in ambient concentrations predicted at the appropriate critical flow condition(s)
- Change in loadings (i.e., the new or expanded loadings compared to total existing loadings to the segment)
- Reduction in available assimilative capacity
- Nature, persistence and potential effects of the pollutant
- Potential for cumulative effects
- Degree of confidence in the various components of any modeling technique utilized (e.g., degree of confidence associated with the predicted effluent variability)

The antidegradation review findings must be documented and public participation activities initiated, as per the procedures in 20.6.4.8(3)(a) NMAC. If the review finds that the proposed discharge will not be temporary, the proposed discharge will be denied. In all cases, Tier 1 protection must be maintained.

Emergency Response Action

If an emergency response action is occurring in proximity to an ONRW and is necessary to mitigate an immediate threat to public health or safety, it may proceed prior to notification to the WQCC and NMED, in accordance with the following as outlined in 20.6.4.8(A)(3)(c) NMAC:

- only actions that mitigate an immediate threat to public health or safety may be undertaken pursuant to this provision; non-emergency portions of the action shall comply with the requirements of 20.6.4.8 NMAC;
- the discharger shall make best efforts to comply with requirements noted above;
- the discharger shall notify the department of the emergency response action within seven days of initiation of the action; and,
- within 30 days of initiation of the emergency response action, the discharger shall provide a summary of the action taken, including all actions taken to comply with the requirements above.

Upstream Discharges & Tier 3 Review

A discharge upstream of an ONRW is prohibited where the proposed discharge would degrade existing water quality of the downstream ONRW on a longer than temporary basis. To determine whether the proposed discharge will result in the lowering of water quality in the downstream ONRW, the following factors may be considered:

- Change in ambient concentrations predicted at the appropriate critical flow condition(s)
- Change in loadings (i.e., the new or expanded loadings compared to total existing loadings to the segment)
- Reduction in available assimilative capacity
- Nature, persistence and potential effects of the pollutant
- Potential for cumulative effects
- Degree of confidence in the various components of any modeling technique utilized (e.g., degree of confidence associated with the predicted effluent variability)

If a preliminary determination is made that the requirements above will be met, the antidegradation review findings must be documented and the applicable public participation activities must be initiated. If the review finds that the proposed discharge will result in the lowering of water quality in a downstream ONRW, the proposed discharge will be denied.

3.2 ANTIDEGRADATION REVIEW REQUIREMENT BY TYPE OF PERMIT

Antidegradation review requirements for regulated discharges that may degrade water quality vary according to 1) classification, existing uses, and condition of the receiving water; 2) the type of discharge and permit under which the discharge is conducted; and 3) the range and severity of projected impacts on the surface water. For example, antidegradation review requirements for discharges authorized under general permits differ from antidegradation review requirements for discharges regulated by individual permits. This section outlines the antidegradation review requirements for regulated discharges that may degrade water quality, including those with individual and general NPDES permits and those covered under Section 404 of the CWA (Dredge or Fill permits).

Compliance with the requirements of general permits and prompt attention to conditions that might result in water quality degradation will help ensure that discharges authorized by general permits do not cause violations of WQS. Moreover, some new or expanded discharges formerly authorized by a general permit may not be eligible for such coverage in the future if NMED believes they could significantly degrade a surface water. In those cases, applicants will be required to seek coverage under an individual permit.

In order to implement New Mexico's antidegradation policy in an efficient manner, it is recommended that persons proposing individually-permitted discharges which might degrade water quality in a perennial water notify NMED before determining BWQ (see Chapter 4 of this appendix) or applying for a permit. Such an approach will help ensure that the antidegradation review proceeds smoothly, without delay, and that planned facilities will comply with applicable statutes and rules. Figure 3-1 summarizes the Tier 2 review process for individual NPDES permit reissuance and new or expanded NPDES permits. Figure 3-2 summarizes the review requirements for individual NPDES; NPDES Stormwater Permits; general NPDES permits; individual and nationwide Section 404 permits, and federal permits and licenses subject to Section 401 water quality certification.

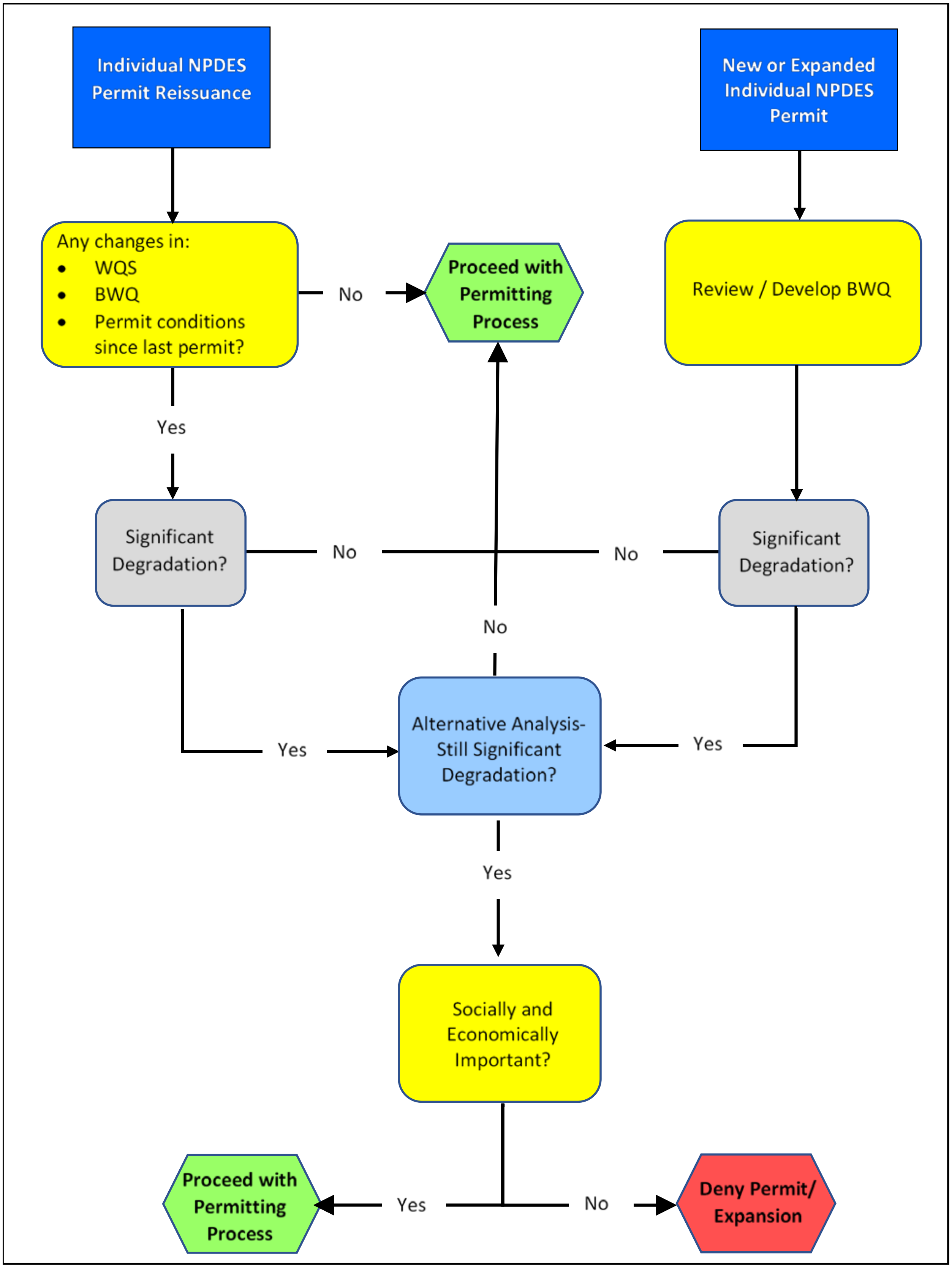


Figure 3-1. **Tier 2 Antidegradation Review Process for Individual NPDES Permits**

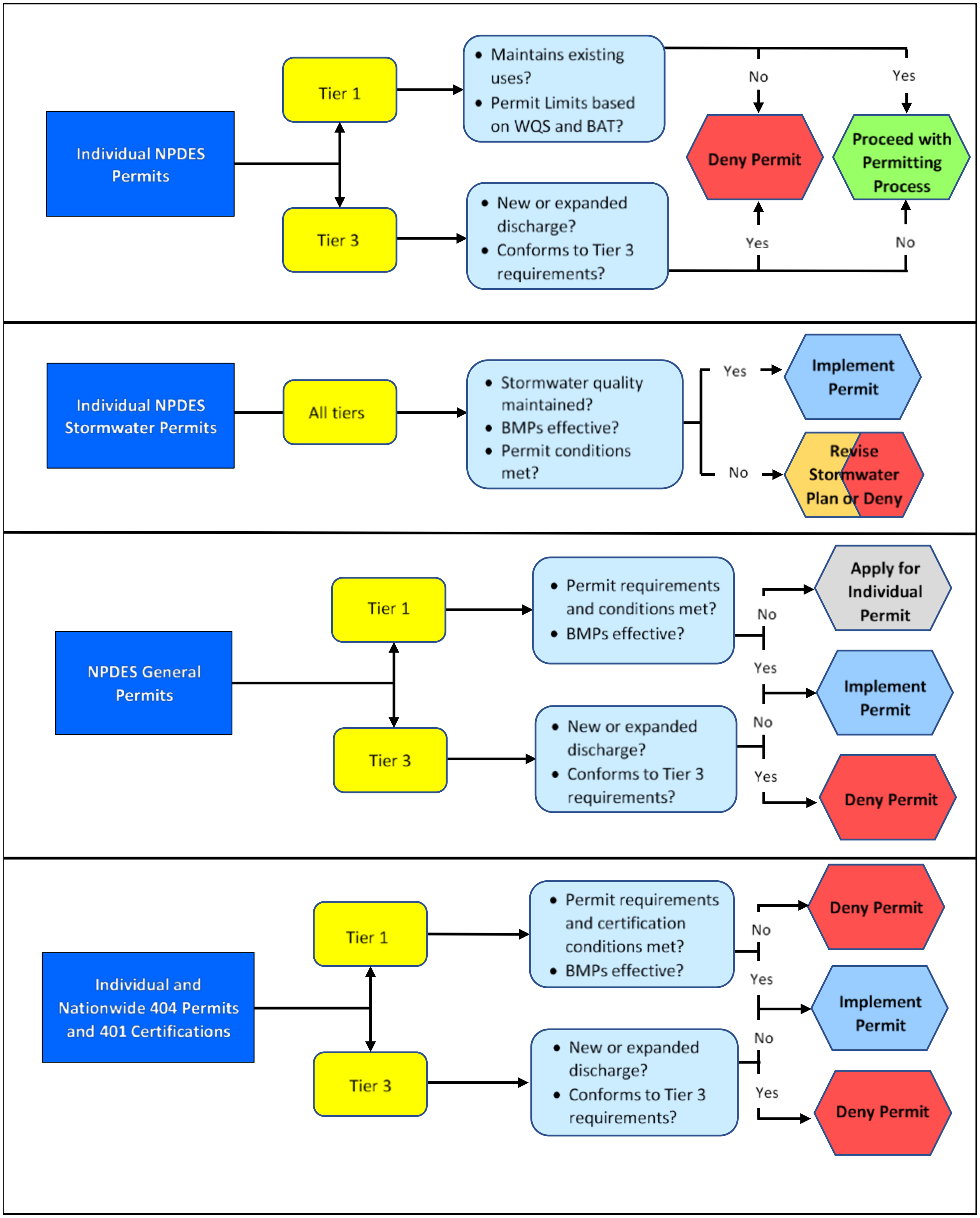


Figure 3-2. Antidegradation Review Requirements by Permit Type

3.3 Individual NPDES Permits

General Applicability

All point source discharges regulated by individual NPDES permits are subject to an antidegradation review at the time of issuance, modification, or renewal of a permit. All NPDES permits must ensure that water quality is protected at the appropriate tier based on available water quality information; however, at a minimum, the level of water quality necessary to maintain existing uses must be maintained and protected.

Reasonable Potential for Minor POTWs

Facilities less than 0.1 million gallons per day (MGD) are not required to sample or report any toxic substances on their NPDES permit applications, since studies indicated they have "no reasonable potential" to discharge toxic substances in amounts that would violate state WQS. Facilities greater than 0.1 MGD, but less than 1 MGD report some toxic substances that are present in facility discharges of that size.

Supporting information for this decision was published by EPA as "Evaluation of the Presence of Priority Pollutants in the Discharges of Minor POTW's," June 1996, and was sent to all state NPDES coordinators by EPA Headquarters. In this study, EPA collected and evaluated data on the types and quantities of toxic pollutants discharged by minor POTWs of varying sizes from less than 0.1 MGD to just under 1 MGD. The Study consisted of a query of the EPA Permit Compliance System (PCS) database from 1990 to 1996, an evaluation of minor POTW data provided by the State agencies, and on-site monitoring for selected toxics at 86 minor facilities across the nation.

Therefore, in the cases of facilities under 0.1 MGD, these facilities have already been assessed as having no reasonable potential to discharge toxic substances in toxic amounts. Additional historical records may provide information to assess reasonable potential.

Overview of the Antidegradation Review Procedure

The antidegradation review for individual NPDES permits will be based upon the assigned protection tier, the existing uses of the segment, applicable WQS, flow regime of the receiving water, pollutants of concern associated with the discharge, projected impacts on the receiving water, cumulative impacts from other pollutant sources, and the significance of any degradation that might occur as a result of the discharge.

All applicants will be required to identify pollutants reasonably expected to be in the discharge, estimate flow rates, and characterize pollutant concentrations and/or mass pollutant loads, as specified by NMED. In addition, applicants for new and expanded discharges to perennial waters under an individual permit are required to collect and submit existing or new information on BWQ needed to analyze the impact(s) of the discharge to a perennial water if ambient water quality data are not available. For the purpose of this analysis, expanded means an increase in design flow of the facility. In many cases, NMED’s current water quality monitoring (conducted on a rotating basis in watersheds across the state) will provide applicable baseline data for use in these evaluations; however, for certain cases, the applicant may need to generate additional data for consideration in the antidegradation analysis if there are atypical pollutants of concern that are not normally monitored by NMED. For intermittent streams, the applicant may choose to collect and submit water quality data for BWQ, which will help to evaluate appropriate and protective limits that may not be end-of-pipe requirements.

If feasible, it is recommended that an applicant discharging to a perennial water meet with NMED in a pre-application conference at least one year prior to individual NPDES permit issuance because of the substantial information requirements associated with development of effluent limits and, if necessary, a comprehensive Tier 2 antidegradation review.

Permit Limits and Antidegradation Requirements for Individual Permits

During the permit development process, EPA Region 6 will coordinate with NMED, who will evaluate existing water quality using both internal and applicant-supplied data, identify designated uses of the receiving water and analyze the impacts of the discharge as well as cumulative discharges that might affect the assimilative capacity of the receiving surface water for relevant pollutants of concern. Individual permit limits for discharges to perennial waters will be based upon applicable effluent guidelines, the characteristics of the discharge, and analyses designed to ensure that no significant degradation of the receiving water occurs. Permit limits for discharges to ephemeral, intermittent, and effluent dependent waters will be based on the WQS and EPA effluent guidelines and other technology-based requirements (e.g., secondary treatment requirements, BAT, MEP). Regardless of hydrology, all permit limits must ensure that existing uses are maintained and protected. NMED will use its authority under Section 401 of the Clean Water Act to conditionally certify federal permits that authorize discharges to Waters of the United States where the antidegradation analysis shows that stricter water quality controls are needed.

Proposed new or expanded discharges that may significantly degrade waters protected at the Tier 2 level must undergo a comprehensive antidegradation review to determine whether less degrading or non-degrading alternatives exist and whether significant degradation is necessary to accommodate important economic or social development in the area where the surface water is located. As it pertains to implementation of New Mexico's antidegradation policy, significant degradation is defined as the consumption of 10% or more of assimilative capacity of the receiving water for any pollutant of concern associated with the discharge during critical flow (e.g., 4Q3) conditions or any consumption of assimilative capacity that exceeds a cumulative cap of 50% of available assimilative capacity.

Early notification and consultation between the applicant, EPA, and NMED will help ensure that the NPDES permitting process proceeds efficiently. The following steps outline the general procedure for processing an NPDES permit:

- Applicant notifies NMED and EPA Region 6 of intent to apply for or renew permit coverage
- EPA determines eligibility for general permit or individual permit coverage
- Applicant consults with NMED on BWQ and available assimilative capacity in the receiving waterbody.
- NMED conducts antidegradation review and drafts a letter to document BWQ and available assimilative capacity; determination of minimal/significant degradation; and if a comprehensive Tier 2 antidegradation review is required. The letter is mailed to EPA and the permittee.
- If required, undergo comprehensive Tier 2 antidegradation review (alternatives analysis, economic/social documentation) – see Chapters 6 & 7 of this appendix.
- If significant degradation is deemed necessary based on the comprehensive Tier 2 review, conduct public participation and intergovernmental coordination consistent with Chapter 8 of this appendix.

- Applicant applies for permit after consultation with NMED.
- EPA (in consultation with NMED) develops draft permit limits based on effluent guidelines, applicable WQS, BWQ (if required), and antidegradation requirements.
- NPDES permitting process/comment period addresses both public notice requirements for antidegradation review and NPDES permitting.
- NMED prepares a Section 401 Water Quality Certification.
- Final permit drafted and issued.

Applicants seeking individual permit coverage for new or expanded discharges to a perennial surface water will be required to provide or collect BWQ information on pollutants of concern (e.g., pH, metals), if that information is not available (see Chapter 4). Data collection may be required depending on the availability of water quality data, nature of the proposed discharge, and the pollutants reasonably expected in the discharge.

Comprehensive Tier 2 Antidegradation Review Procedure for New or Expanded Discharges to Perennial Waters Requiring an Individual NPDES Permit

Degradation under Tier 2 will be deemed significant if the new or expanded discharge requiring an individual NPDES permit results in a reduction of available assimilative capacity (the difference between the BWQ and the applicable water quality criterion) of 10% or more at the defined critical flow condition(s) for the pollutant(s) of concern or any consumption of assimilative capacity that exceeds a cumulative cap of 50% of available assimilative capacity for the pollutant(s) of concern. Significant degradation will be determined on a pollutant-by-pollutant basis.

It should be noted that pollutants of concern for Tier 2 antidegradation reviews include those pollutants reasonably expected to be present in the discharge for which a numeric water quality criterion exists. If multiple water quality criteria apply, assimilative capacity will be calculated using the most stringent applicable WQS.

If a determination is made that significant degradation will occur, NMED will determine whether significant degradation is ***necessary*** by evaluating whether reasonable and cost-effective, less degrading or non-degrading alternatives to the proposed new or expanding discharge exist. The applicant will be responsible for conducting an alternatives analysis as described in this guidance. NMED will evaluate the alternatives analysis submitted by an applicant for consistency with the requirements outlined in Chapter 6. The alternatives analysis must provide substantive information on all reasonable, cost effective, less degrading or non-degrading alternative. Alternatives may include:

- Pollution prevention measures
- Reduction in scale of project
- Water reuse
- Treatment process changes
- Innovative treatment technology or technologies
- Advanced treatment technology or technologies
- Seasonal or controlled discharge options to avoid critical flow periods
- Improved operation and maintenance of existing treatment systems
- Alternative discharge locations, including subsurface discharges
- Zero discharge alternatives

As a rule of thumb, NMED will consider non-degrading or less degrading pollution control alternatives with costs that are less than 110 percent of the base costs of the pollution control measures associated with the proposed discharge to be cost-effective and reasonable (see Chapter 6.4 of this appendix).

If it is determined that reasonable, cost-effective, less degrading or non-degrading alternatives to the proposed discharge exist, the project design must be revised accordingly. In general, if such alternative(s) exist, the alternative or combination of alternatives that result in the least degradation must be implemented. If the regulated entity does not agree to adopt such reasonable and cost-effective alternatives, the alternatives analysis findings will be documented and the discharge will not be allowed. If significant degradation would occur even after application of reasonable less degrading or non-degrading alternatives, a determination must be made as to whether the proposed discharge is necessary to accommodate important economic or social development in the area in which the waters are located. NMED will evaluate the social and economic documentation for consistency with the requirements outlined in Chapter 7.

If the proposed discharge is determined to have social or economic importance in the area where the surface water is located, the basis for that preliminary determination will be documented and the Tier 2 review will continue. If significant degradation is proposed, the applicant also must show that the highest requirements for new and existing point source discharges are achieved, that all cost-effective and reasonable best management practices for non-point source pollution control are identified and effectively implemented and that Tier 1 protection is provided.

Tier 2 reviews include the public participation provisions outlined in Chapter 8. Once the intergovernmental coordination and public participation requirements are satisfied, NMED will make a final determination concerning the social or economic importance of the proposed discharge. All key determinations, including determinations to prohibit the discharge, must be documented and made a part of the public record (40 CFR 131.12 (b)).

3.4 INDIVIDUAL NPDES STORMWATER PERMITS

Urban areas with populations greater than 100,000 based on the 1990 census were considered Phase I Municipal Separate Storm Sewer Systems (MS4) communities and were required to apply for an individual NPDES stormwater permit. Urban areas as defined in the 2000 and subsequent census surveys every 10 years are considered Phase II MS4 communities. Stormwater discharges from Phase II MS4s are authorized by individual or general NPDES stormwater permits. However, neither Phase I nor Phase II MS4s authorized under individual stormwater permits are required to meet the same antidegradation requirements that apply to other individual NPDES permits outlined above.

In addition to MS4s, other entities can be required to obtain an individual NPDES stormwater permit by EPA on a case by case basis.

Overview of the Antidegradation Review for Individual Stormwater Permits

Antidegradation reviews for individual NPDES stormwater permits will be based on an adaptive management approach. This approach may include routine monitoring of stormwater quality at representative outfalls to adequately characterize stormwater discharges. The permittee will then evaluate, through effectiveness monitoring, whether storm water quality is being maintained, improving, or degrading and whether Best Management Practices (BMPs) identified in the permittee’s stormwater pollution prevention plan are effective at controlling the discharge of pollutants. Future antidegradation review of individual NPDES stormwater permits will consist of an analysis of the effectiveness of the BMPs and compliance with the requirements of the stormwater permit.

3.5 GENERAL NPDES PERMITS

A number of discharges to surface waters are authorized under general NPDES permits. These include stormwater runoff from municipalities required to comply with the Phase II MS4 stormwater permit, industrial activities covered by the stormwater program (Multi Sector General Permits), stormwater from construction sites one acre or larger (Construction General Permits), pesticide applications in or adjacent to surface waters (Pesticide General Permit), and concentrated animal feeding operations (CAFOs).

All NPDES general permits require preparation of a stormwater pollution prevention plan (SWPPP) that includes identification and control of all pollutants associated with the activities to minimize impacts to water quality. The permits also include requirements to implement site-specific interim and permanent BMPs and/or other controls to reduce (or eliminate) pollutant loading to minimize impacts to water quality. BMPs are designed to prevent to the maximum extent practicable an increase in pollutant load to the water body. BMPs also include measures to reduce flow velocity to assure that applicable water quality standards, including the antidegradation policy, are met. Compliance with the terms and conditions of the general permits is required to maintain authorization to discharge under the general permit. Discharges covered by a general permit that do not comply with general permit conditions or antidegradation requirements will be required to seek coverage under an individual permit.

Overview of the Antidegradation Review for General Permits

Regulated discharges authorized by general permits are not required to undergo a Tier 2 antidegradation review as part of the permitting process. However, new and reissued general permits must be evaluated to consider the potential for significant degradation as a result of the permitted discharges.

Discharges covered by general permits are transient or essentially non-existent (e.g., “no discharge”) with temporary or short-term impacts. Further, dischargers seeking coverage under a general permit are required in their SWPPP to identify pollutants on a pollutant-by-pollutant basis and to design and implement controls to minimize impacts to water quality. As a result, discharges that comply with general permits are not likely to cause significant degradation of water quality. In addition, activities covered under general permits (e.g., construction, industries, municipalities, dairies, feedlots, etc.) are considered to have social and economic importance to New Mexico. Therefore, antidegradation review for general permits will be based on whether or not the permit conditions are met and if the BMPs are effective at limiting (or eliminating) pollutant loading to minimize water quality impacts.

3.6 SECTION 404 PERMITS

Section 404 of the CWA regulates the placement of dredged or fill material into the “waters of the United States.” The U.S. Army Corps of Engineers (Corps) administers the permit program dealing with these discharges (e.g., wetland fills, in-stream sand/gravel work, etc.), in cooperation with the EPA and in consultation with other public agencies. Individual permits are issued for discharges with significant impacts. Discharges covered under Section 404 permits include any activity that results in the placement of dredged or fill material within the ordinary high-water mark of the waters of the U.S. or within wetlands recognized as waters of the U.S.

Overview of the Antidegradation Review for Regional or Nationwide Permits under Section 404 of the CWA

Antidegradation reviews involving the placement of dredged or fill material will be performed via the water quality certification process under Section 401 of the CWA. New Mexico manages its Section 401 water quality certification program to ensure that discharges resulting in the placement of dredged or fill material into surface waters do not cause water quality impairments or significant degradation of surface waters. New Mexico certifies general Section 404 permits ("regional" permits issued by the Albuquerque district of the Corps, and "nationwide" permits issued at the national level) in advance of individual projects that will be covered by the permits. New Mexico denied certification of the 2017 nationwide permits for projects in ONRWs, except for projects covered by Nationwide Permit 27 (for "Aquatic Habitat Restoration, Enhancement, and Establishment Activities"). Pursuant to Section 404, the Corps requires dischargers to obtain specific authorization from the Corps before commencing a discharge under a nationwide or regional permit. A Corps notification requirement (Regional Condition 2b) coupled with a state Section 401 certification condition provides NMED the opportunity to review projects proposed for authorization under a nationwide permit and confirm their consistency with the existing Section 401 certification. This review process often results in improvements in project design and BMP selection and ensures compliance with the antidegradation policy.

For new nationwide Section 404 permits, new regional Section 404 permits, or projects covered by existing Section 404 permits that have not yet received Section 401 certification (as of 2020, projects located in ONRWs and not covered by Nationwide Permit 27), NMED considers developing new Section 401 certifications. Based on this review, NMED may make one of three decisions: 1) grant the certification, 2) grant the certification with conditions, or 3) deny the certification.

NMED's Surface Water Quality Bureau (SWQB) will use the Section 401 certification process to evaluate whether a discharge will cause significant degradation to water quality. Pollutant loads from dredge or fill projects regulated under Section 404 of the CWA are often difficult or impossible to quantify in the same manner as practiced in NPDES permits. Dredge or Fill permits are often used for temporary construction measures in or near a watercourse that may result in disturbance or deposition of sediments in the water. The primary tool for limiting the discharge of pollutants (e.g., sediment and contaminated sediment) from these activities is through certification conditions mandating the installation and operation of BMPs that prevent pollutant transport to a watercourse and thereby degradation. The SWQB reviews dredge or fill projects pursuant to the State's water quality certification procedures as described under 20.6.2.2002 NMAC and Section 401of the CWA. To protect and maintain water quality, the SWQB has long employed a strategy of requiring the implementation of BMPs that are designed to prevent to the maximum extent possible the discharge of pollutants to a surface water.

Under the BMP-based approach adopted by New Mexico, regulated discharges that qualify for coverage under the Corps regional or nationwide Section 404 permits that have been certified by the state pursuant to Section 401 of the CWA will not be required to undergo a formal antidegradation review at the time of submitting a Preconstruction Notification and receiving authorization to discharge under the nationwide permit. Antidegradation requirements will be deemed to be met if all appropriate and reasonable BMPs related to erosion and sediment control, project stabilization, and prevention of water quality degradation (e.g., preserving vegetation, stream bank stability, and basic drainage hydrology) are applied and maintained. Applicants desiring to fulfill antidegradation review requirements under this approach will be responsible for ensuring that nationwide permit requirements and relevant water quality certification conditions are met.

Regulated discharges that may degrade waters protected at the **Tier 3** level must comply with the antidegradation requirements applicable to that protection level (i.e., only temporary impacts are allowed as authorized under procedures laid out in 20.6.4.8(A)(3) and 20.6.4.8(A)(4) NMAC) before a certification will be granted under Section 401 of the CWA. Any discharge authorized under an individual or nationwide permit (with the exception of Nationwide Permit 27) under Section 404 of the CWA currently requires an individual certification if it will discharge to an ONRW to ensure that impacts will be temporary.

NMED reserves the right to make case-specific determinations regarding the implementation of this approach during the Section 404 permitting or Section 401 water quality certification processes, which must be completed prior to the commencement of any discharges that result in the placement of dredged or fill material into New Mexico surface waters.

Impacts to Downstream or Adjacent Waters

It is important to note that where a discharge covered by a regional or nationwide general permit under Section 404 of the CWA, the permit only applies to the site of the fill and does not apply to activities or conditions downstream of or adjacent to the site of the fill.

Certain nationwide and regional permits require individual certification by the State of New Mexico in accordance with Section 401 of the CWA. During that individual certification process, NMED will evaluate any potential impacts to downstream waters and incorporate certification requirements to ensure compliance with all aspects of the antidegradation rule.

Overview of the Antidegradation Review for Individual Permits Under Section 404 of the CWA

The decision-making process for individual Section 404 permits is contained in the Section 404(b)(1) guidelines and contains all of the required elements for a Tier 1 and Tier 2 antidegradation review. (40 CFR Part 230). Prior to issuing a permit under the Section 404(b)(1) guidelines, the Corps must: 1) make a determination that the proposed discharges are unavoidable (i.e., necessary); 2) examine alternatives to the proposed discharge and authorize only the least damaging practicable alternative; and 3) require mitigation for all impacts associated with the discharge. A Section 404(b)(1) findings document is produced as a result of this procedure and is the basis for the permit decision. Public participation is also provided for in this process. Because the Section 404(b)(1) guidelines meet the requirements of a Tier 1 and Tier 2 antidegradation review, NMED will not conduct a separate review for the proposed discharge. Tier 1 and Tier 2 antidegradation review will be met through Section 401 certification of individual Section 404 permits and will rely upon the information contained in the Section 404(b)(1) findings document. Any discharge to a Tier 3 water authorized under an individual or nationwide permit under Section 404 (with the exception of Nationwide Permit 27) currently requires an individual Section 401 certification.

4 Determining Baseline Water Quality

Existing – or Baseline Water Quality (BWQ) – provides the reference against which predicted degradation associated with a regulated discharge is measured. This section describes how BWQ is characterized through:

- Establishment of BWQ information for perennial surface waters using existing water quality data.
- Approaches which consider the size and potential impacts of the proposed discharge when determining data needs for BWQ characterization and antidegradation review.
- Cooperative action by both NMED and the applicant to generate BWQ information where few or no data exist.

4.1 Summary of Approach

BWQ is used to evaluate an activity or discharge and determine whether it will degrade or lower water quality. Only an activity or discharge that might cause degradation is subject to a Tier 2 antidegradation evaluation. This evaluation is performed for each parameter or pollutant of concern for which the surface water is afforded Tier 2 protection.

In general, BWQ for perennial waters will be based upon existing data collected under NMED monitoring and assessment programs. Evaluations of BWQ will seek to gather information on pollutants of concern reasonably expected to be in discharges regulated by an individual NPDES permit, including suspended and settleable solids, sediment, nutrients, bacteria, biological oxygen demand, and metals. Information about other pollutants of concern will be handled on a case by case basis.

Where no, or few, data exist, NMED will advise the applicant on what data are needed and provide guidance to the applicant on how to collect and report the needed information to NMED. For perennial waters, the priority approach for evaluating BWQ is to use existing water quality data where available. Where adequate data are not available, the second priority approach is to collect BWQ data. Note that due to the lack of flow on intermittent, ephemeral, and effluent dependent, these types of surface waters will be subject to Tier 1 protection levels and appropriate water quality-based effluent limits designed to achieve applicable water quality standards. If ambient water quality information is available for an intermittent water, BWQ will be determined and Tier 2 requirements applied to the waterbody. Therefore, applicants proposing discharges to these surface waters will not be required to determine BWQ.

The regulated entity for a new or expanded discharge to a perennial water that will be regulated by an individual permit generally will be required to provide BWQ data for pollutants of concern that are reasonably expected to be discharged to help NMED determine BWQ, existing uses, and the applicable tier. **The regulated entity is advised to contact NMED prior to initiating an evaluation of BWQ to seek guidance and concurrence regarding the pollutants to be evaluated and the proposed sampling protocols.** This initial consultation may also be used by regulated entities to evaluate the availability of existing data that may be used as a supplement to, or in lieu of, new BWQ data.

Once BWQ is established for a surface water, it is the yardstick against which degradation is measured during all future antidegradation reviews for that surface water unless BWQ is updated by NMED to reflect changes in water quality. Antidegradation policy generally does not allow a lowering of BWQ. However, certain circumstances may allow for re-evaluation of BWQ. For example, if it is shown that there was an error in determining BWQ, then BWQ can be re-evaluated. Likewise, if water quality has improved, allowing for additional available assimilative capacity, then a request for re-evaluation of BWQ will be considered by NMED.

Table 4-1 shows the minimum BWQ information required, by size of discharge (design flow in million gallons per day), before permit development. Data collection for other pollutants may be required depending on the nature of the proposed discharge and the pollutants reasonably expected in the discharge. The BWQ requirements will be based on the surface water quality upstream of the facility.

Table 4-1. Minimum BWQ Information for Dischargers

Parameter/Pollutant	All Dischargers	Discharges >0.1 MGD	Discharges > 1.0 MGD
Flow	Y	Y	Y
Temperature	Y	Y	Y
BOD5/CBOD5/DO	Y	Y	Y
E. coli	Y	Y	Y
Total Suspended Solids	Y	Y	Y
pH	Y	Y	Y
Total Ammonia		Y	Y
Total Residual Chlorine		Y	Y
Total Nitrogen		Y	Y
Total Phosphorus		Y	Y
Total Dissolved Solids		Y	Y
Aluminum, either dissolved or TR			Y
Antimony, dissolved			Y
Arsenic, dissolved			Y
Beryllium, dissolved			Y
Barium, dissolved			Y
Boron, dissolved			Y
Cadmium, dissolved			Y
Chromium, dissolved[1]			Y
Cobalt, dissolved			
Copper, dissolved			Y
Cyanide, TR			
Lead, dissolved			Y
Manganese, dissolved			

[1] Upon consultation, NMED may require speciation of chromium into chromium III and chromium VI.

Parameter/Pollutant	All Dischargers	Discharges >0.1 MGD	Discharges > 1.0 MGD
Mercury [2]			Y
Molybdenum, either dissolved or TR			
Nickel, dissolved			Y
Selenium, either dissolved or TR			Y
Silver, dissolved			Y
Thallium, dissolved			Y
Uranium, dissolved			Y
Vanadium, dissolved			Y
Zinc, dissolved			Y
Hardness, dissolved – must be taken concurrently with metals sampling.			Y
Other constituents (i.e. organics, PCBs, or other applicable pollutants) based on consultation, type of facility	Y	Y	Y

4.2 BASELINE WATER QUALITY EVALUATION PROCEDURES

As needed, BWQ will be established if no BWQ characterization is available or if no information is available for a pollutant of concern reasonably expected to be discharged into the surface water. Data used for a BWQ characterization must meet the following criteria: 1) collected in accordance with an approved quality assurance project plan (QAPP); and 2) collected using specified sample collection and analysis protocols (SOP, SAP, etc.).

Given the complexity of the issue, BWQ characterizations may take some time to complete. It is recommended that regulated entities submit their BWQ monitoring plan and QAPP well in advance of any planned activities or permit application submittals, to facilitate and streamline the permitting process. In addition, environmental groups, trade organizations, the general public, and other governmental agencies may elect to generate BWQ data with the prior approval of NMED and under appropriate, documented quality assurance / quality control (QA/QC) procedures. The objective of this effort is to generate a reasonable, credible, and scientifically defensible characterization of existing water quality for antidegradation reviews.

During data generation projects by regulated entities or third parties, NMED may conduct field, laboratory, or QA/QC audits to verify that data generators are adhering to established sampling protocols, and may split samples for independent analysis. **Data generators that proceed without agency**

[2] Upon consultation, NMED may require speciation of total mercury or dissolved mercury. Methylmercury analysis may also be required.

notification and concurrence risk rejection of the data and significant delays in the permitting process. Potential generators of BWQ data are also encouraged to notify other regulated entities and stakeholders in the water quality segment or watershed of their intent to generate BWQ data. Stakeholder cooperation in the BWQ evaluation process may allow sharing of the cost of data generation and avoidance of conflict in subsequent permitting actions.

4.3 BWQ SAMPLING LOCATION

For new or expanded discharges into a perennial water where there are no existing water quality data on the surface water (i.e., where new data must be collected for evaluation of BWQ), the BWQ sampling location generally will be immediately upstream of the proposed discharge location. Determinations regarding BWQ characterization and accommodation of variations caused by seasonal impacts, water level fluctuations, or other factors will be made by NMED. Information submitted by permittees will be considered on a case-by-case basis.

Where there is adequate, existing water quality data from multiple sampling sites on a surface water, these stations can become the BWQ stations from which a composite BWQ characterization can be developed. Alternatively, NMED may choose one existing monitoring site as the BWQ station from which to characterize baseline water quality. NMED may request additional monitoring at the site if the existing data are insufficient, e.g., where no information has been collected on pollutants of concern reasonably expected in the proposed discharge. Applicants also may be required to collect BWQ data after the permit is issued to develop a BWQ profile during build-out of the activity's discharge capacity.

Sampling and Analysis Protocol

In general, BWQ will be established through existing monitoring and assessment programs sponsored or approved by NMED. NMED will consider the use of older data on a case-by-case basis, as deemed appropriate, if such data is representative of BWQ conditions. In cases where significant changes have occurred in the watershed, it may be appropriate to use a shorter period of record. The minimum elements of an acceptable BWQ monitoring plan include the collection of at least four samples (one sample per quarter) over a minimum one-year period. Data generators may sample more frequently than specified, but are expected to provide the results of all monitoring. Only NMED-approved monitoring results will be used in the establishment of BWQ. Applicants are advised to seek input from NMED prior to developing a BWQ sampling plan and/or collecting samples.

The sampling plan should address the following elements: experimental design of the sampling project; project goals and objectives; evaluation criteria for data results; background of the sampling project; identification of target conditions (including a discussion of whether any weather, seasonal variations, stream flow, lake level, or site access may affect the project); data quality objectives; types of samples scheduled for collection; sampling frequency; sampling period; sampling locations and rationale for site selection; and a list of field equipment (including tolerance range and any other specifications related to accuracy and precision).

Samples, containers, preservation techniques, holding times, and analysis should be conducted in accordance with *Guidelines Establishing Test Procedures and Analysis of Pollutants* at 40 CFR Part 136 and performed by a laboratory certified by the New Mexico Department of Health. The use of other validated analytical methodologies may be authorized where such use can be technically justified. Stream flow should be measured each time BWQ sampling is performed.

It is important to note that the BWQ pollutant concentrations derived from the data generated will be assumed to be the concentration present during the normal annual low-flow period. All stream samples should be taken when there is a measurable surface flow in the segment at the BWQ sampling location. If environmental conditions prevent achieving the minimum collection requirements, the sampling period should be extended until at least 4 samples are obtained. Acceptable methods for flow measurement include those described in the *Standard Operating Procedure for Stream Flow Measurement* (NMED/SWQB 2015) or at https://www.env.nm.gov/wp-content/uploads/2017/06/ SOP_7.0_Discharge _4-7-15.pdf, or in the U.S Geologic Survey manual *Techniques of Water Resources Investigations of the United States Geologic Survey* (Chapter A8, Book 3, "Discharge Measurements at Gauging Stations") or at https://pubs.water.usgs.gov/TWRI3A8/.

4.4 POLLUTANTS OF CONCERN

Pollutants of concern are those pollutants reasonably expected to be present in a discharge and may adversely affect the water quality of a receiving water body. Not every chemical found in the discharge nor every pollutant for which there are water quality criteria will be of concern. Pollutants that rise to the level of concern will vary by discharge—its quality as well as size—and location of that discharge (i.e., quality of the receiving water).

New or expanded dischargers regulated by an individual permit may be required to generate BWQ data for any pollutants of concern associated with the proposed discharge to a perennial water. In addition to the pollutants of concern, regulated entities may also be requested to provide water quality data for parameters necessary to determine the appropriate value range of water quality criteria (e.g., pH, temperature, hardness). The applicant may also be required to collect data pertaining to impairments in the receiving waterbody. Again, the importance of consultation between BWQ data generators and NMED staff prior to BWQ data generation cannot be overstated.

4.5 INTERPRETATION OF DATA AND ESTABLISHMENT OF BWQ

Generators of BWQ data are expected to provide documentation of their adherence to approved or established protocols and certification that the submitted information is accurate and complete. NMED will review available data and determine BWQ for surface waters on a pollutant-by-pollutant basis. Data generators should make every effort to use the most sensitive, practical analytical methods available. **The use of less sensitive analytical methods may cause rejection of the data set.**

In general, NMED will calculate the geometric mean of all credible data to determine BWQ for a particular pollutant, except *E. coli* bacteria for which the geometric mean will be calculated. For data sets that contain "not detected" or "less than" analytical results, BWQ will be considered to be the detection limit where the reported detection limit is less than or equal to the applicable water quality standard for the pollutant. If at least one data point is detected above the detection limit and the rest of the data points are reported as "less than", then all the data reported as "less than" will be counted as ½ the detection limit when calculating the geometric mean for the BWQ determination.

For data sets where the detection limit is greater than the applicable standard for a pollutant and the reported data are "not detected" or "less than", NMED may request additional data that is analyzed at an appropriate detection level. If additional data are not provided, NMED will use ½ the detection limit when calculating the geometric mean for the BWQ determination.

NMED will use the initial BWQ value established for a particular pollutant in a surface water to judge the impact of all subsequent proposals for discharges involving that pollutant. BWQ re-evaluations may be appropriate if the data used in the original determination is shown to be inaccurate or invalid or if the water quality of the segment is significantly improved when compared with the original BWQ determination. Affected stakeholders may submit a request to NMED for a BWQ re-evaluation under those circumstances. Sampling and analysis will follow the approach in Section 4.3 of this policy, including collection of a minimum of four data points for the re-evaluation.

For a waterbody to show significant improvement, NMED will evaluate old versus new data using the Relative Percent Difference (RPD) of the data. In perennial waterbodies, if the RPD indicates that the water has improved (with respect to specific analytes) according to the matrix listed below, a BWQ re-evaluation may be warranted. Other considerations for a re-evaluation of BWQ include sampling techniques, sample processing and transport, and laboratory analyses.

Table 4-1

Analyte Class (as noted in 20.6.4.900 NMAC)	**Relative Percent Difference (RPD) threshold for BWQ Re-evaluation**
Persistent/Bio-accumulative (HH-OO)	No re-evaluation – NMED will consider bio-accumulative pollutants on a case by case basis
All other analytes	≥20% improvement in water quality

5 Evaluating the Level of Degradation of Proposed Discharges

Antidegradation reviews are required for all regulated discharges that have the potential to degrade water quality in New Mexico. The review procedures described in this chapter do not apply to non-point sources of pollution (addressed in the Nonpoint Source Management Plan), discharges covered under Section 404 of the CWA (addressed through certification conditions and implementation of BMPs) or NPDES general permits (addressed through the implementation of benchmarks and BMPs). The antidegradation procedures vary by the tier level of protection and by the type of surface water. For pollutants with Tier 2 protection levels, the degradation evaluation determines whether or not significant degradation will occur – i.e., whether or not 10% or more of the available assimilative capacity for any pollutant of concern will be consumed as a result of the proposed discharge during critical flow (e.g., 4Q3) conditions or the cumulative cap of 50% of available assimilative capacity is exceeded. The level of degradation will be evaluated from BWQ conditions.

For Tier 3 protection levels, the degradation evaluation must determine that no degradation will occur as a result of the proposed discharge unless the impacts are temporary. As a general rule of thumb, temporary impacts are defined as impacts of less than six months duration.

5.1 Applicability of Degradation to the Various Protection Tiers

The concept of degradation is relatively simple: any discharge that results in a decline of water quality (as determined on a pollutant-by-pollutant basis). Degradation is not allowed to cause or contribute to impairments that result in the loss of existing uses (i.e., the Tier 1 threshold), and is not allowed at all in Outstanding New Mexico Waters (ONRWs) unless it is temporary (i.e., the Tier 3 threshold) as determined by NMED and approved according to 20.6.4.8 NMAC.

Significant degradation may be allowed in surface waters protected at the Tier 2 level if the applicant for a new or expanded discharge characterizes the effluent and BWQ, completes an alternative analysis, and provides social and economic supporting documentation. For Tier 2 reviews, determining BWQ, evaluating projected impacts, analyzing possible alternatives, and evaluating economic or social benefits, if applicable, must occur ***prior to*** issuing an individual NPDES permit. Therefore, it is recommended that an applicant discharging to a perennial water meet with NMED in a pre-application conference **at least one year prior** to the anticipated date of NPDES permit issuance.

Decisions regarding significant degradation of Tier 2 protection levels will only be made after the required alternatives analysis along with economic and social benefits justification have been completed, after technology-based and nonpoint source control requirements are met, and after the intergovernmental coordination and public participation provisions in Chapter 8 have been satisfied.

5.2 PROCEDURE FOR TIER 2 DEGRADATION EVALUATION

Tier 2 evaluation procedures vary by the type of surface water, as outlined below:

Discharges to Non-Perennial Waters

Many individual NPDES permit applicants will likely discharge to an ephemeral, intermittent, or effluent dependent water. Tier 2 degradation evaluation procedures do not apply to these discharges. Discharges to non-perennial waters will be required to meet applicable surface water quality standards and technology-based standards, e.g., best available technologies (BAT) at the "end-of-the-pipe" (i.e., Tier 1 degradation evaluation procedures).

In some limited cases, data may be available to determine BWQ in these non-perennial waters. If data are available and assessable and confirm a high-quality water, NMED would conduct a Tier 2 antidegradation review. Similar to perennial waters, no significant degradation of the Tier 2 pollutants would be allowed unless a comprehensive antidegradation review of reasonable alternatives and social and economic considerations supports a lowering of water quality.

Discharges to Perennial Waters

All other individually-permitted discharges to perennial waters must conduct an antidegradation review to determine whether or not significant degradation will occur, i.e., whether or not 10% or more of the available assimilative capacity for any pollutant of concern will be consumed as a result of the proposed discharge during critical flow (e.g., 4Q3) conditions or the cumulative cap of 50% of assimilative capacity is exceeded. The Tier 2 degradation review for new or expanded discharges is based on these characterizations:

- BWQ, as determined by data collected pursuant to Chapter 4
- The critical in-stream flow (e.g., 4Q3)
- The flow and pollutant loads resulting from the proposed discharge
- Projected changes in water quality that occur as a result of the proposed discharge

The results of the antidegradation review will be used to determine whether the proposed discharge will be subject to additional requirements as part of the permitting process, such as analyses of reasonable, cost-effective, less degrading or non-degrading alternatives and examination and justification of important economic and social costs and benefits (see Chapter 6 and Chapter 7, respectively).

Mixing Zones

If needed, a new or expanded facility who discharges to a perennial water may be evaluated for the applicability of a mixing zone analysis on a case by case basis.

5.3 CALCULATIONS TO DETERMINE SIGNIFICANCE OF DEGRADATION

At the Tier 2 protection levels, BWQ is better than the water quality standards for one or more pollutants. Therefore, no significant degradation from BWQ is allowed unless a comprehensive antidegradation review of reasonable alternatives and social and economic considerations supports a lowering of water quality. Degradation is generally assumed to be "significant" if a discharge consumes 10% or more of a surface water's assimilative capacity for any pollutant of concern (other than bio-accumulative pollutants as defined by the human health-organism only (HH-OO) criteria at 20.6.4.900 NMAC) under critical flow conditions or the discharge consumes any percentage of the cumulative assimilative capacity beyond 50%.

To determine if a discharge will cause significant degradation, assimilative capacity must be calculated and then evaluated under critical flow conditions. The first step in this process is to calculate the assimilative capacity and significant degradation limit. The assimilative capacity of the waterbody for any pollutant of concern under review is the difference between *observed* BWQ and the most stringent applicable water quality criterion. Figure 5-1 provides a simplified visual representation of assimilative capacity for a given pollutant (Pollutant X). In this example, the most stringent applicable water quality criterion for Pollutant X is 10 mg/L and the *observed* BWQ measurement is 3 mg/L. In Figure 5-1, the assimilative capacity of Pollutant X is the difference between the water quality criterion and the BWQ, or 10 mg/L minus 3 mg/L, and equals 7 mg/L. The "significant degradation" limit is 10% of the assimilative capacity (7 mg/L) or 0.7 mg/L. Thus, a regulated discharge undergoing a Tier 2 review would be considered *de minimis* (i.e., no significant degradation) if it did not cause the water quality in the receiving surface water to exceed the BWQ (3 mg/L) plus the significant degradation limit (0.7 mg/L), or 3.7 mg/L for Pollutant X.

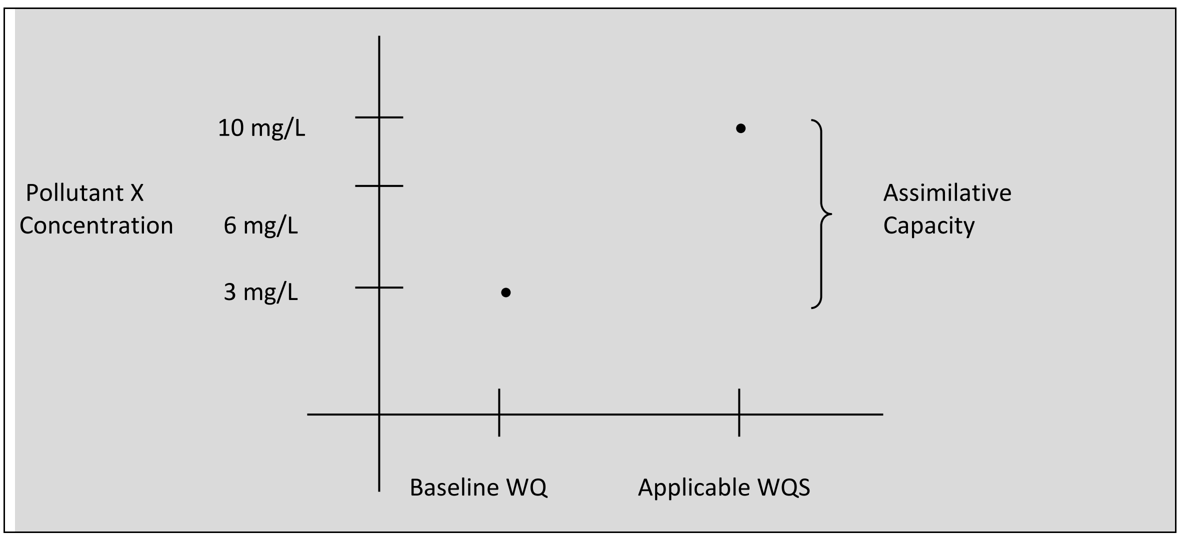


Figure 5-1. Simplified Representation of Assimilative Capacity

The second step to determine the significance of degradation is to evaluate the "significant" assimilative capacity concentration, identified in step one, under critical flow conditions. While NMED's antidegradation formula evaluates the assimilative capacity concentration similar to the example shown above in Figure 5-1, that resultant concentration is converted to a load using the receiving stream's critical flow and a conversion factor of 8.34. For example, the significant degradation concentration limit of 3.7 mg/L for Pollutant X in Figure 5-1 is converted to a loading capacity using the following formula:

$$Load\ Capacity\ \left(\frac{lbs}{day}\right) = concentration\left(\frac{mg}{L}\right) x\ flow\ (4Q3, million\ gallons\ per\ day)\ x\ 8.34$$

Consideration of Multiple Discharges – 50% Cumulative Cap

To address degradation associated with multiple regulated discharges to the same receiving water over time, NMED is establishing a separate significance threshold of a 50% cumulative cap on the consumption of assimilative capacity. This approach creates a "backstop" so that multiple regulated discharges to a water body over time which individually do not consume 10% of the assimilative capacity do not result in the consumption of the majority of the assimilative capacity without NMED ever conducting a comprehensive Tier 2 antidegradation review. NMED has established this significance threshold at 50% of the assimilative capacity when BWQ is characterized. This means that once 50% of the assimilative capacity is used in a surface water for a pollutant of concern, any further lowering of water quality is considered significant degradation. NMED will conduct a comprehensive Tier 2 antidegradation review for each lowering of water quality once the 50% cumulative cap is exceeded, regardless of the amount of assimilative capacity that would be used by the regulated discharge.

Critical Flow

The calculations noted above are to be executed under critical flow conditions for the pollutants of concern. For point source discharges, critical flow for all criteria/pollutants, except HH-OO, is the minimum four consecutive day flow that occurs with a frequency of once in three years (4Q3) in the receiving water. (20.6.4.11(B)(2) NMAC). Critical lake and reservoir water levels will be determined on a case-by-case basis.

Calculations for Tier 2 Pollutants

The calculation to determine if a discharge will result in significant degradation is a variation of the mass balance equation that is used to determine water quality-based effluent limits:

$$(Q_d)(C_d) + (Q_s)(C_s) = (Q_r)(C_r)$$

Where:

Q_d =discharge flow cfs
Q_s =stream flow (4Q3)
Q_r =resulting in-stream flow (downstream of discharge, or Q_s+Q_d)
C_d =discharge concentration,
C_s =concentration in stream

C_r = resultant in-stream concentration

Solve for C_d:

$$C_d = \frac{[C_r(Q_d + Q_s)] - [(C_s)(Q_s)]}{Q_d}$$

For purposes of Tier 2 antidegradation reviews, NMED solves for the discharge concentration that uses 10% of the assimilative capacity:

Where:

C_{bwq} = BWQ
C_r = resultant in-stream concentration = [(WQS - C_{bwq}) x 0.1 + C_{bwq}]

$$C_d = \frac{[((WQS - C_{bwq}) \text{ x } 0.1 + C_{bwq})(Q_d + Q_s)] - [(C_s)(Q_s)]}{Q_d}$$

The calculated discharge concentration (C_d) is compared with the proposed discharge concentration. If the calculated concentration is greater than the proposed concentration, then a determination of “no significant degradation” is found. If the level of degradation is estimated to be less than 10% of the assimilative capacity, and less than 50% of the cumulative cap (if applicable), *and* existing uses are maintained, the antidegradation review process is complete and the permitting process may proceed.

If the discharge is found to consume more than 10% of available assimilative capacity (calculated < proposed) or exceeds the 50% cumulative cap, a comprehensive Tier 2 review is required. The regulated discharge would be required to conduct an alternatives analysis (Chapter 6) and demonstrate “important economic or social development” (Chapter 7) if allowances are sought to further reduce assimilative capacity. If such demonstrations are made, the WQCC may allow consumption of additional assimilative capacity (degradation) as long as intergovernmental and public participation processes are followed and water quality standards are not violated.

6 Identifying and Evaluating Pollution Control Alternatives for Tier 2 Protection

A regulated entity proposing a new or expanded discharge requiring an individual NPDES permit that would significantly degrade water quality in a Tier 2 surface water (i.e., consume 10% or more of the assimilative capacity or exceed the cumulative cap of 50% for any pollutant of concern) is required to prepare an evaluation of alternatives to the proposed discharge. The evaluation must provide substantive information pertaining to the cost and environmental impacts associated with the proposed discharge and the alternatives evaluated. This chapter provides guidance on how to evaluate alternatives when an impacts analysis determines that significant degradation may occur.

The intent of the alternatives analysis is to identify cost-effective and reasonable *less degrading* or *non-degrading* approaches for reducing discharge-related impacts so they do not result in significant degradation of the receiving water.

6.1 Less Degrading and Non-degrading Pollution Control Measures

Under New Mexico's antidegradation implementation procedures, applicants are required to analyze these alternatives if their proposed discharge will cause significant degradation of higher quality (i.e., Tier 2) waters. Less degrading or non-degrading pollution control alternatives identified and evaluated during this process should be reliable, demonstrated processes or practices that can be reasonably expected to result in a defined range of treatment or pollutant removal.

Applications containing proposals for new or experimental methods will be required to append information regarding likely performance results and may be approved at the discretion of NMED with the understanding that if the proposed technology does not meet projected pollutant control targets the applicant must adopt conventional or other pollution control measures that meet state antidegradation requirements.

Pollution control alternatives that may be evaluated when a proposed discharge will result in significant degradation of the receiving water segments may include the following:

- Alternative methods of production or operation
- Pollution prevention and treatment process changes
- Recycling/reusing wastewater (i.e., closed loop systems)
- Holding/transport facilities for treatment/discharge elsewhere
- Groundwater recharge (i.e., soil-aquifer treatment, injection)
- 100% reuse
- Advanced or innovative biological/physical/chemical treatment
- Pollution prevention and process changes
- Improvements in the collection system
- Improved operation and maintenance of existing treatment system

- Seasonal or controlled discharges to avoid critical periods
- Alternative discharge locations, and associated water quality impacts at those locations
- Reduction in the scope of the proposed project

Applicants will be expected to address reasonable and cost-effective alternatives, or mix of alternatives, in their evaluations. NMED staff and the applicant will meet to discuss these and other issues early in the process. It is the responsibility of the applicant to screen for and propose a list of reasonable, cost-effective alternatives that will be evaluated in detail. NMED may require that additional alternatives be analyzed.

If the project results in significant degradation even after applying reasonable, cost-effective alternatives, the proposal must demonstrate 1) important social or economic development as outlined in Chapter 7; 2) the level of water quality necessary to protect existing uses is maintained (i.e., Tier 1 protection); 3) all cost-effective and reasonable BMPs for nonpoint source control are implemented; and 4) the highest statutory and regulatory requirements for all new and existing point sources are achieved (20.6.4.8(A)(2) NMAC).

6.2 IDENTIFYING COST COMPONENTS AND ASSESSING COSTS

An assessment of costs related to the alternatives summarized above is necessary to determine whether or not a prospective alternative pollution control measure is reasonable. General cost categories include:

- Capital costs
- Operating costs
- Other costs (one-time costs, savings, opportunity cost, salvage value)

In order to develop a standardized framework for projecting, evaluating, and comparing costs associated with various pollution control measures, applicants should use a “present worth” framework for generating and reporting cost information. Components of the present worth framework include:

$$P = C + O + [A * (P/A, d, n)] - S - L$$

Where:

P = Present worth,
C = Capital cost,
O = Other costs (expressed as dollars invested at the beginning of the project),
A = Annual operating cost,
d = Discount rate,
n = Useful life in years,
S = Present worth of salvage value of facilities,
L = Present worth of salvage value of land, and
(P/A, d, n) = Equal series present worth factor, = $[(1 + d)^n - 1] / [d (1+d)^n]$.

The present worth calculated for the alternative technologies depends on the right choice for the discount rate (d), and the useful life (n) of the equipment or facility. Recommended discount rates for New Mexico are provided by the New Mexico Water Infrastructure Finance Authority (WIFA). The useful life of the facility or equipment is based upon similar facilities or equipment handling similar wastes and flows and must be approved by NMED. Speculative costs for land, facilities, etc., will not be allowed. For more information on the present worth calculation and other methods that may be used to assess costs, see Appendix A1, Direct Cost Comparison of Alternatives.

6.3 Evaluating Environmental Impacts Associated with Alternatives

Pollution control measures evaluated as alternatives to a proposed discharge may have environmental impacts that help define their overall value and/or desirability. Applicants are required to provide substantive information pertaining to both the cost and environmental impacts associated with pollution control alternatives evaluated for discharges that would significantly degrade Tier 2 level of protection. The information related to environmental impacts should include impacts on the natural environment (i.e., land, air, and water) resulting from implementation of the alternative. The types of impacts evaluated during this process may include:

- Sensitivity of stream uses
- Need for low-flow augmentation
- Sensitivity of groundwater uses in the area
- Potential to generate secondary water quality impacts (storm water, hydrology)
- System or technology reliability, potential for upsets/accidents
- Effect on endangered species
- Non-water quality environmental impacts
- Nature of pollutants discharged
- Dilution ratio for pollutants discharged
- Discharge timing and duration
- Siting of plant and collection facilities

Review of these impacts might be on a qualitative or quantitative basis, as appropriate. Non-water quality environmental impact analyses to be submitted by the applicant include estimations of the potential impact of the alternative(s) on odor, noise, energy consumption, air emissions, and solid waste generation. Odor and noise may be addressed qualitatively while other non-water quality impacts might need to be addressed quantitatively. The energy use, air emission, and solid waste generation impacts can be expressed as a percent increase/decrease as compared to the proposed discharge. Other factors that should be considered during the review include the technical, legal, and local considerations of the various alternatives examined. The schedule and the estimated time of completion of the project should also be provided for each alternative discussed.

6.4 Cost and Reasonableness Criteria for Alternatives Evaluation

In general, an alternative or suite of alternatives is considered to be cost-effective and reasonable if it is feasible and the cost is less than 110% of the *base costs* of pollution control measures for the proposed discharge in present worth costs. It should be noted that the 110% cost-effectiveness criterion is a general rule-of-thumb – if pollution control costs for alternatives that would result in water quality benefits exceed the 110% cost threshold, those alternatives may be required if the water quality and environmental benefits outweigh the economic costs.

When calculating the cost of a proposed discharge and any less- or non-degrading alternatives, it is important to identify the base cost for required pollution control measures for any proposed discharge. The base cost for NPDES-permitted facilities is the cost of treatment to meet applicable water quality standards or the cost of meeting federal technology-based requirements, whichever is more stringent and legally applicable. The base cost for Section 404 dredge-and-fill permits (e.g., wetland fills, mining streambed fills) is the cost of pollution controls to meet minimum Section 404 permit and Section 401 water quality certification requirements.

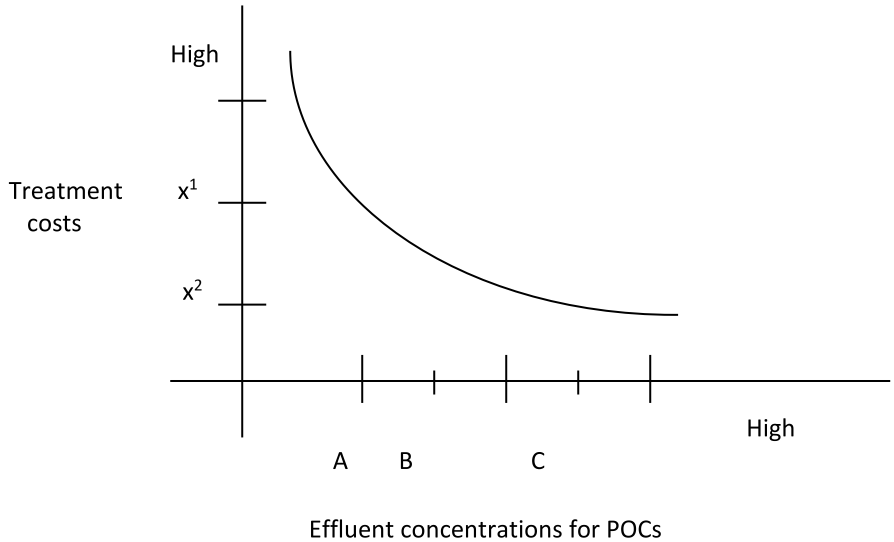
6.5 PROCEDURE FOR COMPARING COSTS OF VARIOUS ALTERNATIVES

In reviewing costs for a variety of discharge scenarios, three reference costs can be identified (see Figure 6-1):

- The cost of treatment that results in no discharges of any pollutants of concern (the "no-discharge" cost).
- The cost of treatment that produces an effluent that results in no significant degradation of the receiving water, i.e., that does not consume more than 10% of the available assimilative capacity for any pollutant of concern.
- The cost of treating an effluent to a quality that meets specific effluent/ BAT limits or water quality criteria for any/all pollutants of concern (i.e., the conceptual minimum Tier 1 requirement).

The base cost for comparing the reasonableness and cost-effectiveness of less degrading or non-degrading alternatives is the cost of producing an effluent that meets water quality standards or the cost of meeting federally-required effluent concentration limits or best available technology, whichever is more stringent (level C in Figure 6-1).

Applicants will be required to submit cost information to NMED for base pollution control measures as defined above and alternative pollution control measures that would result in no significant degradation (level B). NMED may request cost or other information regarding preventing degradation (level A). NMED will evaluate the limitations of the alternatives analysis and may request additional analyses or information, as needed, to make a determination.



A = The "no degradation" alternative
B = Activity modifications resulting in "no significant degradation," i.e., does not consume more than 10 percent of the available assimilative capacity for any other pollutant of concern (POC)
C = Activity modifications that achieve or maintain minimally required use-based water quality criteria or best available demonstrated control technology
x^1 = Costs for implementing the "no degradation" alternative
x^2 = Costs for less degrading alternative(s)

Figure 6-1. Comparison of Treatment Costs to Produce Effluents of Varying Quality

6.6 Summary of the Alternatives Analysis Process

The preceding discussion describes the approach that will be followed by NMED for determining whether or not less- or non-degrading alternatives to the proposed new or expanded discharge will be required to prevent significant degradation of perennial surface water. The following steps summarize the alternatives analysis process and other relevant actions during comprehensive Tier 2 reviews:

- Based on characterizations of the new or expanded proposed discharge, BWQ, and projected impacts on the receiving water segment, NMED will determine whether or not the proposed discharge will significantly degrade water quality, i.e., consume more than 10% of the available assimilative capacity for any other pollutant of concern.
- If it is determined that significant degradation would likely occur due to the proposed discharge, an analysis of less degrading or non-degrading alternatives to the proposed discharge will be required.
- The applicant will be required to submit cost information for base pollution control measures associated with the proposed discharge, alternative pollution control measures that would result in no significant degradation, and for other less or non-degrading alternatives as appropriate.

- NMED will evaluate the proposed discharge, the less and non-degrading alternatives, and the costs and feasibility associated with each mix of options.
- NMED will approve the least degrading alternative – or mix of alternatives – that does not exceed the 110% base cost threshold (i.e., is cost-effective and reasonable).
- If the approved alternative (i.e., pollution control alternative or mix of alternatives) will not result in significant degradation of the receiving water segment, permitting of the discharge may proceed. If the approved alternative will still result in significant degradation of the receiving water, the applicant will be required to conduct an analysis of economic and social benefits so the WQCC can determine whether or not the discharge can be permitted.
- All water quality impacts in the alternatives analysis will be evaluated at the BWQ station and back-calculated to develop the upstream effluent limit (i.e., the degradation of proposed discharges including alternatives will be evaluated at the BWQ point, while permit limits and permit compliance will be developed and evaluated at the discharge point).

If the project results in significant degradation even after applying reasonable, cost-effective alternatives, in order to allow such degradation and lowering of water quality the proposal must demonstrate that the new or expanded discharge is important to economic and social development (as outlined in Chapter 7), protects existing uses (i.e., maintains Tier 1 protection), achieves the highest statutory and regulatory requirements for point sources, and implements cost-effective and reasonable BMPs for nonpoint source control (20.6.4.8(A)(2) NMAC). NMED encourages watershed planning to further protect surface water quality and CWA Section 319 grants are available for various groups to plan and implement on-the-ground improvement projects. In addition, Clean Water State Revolving Fund (CWSRF) loans are available for a wide range of wastewater or storm drainage projects that protect surface and ground water, including projects that control nonpoint source pollution.

7 Social and Economic Importance for Tier 2 Reviews

7.1 Regulatory Requirements for Social and Economic Analysis

As discussed in previous chapters, if an alternatives analysis has been conducted for a proposed new or expanded discharge to a Tier 2 protected water requiring an individual NPDES permit, and the least degrading, cost-effective alternative still results in significant degradation, an analysis of the social and economic importance of the discharge must be conducted. Under New Mexico's antidegradation policy, found at 20.6.4.8(A)(2) NMAC, the Commission may authorize a proposed discharge that would significantly lower the water quality of a Tier 2 water, if allowing lower water quality is necessary to accommodate important economic and social development in the area in which the surface water is located.

There are several steps in determining social and economic importance. First, the applicant conducts an analysis of the social and economic benefits/costs associated with the discharge. The applicant must document any social and economic benefits/costs associated with the proposed discharge and report them to NMED, including identifying and documenting general environmental justice issues in the area where the discharge will be located that may impact the benefits/costs analysis[3,4]. NMED then reviews the information and may require additional information and/or a more in-depth, substantial and widespread impact analysis if there is not enough information to make a decision or if the proposed discharge is complex. Additional information is included in Appendix A.3 and Appendix A.4. If enough information has been submitted, NMED will make a preliminary determination to deny or authorize the degradation. Finally, "after public comment and intergovernmental coordination, the WQCC analyzes all information and makes a final determination (20.6.4.8(A)(2) NMAC).

7.2 Role of the Applicant

The role of the applicant is to demonstrate the social and economic benefits of the proposed new or expanded discharge associated with allowing significant degradation of high-quality water. The report on social and economic benefits/costs (positive and negative) associated with the project is relatively simple and straightforward. NMED requires that up-to-date and accurate data are included in the report, and that estimates of job gains/losses, housing impacts, etc., be summarized completely and based on defensible estimates. Using the *Social and Economic Importance Worksheet*, Appendix A.2, the applicant must document how the proposed new or expanded discharge affects the social, economic, and environmental factors listed below.

Social, Economic, and Environmental Considerations

[3] For information on the EPA Region 6 EJ Action Plan, visit: https://www.epa.gov/environmentaljustice/region-6-new-mexico-ej-action-plan

[4] Environmental Justice Screening and Mapping Tool: https://www.epa.gov/ejscreen

Below are the **economic and social** benefits/costs most commonly associated with this socio-economic analysis:

- Creating, expanding or maintaining employment
- Reducing the unemployment rate
- Increasing median household income
- Reducing the number of households below the poverty line
- Increasing needed housing supply
- Increasing the community tax base
- Providing necessary public services (e.g., fire department, school, infrastructure)
- Correcting a public health, safety, or environmental problem
- Improving quality of life for residents in the area

Below are the **environmental** benefits or costs most commonly associated with this analysis:

- Promoting/impacting fishing, recreation, and tourism industries
- Enhancing/impacting threatened and endangered species
- Providing increased flood control and sediment trapping through maintaining or creating wetlands and riparian zones or impacting wetlands and riparian zones
- Reserving assimilative capacity for future industry and development or reserving no capacity for future discharges.

The applicant may choose or may be required to describe additional factors as needed to strengthen its Social and Economic Importance Analysis. Appendix A.4, *Other Economic and Environmental Considerations*, provides examples of other issues that might be helpful to address in developing an analysis. All information provided should be based upon the most current, available data.

7.3 ROLE OF NMED

Prior to issuance of any proposed new or expanded discharge permit that would significantly lower the water quality of a Tier 2 protected water, NMED will ensure that the proposed discharge is necessary to accommodate important economic or social development in the area in which the waters are located. NMED may also collect and analyze additional information to assess the market and non-market social and economic benefits and costs of the proposed discharge, including by soliciting public information and comment where appropriate or by accessing information available from the New Mexico Community Data Collaborative (http://www.nmcdcmaps.org/), the Distressed Communities Index (https://eig.org/dci), or EPA, including EJSCREEN (https://www.epa.gov/healthresearch/tools-support-environmental-justice). In making a preliminary decision, NMED will rely primarily on the demonstration made by the applicant. NMED will analyze all information and make a preliminary determination on the facts on a case-by-case basis.

If information available to NMED is not sufficient to make a preliminary determination regarding the socioeconomic importance of the proposed new or expanded discharge, NMED may require the project applicant to submit specific items of information needed to make a determination. NMED may also require use of quantitative models for large proposed discharge (e.g., major industrial wastewater treatment facility, large concentrated animal feeding operation, etc.).

Once the available information pertaining to the socioeconomic importance of the proposed new or expanded discharge has been reviewed by NMED, a preliminary determination to deny or authorize the degradation will be made. If the proposed discharge is determined to be necessary to accommodate important economic or social development in the area in which the affected waters are located, the substance and basis for that preliminary determination will be documented and the Tier 2 review will continue. NMED will make the preliminary determination available to the public and forward its preliminary determination to governmental agencies that may be impacted by the discharge.

Once the public participation and intergovernmental coordination requirements are satisfied, the WQCC will make a final determination concerning the social or economic importance of the proposed new or expanded discharge and whether to deny or authorize the discharge (20.6.4.8(A)(2) NMAC). All social and economic importance findings and other required findings, including determinations to deny issuance of a permit for a discharge, will be documented and made part of the public record.

8 Requirements for Intergovernmental Coordination and Public Participation

This chapter outlines public participation and intergovernmental coordination and review requirements. Antidegradation reviews for NPDES-permitted facilities will employ the public participation procedures that are available through the permitting process (e.g., draft permits, fact sheets, opportunities to comment, etc.). The NPDES permit fact sheet will include a discussion for the public of NMED's antidegradation review.

Once the intergovernmental coordination and public notice requirements outlined below are satisfied, NMED will make a final determination concerning the social or economic importance of the proposed new or expanded discharge in the area in which the affected receiving waters are located. All determinations, including determinations to prohibit the discharge, will be documented and made a part of the public record.

8.1 Public Notification Requirements

There are a number of opportunities for public participation in the review of new and increased discharges into Tier 1 waters. The WQCC adopts Total Maximum Daily Loads (TMDLs) with applicable wasteload allocations for point sources discharging to Tier 1 waters not meeting water quality objectives. This process includes public notice and comment. The EPA and Army Corps follow detailed procedures requiring public notice and comment when issuing NPDES and Section 404 dredge or fill permits. Finally, the NMED's Section 401 certifications can be appealed and a full hearing held before the WQCC.

Public notice and opportunity for public comment is also provided for all comprehensive Tier 2 reviews. NMED will publish notice and provide an opportunity to comment on the preliminary decision and statement of basis. The public comment period will be at least 30 days. Public notice and opportunity for comment may be combined with other public participation procedures, such as those related to NPDES permitting processes or intergovernmental coordination / review procedures. During the public comment period, any interested person may submit written comments and request a public hearing. A request for a public hearing must be in writing and must state the nature of the issues to be raised. If NMED determines that the request for public hearing raises issues of significant public interest within the scope of the antidegradation policy, the Department will hold a public hearing. The public hearing will be held in a location near the water affected by the discharge.

Discharges that may result in a significant degradation of water quality for Tier 2 pollutants may be approved by the WQCC, after full satisfaction of the intergovernmental coordination and public participation processes, provided that:

- The level of water quality necessary to protect existing uses is fully protected. Water quality shall be maintained and protected in all surface waters of the state (20.6.4.8(A)(1) NMAC).

- The highest statutory and regulatory requirements for new and existing point sources are achieved.
- All cost-effective and reasonable best management practices for non-point source pollution control are implemented.
- Allowing lower water quality is necessary to accommodate important economic or social development in the area where the surface water is located.
- Watershed-based planning as a further means to protect surface waters is encouraged.

All comprehensive Tier 2 findings will be documented by NMED and made part of the administrative record. Review documents – including evaluations of BWQ, existing uses, the level of review conducted, alternatives analyses, social/economic studies, impacts analyses, and any decisions or findings – will be made available to the public.

For activities that may impact Tier 3 waters, NMED will publish notice and provide a 30-day public comment period. After the comment period, NMED will provide a recommendation to the Commission. NMED will provide notice of activities approved by the WQCC pursuant to 20.6.4.8(A)(3)(a) NMAC and of activities conducted pursuant to 20.6.4.8(A)(4) NMAC by posting a brief description, location, and timeframe for such activities on a dedicated Department website.

8.2 OPPORTUNITIES FOR PUBLIC PARTICIPATION

Public participation in the implementation of New Mexico's water quality antidegradation policy can be broad or specific. Opportunities for broad participation include involvement in the triennial review of the water quality standards program (i.e., use designations, water quality criteria determinations, antidegradation implementation procedures) and participation in rule development relative to permitting processes. In addition, any interested party may nominate a water segment for protection at the Tier 3 level by following the procedure for consideration outlined under 20.6.4.9 NMAC (see Chapter 2). Finally, interested groups can conduct volunteer monitoring under an NMED-approved plan to support BWQ determinations.

Wherever possible, NMED will seek to integrate public participation regarding antidegradation reviews with existing NMED public participation procedures (e.g., NPDES permitting procedures).

8.3 INTERGOVERNMENTAL COORDINATION AND REVIEW

Intergovernmental coordination is required prior to approving a new or expanded discharge requiring an individual NPDES permit that would significantly degrade a surface water protected at the Tier 2 level. This requirement seeks to ensure that all relevant public entities at the local, state, and federal levels are aware of any proposal to significantly lower water quality and are provided with an opportunity to review, seek additional information, and comment on the proposal. The intergovernmental coordination and review process occurs prior to the issuance of any final determination on the social and/or economic importance of the proposed discharge, and may occur in tandem with public notice procedures outlined in the previous section. The time period afforded to commenting agencies will be consistent with the requirements for submission of public comments.

Intergovernmental coordination requirements will be satisfied by providing a written notice and request for comment to the appropriate agencies listed in Appendix A.5. Such notice will include summary information on the proposed new or expanded discharge, the receiving water segment, the BWQ of the receiving water segment, the tier designation, estimated impacts of the proposed discharge upon the receiving water, the alternatives reviewed, and the projected social or economic importance of the proposed discharge. In providing notice to these agencies, staff should note the importance of circulating the notice to local or regional constituents of the agencies involved so that NMED receives timely and complete responses from governmental entities that might have information regarding the proposal or might be affected by it.

8.4 APPEALS OF ANTIDEGRADATION REVIEW DECISIONS

Persons adversely affected by any final decision of the Department may appeal to the WQCC in accordance with the New Mexico Water Quality Act, NMSA 1978, Sections 74-6-1 to -17.

Appendix A.1
Direct Comparison of Alternatives

Direct cost comparisons of alternatives are typically performed on the basis of present worth calculations or calculations of uniform annual cost (if the useful life of each alternative is different), using an applicable interest (discount) rate. The present worth calculation is a well-established method for integrating the upfront capital costs (and associated indebtedness) of a project with its ongoing annual costs of operation, and transforming the integrated costs to one equivalent value. The calculation yields the total equivalent dollars which would have to be invested at the beginning of a project in order to finance it for the life of the facility. The monetary costs considered in the calculations include the total value of the resources, which are attributable to the wastewater treatment, control, and management systems and the component parts. To determine these values, all monies necessary for capital construction costs, operational costs, and maintenance costs should be identified.

Capital construction costs used in cost comparison analysis consist of estimates of the construction costs, including overhead and profit; costs of land (including land purchased for the treatment works site and land used as part of the treatment process or for ultimate disposal of residues), relocation expenses, and right-of-way and easement acquisitions; costs of design engineering, field services (including cost of bond sales); startup costs such as operator training; financing costs and interest during construction; and the costs of any other site-related environmental controls, such as erosion and sediment control practices.

Operational and maintenance costs are usually considered on an annual basis and include operational staff salaries, cost of energy and fuels, cost of treatment chemicals, cost of routine replacement of equipment and equipment parts, and other expenditures necessary to ensure effective and dependable operation over the life of the facility. Annual operation and maintenance costs should be averaged to account for variations, which might occur, year-to-year due to varying production or wastewater volume.

The salvage value of equipment, tankage, and materials from the treatment works is part of the present worth calculation. Salvage value is estimated using straight-line depreciation during the useful life of the project and can generally only be claimed for equipment where it can be clearly demonstrated that a specific market or re-use opportunity will exist. Salvage value estimation should also take into account the costs of any restoration or decommissioning of treatment units and final disposal costs. It is possible in some cases that these costs may be high enough that the net salvage value will be negative.

Land purchased for the treatment works site is also assumed to have a salvage value at the end of the project useful life equal to its market value at the end of the analysis period. The local inflation rate for land in the use area should be used to project the market value at the end of the analysis period.

It is also important to evaluate any opportunity cost associated with different alternatives. Opportunity costs should not be considered for speculative growth or production increases claimed by an applicant. Any costs claimed should be clearly associated with integral portions of projects, which are realistically available, and are otherwise locally approvable.

The discount rate used in the present worth or uniform annual cost calculation for public sewerage projects should be that rate published by the NMED Construction Program Bureau and associated funding agencies for the planning review and evaluation of water resource projects. The rate is available from NMED. For private sector projects, the interest rate utilized should be that rate at which the applicant can borrow funds. Since the present worth calculation is being performed more to compare alternatives rather than to obtain a very accurate estimation of actual costs, the fact that the same interest rate assumption be utilized for each alternative is more important than the actual interest rate selected.

Cost estimates have an associated level of precision. The cost estimates prepared by the project sponsor should include an estimate of the error for each alternative. The applicant is responsible for documenting and defending all cost estimates used in the analysis.

Cost estimate equations:

The equations below are the basic expressions of the present worth and equivalent annualized cost concepts. Additional mathematical factors and apportionment of costs are incorporated into the equations where appropriate.

I. The basic present worth calculation should be performed in accordance with the following equation:

$P = C + O + [A * (P/A,d,n)] – S – L$

where,

P = present worth
C = capital cost
A = annual operating costs
$(P/A,d,n)$ = equal series present worth factor $[(1 + d)^n – 1] / [d (1 + d)^n]$
d = discount rate
n = useful life in years
S = present worth of salvage value of facilities
L = present worth of salvage value of land
O = other costs (if any)

A gradient factor may be added into the equations to account for inflation of annual operating costs, as opposed to using an average value throughout the project life, by simply adding the additional following term onto the right-hand side of the above equation:

$[G * (P/G,d,n)]$

where,

G = uniform increase in annual costs
$(P/G,d,n)$ = present worth factor for a gradient =
$(1 – nd) [(1 + d)^n – 1] / [d^2 * (1 + d)^n]$.

II. If the alternatives have different useful lives, the cost comparison may be performed using the Equivalent Uniform Annual Cost Method. The equation for this method is:

$EUA = (C + O) * (A/P,d,n) + A – [(S + L) * (A/F,d,n)]$

where,

EUA = equivalent uniform annual cost
$(A/P,d,n)$ = capital recovery factor $[(1 + d)^n – 1] / [d (1 + d)^n]$
$(A/F,d,n)$ = uniform series sinking fund factor $d / [(1 + d)^n – 1)]$

To add a gradient factor, the following additional term is simply added to the right hand side of the above equation:

[G * (A/G,d,n)]

where,

$(A/G,d,n)$ = EUA factor for a gradient = $[(1 + d)^n – 1 – nd] / d * [(1 + d)^n – 1]$.

Additional cost factors:

Other costs, such as opportunity costs, while presented above as one-time present losses, may also have an annual lost revenue component, which could be accounted for by apportioning the costs as both upfront and annual costs.

In general, it is the responsibility of the applicant for a permit or approval to prepare detailed cost estimates for all appropriate and approvable discharge, non-discharge, and combination discharge/non-discharge alternatives. The cost estimates may be prepared by a licensed professional engineer, accountant, economist or other professional qualified in the field, but they must be submitted under a professional engineer seal as part of the permit application.

The sources and rationale for all data and assumptions must be clearly indicated. NMED will review the cost estimates for completeness, accuracy, and validity of assumptions. Where deficiencies are discovered, NMED will either request additional information or obtain the information on its own, or both. Following the review process, NMED will advise the applicant on which alternatives (or combination discharge/non-discharge alternatives) are cost-effective, and processing of a permit application will proceed on that basis. In general, an alternative or suite of alternatives is considered to be cost-effective and reasonable if it is feasible and the cost is less than 110% of the base costs of pollution control measures for the proposed discharge (present worth costs).

Other factors:

While the basic concept behind the direct comparison is the present worth method, which has traditionally been used, other approaches and factors may be proposed by applicants and will be considered by the Department (e.g., EPA's Water Quality Standards Handbook – *Interim Economic Guidance for Water Quality Standards*, EPA-823-B-95-002, 1995).

Combined approach:

Aspects of the other approaches can be integrated or combined with the direct comparison approach. For instance, in EPA's guidance document, the 1 percent of median household income user-fee criteria can be applied as a first test of cost-effectiveness, even before the direct cost comparisons are considered. Only if the user-fees exceed the screening criteria would the direct comparison of the alternative come into play.

Where appropriate, NMED may require that the submitted demonstration of cost-effectiveness include information to support both a primary screening/affordability evaluation as well as a secondary alternative-to-alternative cost comparison.

Appendix A.2
Social and Economic Importance Worksheet

Social & Economic Worksheet

Social and Economic Benefits/Costs

Does your proposed activity:

1. Create or expand employment?

   Yes ______ Describe ____

   No ______ Describe ____

   Don't Know ____

   Not Applicable __Why not? ______________________________

2. Reduce the unemployment rate?

   Yes ______ Describe ____

   No ______ Describe ____

   Don't Know ____

   Not Applicable __Why not? ______________________________

3. Increase median family income?

   Yes ______ Describe ____

   No ______ Describe ____

   Don't Know ____

   Not Applicable __Why not? ______________________________

4. Reduce the number of households below the poverty line?

   Yes ______ Describe ____

   No ______ Describe ____

   Don't Know ____

   Not Applicable __Why not? ______________________________

5. Increase needed housing supply?

Yes ______ Describe ____

No ______ Describe ____

Don't Know ____

Not Applicable __Why not? ________________________________

6. Increase the community tax base?

Yes ______ Describe ____

No ______ Describe ____

Don't Know ____

Not Applicable __Why not? ________________________________

7. Provide necessary public services (e.g., fire department, school, infrastructure)?

Yes ______ Describe ____

No ______ Describe ____

Don't Know ____

Not Applicable __Why not? ________________________________

8. Correct a public health or environmental problem?

Yes ______ Describe ____

No ______ Describe ____

Don't Know ____

Not Applicable __Why not? ________________________________

9. Improve quality of life for residents in the area?

Yes ______ Describe ____

No ______ Describe ____

Don't Know ____

Not Applicable __Why not? ________________________________

Environmental Protection Benefits/Costs

Explain how your proposed activity positively or negatively affects the following:

1. The societal and economic benefits/costs of better health protection.

   Describe ____

   ____

   Don't Know ___

   Not Applicable ___ Why not? ____

2. Fishing, recreation, and tourism industries.

   Describe ____

   ____

   Don't Know ___

   Not Applicable ___ Why not? ____

3. The general societal value of maintaining the quality of the environment.

   Describe ____

   ____

   Don't Know ___

   Not Applicable ___ Why not? ____

4. Threatened and endangered species.

   Describe ____

   ____

   Don't Know ___

   Not Applicable ___ Why not? ____

5. Increased flood control and sediment trapping through maintaining wetlands and riparian zones.

   Describe ____

   ____

   Don't Know ____

   Not Applicable __Why not? ____

6. Reservation of assimilative capacity for future industry and development.

   Describe ____

   ____

   Don't Know ____

   Not Applicable __Why not? ____

If you need more space to "describe" how this discharge will impact the social, economic and environmental benefits/costs above, please attach additional sheet(s) to this form.

Likewise, if additional considerations are desired or required in your social and economic justification analysis, please refer to Appendix A.3 and Appendix A.4.

Appendix A.3
Information for Substantial and Widespread Impact Analysis (OPTIONAL)

Attachment 1 – Tier 2 Review of a Public Facility

Attachment 1 includes additional information that may be required by the Department to evaluate socio-economic factors of a public facility during a Tier 2 review. This evaluation is based on two types of impacts, referred to as "substantial" and "widespread". The Substantial Impacts analysis is found in Tables 1-3 – 1-7. The Widespread Impacts[12] analysis is found in Table 1-8.

SUBSTANTIAL IMPACTS - SUMMARY

Purpose of Substantial Impacts analysis: Determine whether a public facility can afford pollution controls in order to avoid any degradation of water quality.

The first step in a Substantial Impacts analysis is to provide data on the socio-economic factors listed in the worksheets in Tables 1-1 and 1-2. This data is then used to determine two indicators called the "Municipal Affordability Screener" (Table 1-3) and the "Secondary Affordability Test" (Tables 1-4 – 1-6). The results of these indicators are then compared in the "Assessment of Substantial Impacts Matrix" (Table 1-7) as a way to determine overall affordability to the community.

Widespread Impacts[5] - Summary

Purpose of Widespread Impacts Analysis: evaluates the social costs of pollution control requirements by: 1) defining the affected community; 2) evaluating the community's current characteristics; and 3) evaluating how community characteristics would change if discharger must avoid degradation to water quality.

If the conclusion from the Substantial Impacts analysis is "Questionable Affordability" or "Community cannot afford the pollution control", then a Widespread Impacts analysis may be completed to further resolve the affordability issue. This analysis is primarily a qualitative evaluation based on community socioeconomic factors that are expanded to a larger scale than the Substantial Impacts analysis.

[5] Widespread Impact Analysis forms derived from EPA's Water Quality Standards Academy Participant Manual Update-4, 2000 [EPA 823-B-00-005].

Table 1-1. Antidegradation Data Worksheet

SOCIO-ECONOMIC INDICATORS	DATA
CITY'S DEMOGRAPHICS	
Population__________(year)	
Current Population___________(year)	
Type of household moving away from ________________________(city)	
Number of households	
Median Household Income (U.S. Census, Census Designated Place)	
Median Household Income (Local Planning Board Estimates, City)	
Median Household Income (U.S. Census, State)	
Median Household Income (U.S. Census, County)	
Major Type of Employment	
Regional Economic Conditions	
% of Total Wastewater Flow from Residential & Municipal Sources	
Unemployment Rate (City)	
Unemployment Rate (County)	
Unemployment Rate (State)	
CITY'S FINANCIAL HISTORY	
Property Tax Revenues (year)	
Sales Tax & Miscellaneous Revenues (year)	
Total Government Revenues__________(year)	
Property Tax Revenues (FY______________)	
Sales Tax & Miscellaneous Revenues (FY___________)	
Total Government Revenues (FY_____________)	
Current Market Value of Taxable Property (FY____________)	
Property Tax Delinquency Rate	
Bond Rating - insured sewer	
Bond Rating - non insured sewer	
Overall Net Debt (FY______________)	

Table 1-2. Antidegradation Data Worksheet

SOCIO-ECONOMIC INDICATOR	DATA
Cost of Treatment Options (pollution controls) that will Avoid Degradation of Water Quality	
Capital Improvements	
OPTION 1. (year)______________dollars	
OPTION 2. (year)_______________dollars	
Annual Operating Costs	
OPTION 1. (year)_______________dollars	
OPTION 2. (year)_______________dollars	
FINANCING FOR WASTEWATER TREATMENT OPTIONS	
OPTION 1. Source of Financing	
Repayment Term, Vehicle	
Bond Rate	
Total Annual Cost of Existing Plant	
OPTION 2. Source of Financing	
Repayment Term, Vehicle	
Bond Rate	
Total Annual Cost of Existing Plant	

Table 1-3. Substantial Impacts Analysis – Part I

PART I. CALCULATING THE MUNICIPAL AFFORDABILITY SCREENER	
This screener is used to evaluate expected impacts to households. It indicates whether community households can afford to pay the total annualized pollution control costs to avoid water quality degradation.	
A. Calculate Average Annualized Cost Per Household	
1. Calculate the Total Annual Cost of the Project	
Interest Rate for Financing (*i*) =	______________(expressed as a fraction)
Time Period for Financing (*n*) =	______________(years)
Annualization Factor: $\frac{i}{(i+1)^n - 1}(+i) =$	________________________ (1)
Total Capital Cost of Project to be Financed =	________________________ (2)
Annual Operating Costs of Project =	________________________ (3)
Annualized Capital Cost [(1) *x* (2)] =	________________________ (4)
Total Annual Cost of Project [(3) + (4)] =	________________________ (5)
2. Calculate the Total Annual Cost to Households	
Total Annual Cost of Project (5) x Percentage of Total Wastewater Flow Attributable to Residential and Municipal Wastewater Flows =	________________________ (6)
Total Annual Cost of Existing Plant ($) *x* Percentage of Total Wastewater Flow Attributable to Residential and Municipal Wastewater Flows =	________________________ (7)
Total Annual Cost to Households [(6) + (7)] =	________________________ (8)
3. Calculate the Average Annualized Cost Per Household Total Annual Cost to Households (8) = Number of Households	________________________ (9)
B. Calculate Screener Value:	
Average Annualized Cost Per Household (9) (*x 100*) = Median Household Income	________________% municipal affordability screen (10)
What type of impact does the Municipal Affordability Screener Indicate in table below? Little Impact: < 1.0 % Mid-Range Impact: 1.0% - 2.0% Large Impact: > 2.0% **Explanation of Impacts:** Little Impact – high affordability; households can afford to pay pollution control costs Mid-Range Impact – uncertain affordability Large Impact – low affordability; pollution control costs may cause economic hardship on households	________________ impact
Is there a need to proceed to the Secondary Affordability Test? (yes, if large impact or mid- range impact)	_________________(yes/no)

Little Impact	Mid-Range Impact	Large Impact
< 1.0 %	1.0% - 2.0%	> 2.0%

Table 1-4. Substantial Impacts Analysis – Part II

<table>
<tr><td colspan="2">PART II. APPLYING THE SECONDARY AFFORDABILITY TEST</td></tr>
<tr><td>A. EVALUATING THE DEBT INDICATORS</td><td></td></tr>
<tr><td>Bond Rating:
This is a Measure of the Credit Worthiness of a Community</td><td></td></tr>
<tr><td>What is Bond Rating of (name of municipality)____________________?</td><td>____________________</td></tr>
<tr><td>What is the resulting score? (assign score from table below)
<table>
<tr><td>Source of Bond Rating</td><td>Weak</td><td>Mid-Range</td><td>Strong</td></tr>
<tr><td>S&P</td><td>below BBB</td><td>BBB</td><td>above BBB</td></tr>
<tr><td>Moody’s</td><td>below Baa</td><td>Baa</td><td>above Baa</td></tr>
<tr><td>Score</td><td>1</td><td>2</td><td>3</td></tr>
</table></td><td>__________score points
(11)</td></tr>
<tr><td>Overall Net Debt to Market Value of Taxable Property:
This measures Debt Burden on Residents within the Community</td><td></td></tr>
<tr><td>(municipality)____________________Overall Net Debt =</td><td>______________________
(12)</td></tr>
<tr><td>(municipality)____________________Market Value of Taxable Property =</td><td>______________________
(13)</td></tr>
<tr><td>________Overall Net Debt (12)____________(x 100) =
Market Value of Taxable Property (13)</td><td>___________________ %
(13a)</td></tr>
<tr><td>What is the resulting score? (assign score from table below)
<table>
<tr><td></td><td>Weak</td><td>Mid-Range</td><td>Strong</td></tr>
<tr><td>Compare % from 13a</td><td>>5%</td><td>2% - 5%</td><td><2%</td></tr>
<tr><td>Score</td><td>1</td><td>2</td><td>3</td></tr>
</table></td><td>__________score points
(14)</td></tr>
<tr><td>Explanation of Ratings:
<u>Weak</u> = negative effect on indicator from increased costs for pollution controls
<u>Mid-Range</u> = uncertain effect on indicator
<u>Strong</u> = indicator can withstand increased costs for pollution controls</td><td></td></tr>
</table>

Table 1-5. Substantial Impacts Analysis – Part II

PART II. APPLYING THE SECONDARY AFFORDABILITY TEST (continued)	
B. EVALUATING THE SOCIOECONOMIC INDICATORS	
Unemployment Rate: This measures the General Economic Health of the Community	
What is (municipality)__________________Unemployment Rate?	___________________
Is this above, below, or equal to the State's rate?	
What is the resulting Score? (assign score from table below)	___________score points (15)

	Weak	Mid-Range	Strong
Compare unemployment rate	Above State Average	State Average	Below State Average
Score	1	2	3

Median Household Income: **This Measure Provides an Overall Indication of Community Earning Capacity**	
What is (municipality) Median Household Income?	
Is this above, below, or equal to the State's rate?	
What is the resulting Score? (assign score from table below)	**score points (16)**

	Weak	Mid-Range	Strong
Compare median income	Below State Average	State Average	Above State Average
Score	1	2	3

Table 1-6. Substantial Impacts Analysis – Part II

PART II. APPLYING THE SECONDARY AFFORDABILITY TEST (continued)	
C. EVALUATING THE FINANCIAL MANAGEMENT INDICATORS	
Property Tax Revenue to Full Market Value of Taxable Property: This Measures Funding Capacity Available to Support Debt Based on Community's Wealth	
What is (municipality)_________________Property Tax Revenue?	_____________________ (17)
What is the Full Market Value of Taxable Property?	_____________________ (18)
Property Tax Revenue (17) / Full Market Value of Taxable Property (18) (*x* 100) =	_________________% (18a)
What is the resulting Score? (assign score from table below)	__________score points (19)

	Weak	Mid-Range	Strong
Compare % from 18a	<2%	2% - 4%	>4%
Score	1	2	3

Property Tax Collection Rate: This Measures How Well the Local Government is Administrated	
What is the Property Tax Collection Rate of (municipality)	_______%
What is the resulting Score? (assign score from table below)	________score points (20)

	Weak	Mid-Range	Strong
Compare tax collection rate	<94%	94% - 98%	>98%
Score	1	2	3

D. CALCULATE THE CUMULATIVE SECONDARY AFFORDABILITY TEST SCORE: This is the average score of all the indicators calculated above.	
$\frac{(11) + (14) + (15) + (16) + (19) + (20)}{6}$ =	_______cumulative score (21)
In what impact range does the cumulative secondary score fall?	________ impact range

	Weak	Mid-Range	Strong
Compare cumulative score from 21	< 1.5	1.5 – 2.5	> 2.5

Table 1-7. Substantial Impacts Analysis – Part III

Part III. Assessment of Substantial Impacts Matrix	
THE MUNICIPAL AFFORDABILITY SCREENER (10) =	________________%
THE CUMULATIVE SECONDARY AFFORDABILITY TEST SCORE (21) =	_____________score points
Where does (municipality)_________________________appear in the Substantial Impacts Matrix below?	

Substantial Impacts Matrix

Secondary Assessment Score	Municipal Affordability Screener		
	<1.0%	1.0% - 2.0%	>2.0%
< 1.5	?	X	X
1.5 – 2.5	√	?	X
> 2.5	√	√	?

? = Questionable affordability
√ = Community can afford the pollution control
X = Community cannot afford the pollution control

Based on the Substantial Impacts Matrix above, what is the affordability status (afford, not afford, or questionable) of the (municipality)_________? In other words, can the project proponent afford to upgrade the facility in order to avoid water quality degradation?	______________________ Matrix Result
If the conclusion from the Substantial Impacts analysis is either "Cannot Afford" or "Questionable Affordability", then proceed to the Widespread Impacts analysis for further evaluation.	Complete Widespread Impacts Analysis? __________(yes/no)

Table 1-8. Widespread Impacts Analysis – Public Facility

1. **Define the Affected Community**

Evaluate the Discharger's Contribution to the Community:

- Contribution to economic base (e.g., property taxes and employment)
- Provides product or service upon which other businesses or thecommunity depend

2. **Evaluate Community's Current Characteristics**

Evaluate how community's current socioeconomic health may change if proposed project must avoid degradation to water quality by considering the following factors:

- Median household income
- Unemployment rate
- Rate of industrial development
- Developing and declining industries
- Percent of households below poverty line
- Ability of community to carry more debt
- Local and regional factors

Other applicable information on the local and regional economy that should also be reviewed includes:

- Annual rate of population change
- Current financial surplus as a percentage of total expenditures
- Percentage of property taxes actually collected
- Property tax revenues as a percentage of the market value of real property
- Overall debt outstanding as a percentage of market value of real property
- Overall debt per capita
- Percentage of outstanding debt due within 5 years

3. **Evaluate How Community Characteristics Would Change if Discharger Must Avoid Degradation to Water Quality**

Evaluate the projected adverse socioeconomic impacts of adding pollution controls to the project to meet antidegradation requirements by considering the following:

- Property Values
- Employment Rate
- Commercial Development Opportunities
- Tax Revenues
- Expenditure on Social Services
- State level impacts such as loss of revenues and increased expenditures

Attachment 2 – Tier 2 Review of a Private Facility

Attachment 2 includes additional information that may be required by the Department to evaluate socio-economic factors of a private facility during a Tier 2 review. This evaluation is based on two types of impacts, referred to as "substantial" and "widespread". The Substantial Impacts analysis is found in Table 2-2. The Widespread Impacts analysis is found in Table 2-3.

SUBSTANTIAL IMPACTS - SUMMARY

Purpose of Substantial Impacts analysis: Determine whether a private facility can afford pollution controls in order to avoid any degradation of water quality.

The first step in a Substantial Impacts analysis is to provide data on the socio-economic factors listed in the worksheet in Table 1. This data is then used to calculate four financial tests that in turn indicate the financial health of a private entity (Table 2).

WIDESPREAD IMPACTS - SUMMARY

Purpose of Widespread Impacts analysis: Evaluates the social costs of pollution control requirements by: 1) defining the affected community; 2) evaluating the community's current characteristics; and 3) evaluating how community characteristics would change if discharger must avoid degradation to water quality.

If the Substantial Impacts analysis (i.e., the four financial tests) indicates that the private entity's financial health is questionable, then a Widespread Impacts analysis may be completed to further resolve the affordability issue. This analysis is primarily a qualitative evaluation based on community socioeconomic factors that are expanded to a larger scale than the Substantial Impacts analysis.

Table 2-1. Data Worksheet for Financial Factors

Financial Factor	Data
Current Assets	
Current Liabilities	
Cash flow per given year	
Total debt of the entity	
Amount firm has borrowed (debt)	
Amount of stockholders' capital (equity)	
Pre-tax earnings	
Annualized pollution control cost	

Table 2-2. Substantial Impacts Analysis - Financial Tests Used to Measure the Financial Health of a Private Entity

1. Liquidity Test - Indicates how easily an entity can pay its short-term bills. Current Ratio = Current Assets / Current Liabilities NOTE: A ratio greater that 2 indicates affordability
2. Solvency Test - Indicates how easily an entity can pay its fixed and long-term bills. Beaver's Ratio = Cash flow per given year / Total debt of the entity NOTE: > 0.20 Indicates private entity is solvent < 0.15 Indicates private entity may go bankrupt
3. Leverage Test - Indicates how much money the entity can borrow. Debt-to-Equity Ratio = Amount firm has borrowed (debt) / Amount of Stockholders' capital (equity) NOTE: The larger the Debt-to-Equity Ratio, the less likely that the entity will be able to borrow funds
4. Earnings Test - Indicates how much the entity's profitability will change with the additional pollution control needed to avoid degradation of water quality. Earnings = Pre-tax – Annualized Pollution Control Cost NOTE: Compare earnings result with entity's revenues to measure post-compliance profit rate
Guidelines to evaluate financial tests: o Results of all four tests above should be considered jointly o Ratios and tests should be compared over several years o Financial ratios should also be compared against those of "healthy" entities o The role the entity plays in a parent firm's operations should also beconsidered

Table 2-3. Widespread Impacts Analysis – Private entity/facility

1. Define the Affected Community

Evaluate the Discharger's Contribution to the Community:

- Contribution to economic base (e.g., property taxes and employment)
- Provides product or service upon which other businesses or the community depend

2. Evaluate Community's Current Characteristics

Evaluate how community's current socioeconomic health would change if proposed project must avoid degradation to water quality by considering the following factors:

- Median household income
- Unemployment rate
- Rate of industrial development
- Developing and declining industries
- Percent of households below poverty line
- Ability of community to carry more debt
- Local and regional factors

Other applicable information on the local and regional economy that should also be reviewed includes:

- Annual rate of population change
- Current financial surplus as a percentage of total expenditures
- Percentage of property taxes actually collected
- Property tax revenues as a percentage of the market value of real property
- Overall debt outstanding as a percentage of market value of real property
- Overall debt per capita
- Percentage of outstanding debt due within 5 years

3. Evaluate How Community Characteristics Would Change if Discharger Must Avoid Degradation to Water Quality

Evaluate the projected adverse socioeconomic impacts of adding the pollution control to the project to meet antidegradation requirements by considering the following:

- Property Values
- Employment Rate
- Commercial Development Opportunities
- Tax Revenues
- Expenditure on Social Services
- State level impacts such as loss of revenues and increased expenditures

Appendix A.4
Summary of Other Economic and Environmental Impact Categories

1. **Public Need/Social Service**
   Health/Nursing Care
   Police/Fire Protection
   Infrastructure Need
   Education (primary)

2. **Consistency with Local Zoning and Planning**
   Sewage Facility Planning
   Zoning Requirements
   Land Use Plans
   Patterns of Growth/Development

3. **Quality of Life**
   Educational (post-secondary)
   Cultural
   Recreational

4. **Housing**
   Quantity
   Affordability

5. **Employment**
   Number and Type of Jobs Relative to Local Unemployment Rate and Local Labor Force
   State Local Mean Qualified Income

6. **Tax Revenues**
   Tax Revenue Income for Relative to Increased Private Demand for Services
   Public and Private Change in Property Value or Tax Status

7. **Development Potential**
   Potential to Spur Increased Growth

8. **Sensitivity of Water Use**
   Presence of Threatened and Endangered Species
   Public Water Supply Use
   Water Contact Sports

9. **Nature of Pollutants**
   Synthetic
   Bioaccumulative
   Naturally Occurring

10. **Proposed Degree of Change in Water Quality**
    Available Dilution
    Amount of Assimilative Capacity Used

11. Proximity to Wetlands or Floodplain

Presence of Wetlands
Location with Respect to Stream Channel

12. Duration of Discharge

Permanent
Continuous
Short-term

13. Reliability of Treatment Technology

High Tech/Experimental
Energy Intensive
Maintenance Intensive
Natural System
Overall Reliability

14. Compliance Record

Current Violations
Historical Violations
Overall Record

15. Secondary Beneficial Impacts

Groundwater Recharge
Post-Construction Storm Water
Hydromodifications
Thermal Modification
Construction on Previously Undisturbed Lands
Discharge to Previously Undegraded Waters

Appendix A.5
List of Agencies Involved in Intergovernmental Coordination

Interagency Coordination for Antidegradation Review

In accordance with 20.6.2.2001 NMAC, and to the extent practicable, the Department will provide joint public notice with the EPA that the Department is reviewing a draft NPDES permit (which contains the antidegradation review) for the purpose of preparing a state certification or denial pursuant to Section 401 of the CWA. When joint notice is impractical, the Department provides notice that it is reviewing a draft NPDES permit for purpose of preparing a state certification or denial pursuant to Section 401 of the CWA by mailing or emailing the notice, as appropriate, to:

- the NPDES permit applicant or permittee;
- any user identified in the permit application of a privately-owned treatment works;
- any affected federal agency, such as EPA Region 6, the U.S. Fish & Wildlife Service and affected federal public land managers (i.e., U.S. Forest Service, BLM, and National Park Service);
- any affected state agency, such as the NM Office of the State Engineer, New Mexico Game & Fish Department, NM State Land Office, and New Mexico State Parks - EMNRD;
- any affected tribal agency;
- any affected local agency, including each applicable county department of health, environmental services or comparable department;
- any affected Council of Government (COG);
- any federal and state agencies with jurisdiction over fish, shellfish, and wildlife resources;
- the New Mexico Historic Preservation Office;
- the U.S. Army Corps of Engineers; and,
- any person who requests public notice in writing.

Appendix A.6
Antidegradation Policy and Implementation Plan
(20.6.4.8 NMAC)

20.6.4.8 ANTIDEGRADATION POLICY AND IMPLEMENTATION PLAN:

A. Antidegradation Policy: This antidegradation policy applies to all surface waters of the state.

(1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected in all surface waters of the state.

(2) Where the quality of a surface water of the state exceeds levels necessary to support the propagation of fish, shellfish, and wildlife, and recreation in and on the water, that quality shall be maintained and protected unless the commission finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the state's continuing planning process, that allowing lower water quality is necessary to accommodate important economic and social development in the area in which the water is located. In allowing such degradation or lower water quality, the state shall assure water quality adequate to protect existing uses fully. Further, the state shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable BMPs for nonpoint source control. Additionally, the state shall encourage the use of watershed planning as a further means to protect surface waters of the state.

(3) No degradation shall be allowed in waters designated by the commission as outstanding national resource waters (ONRWs), except as provided in Subparagraphs (a) through (e) of this paragraph and in Paragraph (4) of this Subsection A.

(a) After providing a minimum 30-day public review and comment period, the commission determines that allowing temporary and short-term degradation of water quality is necessary to accommodate public health or safety activities in the area in which the ONRW is located. Examples of public health or safety activities include but are not limited to replacement or repair of a water or sewer pipeline or a roadway bridge. In making its decision, the commission shall consider whether the activity will interfere with activities implemented to restore or maintain the chemical, physical or biological integrity of the water. In approving the activity, the commission shall require that:

(i) the degradation shall be limited to the shortest possible time and shall not exceed six months;

(ii) the degradation shall be minimized and controlled by best management practices or in accordance with permit requirements as appropriate; all practical means of minimizing the duration, magnitude, frequency and cumulative effects of such degradation shall be utilized;

(iii) the degradation shall not result in water quality lower than necessary to protect any existing use in the ONRW; and

(iv) the degradation shall not alter the essential character or special use that makes the water an ORNW.

(b) Prior to the commission making a determination, the department or appropriate oversight agency shall provide a written recommendation to the commission. If the commission approves the activity, the department or appropriate oversight agency shall oversee implementation of the activity.

(c) Where an emergency response action that may result in temporary and short-term degradation to an ONRW is necessary to mitigate an immediate threat to public health or safety, the emergency response action may proceed prior to providing notification required by Subparagraph (a) of this paragraph in accordance with the following:

(i) only actions that mitigate an immediate threat to public health or safety may be undertaken pursuant to this provision; non-emergency portions of the action shall comply with the requirements of Subparagraph (a) of this paragraph;

(ii) the discharger shall make best efforts to comply with requirements (i) through (iv) of Subparagraph (a) of this paragraph;

(iii) the discharger shall notify the department of the emergency response action in writing within seven days of initiation of the action;

(iv) within 30 days of initiation of the emergency response action, the discharger shall provide a summary of the action taken, including all actions taken to comply with requirements (i) through (iv) of Subparagraph (a) of this paragraph.

(d) Preexisting land-use activities, including grazing, allowed by federal or state law prior to designation as an ONRW, and controlled by best management practices (BMPs), shall be allowed to continue so long as there are no new or increased discharges resulting from the activity after designation of the ONRW.

(e) Acequia operation, maintenance, and repairs are not subject to new requirements because of ONRW designation. However, the use of BMPs to minimize or eliminate the introduction of pollutants into receiving waters is strongly encouraged.

(4) This antidegradation policy does not prohibit activities that may result in degradation in surface waters of the state when such activities will result in restoration or maintenance of the chemical, physical or biological integrity of the water.

(a) For ONRWs, the department or appropriate oversight agency shall review on a case-by-case basis discharges that may result in degradation from restoration or maintenance activities, and may approve such activities in accordance with the following:

(i) the degradation shall be limited to the shortest possible time;

(ii) the degradation shall be minimized and controlled by best management practices or in accordance with permit requirements as appropriate, and all practical means of minimizing the duration, magnitude, frequency and cumulative effects of such degradation shall be utilized;

(iii) the degradation shall not result in water quality lower than necessary to protect any existing use of the surface water; and

(iv) the degradation shall not alter the essential character or special use that makes the water an ORNW.

(b) For surface waters of the state other than ONRWs, the department shall review on a case-by-case basis discharges that may result in degradation from restoration or maintenance activities, and may approve such activities in accordance with the following:

(i) the degradation shall be limited to the shortest possible time;

(ii) the degradation shall be minimized and controlled by best management practices or in accordance with permit requirements as appropriate, and all practical means of minimizing the duration, magnitude, frequency and cumulative effects of such degradation shall be utilized; and

(iii) the degradation shall not result in water quality lower than necessary to protect any existing use of the surface water.

(5) In those cases where potential water quality impairment associated with a thermal discharge is involved, this antidegradation policy and implementing method shall be consistent with Section 316 of the federal Clean Water Act.

(6) In implementing this section, the commission through the appropriate regional offices of the United States environmental protection agency will keep the administrator advised and provided with such information concerning the surface waters of the state as he or she will need to discharge his or her responsibilities under the federal Clean Water Act.

B. Implementation Plan: The department, acting under authority delegated by the commission, implements the water quality standards, including the antidegradation policy, by describing specific methods and procedures in the continuing planning process and by establishing and maintaining controls on the discharge of pollutants to surface waters of the state. The steps summarized in the following paragraphs, which may not all be applicable in every water pollution control action, list the implementation activities of the department. These implementation activities are supplemented by detailed antidegradation review procedures developed under the state's continuing planning process. The department:

(1) obtains information pertinent to the impact of the effluent on the receiving water and advises the prospective discharger of requirements for obtaining a permit to discharge;

(2) reviews the adequacy of existing data and conducts a water quality survey of the receiving water in accordance with an annually reviewed, ranked priority list of surface waters of the state requiring total maximum daily loads pursuant to Section 303(d) of the federal Clean Water Act;

(3) assesses the probable impact of the effluent on the receiving water relative to its attainable or designated uses and numeric and narrative criteria;

(4) requires the highest and best degree of wastewater treatment practicable and commensurate with protecting and maintaining the designated uses and existing water quality of surface waters of the state;

(5) develops water quality based effluent limitations and comments on technology based effluent limitations, as appropriate, for inclusion in any federal permit issued to a discharger pursuant to Section 402 of the federal Clean Water Act;

(6) requires that these effluent limitations be included in any such permit as a condition for state certification pursuant to Section 401 of the federal Clean Water Act;

(7) coordinates its water pollution control activities with other constituent agencies of the commission, and with local, state and federal agencies, as appropriate;

(8) develops and pursues inspection and enforcement programs to ensure that dischargers comply with state regulations and standards, and complements EPA's enforcement of federal permits;

(9) ensures that the provisions for public participation required by the New Mexico Water Quality Act and the federal Clean Water Act are followed;

(10) provides continuing technical training for wastewater treatment facility operators through the utility operators training and certification programs;

(11) provides funds to assist the construction of publicly owned wastewater treatment facilities through the wastewater construction program authorized by Section 601 of the federal Clean Water Act, and through funds appropriated by the New Mexico legislature;

(12) conducts water quality surveillance of the surface waters of the state to assess the effectiveness of water pollution controls, determines whether water quality standards are being attained, and proposes amendments to improve water quality standards;

(13) encourages, in conjunction with other state agencies, implementation of the best management practices set forth in the New Mexico statewide water quality management plan and the nonpoint source management program, such implementation shall not be mandatory except as provided by federal or state law;

(14) evaluates the effectiveness of BMPs selected to prevent, reduce or abate sources of water pollutants;

(15) develops procedures for assessing use attainment as required by 20.6.4.15 NMAC and establishing site-specific standards; and

(**16)** develops list of surface waters of the state not attaining designated uses, pursuant to Sections 305(b) and 303(d) of the federal Clean Water Act.

[20.6.4.8 NMAC - Rp 20 NMAC 6.1.1101, 10-12-00; A, 05-23-05; A, 08-01-07; A, 01-14-11]

State of New Mexico
Water Quality Management Plan & Continuing Planning Process

Appendix B

Approved Total Maximum Daily Loads for New Mexico

List of Approved TMDLs in New Mexico

Appendix B - Water Quality Management Plan and Continuing Planning Process

Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Arkansas-White-Red Rivers Basin	11080001	NM-2306.A_151	Caliente Canyon (Vermejo River to headwaters)	specific conductance	TMDL for the Canadian River Watershed-Part One (Mora River to Colorado border)	August 14, 2007	September 21, 2007
Arkansas-White-Red Rivers Basin	11080001	NM-2305.A_200	Canadian River (Cimarron River to CO border)	plant nutrients	TMDL for the Mainstem of the Canadian River (from TX to CO) and select tributaries	September 30, 2011	November 21, 2011
Arkansas-White-Red Rivers Basin	11080003	NM-2305.A_000	Canadian River (Conchas River to Mora River)	E.coli	TMDL for the Mainstem of the Canadian River (from TX to CO) and select tributaries	September 30, 2011	November 21, 2011
Arkansas-White-Red Rivers Basin	11080006	NM-2303_00	Canadian River (Ute Reservoir to Conchas Reservoir)	E.coli	TMDL for the Mainstem of the Canadian River (from TX to CO) and select tributaries	September 30, 2011	November 21, 2011
Arkansas-White-Red Rivers Basin	11080002	NM-2306.A_065	Cieneguilla Creek (Eagle Nest Lake to headwaters)	chronic aluminum	TMDL for Metals (Chronic Aluminum) in Cieneguilla	January 13, 2004	May 19, 2004
					Chronic aluminum TMDL withdrawal	April 11, 2017	May 12, 2017
				fecal coliform	TMDL for Fecal Coliform in Six-Mile, Cienguilla, and and Moreno Creeks	January 13, 2004	May 19, 2004
				turbidity, stream bottom deposits, total phosphorus	TMDL for Turbidity, Stream Bottom Deposits, and Total Phosphorus in the Canadian River Basin (Cimarron)		
				E. coli, plant nutrients, temperature	TMDL for the Cimarron River Watershed (Canadian River to headwaters)	August 10, 2010	September 3, 2010
Arkansas-White-Red Rivers Basin	11080002	NM-2305.1.A_10	Cimarron River (Canadian River to Cimarron Village)	plant nutrients	TMDL for the Cimarron River Watershed (Canadian River to headwaters)	August 10, 2010	September 3, 2010
Arkansas-White-Red Rivers Basin	11080002	NM-2306.A_040	Cimarron River (Cimarron Village to Turkey Creek)	arsenic, temperature	TMDL for the Cimarron River Watershed (Canadian River to headwaters)	August 10, 2010	September 3, 2010
Arkansas-White-Red Rivers Basin	11080002	NM-2306.A_130	Cimarron River (Turkey Creek to Eagle Nest Lake)	arsenic, plant nutrients	TMDL for the Cimarron River Watershed (Canadian River to headwaters)	August 10, 2010	September 3, 2010

List of Approved TMDLs in New Mexico

Appendix B - Water Quality Management Plan and Continuing Planning Process

Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Arkansas-White-Red Rivers Basin	11080004	NM-2306.A_020	Coyote Creek (Mora River to Black Lake)	specific conductance, temperature	TMDL for the Canadian River Watershed-Part One (Mora River to Colorado border)	August 14, 2007	September 21, 2007
Arkansas-White-Red Rivers Basin	11080004	NM-2306.A_024	Little Coyote Creek (Black Lake to headwaters)	nutrients	TMDL for the Canadian River Watershed-Part One (Mora River to Colorado border)	August 14, 2007	September 21, 2007
Arkansas-White-Red Rivers Basin	11080002	NM-2306.A_121	Middle Ponil Creek (South Ponil Creek to headwaters)	temperature	TMDL for Temperature on Middle Ponil Creek	July 10, 2001	September 21, 2001
				turbidity	TMDL for Turbidity in Middle Ponil Creek and Ponil Creek		
Arkansas-White-Red Rivers Basin	11080002	NM-2306.A_124	Middle Ponil Creek (Greenwood Creek to headwaters)	plant nutrients	TMDL for the Waters of the Valle Vidal	September 30, 2011	November 8, 2011
Arkansas-White-Red Rivers Basin	11080004	NM-2305.A_00	Mora River (USGS gage east of Shoemaker to Hwy 434)	nutrients	TMDL for the Canadian River Watershed-Part One (Mora River to Colorado border)	August 14, 2007 June 10, 2015 (update)	September 21, 2007 July 22, 2015 (update)
Arkansas-White-Red Rivers Basin	11080004	NM-2306.A_000	Mora River (Hwy 434 to headwaters)	sedimentation, specific conductance	TMDL for the Canadian River Watershed-Part One (Mora River to Colorado border)	August 14, 2007 September 30, 2011 (update)	September 21, 2007 November 28, 2011 (update)
Arkansas-White-Red Rivers Basin	11080002	NM-2306.A_060	Moreno Creek (Eagle Nest Lake to headwaters)	fecal coliform	TMDL for Fecal Coliform in Six-Mile, Cieneguilla and Moreno Creeks in the Canadian River Basin (Cimarron)	January 13, 2004	May 19, 2004
				turbidity	TMDL for Turbidity, Stream Bottom Deposits, and Total Phosphorus in Canadian Basin (Cimarron)		
				temperature, plant nutrients	TMDL for the Cimarron River Watershed (Canadian River to headwaters)	August 10, 2010	September 3, 2010

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Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Arkansas-White-Red Rivers Basin	11080002	NM-2306.A_110	North Ponil Creek (South Ponil Creek to McCrystal Creek)	stream bottom deposits, turbidity, total phosphorus	TMDL for Turbidity, Stream Bottom Deposits, and Total Phosphorus in the Canadian Basin (Cimarron)	January 13, 2004	May 19, 2004
				temperature	TMDL for Temperature on North Ponil Creek	November 9, 1999	December 17, 1999
				E. coli	TMDL for the Cimarron River Watershed (Canadian River to headwaters)	August 10, 2010	September 3, 2010
Arkansas-White-Red Rivers Basin	11080002	NM-2306.A_162	North Ponil Creek (Seally Canyon to headwaters)	temperature	TMDL for the Waters of the Valle Vidal	September 30, 2011	November 8, 2011
Arkansas-White-Red Rivers Basin	11080006	NM-2303_10	Pajarito Creek (Canadian River to headwaters)	e.coli, plant nutrients	TMDL for the Mainstem of the Canadian River (from TX to CO) and select tributaries	September 30, 2011	November 21, 2011
Arkansas-White-Red Rivers Basin	1108002	NM-2306.A_100	Ponil Creek (Cimarron River to confluence of North and South Ponil	temperature,	TMDL for Temperature on Ponil Creek	July 10, 2001	September 21, 2001
				turbidity	TMDL for Turbidity in Middle Ponil Creek and Ponil Creek	July 10, 2001	September 21, 2001
				chronic aluminum	TMDL for Metals (Chronic Aluminum) in Ponil Creek		
Arkansas-White-Red Rivers Basin	11080006	NM-2303_10	Pajarito Creek (Canadian River to headwaters)	E.coli, plant nutrients	TMDL for the Mainstem of the Canadian River (from TX to CO) and select tributaries	September 30, 2011	November 21, 2011
Arkansas-White-Red Rivers Basin	11080002	NM-2306.A_100	Ponil Creek (Cimarron River to US 64)	E. coli	TMDL for the Cimarron River Watershed (Canadian River to headwaters)	August 10, 2010	September 3, 2010
Arkansas-White-Red Rivers Basin	11080002	NM-2306.A_101	Ponil Creek (US 64 to confl of North and South Ponil)	E. coli, plant nutrients	TMDL for the Cimarron River Watershed (Canadian River to headwaters)	August 10, 2010	September 3, 2010
Arkansas-White-Red Rivers Basin	11080002	NM-2306.A_051	Rayado Creek (Miami Lake Diversion to headwaters)	E. coli, temperature	TMDL for the Cimarron River Watershed (Canadian River to headwaters)	August 10, 2010	September 3, 2010
Arkansas-White-Red Rivers Basin	11080002	NM-2305.A_80	Rayado Creek (Cimarron River to Miami Lake Diversion)	stream bottom deposits	TMDL for Stream Bottom Deposits in Rayado Creek and Metals (Chronic Aluminum) in the Cimarron River	December 12, 2000	February 16, 2001
				plant nutrients	TMDL for the Cimarron River Watershed (Canadian River to headwaters)	August 10, 2010	September 3, 2010

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Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Arkansas-White-Red Rivers Basin	11080008	NM-2301_10	Revuelto Creek (Canadian River to headwaters)	boron	TMDL for the Mainstem of the Canadian River (from TX to CO) and select tributaries	September 30, 2011	November 21, 2011
Arkansas-White-Red Rivers Basin	11080004	NM-2305.3.A_20	Sapello River (Mora River to Manuelitas Creek)	sedimentation	TMDL for the Canadian River Watershed-Part One (Mora River to Colorado	August 14, 2007	September 21, 2007
Arkansas-White-Red Rivers Basin	11080002	NM-2306.A_064	Sixmile Creek (Eagle Nest Lake to headwaters)	fecal coliform	TMDL for Fecal Coliform in Six-mile, Cieneguilla, and Moreno Creeks in the Canadian River Basin (Cimarron)	January 13, 2004	May 19, 2004
				turbidity	TMDL for Turbidity, Stream Bottom Deposits, and Total Phosphorus in the Canadian River Basin (Cimarron)	January 13, 2004	May 19, 2004
				E. coli, temperature, plant nutrients	TMDL for the Cimarron River Watershed (Canadian River to headwaters)	August 10, 2010	September 3, 2010
Arkansas-White-Red Rivers Basin	11080002	NM-2306.A_120	South Ponil Creek (Ponil Creek to Middle Ponil)	temperature	TMDL for the Cimarron River Watershed (Canadian River to headwaters)	August 10, 2010	September 3, 2010
Arkansas-White-Red Rivers Basin	11080001	NM-2305.A_254	Una de Gato (Chicorica Creek to Hwy 64)	plant nutrients	TMDL for the Mainstem of the Canadian River (from TX to CO) and select tributaries	September 30, 2011	November 21, 2011
Arkansas-White-Red Rivers Basin	11080001	NM-2305.A_030	Una de Gato (Hwy 64 to headwaters)	plant nutrients	TMDL for the Mainstem of the Canadian River (from TX to CO) and select tributaries	September 30, 2011	November 21, 2011
Arkansas-White-Red Rivers Basin	11080002	NM-2306.A_068	Ute Creek (Cimarron River to headwaters)	arsenic, E. coli, temperature	TMDL for the Cimarron River Watershed (Canadian River to headwaters)	August 10, 2010	September 3, 2010
Arkansas-White-Red Rivers Basin	11080001	NM-2305.A_220	Vermejo River (Rail Canyon to York Canyon)	specific conductance, temperature	TMDL for the Canadian River Watershed-Part One (Mora River to Colorado border)	August 14, 2007	September 21, 2007
Arkansas-White-Red Rivers Basin	11080001	NM-2305.A_230	Vermejo River (York Canyon to headwaters)	temperature	TMDL for the Canadian River Watershed-Part One (Mora River to Colorado border)	August 14, 2007	September 21, 2007
Arkansas-White-Red Rivers Basin	11080001	NM-2306.A_153	York Canyon (Vermejo Park to headwaters)	specific conductance	TMDL for the Canadian River Watershed-Part One (Mora River to Colorado border)	August 14, 2007	September 21, 2007

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Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Arkansas-White-Red Rivers Basin	11040001	NM-2701_00	Dry Cimarron River (perennial reaches OK bnd to Long Canyon)	sulfate, total dissolved solids	TMDL for the Dry Cimarron River Watershed	April 14, 2009	June 2, 2009
Arkansas-White-Red Rivers Basin	11040001	NM-2701_02	Dry Cimarron River (Long Canyon to Oak Creek)	E.coli, total dissolved solids	TMDL for the Dry Cimarron River Watershed	April 14, 2009	June 2, 2009
Arkansas-White-Red Rivers Basin	11040001	NM-2701_20	Long Canyon (perennial reaches above Dry Cimarron)	E.coli, selenium	TMDL for the Dry Cimarron River Watershed	April 14, 2009	June 2, 2009
Arkansas-White-Red Rivers Basin	11040001	NM-2701_10	Oak Creek (Dry Cimarron to headwaters)	nutrients, E. coli	TMDL for the Dry Cimarron River Watershed	April 14, 2009	June 2, 2009
Arkansas-White-Red Rivers Basin	11080006	NM-2303_00	Canadian River (Ute Reservoir to Conchas Reservoir)	temperature	Canadian River Watershed TMDL	August 13, 2019	September 18, 2019
Arkansas-White-Red Rivers Basin	11080005	NM-2305.A_010	Conchas River (Conchas Reservoir to Salitre Creek)	chronic aluminum, E.coli, plant nutrients	Canadian River Watershed TMDL	August 13, 2019	September 18, 2019
Arkansas-White-Red Rivers Basin	11080004	NM-2306.A_021	Coyote Creek (Black Lake to headwaters)	temperature, plant nutrients	Canadian River Watershed TMDL	August 13, 2019	September 18, 2019
Arkansas-White-Red Rivers Basin	11080004	NM-2306.A_020	Coyote Creek (Mora River to Amola Ridge)	plant nutrients	Canadian River Watershed TMDL	August 13, 2019	September 18, 2019
Arkansas-White-Red Rivers Basin	11080004	NM-2306.A_022	Coyote Creek (Williams Canyon to Black Lake)	plant nutrients	Canadian River Watershed TMDL	August 13, 2019	September 18, 2019
Arkansas-White-Red Rivers Basin	11080004	NM-2306.A_023	Coyote Creek (Amola Ridge to Williams Canyon)	plant nutrients	Canadian River Watershed TMDL	August 13, 2019	September 18, 2019
Arkansas-White-Red Rivers Basin	11080001	NM-2305.A_255	Doggett Creek (Raton Creek to headwaters)	E.coli, plant nutrients	Canadian River Watershed TMDL	August 13, 2019	September 18, 2019
Arkansas-White-Red Rivers Basin	11040001	NM-2701_00	Dry Cimarron River (perennial reaches OK bnd to Long Canyon)	temperature, plant nutrients	Canadian River Watershed TMDL	August 13, 2019	September 18, 2019
Arkansas-White-Red Rivers Basin	11040001	NM-2701_02	Dry Cimarron River (Long Canyon to Oak Creek	plant nutrients	Canadian River Watershed TMDL	August 13, 2019	September 18, 2019
Arkansas-White-Red Rivers Basin	11040001	NM-2701_01	Dry Cimarron River (Oak Creek to headwaters)	plant nutrients	Canadian River Watershed TMDL	August 13, 2019	September 18, 2019

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Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Arkansas-White-Red Rivers Basin	11080001	NM-2305.A_252	East Fork Chicorica Creek (Chicorica Creek to headwaters)	E.coli	Canadian River Watershed TMDL	August 13, 2019	September 18, 2019
Arkansas-White-Red Rivers Basin	11040001	NM-2701_20	Long Canyon (perennial reaches above Dry Cimarron)	temperature, plant nutrients	Canadian River Watershed TMDL	August 13, 2019	September 18, 2019
Arkansas-White-Red Rivers Basin	11080004	NM-2305.3.A_00	Mora River (USGS gage east of Shoemaker to Hwy 434)	E.coli	Canadian River Watershed TMDL	August 13, 2019	September 18, 2019
Arkansas-White-Red Rivers Basin	11080006	NM-2303_10	Pajarito Creek (perennial portions Canadian River to Vigil Canyon)	temperature	Canadian River Watershed TMDL	August 13, 2019	September 18, 2019
Arkansas-White-Red Rivers Basin	11080001	NM-2305.A_253	Raton Creek (Chicorica Creek to headwaters)	E.coli, plant nutrients	Canadian River Watershed TMDL	August 13, 2019	September 18, 2019
Arkansas-White-Red Rivers Basin	11080001	NM-9000.A_019	Tinaja Creek (West Fork Tinaja Creek to headwaters)	E.coli	Canadian River Watershed TMDL	August 13, 2019	September 18, 2019
Lower Colorado River Basin	15040001	NM-2503_21	Black Canyon Creek (East Fork Gila River to headwaters)	temperature	TMDL for Temperature on Black Canyon Creek	November 13, 2001	April 5, 2002
Lower Colorado River Basin	15040001	NM-2503_43	Canyon Creek (Middle Fork Gila River to headwaters)	plant nutrients	TMDL for Plant Nutrients for Canyon Creek	December 11, 2001	April 10, 2002
				turbidity	TMDL for Turbidity for Canyon Creek		
Lower Colorado River Basin	15040004	NM-2603.A_50	Centerfire Creek (San Francisco R to headwaters)	conductivity	TMDL for Conductivity on Centerfire Creek	November 13, 2001	April 16, 2002
				plant nutrients	TMDL for Plant Nutrients on Centerfire Creek	December 11, 2001	
Lower Colorado River Basin	15040004	NM-2603.A_50	Centerfire Creek (San Francisco R to headwaters)	E.coli, turbidity	TMDL for Upper Gila, San Francisco, and Mimbres River Watersheds	September 9, 2014	September 11, 2014
Lower Colorado River Basin	13030202	NM-2803_11	Cold Springs Creek (Hot Springs Creek to headwaters)	cadmium, lead	TMDL for Upper Gila, San Francisco, and Mimbres River Watersheds	September 9, 2014	September 11, 2014
Lower	15040001	NM-2503_20	Gila River (East Fork)	chronic aluminum	TMDL for Metals (Chronic	November 13, 2001	April 15, 2002

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Colorado River Basin					Aluminum) for the East Fork of the Gila River and Taylor		

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Lower Colorado River Basin	15040003	NM-2502.A_21	Mangas Creek (Gila River to Mangas Springs)	plant nutrients	TMDL for Plant Nutrients on Mangas Creek	December 11, 2001	April 16, 2002
Lower Colorado River Basin	13030202	NM-2803_00	Mimbres R (Perennial reaches downstream of Willow Springs)	E.coli	TMDL for Upper Gila, San Francisco, and Mimbres River Watersheds	September 9, 2014	September 11, 2014
Lower Colorado River Basin	15040001	NM-2503_02	Mogollon Creek (Perennial reaches abv USGS gage)	chronic aluminum	TMDL for Metals (Chronic Aluminum) on Mogollon Creek	November 13, 2001	April 5, 2002
Lower Colorado River Basin	15040004	NM-2603.A_43	Negrito Creek (South Fork)	temperature	TMDL for Temperature on the South Fork of Negrito Creek from the Confluence with the North Fork to the	November 13, 2001	April 5, 2002
Lower Colorado River Basin	15040004	NM-2602_20	San Francisco River (Centerfire Creek to AZ border)	temperature	TMDL for Temperature on the San Francisco River from Centerfire Creek to the New Mexico/Arizona Border	November 13, 2001	April 12, 2002
				plant nutrients	TMDL for Plant Nutrients on the San Francisco River from Centerfire Creek upstream to the New Mexico/Arizona	December 11, 2001	August 5, 2002
Lower Colorado River Basin	15040004	NM-2602_10	San Francisco River (NM 12 at Reserve to Centerfire Creek)	E.coli, turbidity	TMDL for Upper Gila, San Francisco, and Mimbres River Watersheds	September 9, 2014	September 11, 2014
Lower Colorado River Basin	15040004	NM-2602_22	San Francisco River (Willow Springs Cyn to NM 12 at Reserve)	E.coli	TMDL for Upper Gila, San Francisco, and Mimbres River Watersheds	September 9, 2014	September 11, 2014

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Lower Colorado River Basin	15040001	NM-2503_04	Sapillo Creek (Gila River to Lake Roberts)	total organic carbon	TMDL for Total Organic Carbon (TOC) on Sapillo	December 11, 2001	April 12, 2002
				turbidity	TMDL for Turbidity on Sapillo Creek		
Lower Colorado River Basin	15040004	NM-2603.A_43	South Fork Negrito Creek (Negrito Creek to headwaters)	E.coli	TMDL for Upper Gila, San Francisco, and Mimbres River Watersheds	September 9, 2014	September 11, 2014
Lower Colorado River Basin	15040001		Taylor Creek (Beaver Creek to Wall Lake)	chronic aluminum	TMDL for Metals (Chronic Aluminum) for the East Fork of the Gila River and Taylor Creek	November 13, 2001	April 15, 2002
				temperature	TMDL for Temperature on Taylor Creek		August 5, 2002
Lower Colorado River Basin	15040004	NM-2603.A_40	Tularosa River (San Francisco R to Apache Creek)	conductivity	TMDL for Conductivity on the Tularosa River	November 13, 2001	April 5, 2002
Lower Colorado River Basin	15040004	NM-2603.A_40	Tularosa River (San Francisco River to Apache Creek)	E.coli, turbidity	TMDL for Upper Gila, San Francisco, and Mimbres River Watersheds	September 9, 2014	September 11, 2014
Lower Colorado River Basin	15040004	NM-2603.A_10	Whitewater Creek (San Francisco River to White-water Campgrd)	turbidity	TMDL for Temperature on Whitewater Creek	November 13, 2001	April 12, 2002
				chronic aluminum	TMDL for Chronic Aluminum on Whitewater Creek	December 11, 2001	
				chronic aluminum	TMDL withdrawal for Chronic Aluminum on Whitewater Creek	March 13, 2018	April 24, 2018
Lower Colorado River Basin	15040004	NM-2503_47	Willow Creek (Gilita Creek to headwaters)	chronic aluminum	TMDL for Upper Gila, San Francisco, and Mimbres River Watersheds	September 9, 2014	September 11, 2014

Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Lower Rio Grande Basin	13030102	NM-2101_00	Rio Grande (International Mexico boundary to Leasburg Dam)	E. coli	TMDL for the Main Stem of the Lower Rio Grande (from the International boundary with Mexico to Elephant Butte Dam)	May 8, 2007	June 11, 2007
Lower Rio Grande Basin	13030102	NM-2101_10	Rio Grande (Leasburg Dam to Percha Dam)	E. coli	TMDL for the Main Stem of the Lower Rio Grande (from the International boundary with Mexico to Elephant Butte Dam)	May 8, 2007	June 11, 2007
Middle Rio Grande Basin	13020102	NM-2113_50	Abiquiu Creek (Rio Chama to headwaters)	dissolved oxygen	TMDLs for the Lower Chama Watershed (Below El Vado Reservoir to the confluence with the Rio Grande)	June 8, 2004	September 3, 2004
Middle Rio Grande Basin	13020102	NM-2116.A_030	Canjilon Creek (perennial portions Abiquiu Rsrv to headwaters)	specific conducance, temperature	TMDL for the Rio Chama Watershed (Abiquiu Reservoir to headwaters)	July 12, 2011	August 16, 2011
Middle Rio Grande Basin	13020102	NM-2116.A_010	Cañones Creek (Abiquiu Reservoir to headwaters)	chronic aluminum, fecal coliform, turbidity	TMDLs for the Lower Chama Watershed (Below El Vado Reservoir to the confluence with the Rio Grande)	June 8, 2004	September 3, 2004
Middle Rio Grande Basin	13020102	NM-2116.A_081	Chavez Creek (Rio Brazos to headwaters)	temperature	TMDLs for the Upper Chama Watershed (El Vado Reservoir to Colorado border)	September 9, 2003	March 4, 2004
Middle Rio Grande Basin	13020102	NM-2116.A_023	Poleo Creek (Rio Puerco de Chama to headwaters)	turbidity	TMDLs for the Lower Chama Watershed (Below El Vado Reservoir to the confluence with the Rio Grande)	June 8, 2004	September 3, 2004
Middle Rio Grande Basin	13020102	NM-2116.A_011	Polvadera Creek (Cañones Creek to headwaters)	temperature	TMDLs for the Lower Chama Watershed (Below El Vado Reservoir to the confluence with the Rio Grande)	June 8, 2004	September 3, 2004

Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Middle Rio Grande Basin	13020102	NM-2116.A_080	Rio Brazos (Rio Chama to Chavez Creek)	temperature	TMDLs for the Upper Chama Watershed (El Vado Reservoir to Colorado border)	September 9, 2003	March 4, 2004
Middle Rio Grande Basin	13020102	NM-2116.A_041	Rio Capulin (Rio Gallina to headwaters)	E.coli	TMDL for the Rio Chama Watershed (Abiquiu Reservoir to headwaters)	July 12, 2011	August 16, 2011
Middle Rio Grande Basin	13020102	NM-2116.A_000	Rio Chama (El Vado Reservoir to Rio Brazos)	E.coli, temperature, plant nutrients	TMDL for the Rio Chama Watershed (Abiquiu Reservoir to headwaters)	July 12, 2011	August 16, 2011
Middle Rio Grande Basin	13020102	NM-2116.A_002	Rio Chama (Little Willow Creek to CO border)	E.coli, temperature	TMDL for the Rio Chama Watershed (Abiquiu Reservoir to headwaters)	July 12, 2011	August 16, 2011
Middle Rio Grande Basin	13020102	NM-2116.A_001	Rio Chama (Rio Brazos to Little Willow Creek)	temperature	TMDLs for the Upper Chama Watershed (El Vado Reservoir to Colorado border)	September 9, 2003	March 4, 2004
				E.coli, plant nutrients	TMDL for the Rio Chama Watershed (Abiquiu Reservoir to headwaters)	July 12, 2011	August 16, 2011
Middle Rio Grande Basin	13020102	NM-2116.A_110	Rio Chamita (Rio Chama to CO border)	chronic aluminum	TMDLs for the Upper Chama Watershed (El Vado Reservoir to Colorado border)	September 9, 2003	March 4, 2004
				chronic aluminum	Chronic aluminum TMDL withdrawal for Rio Chamita	March 13, 2018	April 24, 2018
Middle Rio Grande Basin	13020102	NM-2116.A_110	Rio Chamita (Rio Chama to CO border)	total ammonia, total phosphorus, fecal coliform	TMDL for the Rio Chamita from the confluence of the Rio Chama to the NM-CO border	August 10. 1999	September 30, 1999
				temperature	TMDL for Temperature on the Rio Chamita	November 9, 1999	December 17, 1999
				E.coli, plant nutrients	TMDL for the Rio Chama Watershed (Abiquiu Reservoir to headwaters)	July 12, 2011	August 16, 2011
Middle Rio Grande Basin	13020102	NM-2115_20	Rio Puerco de Chama (Abiquiu Res to Hwy 96)	E.coli, temperature	TMDL for the Rio Chama Watershed (Abiquiu Reservoir to headwaters)	July 12, 2011	August 16, 2011

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Middle Rio Grande Basin	13020102	NM-2116.A_060	Rio Nutrias (Rio Chama to headwaters)	turbidity	TMDLs for the Lower Chama Watershed (Below El Vado Reservoir to the confluence with the Rio Grande)	June 8, 2004	September 3, 2004
Middle Rio Grande Basin	13020102	NM-2113_30	Rio Tusas (Rio Vallecitos to headwaters)	plant nutrients	TMDL for the Rio Chama Watershed (Abiquiu Reservoir to headwaters)	July 12, 2011	August 16, 2011
Middle Rio Grande Basin	13020102	NM-2112.A_00	Rio Vallecitos (Rio Tusas to headwaters)	chronic aluminum, temperature, turbidity	TMDLs for the Lower Chama Watershed (Below El Vado Reservoir to the confluence with the Rio Grande)	June 8, 2004	September 3, 2004
Middle Rio Grande Basin	13020102	NM-2116.A_070	Rito de Tierra Amarilla (Rio Chama to HWY 64)	stream bottom deposits, temperature, turbidity	TMDLs for the Upper Chama Watershed (El Vado Reservoir to Colorado border)	September 9, 2003	March 4, 2004
Middle Rio Grande Basin	13020102	NM-2116.A_010	Cañones Creek (Abiquiu Reservoir to Chihuahueños Creek)	E.coli	Chama River Watershed TMDL	October 13, 2020	December 1, 2020
Middle Rio Grande Basin	13020102	NM-2116.A_022	Coyote Creek (Rio Puerco de Chama to headwaters)	sedimentation	Chama River Watershed TMDL	October 13, 2020	December 1, 2020
Middle Rio Grande Basin	13020102	NM-2112.A_03	Placer Creek (Hopewell Lake to headwaters)	temperature	Chama River Watershed TMDL	October 13, 2020	December 1, 2020
Middle Rio Grande Basin	13020102	NM-2116.A_023	Poleo Creek (Rio Puerco de Chama to headwaters)	sedimentation	Chama River Watershed TMDL	October 13, 2020	December 1, 2020
Middle Rio Grande Basin	13020102	NM-2116.A_060	Rio Nutrias (Perennial portions Rio Chama to headwaters)	E.coli	Chama River Watershed TMDL	October 13, 2020	December 1, 2020
Middle Rio Grande Basin	13020102	NM-2113_30	Rio Tusas (Perennial portions Rio Vallecitos to headwaters)	temperature	Chama River Watershed TMDL	October 13, 2020	December 1, 2020
Middle Rio Grande Basin	13020102	NM-2116.A_021	Rito Encino (Rio Puerco de Chama to headwaters)	sedimentation	Chama River Watershed TMDL	October 13, 2020	December 1, 2020
Middle Rio Grande Basin	13020102	NM-2116.A_112	Sixto Creek (Rio Chamita to CO border)	temperature	Chama River Watershed TMDL	October 13, 2020	December 1, 2020

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Middle Rio Grande Basin	13020201	NM-2118.A_12	Galisteo Creek (Perennial prt 2.2 mi abv Lamy to hdwts)	temperature	TMDL for Galisteo Creek	July 11, 2017	August 22, 2017
		NM-2118.A_10	Galisteo creek (Perennial prt Kewa bnd to 2.2 mi abv Lamy)	temperature	TMDL for Galisteo Creek	July 11, 2017	August 22, 2017
Middle Rio Grande Basin	13020201	NM-2110_00	Santa Fe River (Cochiti Pueblo bnd to Santa Fe WWTP)	chlorine, stream bottom deposits	TMDL for the Santa Fe River from the Cochiti Pueblo to the Santa Fe Wastewater Treatment Plant for Chlorine and Stream Bottom Deposits	January 11, 2000	March 20, 2000
				dissolved oxygen, pH	TMDL for the Santa Fe River for Dissolved Oxygen and pH	December 12, 2000	January 11, 2001
				E.coli	Santa Fe River E.coli TMDL	April 11, 2017	May 3, 2017
Middle Rio Grande Basin	13020201	NM-9000.A_061	Santa Fe River (Santa Fe WWTP to Guadalupe Street)	E.coli	Santa Fe River E.coli TMDL	April 11, 2017	May 3, 2017
Middle Rio Grande Basin	13020201	NM-9000.A_062	Santa Fe River (Guadalupe St to Nichols Reservoir)	E.coli	Santa Fe River E.coli TMDL	April 11, 2017	May 3, 2017
Middle Rio Grande Basin	13020101	NM-9000.A047	Sandia Canyon (Sigma Canyon to NPDES outfall 001)	dissolved copper	Sandia Canyon IR Category 4b demonstration project	September 9, 2014	November 11, 2014
Middle Rio Grande Basin	13020202	NM-2106.A_54	Clear Creek (Rio de las Vacas to San Gregio Lake)	total organic carbon, turbidity	TMDL Report for the Jemez River Watershed	December 16, 2002	June 3, 2003
Middle Rio Grande Basin	13020202	NM-2106.A_54	Clear Creek (Rio de las Vacas to San Gregio Lake)	E.coli, plant nutrients	Jemez River Watershed TMDL	September 13, 2016	September 23, 2016
Middle Rio Grande Basin	13020202	NM-2106.A_55	Clear Creek (San Gregorio Lake to headwaters)	Plant nutrients	Jemez River Watershed TMDL	September 13, 2016	September 23, 2016
Middle Rio Grande Basin	13020202	NM-2106.A_10	Jemez River (East Fork)	turbidity	TMDL Report for the Jemez River Watershed	December 16, 2002	June 3, 2003
Middle Rio Grande Basin	13020202	NM-2106.A_10	East Fork Jemez (East Fork Jemez to headwaters)	temperature	TMDL for the Jemez River Watershed (Valles Caldera National Preserve boundaries to headwaters)	August 8, 2006	October 11, 2006

Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Middle Rio Grande Basin	13020202	NM-2016.A_10	East For Jemez (VCNP to headwaters)	plant nutrients	Jemez River Watershed TMDL	September 13, 2016	September 23, 2016
Middle Rio Grande Basin	13020202	NM-2106.A_13	East Fork Jemez River (San Antonio Creek to VCNP boundary)	temperature, arsenic	TMDL for the Jemez River Watershed (from San Ysidro to headwaters excluding the waters in the Valles Caldera National Preserve)	August 11, 2009	September 15, 2009
Middle Rio Grande Basin	13020202	NM-2016.A_12	Jaramillo Creek (East Fork Jemez to headwaters)	plant nutrients	Jemez River Watershed TMDL	September 13, 2016	September 23, 2016
Middle Rio Grande Basin	13020202	NM-2106.A_00	Jemez River (HWY 4 near Jemez Springs to East Fork)	stream bottom deposits, turbidity	TMDL for Turbidity and Stream Bottom Deposits for the Jemez River and Rio Guadalupe	June 8, 2004	July 30, 2004
				chronic aluminum	TMDL Report for the Jemez River Watershed	December 16, 2002	June 3, 2003
				chronic aluminum	Aluminum TMDL revision	March 13, 2018	April 27, 2018
Middle Rio Grande Basin	13020202	NM-2105.5_10	Jemez River (Rio Guadalupe to HWY 4 nr Jemez Springs)	stream bottom deposits, turbidity	TMDL for Turbidity and Stream Bottom Deposits for the Jemez River and Rio Guadalupe	June 8, 2004	July 30, 2004
				chronic aluminum	TMDL Report for the Jemez River Watershed	December 16, 2002	June 3, 2003
Middle Rio Grande Basin	13020202	NM-2105_75	Jemez River (Zia Pueblo bnd to Jemez Pueblo bnd)	E.coli	Jemez River Watershed TMDL	September 13, 2016	September 23, 2016
Middle Rio Grande Basin	13020202	NM-2105_75	Jemez River (Zia Pueblo bnd to Jemez Pueblo bnd)	arsenic, boron	TMDL for the Jemez River Watershed (from San Ysidro to headwaters excluding the waters in the Valles Caldera National Preserve)	August 11, 2009	September 15, 2009
Middle Rio Grande Basin	13020202	NM-2105_71	Jemez River (Jemez Pueblo bnd to Rio Guadalupe)	arsenic, boron	TMDL for the Jemez River Watershed (from San Ysidro to headwaters excluding the waters in the Valles Caldera National Preserve)	August 11, 2009	September 15, 2009
Middle Rio Grande Basin	13020202	NM-2105_71	Jemez River (Jemez Pueblo bnd to Rio Guadalupe)	E.coli	Jemez River Watershed TMDL	September 13, 2016	September 23, 2016

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Middle Rio Grande Basin	13020202	NM-2105.5_10	Jemez River (Rio Guadalupe to Soda Dam nr Jemez Springs)	arsenic, boron, temperature, nutrients	TMDL for the Jemez River Watershed (from San Ysidro to headwaters excluding the waters in the Valles Caldera National Preserve)	August 11, 2009	September 15, 2009
Middle Rio Grande Basin	13020202	NM-2105.5_10	Jemez River (Rio Guadalupe to Soda Dam nr Jemez Springs)	E.coli	Jemez River Watershed TMDL	September 13, 2016	September 23, 2016
Middle Rio Grande Basin	13020202	NM-2106.A_00	Jemez River (Soda Dam nr Jemez Springs to East Fork)	E.coli	Jemez River Watershed TMDL	September 13, 2016	September 23, 2016
Middle Rio Grande Basin	13020202	NM-2106.A_00	Jemez River (Soda Dam nr Jemez Springs to East Fork)	arsenic	TMDL for the Jemez River Watershed (from San Ysidro to headwaters excluding the waters in the Valles Caldera National Preserve)	August 11, 2009	September 15, 2009
Middle Rio Grande Basin	13020202	NM-2106.A_21	Redondo Creek (Sulphur Creek to headwaters)	total phosphorus	TMDL for Total Phosphorus for Redondo Creek	October 12, 1999	December 2, 1999
				temperature, turbidity	TMDL Report for the Jemez River Watershed	December 16, 2002	June 3, 2003
Middle Rio Grande Basin	13020202	NM-2106.A_12	Jaramillo Creek (VCNP boundary to headwaters)	temperature, turbidity	TMDL for the Jemez River Watershed (Valles Caldera National Preserve boundaries to headwaters)	August 8, 2006	October 11, 2006

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Middle Rio Grande Basin	13020202	NM-2106.A_52	Rio Cebolla (Fenton Lake to headwaters)	stream bottom deposits, temperature	TMDL Report for the Jemez River Watershed	December 16, 2002	June 3, 2003
Middle Rio Grande Basin	13020202	NM-2106.A_50	Rio Cebolla (Rio de las Vacas to Fenton Lake)	stream bottom deposits	TMDL Report for the Jemez River Watershed	December 16, 2002	June 3, 2003
Middle Rio Grande Basin	13020202	NM-2106.A_40	Rio de las Vacas (Rio Cebolla to Clear Creek)	nutrients	TMDL for the Jemez River Watershed (from San Ysidro to headwaters excluding the waters in the Valles Caldera National Preserve)	August 11, 2009	September 15, 2009
Middle Rio Grande Basin	13020202	NM-2106.A_40	Rio de las Vacas (Rio Cebolla to Rito de las Palomas)	temperature, total organic carbon	TMDL Report for the Jemez River Watershed	December 16, 2002	June 3, 2003
Middle Rio Grande Basin	13020202	NM-2106.A_30	Rio Guadalupe (Jemez River to confl with Rio Cebolla)	Plant nutrients	Jemez River Watershed TMDL	September 13, 2016	September 23, 2016
Middle Rio Grande Basin	13020202	NM-2106.A_30	Rio Guadalupe (Jemez River to confl with Rio Cebolla)	chronic aluminum	TMDL Report for the Jemez River Watershed	December 16, 2002	June 3, 2003
				stream bottom deposits, turbidity	TMDL for Turbidity and Stream Bottom Deposits for the Jemez River and the Rio Guadalupe	June 8, 2004	July 30, 2004
				temperature	TMDL for the Jemez River Watershed (from San Ysidro to headwaters excluding the waters in the Valles Caldera National Preserve)	August 11, 2009	September 15, 2009
Middle Rio Grande Basin	13020202	NM-2106.A_43	Rito de las Palomas (Rio de las Vacas to headwaters)	temperature, sedimentation	TMDL for the Jemez River Watershed (from San Ysidro to headwaters excluding the waters in the Valles Caldera National Preserve)	August 11, 2009	September 15, 2009
Middle Rio	13020202	NM-2106.A_42	Rito Penas Negras (Rio de las	stream bottom deposits,	TMDL Report for the Jemez	December 16, 2002	June 3, 2003

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Grande Basin			Vacas to headwaters)	temperature, total	River Watershed		
				nutrients	TMDL for the Jemez River Watershed (from San Ysidro to headwaters excluding the waters in the Valles Caldera National Preserve)	August 11, 2009	September 15, 2009

Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Middle Rio Grande Basin	13020202	NM-2106.A_20	San Antonio Creek (East Fork Jemez River to headwaters)	temperature, turbidity	TMDL Report for the Jemez River Watershed	December 16, 2002	June 3, 2003
Middle Rio Grande Basin	13020202	NM-2106.A_20	San Antonio Creek (East Fork Jemez to VCNP bnd)	arsenic	TMDL for the Jemez River Watershed (from San Ysidro to headwaters excluding the waters in the Valles Caldera National Preserve)	August 11, 2009	September 15, 2009
Middle Rio Grande Basin	13020202	NM-2106.A_22	Sulphur Creek (Redondo Creek to headwaters)	conductivity, pH	TMDL Report for the Jemez River Watershed	December 16, 2002	June 3, 2003
Middle Rio Grande Basin	13020204	NM-2107.A_46	La Jara Creek (perennial reaches above Arroyo San Jose)	chronic aluminum	TMDL for the Rio Puerco Watershed-Part Two	August 14, 2007	September 21, 2007
Middle Rio Grande Basin	13020204	NM-2107.A_46	La Jara Creek (perennial reaches above Arroyo San Jose)	Total aluminum	Upper Rio Puerco TMDL	May 10, 2016	June 16, 2016
Middle Rio Grande Basin	13020203	NM-2105.1_00	Rio Grande (non-Pueblo Alameda to Angostura Diversion)	E. coli	TMDL for the Middle Rio Grande Watershed	April 13, 2010	June 30, 2010
Middle Rio Grande Basin	13020203	NM-2105.1_00	Rio Grande (Alameda Bridge to Santa Ana Pueblo bnd)	fecal coliform	Middle Rio Grande TMDL for Fecal Coliform	November 13, 2001	May 3, 2002
Middle Rio Grande Basin	13020203	NM-2105_50	Rio Grande (Isleta Pueblo boundary to Alameda bridge)	E. coli	TMDL for the Middle Rio Grande Watershed	April 13, 2010	June 30, 2010
				fecal coliform	Middle Rio Grande TMDL for Fecal Coliform	November 13, 2001	May 3, 2002
Middle Rio Grande Basin	13020203	NM-2105_40	Rio Grande (Rio Puerco to Isleta Pueblo boundary)	E. coli	TMDL for the Middle Rio Grande Watershed	April 13, 2010	June 30, 2010

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Middle Rio Grande Basin	13020203	NM-2105_10 NM-2105_11	Rio Grande (San Marcial at USGS gage to Rio Puerco)	aluminum, E. coli	TMDL for the Middle Rio Grande Watershed	April 13, 2010	June 30, 2010
				aluminum	Aluminum TMDL revision	March 13, 2018	April 27, 2018
Middle Rio Grande Basin	13020203	NM-9000.A_001	Tijeras Arroyo (Four Hills Bridge to Headwaters)	plant nutrients	Tijeras Arroyo Nutrients TMDL	September 12, 2017	October 12, 2017
Middle Rio Grande Basin	13020204	NM-2107.A_40	Rio Puerco (Arroyo Chijuilla to Northern Boundary Cuba)	sedimentation	TMDL for the Rio Puerco Watershed-Part One	November 14, 2006	August 10, 2007
				chronic aluminum, nutrients	TMDL for the Rio Puerco Watershed-Part Two	August 14, 2007	September 21, 2007
				chronic aluminum	Chronic aluminum TMDL withdrawal for Rio Puerco	March 13, 2018	April 24, 2018
Middle Rio Grande Basin	13020204	NM-2107.A_42	Nacimiento Creek (Perennial part Hwy 126 to San Gregorio Reservoir)	Turbidity, Total aluminum, uranium	Upper Rio Puerco TMDL	May 10, 2016	June 16, 2016
Middle Rio Grande Basin	13020204	NM-2107.A_44	Rio Puerco (Perennial part northern bnd Cuba to headwaters)	Sedimentation	Upper Rio Puerco TMDL	May 10, 2016	June 16, 2016
Middle Rio Grande Basin	13020207	NM-2107.A_01	Bluewater Creek (Bluewater Reservoir to headwaters)	temperature, nutrients	TMDL for the Rio Puerco Watershed-Part Two	August 14, 2007	September 21, 2007
Middle Rio Grande Basin	13020207	NM-2107.A_00	Bluewater Creek (non-tribal Rio San Jose to Bluewater Rsrv)	temperature, nutrients	TMDL for the Rio Puerco Watershed-Part Two	August 14, 2007	September 21, 2007
Middle Rio Grande Basin	13020207	NM-2107.A_10	Río Moquino (Laguna Pueblo to Seboyettia Creek)	temperature, nutrients	TMDL for the Rio Puerco Watershed-Part Two	August 14, 2007	September 21, 2007
Upper Rio Grande Basin	13020101	NM-98.A_002	Apache Canyon (Rio Fernando de Taos to headwaters)	E.coli	TMDL for the Upper Rio Grande Watershed	August 14, 2012	September 13, 2012
Upper Rio Grande Basin	13020101	NM-2120.A_705	Bitter Creek (Red River to headwaters)	stream bottom deposits, acute aluminum	TMDL for the Red River Watershed (Rio Grande River to headwaters)	January 10, 2006	March 17, 2006
Upper Rio Grande Basin	13020101	NM-2120.A_827	Comanche Creek (Costilla Creek to Little Costilla Creek)	temperature	TMDL for the Upper Rio Grande Watershed Part 1 (Pilar, NM to CO border)	November 9, 2004	December 17, 2004
Upper Rio Grande Basin	13020101	NM-2120.A_823	Cordova Creek (Costilla Creek to headwaters)	stream bottom deposits, total phosphorus, turbidity	TMDL for Turbidity, Stream Bottom Deposits, and Total Phosphorus for Cordova Creek	November 9, 1999	December 17, 1999

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Appendix B - Water Quality Management Plan and Continuing Planning Process

Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval

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Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Upper Rio Grande Basin	13020101	NM-2120.A_820	Costilla Creek (diversion above Costilla to Comanche Creek)	temperature	TMDL for the Upper Rio Grande Watershed Part 1 (Pilar, NM to CO border)	November 9, 2004	December 17, 2004
Upper Rio Grande Basin	13020101	NM-2118.A_34	Embudo Creek (Rio Grande to Canada de Ojo Sarco)	stream bottom deposits, turbidity	TMDL for the Upper Rio Grande Watershed Part 2 (Cochiti Reservoir to Pilar, NM)	April 12, 2005	June 2, 2005
Upper Rio Grande Basin	13020101	NM-2120.A_835	Gold Creek (Comanche Creek to headwaters)	temperature	TMDL for the Waters of the Valle Vidal	September 30, 2011	November 8, 2011
Upper Rio Grande Basin	13020101	NM-2120.A_837	Holman Creek (Comanche Creek to headwaters)	temperature	TMDL for the Waters of the Valle Vidal	September 30, 2011	November 8, 2011
Upper Rio Grande Basin	13020101	NM-2120.A_839	LaBelle Creek (Comanche Creek to headwaters)	temperature	TMDL for the Waters of the Valle Vidal	September 30, 2011	November 8, 2011
Upper Rio Grande Basin	13020101	NM-2118.A_34	Little Tesuque (Rio Tesuque to headwaters)	chronic aluminum	TMDL for the Upper Rio Grande Watershed Part 2 (Cochiti Reservoir to Pilar, NM)	April 12, 2005	June 2, 2005
Upper Rio Grande Basin	13020101	NM-2120.A_706	Placer Creek (Red River to headwaters)	acute aluminum	TMDL for the Red River Watershed (Rio Grande River to headwaters)	January 10, 2006	March 17, 2006
Upper Rio Grande Basin	13020101	NM-2119_10	Red River (Rio Grande to Placer Creek)	acute aluminum	TMDL for the Red River Watershed (Rio Grande River to headwaters)	January 10, 2006	March 17, 2006

Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Upper Rio Grande Basin	13010005	NM-2120.A_900	Rio de los Pinos (Colorado border to headwaters)	temperature	TMDL for the Upper Rio Grande Watershed Part 1 (Pilar, NM to CO border)	November 9, 2004	December 17, 2004
Upper Rio Grande Basin	13020101	NM-2120.A_512	Rio Fernando de Taos (Rio Pueblo de Taos to headwaters)	specific conductance, temperature	TMDL for the Upper Rio Grande Watershed Part 1 (Pilar, NM to CO border)	November 9, 2004	December 17, 2004
Upper Rio Grande Basin	13020101	NM-98.A_001	Rio Fernando de Taos (Tienditas Creek to headwaters)	E.coli	TMDL for the Upper Rio Grande Watershed	August 14, 2012	September 13, 2012
Upper Rio Grande Basin	13020101	NM-2120.A_512	Rio Fernando de Taos (Rio Pueblo de Taos to USFS bnd at Canyon)	E.coli	TMDL for the Upper Rio Grande Watershed	August 14, 2012	September 13, 2012
Upper Rio Grande Basin	13020101	NM-2120.A_513	Rio Fernando de Taos (USFS bnd at Canyon to Tienditas Creek)	E.coli	TMDL for the Upper Rio Grande Watershed	August 14, 2012	September 13, 2012
Upper Rio Grande Basin	13020101	NM-2111_12	Rio Grande (non-pueblo Santa Clara to Embudo Creek)	turbidity	TMDL for the Upper Rio Grande Watershed Part 2 (Cochiti Reservoir to Pilar, NM)	April 12, 2005	June 2, 2005
Upper Rio Grande Basin	13020101	NM-2119_05	Rio Grande (Red River to NM-CO border)	temperature	TMDL for the Upper Rio Grande Watershed Part 1 (Pilar, NM to CO border)	November 9, 2004	December 17, 2004
Upper Rio Grande Basin	13020101	NM-2120.A_501	Rio Grande del Rancho (Rio Pueblo de Taos to Hwy 518)	specific conductance	TMDL for the Upper Rio Grande Watershed Part 1 (Pilar, NM to CO border)	November 9, 2004	December 17, 2004
Upper Rio Grande Basin	13020101	NM-2120.A_600	Rio Hondo (Rio Grande to USFS boundary)	temperature	TMDL for the Upper Rio Grande Watershed Part 1 (Pilar, NM to CO border)	November 9, 2004	December 17, 2004

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Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Upper Rio Grande Basin	13020101	NM-2120.A_602	Rio Hondo (South Fork of Rio Hondo to Lake Fork Creek)	total phosphorus, Total Nitrogen	TMDL for the Rio Hondo (South Fork of Rio Hondo to Lake Fork Creek)	June 14, 2005	September 14, 2005
Upper Rio Grande Basin	13020101	NM-2119_30	Rio Pueblo de Taos (Arroyo del Alamo to Rio Grande del Rancho)	stream bottom deposits, temperature	TMDL for the Upper Rio Grande Watershed Part 1 (Pilar, NM to CO border)	November 9, 2004	December 17, 2004
Upper Rio Grande Basin	13020101	NM-2120.A_511	Rio Pueblo de Taos (Rio Grande del Rancho to Taos Pueblo boundary)	temperature	TMDL for the Upper Rio Grande Watershed Part 1 (Pilar, NM to CO border)	November 9, 2004	December 17, 2004
Upper Rio Grande Basin	13020101	NM-2120.A_511	Rio Pueblo de Taos (Rio Grande del Rancho to Taos Pueblo boundary)	E.coli	TMDL for the Upper Rio Grande Watershed	August 14, 2012	September 13, 2012
Upper Rio Grande Basin	13020101	NM-2119_20	Rio Pueblo de Taos (Rio Grande to Arroyo del Alamo)	temperature	TMDL for the Upper Rio Grande Watershed Part 1 (Pilar, NM to CO border)	November 9, 2004	December 17, 2004
Upper Rio Grande Basin	13020101	NM-2118.A_52	Rio Quemado (Santa Cruz River to Rio Arriba County bnd)	E.coli	TMDL for the Upper Rio Grande Watershed	August 14, 2012	September 13, 2012
Upper Rio Grande Basin	13010005	NM-2120.A_901	Rio San Antonio (Montoya Canyon to headwaters)	temperature	TMDL for the Upper Rio Grande Watershed Part 1 (Pilar, NM to CO border)	November 9, 2004	December 17, 2004
Upper Rio Grande Basin	13010005	NM-2120.A_901	Rio San Antonio (Montoya Canyon to headwaters)	E.coli	TMDL for the Upper Rio Grande Watershed	August 14, 2012	September 13, 2012

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Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Upper Rio Grande Basin	13020101	NM-2120.A_419	Rio Santa Barbara (Picuris Pueblo boundary to USFS boundary)	turbidity	TMDL for the Upper Rio Grande Watershed Part 2 (Cochiti Reservoir to Pilar, NM)	April 12, 2005	June 2, 2005
Upper Rio Grande Basin	13020101	NM-2120.A_419	Rio Santa Barbara (non-Pueblo Embudo Creek to USFS bnd)	E.coli	TMDL for the Upper Rio Grande Watershed	August 14, 2012	September 13, 2012
Upper Rio Grande Basin	13020101	NM-2111_50	Santa Cruz River (Santa Clara Pueblo bnd to Santa Cruz Dam)	E.coli	TMDL for the Upper Rio Grande Watershed	August 14, 2012	September 13, 2012
Pecos River Basin	13050003	NM-2801_10	Nogal Creek (Tularosa Creek to Mescalero Apache boundary)	E.coli	TMDL for the Sacramento Mountains (Rio Hondo, Tularosa and Rio Peñasco Watersheds)	August 11, 2015	September 21, 2015
Pecos River Basin	13060001	NM-2214.A_091	Bull Creek (Cow Creek to headwaters)	temperature	TMDL for the Pecos Headwaters Watershed (Ft. Sumner Reservoir to headwaters)	August 9, 2005	September 13, 2005
Pecos River Basin	13060001	NM-2214.A_102	Cow Creek (Bull Creek to headwaters)	temperature, turbidity	TMDL for the Pecos Headwaters Watershed (Ft. Sumner Reservoir to headwaters)	August 9, 2005	September 13, 2005
Pecos River Basin	13060001	NM-2214.A_090	Cow Creek (Pecos River to Bull Creek)	temperature, turbidity	TMDL for the Pecos Headwaters Watershed (Ft. Sumner Reservoir to headwaters)	August 9, 2005	September 13, 2005
Pecos River Basin	13060001	NM-2214.A_070	Dalton Canyon Creek (Pecos River to headwaters)	specific conductance	TMDL for the Upper Pecos River Watershed	September 10, 2013	September 25, 2013

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Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Pecos River Basin	13060001	NM-2212_12	Falls Creek (Tecolote Creek to headwaters)	specific conductance	TMDL for the Upper Pecos River Watershed	September 10, 2013	September 25, 2013

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Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Pecos River Basin	13060001	NM-2212_00	Gallinas River (Las Vegas diversion to headwaters)	temperature	TMDL for the Pecos Headwaters Watershed (Ft. Sumner Reservoir to headwaters)	August 9, 2005	September 13, 2005
Pecos River Basin	13060001	NM-2214.A_071	Macho Canyon Creek (Pecos River to headwaters)	specific conductance	TMDL for the Upper Pecos River Watershed	September 10, 2013	September 25, 2013
Pecos River Basin	13060001	NM-2213_22	Pecos Arroyo (Gallinas River to headwaters)	E.coli	TMDL for the Upper Pecos River Watershed	September 10, 2013	September 25, 2013
Pecos River Basin	13060001	NM-2214.A_002	Pecos River (Alamitos Canyon to Willow Creek)	turbidity	TMDL for the Pecos Headwaters Watershed (Ft. Sumner Reservoir to headwaters)	August 9, 2005	September 13, 2005
Pecos River Basin	13060001	NM-2214.A_003	Pecos River (Canon de Manzanita to Alamitos Canyon)	temperature, turbidity	TMDL for the Pecos Headwaters Watershed (Ft. Sumner Reservoir to headwaters)	August 9, 2005	September 13, 2005
Pecos River Basin	13060001	NM-2211.A_10	Pecos River (Santa Rosa Reservoir to Tecolote Creek)	E.coli	TMDL for the Upper Pecos River Watershed	September 10, 2013	September 25, 2013
Pecos River Basin	13060001	NM-9000.A_050	El Rito (Pecos River to headwaters)	E.coli	TMDL for the Upper Pecos River Watershed	September 10, 2013	September 25, 2013

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Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Pecos River Basin	13060001	NM-2114.A_030	Willow Creek (Pecos River to headwaters)	specific conductance	TMDL for the Upper Pecos River Watershed	September 10, 2013	September 25, 2013
Pecos River Basin	13060008	NM-2209.A_22	Carrizo Creek (Rio Ruidoso to Mescalero Apache boundary)	bacteria	TMDL for the Rio Hondo Watershed (Lincoln County) (Pecos River to Headwaters)	January 10, 2006	February 10, 2006
Pecos River Basin	13060008	NM-2209.A_22	Carrizo Creek (Rio Ruidoso to Mescalero Apache boundary)	E.coli	TMDL for the Sacramento Mountains (Rio Hondo, Tularosa and Rio Peñasco Watersheds)	August 11, 2015	September 21, 2015
Pecos River Basin	13060008	NM-2209.A_10	Rio Bonito (Angus Canyon to headwaters)	bacteria	TMDL for the Rio Hondo Watershed (Lincoln County) (Pecos River to Headwaters)	January 10, 2006	February 10, 2006
Pecos River Basin	13060008	NM-2209.A_10	Rio Bonito (NM 48 near Angus to headwaters	E.coli	TMDL for the Sacramento Mountains (Rio Hondo, Tularosa and Rio Peñasco	August 11, 2015	September 21, 2015
Pecos River Basin	13060008	NM-2208_30	Rio Hondo (Perennial Reaches Pecos to headwaters)	bacteria	TMDL for the Rio Hondo Watershed (Lincoln County) (Pecos River to Headwaters)	January 10, 2006	February 10, 2006
Pecos River Basin	13060008	NM-2208_20	Rio Ruidoso (Rio Bonito to US Highway 70)	total nitrogen, total phosphorus (plant nutrients)	TMDL for the Rio Hondo Watershed (Lincoln County) (Pecos River to Headwaters)	January 10, 2006 November 15, 2016 (update)	February 10, 2006 December 13, 2016 (update)

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Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Pecos River Basin	13060008	NM-2208_20	Rio Ruidoso (Eagle Creek to US Hwy 70 bridge)	E.coli, turbidity	TMDL for the Sacramento Mountains (Rio Hondo, Tularosa and Rio Peñasco Watersheds)	August 11, 2015	September 21, 2015
Pecos River Basin	13060008	NM-2209.A_20	Rio Ruidoso (US Highway 70 Mescalero Apache boundary)	temperature, turbidity	TMDL for the Rio Hondo Watershed (Lincoln County) (Pecos River to Headwaters)	January 10, 2006	February 10, 2006
Pecos River Basin	13060008	NM-2209.A_20	Rio Ruidoso (Carrizo Creek to Mescalero Apache boundary)	plant nutrients	Rio Ruidoso TMDL	November 15, 2016	December 13, 2016
Pecos River Basin	13060008	NM-2209.A_21	Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	E.coli	TMDL for the Sacramento Mountains (Rio Hondo, Tularosa and Rio Peñasco Watersheds)	August 11, 2015	September 21, 2015
Pecos River Basin	13060008	NM-2209.A_21	Rio Ruidoso (US Hwy 70 bridge to Carrizo Creek)	plant nutrients	Rio Ruidoso TMDL	November 15, 2016	December 13, 2016
Pecos River Basin	13060010	NM-2208_01	Agua Chiquita (Perennial portions McEwan Canyon to headwaters)	Turbidity	TMDL for the Sacramento Mountains (Rio Hondo, Tularosa and Rio Peñasco Watersheds)	August 11, 2015	September 21, 2015
Pecos River Basin	13060010	NM-2208_00	Rio Penasco (Highway 24 to Cox Canyon)	Turbidity	TMDL for the Sacramento Mountains (Rio Hondo, Tularosa and Rio Peñasco Watersheds)	August 11, 2015	September 21, 2015
Pecos River Basin	13060011	NM-2201_00	Pecos River (TX border to Black River)	E.coli	Lower Pecos Watershed TMDL	September 13, 2016	September 23, 2016
Pecos River Basin	13060011	NM-2202.A_00	Pecos River (Black river to Six Mile Dam Lake)	E.coli	Lower Pecos Watershed TMDL	September 13, 2016	September 23, 2016

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Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
Pecos River Basin	13060011	NM-2212_10	Tecolote Creek (I-25 to Blue Creek)	temperature	Tecolote Creek TMDL	August 15, 2018	September 13, 2018

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Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
San Juan River Basin	14080104	NM-2403.A_00	Animas River (San Juan River to Estes Arroyo)	fecal coliform	TMDL for the San Juan River Watershed Part One (Navajo Nation Boundary at the Hogbackk to Navajo Dam)	June 14, 2005	August 26, 2005
				total nitrogen, total phosphorus	TMDL for the San Juan River Watershed Part Two (Navajo Nation Boundary at the Hogbackk to Navajo Dam)	December 13, 2005	January 17, 2006
San Juan River Basin	14080104	NM-2403.A_00	Animas River (San Juan River to Estes Arroyo)	E.coli, temperature	TMDL for the Animas River Watershed	September 10, 2013	September 30, 2013
San Juan River Basin	14080104	NM-2404_00	Animas River (Estes Arroyo to Southern Ute Indian Tribe bnd)	E.coli, total phosphorus	TMDL for the Animas River Watershed	September 10, 2013	September 30, 2013
San Juan River Basin	14080101	NM-9000.A_060	Gallegos Canyon (San Juan to Navajo Boundary)	selenium	TMDL for the San Juan River Watershed Part One (Navajo Nation Boundary at the Hogbackk to Navajo Dam)	June 14, 2005	August 26, 2005
San Juan River Basin	14080105	NM-2402.A_01	La Plata River (McDermott Arroyo to Colorado Border)	fecal coliform	TMDL for the San Juan River Watershed Part One (Navajo Nation Boundary at the Hogbackk to Navajo Dam)	June 14, 2005	August 26, 2005
				dissolved oxygen	TMDL for the San Juan River Watershed Part Two (Navajo Nation Boundary at the Hogbackk to Navajo Dam)	December 13, 2005	January 17, 2006
San Juan River Basin	14080105	NM-2403.A_00	La Plata River (San Juan River to McDermott Arroyo)	fecal coliform, stream bottom deposits	TMDL for the San Juan River Watershed Part One (Navajo Nation Boundary at the Hogback to Navajo Dam)	June 14, 2005	August 26, 2005

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Watershed	HUC	AU_ID	Waterbody	TMDL Paramenter	Document Name	WQCC Approval	EPA Approval
San Juan River Basin	14080105	NM-2401_10	San Juan River (Navajo Boundary at Hogback to Animas River)	fecal coliform	TMDL for the San Juan River Watershed Part One (Navajo Nation Boundary at the Hogback to Navajo Dam)	June 14, 2005	August 26, 2005
San Juan River Basin	14080101	NM-2401_00	San Juan River (Animas River to Canon Largo)	fecal coliform, stream bottom deposits	TMDL for the San Juan River Watershed Part One (Navajo Nation Boundary at the Hogbackk to Navajo Dam)	June 14, 2005	August 26, 2005

State of New Mexico
Water Quality Management Plan
& Continuing Planning Process

Appendix C

Hydrology Protocol

for the

Determination of Uses Supported by
Ephemeral, Intermittent, and Perennial Waters

Originally Approved May 2011
Approved Revision October 23, 2020

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EXECUTIVE SUMMARY

The *Hydrology Protocol* provides a methodology for distinguishing among ephemeral, intermittent and perennial streams and rivers in New Mexico. The results of the *Hydrology Protocol* may also aid in the designation of appropriate designated uses supported by those waterbodies as a result of flow regime. New Mexico's water quality standards (*Standards for Interstate and Intrastate Surface Waters*, 20.6.4 NMAC) set distinct protections for unclassified ephemeral, intermittent and perennial waters (*see* 20.6.4.97 to 99 NMAC) and also identify many classified waters by their hydrology, e.g. "perennial tributaries to" or "perennial reaches of" (*see* 20.6.4.101 to 899 NMAC). Hydrological determinations are key to assuring that the appropriate designated uses and water quality criteria are applied to a particular waterbody.

The *Hydrology Protocol* was specifically developed to generate documentation of the aquatic life and recreation uses supported by the hydrology of a given stream or river. This information can then be used to provide technical support for a Use Attainability Analysis (UAA). Under particular circumstances, the use of the *Hydrology Protocol* can be used for the expedited UAA process (20.6.4.15(C) NMAC), which facilitates the efficient application of the limited aquatic life and secondary contact uses to ephemeral waters, where appropriate, prior to undergoing the full administrative rule-making process. However, the *Hydrology Protocol* cannot be used in place of the UAA.

SWQB or any other party may conduct a *Hydrology Protocol* survey as part of a UAA in accordance with UAA requirements found under 40 CFR 131.10, 20.6.4.15 NMAC and the State's approved Water Quality Management Plan/Continuing Planning Process (WQMP/CPP), therefore the user/evaluator may be a member of SWQB, another regulatory agency, a contractor, or a member of the public.

The information gained from the protocol can also be used to identify unclassified waters within an otherwise classified standards segment. The details of these specific applications are described in Section II of *New Mexico's Water Quality Management Plan and Continuing Planning Process*, to which this *Hydrology Protocol* is an appendix. Other applications where a determination of stream hydrology is necessary are possible but results of the *Hydrology Protocol* must be evaluated cautiously within the specific decision framework of the study.

The protocol relies on hydrological, geomorphic and biological indicators related to the persistence of water and is organized into two levels of evaluations: Level 1 and Level 2. Data gathered during the Level 1 Evaluation should, in most cases, provide enough information to give a clear indication of the hydrological status of the stream. The "*Hydrology Determination Field Sheets,*" a.k.a. "*Field Sheets,*" was developed to record the information collected through application of the *Hydrology Protocol* and may be used to support the UAA process. The Level 1 Evaluation Field Sheets provide some of the necessary information needed in a Use Attainability Analysis to demonstrate a stream is ephemeral, intermittent or perennial. Attainment of a specific Clean Water Act Section 101(a)(2) aquatic life and recreational use may not be feasible due to the factor identified in 40 CFR 131.10(g)(2): *natural, ephemeral, intermittent, or low flow conditions or water levels prevent the attainment of the use*. The data obtained through a Hydrology Protocol survey provides some of the information that would be necessary to demonstrate that attainment is not achievable but, is only one of the elements required under a UAA to demonstrate the evidence to support changing a designated use.

In certain instances, additional data and supporting information are necessary to determine the hydrological condition of the stream. The methods described as part of the Level 2 Evaluation may be conducted if the Level 1 Evaluation is inconclusive (i.e. the score falls within a gray zone, see Section 2, Table 5). The Level 2 Evaluation relies on more intense and focused data collection efforts and provides the evaluator with additional data and observations to make a final hydrological determination. The Level 2 Evaluation may be used for either an expedited or regular UAA as documentation to support the proper standards classification of a given stream.

Regardless of whether a Level 1 or Level 2 Evaluation is performed, the SWQB encourages the evaluator to gather as much information as possible to make an accurate assessment of the stream. Recommendations are provided in the protocol, but other data not included in these recommendations may be gathered as well.

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I. INTRODUCTION

Streams are drainage features that may exhibit ephemeral, intermittent or perennial characteristics or change from ephemeral to intermittent and intermittent to perennial along a gradient or continuum—sometimes with no single distinct point demarcating these transitions. Nevertheless, all stream systems are characterized by interactions among hydrological, biological, and geomorphic (physical) processes. According to Maidment (1993), *Streamflow* can be described as flowing surface water along a defined natural channel generated by a combination of:

- *Stormflow* – streamflow resulting from the relatively rapid runoff of precipitation from the land as interflow (rapid, unsaturated, subsurface flow), overland flow, or saturated flow from raised, near surface water tables close to the stream.
- *Baseflow* – return flow from sustained groundwater discharge into the channel.
- Contributions of discharge from upstream tributaries as stormflow or baseflow.
- Contributions of discharge from point source dischargers and irrigation return flows.

The *Hydrology Protocol* uses attributes of hydrological, biological and geomorphic processes to produce a quantitative score. The score is then used to characterize the stream as "ephemeral," "intermittent," or "perennial". The term "stream", as it pertains to the *Hydrology Protocol*, refers to a wadable, lotic water body (typically 1st, 2nd, or 3rd Strahler stream order) and the term "river" refers to a non-wadable, lotic water body (generally 4th Strahler stream order or higher). Throughout this document the terms are interchangeable with one another as the same process and procedures are used regardless of whether the channel is wadable or not.

II. DEFINITIONS

The *Hydrology Protocol* is based on the definitions of "ephemeral," "intermittent" and "perennial" adopted by the WQCC in 20.6.4.7 NMAC as follows:

> ***"Ephemeral"*** *when used to describe a surface water of the state means the water body contains water briefly only in direct response to precipitation; its bed is always above the water table of the adjacent region.*
>
> ***"Intermittent"*** *when used to describe a surface water of the state means the water body contains water for extended periods only at certain times of the year, such as when it receives seasonal flow from springs or melting snow.*
>
> ***"Perennial"*** *when used to describe a surface water of the state means the water body typically contains water throughout the year and rarely experiences dry periods.*

III. HYDROLOGY DETERMINATION AND RATING FORM

A. General Information

There are two levels of evaluation for the *Hydrology Protocol* (HP). Data gathered during the Level 1 Evaluation should, in most cases, provide enough information to give a clear indication of the hydrological status of the stream. However, a more in-depth Level 2 Evaluation may be used to gather more information and data for more complex borderline cases. The *Field Sheets* are used to record the information and data collected through application of the HP.

For waterbodies where an HP is being conducted with the intent to remove a designated use that is not an existing use, as defined under 40 CFR 131.3 and 20.6.4.7(E)(3) NMAC, a UAA must be prepared. Third-party UAAs conducted in accordance with 20.6.4.15(D) NMAC, must have a workplan, approved by the Department, prior to conducting an HP UAA.

Although the HP is used as supporting evidence in a UAA, it is beyond the scope of this document to provide guidance on preparing a UAA.

B. User/Evaluator Experience

In order to distinguish ephemeral streams and rivers from non-ephemeral ones or intermittent streams and rivers from perennial ones using the information presented in this protocol, the evaluator should have experience making geomorphic, hydrological, and biological observations in New Mexico or in the semi-arid climate of the southwestern U.S.

The *Hydrology Protocol* was designed to provide the necessary supporting documentation for a UAA based on natural hydrologic flow conditions. In accordance with 20.6.4.15 NMAC, NMED or any other party may conduct a UAA, therefore the User/Evaluator for the *Hydrology Protocol* may be a member of NMED, another regulatory agency, a contractor, and/or a member of the public. It should be noted that only the Department can submit an expedited UAA using the *Hydrology Protocol* for EPA's technical review and approval, as described under 20.6.4.15(C) NMAC.

C. Drought Conditions

Spatial and temporal variations in stream attributes occur in stream systems. These variations can affect persistence and volume of streamflow. The changes to the system's flow regime can be related to seasonal precipitation and evapotranspiration patterns, as well as influenced by recent weather and interannual climate variability.

Local drought and weather data should be reviewed prior to evaluating flow conditions in the field. Perennial streams will have water in their channels year-round in the absence of drought conditions. Therefore, it is *strongly* recommended that field evaluations be conducted outside of drought conditions whenever possible.

Drought conditions, for the purposes of this *Hydrology Protocol*, are defined as any time the Standardized Precipitation Index (SPI) is less than -1.5, indicating severely to extremely dry conditions as described by the National Drought Mitigation Center (NDMC 1995). The 12-month SPI will be used to determine drought conditions and noted on the *Field Sheets*. The 12-month SPI should be verified through other sources such as the Standardized Precipitation Evapotranspiration Index (Beguería, et al. 2014) or the United States Drought Monitor to ensure that extreme or exceptional drought conditions are not indicated for the survey location.

The 12-month SPI was chosen for use in the *Hydrology Protocol* because SPIs of this time-scale can be linked to groundwater-surface water fluctuations and reservoir storage, it can provide an early warning of drought, and it can help assess drought severity. The SPI calculation for any location in New Mexico is based on 10 climate regions of New Mexico and long-term precipitation records (both rainfall and snowpack), and has available archived maps dating back to 1996. The 12-month SPI value for a particular stream is included as another piece of evidence to be evaluated before making a final stream determination. If the evaluator believes that extreme conditions such as severe drought or abnormal precipitation are influencing the overall rating, he may want to postpone a final decision until another evaluation can take place during more normal conditions.

D. Recent Rainfall Activity

Recent (generally considered to be within 48 hours) rainfall or snowmelt can also influence scoring; therefore, it is *strongly* recommended that field evaluations be conducted at least 48 hours after the last known major rainfall or snowmelt. Field observations regarding the presence or absence of recent high flows should be made and documented on the *Field Sheets* to supplement any available local rain gauge data and to determine if field observations were made at least 48 hours following a precipitation or runoff event. To reduce this source of variability, the Level 1 Field Evaluation should occur during stable baseflow conditions which will vary by region and elevation of the sample reach but are typically between late May and mid-July (to avoid snowmelt) or mid-September and early November (to avoid monsoons). The protocol and scoring mechanism were designed with redundancy (i.e. multiple indicators) to allow for defensible scoring even within 48 hours after a recent rainfall or during drought conditions. Nevertheless, performing field evaluations during or after severe conditions, such as floods or drought, is not optimal nor is it recommended.

E. Scoring

The *Field Sheets* are used to record the score for each attribute and determine the total numeric score for the sample reach under investigation. The *Field Sheets* specifically request information regarding: date, project, evaluator, site, Assessment Unit (AU), 12-month SPI value, latitude/longitude, as well as any other pertinent observations (such as indications of recent rain events). Additional notes for the Field Sheets should include the most recent precipitation date and amount from the closest rain gage, if available, and evidence of any anthropogenic influences and modifications. The *Field Sheets* are an official record, so all pertinent observations should be recorded on it.

In order to assess the natural variability encountered when making hydrological determinations in the field, a four-tiered, weighted scale was developed for evaluating and scoring each hydrological attribute. The scores that are applied to sets of geomorphic, hydrological and biological attributes are: poor, weak, moderate, and strong. *Moderate* scores are intended as an approximate qualitative midpoint between the two extremes of *Poor* and *Strong*. The score ranges were developed to better assess the often gradual and variable transitions of streams from ephemeral to non-ephemeral. The remaining qualitative description of *Weak* represents gradations that will often be observed in the field. Definitions of poor, weak, moderate and strong are provided in **Table 1**. These definitions are intended as guidelines and the evaluator must select the most appropriate category based upon experience and observations of the sample reach under review, its watershed, and physiographic region.

The quantitative score given to each attribute reflects the evaluator's qualitative assessment of the characteristic along the sample reach. These category range within each of the characteristics allows the evaluator flexibility in assessing variable features or attributes. In addition, the incremental category gradients reduce the variability of range in scores between different evaluators. There may be circumstances where intermediary scores between the categories presented for each indicator are appropriate. In those cases, document the rationale for the intermediary score on the *Field Sheets*.

Table 1. Guide to Scoring Categories

Category	Description
Strong	The characteristic* is easily observable (i.e. observed within less than one minute of searching).
Moderate	The characteristic is present and observable with minimal (i.e. one or two minutes) searching.
Weak	The characteristic is present, but you have to search intensely (i.e., ten or more minutes) to find it.
Poor	The characteristic is not observed.

*****geomorphic, hydrological or biological

F. Level 1 Evaluation: Data Collection for the Hydrology Determination of NM Streams and Rivers

1. Level 1 Office Procedures

The following information should be gathered and reviewed prior to conducting field work for a Level 1 Field Evaluation. It is important to gather as much physical and geographic information as possible by conducting reconnaissance on the stream reach prior to going out to the study site to save time, money and other resources and identify any risks or concerns.

Geographical Information System (GIS) and Remote Sensing Tools

The following is a non-exhaustive list of suggested coverages and resources that can help identify and generate informative maps of the field of study area. In addition, the aerial photographs, GIS coverages and resources listed below can be used to calculate sinuosity prior to field work (see *Indicator* #1.7 (Sinuosity) for more information).

Useful resources include:

- Google Earth
- SWQB Mapper (https://gis.web.env.nm.gov/oem/?map=swqb)
- GIS software (ArcMAP, QGIS, etc.)

Useful coverages that can be added to a GIS project include (Note, not all information listed here will be available for every stream.):

- SWQB water quality stations
- SWQB assessment units
- National Hydrography Dataset (NHD) streams
- Southwest Regional Gap Analysis (http://swregap.nmsu.edu/default.htm)
- Office of the State Engineer (OSE) data
- The United States Geological Survey (USGS) quadrangle maps
- Aerial photographs
- National Hydrography Dataset
- Digital Geologic Map of NM
- National Land Cover Dataset
- Bureau of Land Management (BLM) Land Status
- United States Department of Agriculture (USDA) or Natural Resources Conservation Service (NRCS) soil survey
- Omernik Ecoregions
- NM Roads

Streamflow

Historic or recent flow data from gages such as those managed by the USGS, OSE or Los Alamos National Laboratory (LANL) should be used to make hydrological determinations. Streamgage data, if available, may clearly indicate ephemeral, intermittent, or perennial flow patterns for the available period of record and will facilitate the scoring of Indicator #1.1 *Water in Channel*.

Useful resources include:

- USGS Current Water Data for New Mexico: https://waterdata.usgs.gov/nm/nwis/rt
- OSE Real-Time Water Measurement Information System: http://meas.ose.state.nm.us/
- Los Alamos Area Environmental Data (Intellus): https://www.intellusnm.com

Drought Conditions

The following resources will help determine drought conditions and recent rainfall activity. At a minimum, the 12-month Standardized Precipitation Index (SPI) should be recorded on the *field sheets* along with the date and source the SPI was evaluated. Note, not all information listed here will be available for every stream:

- Historic or recent flow data (known sources include SWQB, OSE, USGS, or localized sources such as Los Alamos National Laboratory for waters on the Pajarito Plateau)
- Standardized Precipitation Index (SPI)
    - https://hprcc.unl.edu/maps.php?map=ACISClimateMaps
- Standardized Precipitation Evapotranspiration Index (SPEI)
    - http://spei.csic.es/index.html
- Rain gauge stations within the County
- Airport/regional climate data
- The National Weather Service:
    - https://w2.weather.gov/climate/index.php?wfo=abq
- https://w2.weather.gov/climate/xmacis.php?wfo=abqhttps://water.weather.gov/ahps/United States Drought Monitor https://droughtmonitor.unl.edu/
- PRISM Climate Data:
    - http://www.prism.oregonstate.edu/mtd

Refer to *Drought Conditions* and *Recent Rainfall Activity* on pages 6-7 for more information.

Stream Segment Identification and Sample Reach Selection

This protocol describes a method for assessing geomorphic, hydrological, and biological indicators of stream flow duration. However, flow characteristics often vary along the length of a stream, resulting in gradual transitions in flow duration. Choosing the sample reach on which to conduct an assessment can influence the resulting conclusion about flow duration. Before a determination of hydrology can be made for a stream the appropriate sample reach, within the larger stream segment to which the UAA will apply, must be identified.

For SWQB stream segments are termed **assessment units** (**AUs**). AUs are river or stream reaches defined by various factors such as hydrologic or watershed boundaries, geology, topography, incoming tributaries, surrounding land use/land management, water quality standards, etc. AUs are designed to represent waters with assumed homogeneous water quality (WERF 2007). AUs in New Mexico average 10 miles in length and are typically no more than 25 miles in length. A **sample reach**, as used in this protocol, is a length of stream (40 times the average stream bankfull width or 160 meters, whichever is larger) that is chosen to represent a uniform set of physical, chemical, and biological conditions within an AU. It is the principal sampling unit for collecting hydrological, geomorphic and biological data using this protocol. Below are several factors to look for when determining the homogeneity of the AU and the representativeness of the sample reach:

- Are there significant tributaries (2nd order or higher) entering along the reach?
- Are there any changes in geology?
- Are there any dramatic shifts in land use?
- Is there a dramatic change in slope?
- Are there changes in riparian vegetation type and amount?
- Are there any point sources discharging into the reach?
- Are there any irrigation return flows discharging into the reach?

Many of these questions may be evaluated using maps and remote sensing products (e.g. Google Earth), however field reconnaissance along the length of the AU – to evaluate potential gradients in stream hydrology and to select representative sample reach(es) for hydrologic evaluation – should also be conducted.

The sample reach(es) selected for evaluation with the Hydrology Protocol should be as representative as possible of the natural characteristics of the AU. For example, if the stream is mostly vegetated, the sample reach should be located along an area of the channel that is mostly vegetated as opposed to an area that has no vegetation or is sparsely vegetated. It is the responsibility of the assessor(s) to verify and document the homogeneity of the AU and representativeness of the sample reach. SWQB typically defines a representative sample reach for conducting data collection as 40 times the average stream width or 160 meters, whichever is larger. If there are questions regarding the homogeneity of an AU (i.e., you answered "yes" to any of the questions above) then a hydrology evaluation should be performed on multiple sample reaches to identify potential transition point(s) between flow categories and accurately characterize the AU. One approach may be to examine air photos or satellite imagery and identify those areas with the greatest vegetation as potential study reaches with the greatest likelihood for "perennial" characteristics. Using the tools and resources described above may be helpful in confirming characteristics on the ground should an AU need to be re-evaluated.

2. Level 1 Field Procedures

In order to distinguish between ephemeral, intermittent, and perennial streams and rivers using the information presented in this protocol, the field evaluator should have experience making geomorphic, hydrological, and biological observations in New Mexico or the semi-arid region of the southwestern U.S. Field evaluations should be performed at least 48 hours after the last known major rainfall or snowmelt event. In addition, it is *strongly* recommended that field evaluations be conducted outside of drought conditions whenever possible.

Field Equipment and Supplies

- Copy of *Hydrology Protocol* and associated *Field Sheets*.
- Site maps and satellite imagery (1:250 scale if possible)
- Global Positioning System (GPS) – used to determine latitude and longitude
- Clipboard/pencils/sharpies
- Two Metric Rulers
- Two Measuring Tapes
- Survey rod
- Bank pins
- Laser Level/Rod Eyes/Clinometer
- Compass (if not available as part of GPS unit)
- Camera – used to photograph and document site features
- Shovel or Soil Auger
- D-frame dip net/white sorting tray (optional) Munsell
- Soil color chart (optional)
- Long piece of string (optional)
- Mechanical tally counter (optional)
- Sand-gauge card (optional)

Sample Reach Selection

Before selecting a location for the survey, note the character of the stream while driving to the site to verify that the reach is representative of the AU being characterized. This initial examination allows the evaluator to study the nature of the channel, observe characteristics of the watershed, and observe characteristics that indicate what source of water (stormflow, or base flow plus tributary/point source discharges, if present) may predominantly or solely contribute to flow in the AU. These initial observations also aid in determining the magnitude (poor, weak, moderate or strong) of specific parameters. In addition, the assessor can identify if the sample reach is generally uniform (i.e. "representative") or if it should be assessed as two or more distinct reaches. Hydrology evaluations must not be made at one point without first walking up and down the channel for at least 160 meters.

Ideally, the visual examination would be from the stream origin to the downstream confluence with a larger stream or until a change in characteristics such as slope or geology is observed, but this is usually not feasible or practical. Furthermore, property access issues may arise on privately held property. Make sure the site is easily and safely accessible. If the site is on private property get the land owner's approval before conducting an evaluation.

Upon finding a representative area to conduct the survey, document the latitude and longitude (origination and termination) extent of the survey reach on the *Field Sheets*, the length of the survey area should be no less than 160 meters.

Photodocumentation

It is important to explain the rationale behind any conclusions reached using this protocol and sometimes photos are just the medium in which to do that. It is essential to take several photos of the sample reach, AU and/or watershed, as appropriate, to document the environmental conditions and any disturbances or modifications that are relevant to making a final hydrology determination. Multiple and varied photos will help evaluate and verify the homogeneity of the AU as well as the representativeness of the sample reach when and if a UAA is reviewed by NMED, EPA and the WQCC. Photos that document the evaluation attributes (e.g. riparian vegetation, benthic macroinvertebrates, etc.) are also encouraged and provide excellent supporting documentation for any conclusions reached.

The assessor should include a detailed description of each photo on the *Field Sheets*, including date, description of the photo (e.g. left bank, right bank, upstream, downstream, etc.), and GPS coordinates (if different from site location), and attach the photos to the *Field Sheets* to officially document the conditions at the time of the evaluation and to support any conclusions that were reached using this protocol.

3. Level 1 Scoring

Hydrological determinations are accomplished by evaluating 14 different attributes of the sample reach and assigning a numeric score to each attribute following the four–tiered, weighted scale described in Section 1 Scoring and summarized in Table 1. Total scores reflect the persistence of water with higher scores indicating intermittent and perennial systems. **Please see Section 2 – Guidance for Overall Score Interpretation for more details.**

4. Level 1 Indicators

1.1. Water in Channel

It is necessary to distinguish stormwater inflow (resulting from precipitation within the past 48 hours) from baseflow. Flow observations preferably should be taken at least 48 hours after the last substantial rainfall or runoff event. Local weather data and drought information should be reviewed before evaluating flow conditions. Perennial systems will have water in their channels year-round in the absence of drought conditions. Therefore, it is recommended that field evaluations be conducted outside of drought conditions whenever possible. Drought conditions are defined as any time the Standard Precipitation Index (SPI) is less than -1.5, indicating severely to extremely dry conditions (NDMC 1995). The 12-month SPI should be recorded on the *Field Sheets* to indicate climatic conditions at the time of sampling, and confirmed through other sources such as the Standardized Precipitation Evapotranspiration Index (Beguería, et al. 2014) or the United States Drought Monitor to ensure that extreme conditions are not indicated for the survey location.

Evidence of recent high flows should be noted on the *Field Sheets*. Such evidence includes moist or wet sediment on plants or debris and organic drift lines at or above bankfull or in the active floodplain. Artificial (i.e. point-source) discharges should also be noted on form. Site inspections should result in visually discernible stream flows as evidence of base flow contribution between rain events, even in low flow conditions. If base flows are present during a site inspection that is more than 48 hours after a major rainfall or runoff event, the sample reach is either perennial or intermittent. However, intermittent reaches do not always have water in them. A good rule of thumb for differentiating ephemeral reaches from intermittent ones is if they have water in them during the dry season or during a drought. Look for water in pool areas in the streambed. The presence or types of plants as well as saturated sediment underneath rocks located within the channel are also good indications of the presence of water during the dry season or during a drought.

If the stream is visited during the dry season (typically defined in NM as **late May to mid-July** and **mid-September to early November**, but also varies by region and elevation of the stream) and base flows are not evident, the stream may be ephemeral or intermittent. If there is no flowing water within 48 hours of a rain or runoff event, then the stream is more than likely ephemeral. The prerequisite for a stream to be determined as ephemeral is that there must be no evidence of base flows in the stream banks.

Strong – Flow is evident throughout the sample reach. Moving water is seen in riffle areas but may not be as evident throughout the runs.

Moderate – Water is present in the channel but flow is barely discernable in areas of greatest gradient change (i.e. riffles) or floating object is necessary to observe flow.

Weak – Dry channel with standing pools. There is some evidence of base flows (e.g. riparian vegetation growing along channel, saturated sediment under rocks, etc)

Poor – Dry channel. Dry under rocks and debris. No evidence of base flows was found.

If available, historic or recent flow data from streamgages such as those managed by the USGS, OSE, or LANL may clearly indicate ephemeral, intermittent, or perennial flow patterns for the available period of record and will facilitate the scoring of Indicator #1.1 *Water in Channel*.

1.2. Fish (qualitative observations)
In most cases, fish are indicators of perennial systems, since fish will rarely inhabit an intermittent stream. Fluctuating water levels of intermittent streams provide unstable and stressful habitat conditions for fish communities. When looking for fish, all available habitats should be observed, including pools, riffles, root clumps, and other obstructions (to greatly reduce surface glare, the use of polarized sunglasses is recommended). In small streams, the majority of species usually inhabit pools and runs. Fish should be easily observed within a minute or two. Also, fish will seek cover once alerted to your presence, so be sure to look for them slightly ahead of where you are walking. Check several areas along the sample reach, especially underneath undercut banks.

Strong - Found easily and consistently throughout the sample reach.
Moderate - Found with little difficulty but not consistently throughout the sample reach.
Weak - Takes 10 or more minutes of extensive searching to find.
Poor - Fish are not present (after 10 or more minutes of searching).

1.3. Benthic Macroinvertebrates (qualitative observations)
The larval stages of many aquatic insects are good indicators that a stream is perennial because a continuous aquatic habitat is required for these species to mature. Turn over the rocks and other large substrate found in areas of visible flowing water, (i.e. riffles) and scan the undersides for benthic macroinvertebrates. Also observe the newly disturbed area where the rock once was for signs of movement. This method may be more suitable for mountainous areas where riffles predominate. For lower gradient systems and other areas of slow moving water, benthic macroinvertebrates may be located in a variety of habitats including root wads, undercut banks, pools, leaf-packs, and submerged aquatic vegetation. Note that some benthic macroinvertebrates will make small debris/sand cases, which can be covered with periphyton and easily confused for
excess debris picked up from the substrate. The use of a small net to sample a variety of habitats
including water under overhanging banks or roots, accumulations of organic debris (e.g. leaves) and the substrate may be helpful.

In DRY channels, focus the search on the sandy channel margins for mussel and aquatic snail shells, any remaining pools for macroinvertebrates, and under cobbles and other larger bed materials for caddisfly casings. Casings of emergent mayflies or stoneflies may be observed on dry cobbles or on stream-side vegetation.

Strong - Found easily and consistently throughout the sample reach.
Moderate - Found with little difficulty but not consistently throughout the sample reach.
Weak - Takes 10 or more minutes of extensive searching to find.
Poor - Benthic macroinvertebrates are not present (after 10 or more minutes of searching).

1.4. Presence of Filamentous Algae and Periphyton (qualitative observations)
These forms of algae are attached to the streambed substrate and require an aquatic environment to persist. They are visible as a pigmented mass or film, or sometimes hair-

like growths on submerged surfaces of rocks, logs, plants and any other structures within the channel. Periphyton growth is influenced by chemical disturbances such as increased nutrient (nitrogen or phosphorus) inputs and physical disturbances such as increased sunlight to the stream from riparian zone disturbances.

Strong - Found easily and consistently throughout the sample reach.
Moderate - Found with little difficulty but not consistently throughout the sample reach.
Weak - Takes 10 or more minutes of extensive searching to find.
Poor - Filamentous algae and/or periphyton are not present (after 10 or more minutes of searching).

1.5. Differences in Vegetation

As a rule, only perennial and intermittent systems can support riparian areas that serve the entire suite of riparian ecological functions. Ephemeral streams generally do not possess the hydrological conditions that allow true riparian vegetation to grow. Although water flows down ephemeral channels periodically, the water table does not occur sufficiently close to the soil surface to allow water loving vegetation to access the greater quantity of water they need to grow. Vegetation growing along ephemeral watercourses may occur in greater densities or grow more vigorously than vegetation in the adjacent uplands, but generally there are no dramatic compositional differences between the two. Even along those ephemeral channels where vegetation composition differs somewhat from the adjacent uplands, that vegetation does not require as much soil moisture as true riparian plants.

Note if vegetation is absent or altered due to man-made activities on the Level 1 *Field Sheet*

Strong – Dramatic compositional differences in vegetation are present between the riparian corridor and the adjacent uplands. A distinct riparian vegetation corridor exists along the entire sample reach – riparian, aquatic, or wetland species dominate the length of the reach.
Moderate – A distinct riparian vegetation corridor exists along part of the sample reach. Compositional species difference between upland and riparian corridor. Riparian
vegetation is interspersed with upland vegetation along the length of the reach.
Weak – Vegetation growing along the sample reach may occur in greater densities or grow more vigorously than in the adjacent uplands, but there are minimal compositional differences between the two.
Poor – No compositional or density differences in vegetation are present between the banks and the adjacent uplands. Vegetation growing along the riparian area does not occur in greater density or grow more vigorously than in the adjacent uplands.

1.6. Absence of Rooted Upland Plants in Streambed

This attribute relates flow to the absence of rooted plants, since flow will often act as a deterrent to plant establishment by removing seeds or preventing aeration to roots. Cases where rooted upland plants are present in the streambed may indicate ephemeral or intermittent flow. Focus should be on the presence of plants in the bed or thalweg and plants growing on any part of the bank should not be considered. Note, however, there will be exceptions to this attribute. For example, rooted plants can be found in shaded perennial streams with moderate flow but in all cases these plants will be water tolerant (i.e. obligate and/or facultative wetland plants).

Additionally, in some situations (e.g., high gradient sand bedded streams located within flashy watersheds) highly erosive flows and/or depth of scour in response to extreme rainfall events may limit the presence of rooted vegetation. Under these circumstances the assessor may use

professional judgment in selecting the appropriate scoring criteria, and should document on the

Field Sheets and with photos those factors that explain any alternative scoring methodology.

Strong – Rooted upland plants are absent within the streambed/thalweg.
Moderate – There are a few rooted upland plants present within the streambed/thalweg.
Weak – Rooted upland plants are consistently dispersed throughout the streambed/thalweg.
Poor – Rooted upland plants are prevalent within the streambed/thalweg.

*** If the sample reach being evaluated has a score ≤ 2 up to this point, the reach is determined to be ephemeral. If the reach being evaluated has a score≥ 18 at this point, the reach is determined to be perennial. You can STOP the evaluation. However, if the reach has a score between 2 and 18 you should continue the Level 1 Evaluation.***

1.7. Sinuosity

Sinuosity is a measure of a channel's "crookedness." Sinuosity is the result of the stream naturally dissipating its flow forces. Intermittent systems don't have a constant flow regime and, as a result, exhibit substantially less sinuous channel morphology. While ranking, take into consideration the size of the stream (e.g. 1st, 2nd, 3rd order, etc.), which may also influence the stream sinuosity. Sinuosity is best measured using aerial photography (Rosgen 1996).

Examples of sinuosity are provided in Figure 1. To calculate sinuosity using an aerial photograph, measure the stream length and related valley length for at least two meander wavelengths. A meander wavelength is the distance of one meander, or bend, along the down- valley axis of the stream. Divide the *stream* length (SL) by the *valley* length (VL) (Figure 2). If aerial photos are not available, sinuosity can be measured using a GPS's trip computer function to measure channel length and valley length. The higher the ratio (SL/VL), the more sinuous the stream.

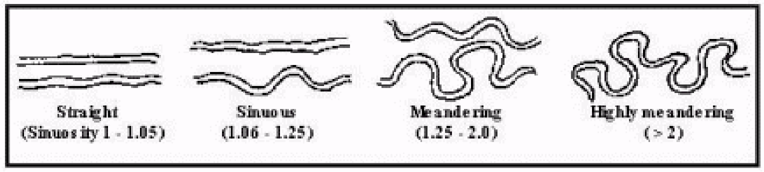


Figure 1. Examples of Stream Sinuosity (NCDWQ 2005)

In some surface waters (e.g., mountain stream settings or areas of complex and varied geology) channel sinuosity may be more reflective of external morphological factors, rather than the presence or absence of stream flow. Under these circumstances the assessor may use professional judgment in selecting the appropriate scoring criteria, and should document on the Level 1 *Field Sheets* and with photos those factors that explain any alternative scoring methodology.

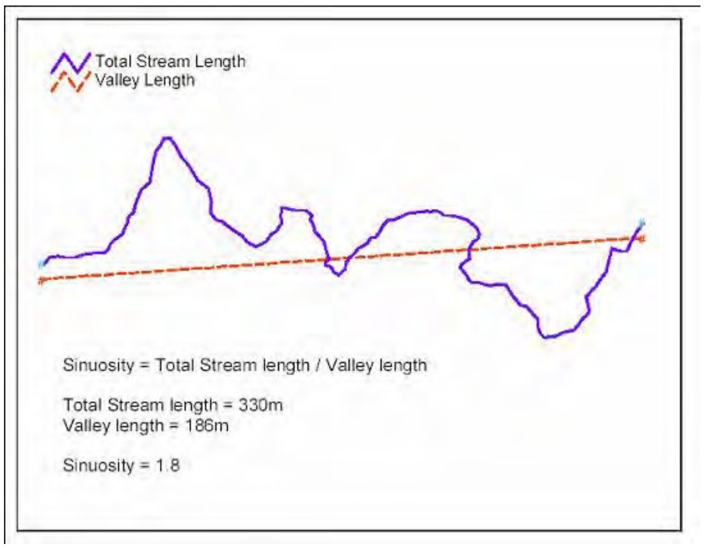


Figure 2. Stream Sinuosity (NCDWQ 2005)

******Note method used to determine sinuosity on the Field Sheets******

Strong – Stream sinuosity ratio is greater than 1.4. Stream has numerous, closely-spaced bends, few straight sections.

Moderate – Stream sinuosity ratio is between 1.4 and 1.2. Stream has good sinuosity with some straight sections.

Weak – Stream sinuosity ratio is between 1.2 and 1.0. Stream has very few bends and mostly straight sections.

Poor – Stream sinuosity ratio is equal to 1.0. Stream is completely straight with no bends.

1.8. Floodplain and Channel Dimensions

The relative importance of many fluvial processes in arid regions, especially the magnitude and frequency of their operation, differs considerably from more humid regions. As a result, channel forms also differ considerably from humid regions. Although one of the difficulties of characterizing dryland ephemeral streams is their enormous variability in form, they tend to be more incised with confined channels relative to intermittent and perennial streams (Knight et al. 1999).

When determining the vertical confinement of the stream, it is important to distinguish whether the flats adjacent to the channel are a frequent and active floodplain, terraces (abandoned floodplain), or are well outside of the flood-prone area. The ratio of the flood-prone area width to the bankfull, or active, channel width is used to determine the vertical confinement of the stream (Rosgen 1994). A larger ratio corresponds to a wide, active floodplain and a minimally confined channel, whereas a smaller ratio corresponds to a narrow or absent floodplain and a noticeably confined channel (**see scoring and "note" below*).

The flood-prone area width is measured at the elevation that corresponds to twice the maximum depth of the bankfull channel as taken from the established bankfull stage (Figure 3). The bankfull, or active, channel is defined as that which is filled with moderate sized flood events that would typically occur every one or two years and do not usually inundate the floodplain. Bankfull levels can be identified by:

- The presence of a floodplain at the elevation of initial flooding,
- The elevation associated with the *highest* depositional features,
- An obvious slope break that differentiates the channel from a relatively flat floodplain terrace higher than the channel,
- A transition from exposed sediments to terrestrial vegetation,
- Moss growth on rocks along the banks,
- Evidence of recent flooding,
- Presence of drift material caught on overhanging vegetation, and
- Transition from flood- and scour-tolerant vegetation to that which is relatively intolerant.

Field Protocol:
The evaluator(s) should start by selecting a location for the purpose of obtaining bankfull data. In general, the easiest location to measure bankfull channel width is within the narrowest segment of the sample reach. Deflectors such as rocks, logs, or unusual constrictions that make a stream especially narrow should be avoided.

1. Once a location is chosen, obtain a *rod reading* for an elevation at the "max depth" location by having one person hold a survey rod at the max depth location (thalweg) and a second person on the terrace adjacent to the stream using a clinometer and a meter stick or ski pole with one meter marked on it (if available, a surveyor's level can be used instead of a clinometer). Hold the clinometer at the one-meter mark on the ski pole, look through the clinometer holding it at zero, and read the height on the survey rod at the "max depth" location (Refer to **Figure 3**). Record the "max depth" *rod reading* on *Level 1 Field Sheets*.
2. Identify the bankfull stage using the indicators described above. Obtain a *rod reading* for an elevation at the "bankfull stage" location using the methods described in Step #1. Record the "bankfull stage" *rod reading* on Level 1 *Field Sheets*.
3. Subtract the "bankfull stage" reading from the "max depth" reading to obtain a maximum depth value. Multiply the maximum depth value by 2 for the "2x Max.

Depth" value. Record the "2x Max. Depth" value on Level 1 *Field Sheets*.

4. Subtract the "2x Max Depth" value from the "max depth" *rod reading* for the "flood- prone area" location *rod reading*. Move the rod upslope, online with the cross-section, until a rod reading for the "flood-prone area" location is obtained.
5. Mark the flood-prone area (FPA) locations on each bank. Measure the distance between the two FPA locations. Record the **FPA Width** on Level 1 *Field Sheets*.
6. Measure the distance between the two Bankfull Stage locations. Record the **Bankfull Width** on Level 1 *Field Sheets*.
7. Divide the FPA Width by the Bankfull Width to calculate the Floodplain to Channel Ratio. Record the calculated ratio on Level 1 *Field Sheets*. The Floodplain to Channel Ratio is used to score the stream for this indicator.

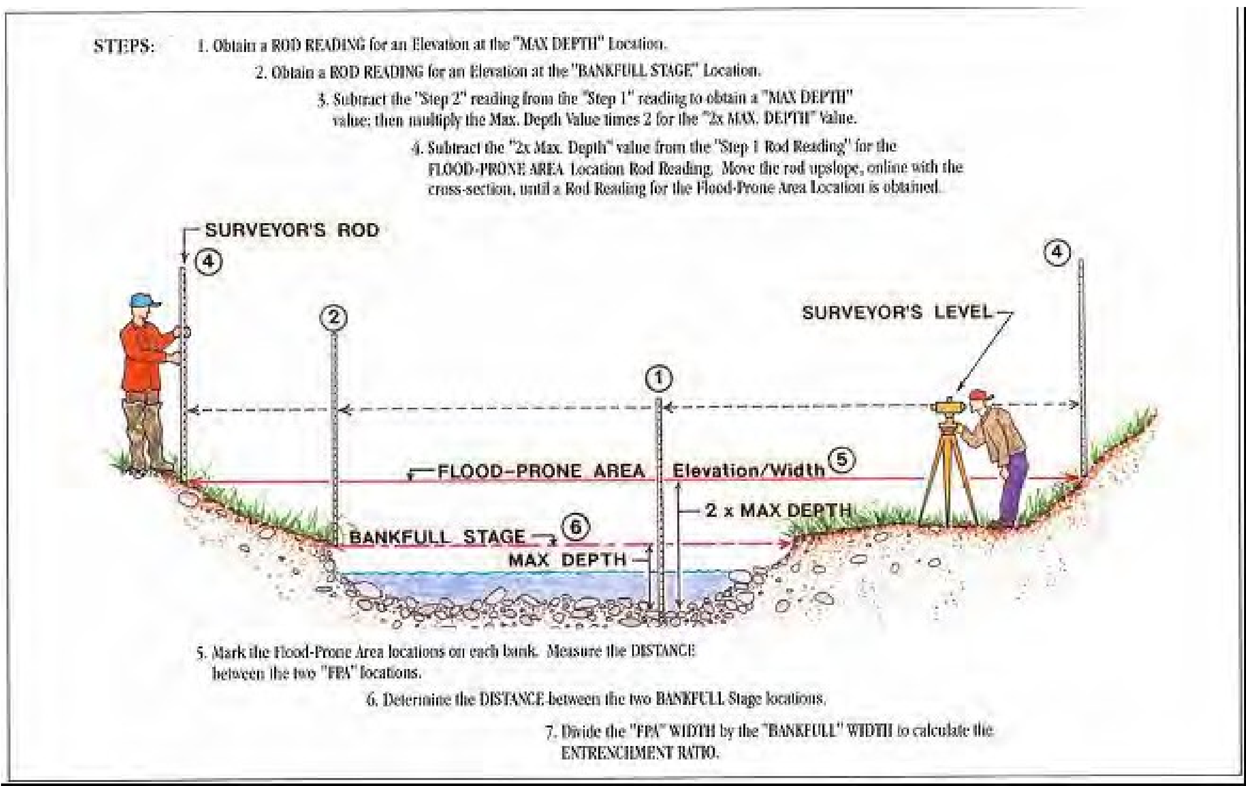


Figure 3. Determining a Flood-Prone Area elevation/width (Rosgen 1996)

In some surface waters (e.g., mountain stream settings or areas of complex and varied geology) the degree of channel confinement may be more reflective of external morphological factors rather than the presence or absence of stream flow. Under these circumstances the assessor may use professional judgment in selecting the appropriate survey location and scoring criteria and should document on the Level 1 *Field Sheets* and with photos those factors that explain the resulting 'representative' scores.

******Alternative methods for determining the Floodplain to Active Channel Ratio should be described and recorded on the Field Sheets******

Strong - Ratio > 2.5*. Stream is minimally confined with a wide, active floodplain.
Moderate - Ratio between 1.2 and 2.5. Stream is moderately confined. Floodplain is present but may only be active during larger storm events.
Weak - Ratio < 1.2. Stream is incised with a noticeably confined channel. Floodplain is narrow or absent and disconnected from the channel during most storm events.

*NOTE**:** a larger ratio corresponds to a wide, active floodplain and a minimally confined channel, while a smaller ratio corresponds to a narrow or absent floodplain and a noticeably confined channel. If the channel is dry and bankfull stage cannot be determined, score this indicator based on your observations using the following scoring system:

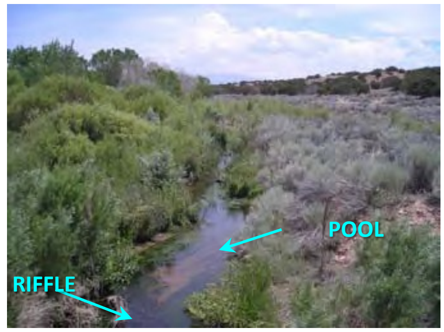
Strong = stream is not incised/confined. Wide, active floodplain is connected to the channel.
Moderate = stream is moderately incised/confined. Flood-prone area width is narrow. Floodplain adjacent to the channel may be connected during large floods or represented by abandoned terraces.
Weak = stream is undeniably incised/confined. Flats adjacent to the stream are well outside of the flood-prone area.

1.9. In-channel Structure -- Riffle-Pool Sequences

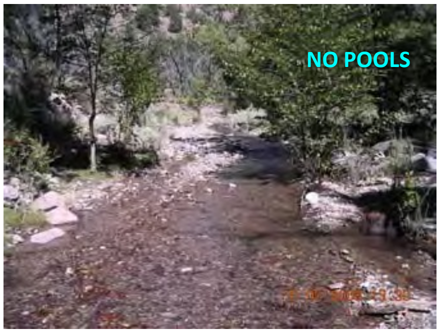
A repeating sequence of riffle/pool (riffle/run in lower gradient systems, ripple/pool in sand bed systems, or step/pool in higher gradient systems) can be observed readily in perennial systems. Riffle-run (or ripple-run) sequences in low gradient systems are often created by in-channel woody structures such as roots and woody debris. When present, these characteristics can be observed even in a dry channel by closely examining the local profile of the channel. A riffle is a zone with relatively high channel slope gradient, shallow water, and high flow velocity and turbulence. In smaller streams, riffles are defined as areas of a distinct change in gradient where flowing water can be observed. The bottom substrate material in riffles contains the largest sedimentary particles that are moved by bankfull flow (bedload). A pool is a zone with relatively low channel slope gradient, deep water, and low velocity and turbulence. Fine textured sediments generally dominate the bottom substrate material in pools. Along the sample reach, take notice of the frequency between the riffles and pools.

Strong - Demonstrated by a frequent number of riffles followed by pools along the entire sample reach. There is an obvious transition between riffles and pools.
Moderate - Represented by a less frequent number of riffles and pools. Distinguishing the transition between riffles and pools is difficult.
Weak - Mostly has areas of pools or of riffles.
Poor - No riffles or pools observed.

Example of “**Strong**” Score – San Francisco River



Example of “**Moderate**” Score – Santa Fe River



Example of “**Weak**” Score – Mineral Creek

Example of “**Poor**” Score – Arroyo Chamiso

*** If the sample reach being evaluated has a score ≤ 5 at this point, the reach is determined to be ephemeral. If the reach being evaluated has a score ≥ 21 at this point, the reach is determined to be perennial. You can STOP the evaluation. However, if the reach has a score between 5 and 21 you should continue the Level 1 Evaluation.***

1.10. Particle size or Stream Substrate Sorting

This feature can be examined in two ways. The first is to determine if the sediment texture in the bottom of the channel is similar to the texture outside the channel. If this is the case, then there is evidence that erosive forces have not been active enough to down cut the channel and support an intermittent or perennial system. Sediment in the bed of ephemeral channels typically have the same or comparable texture (i.e. particle size) as areas close to but not in the channel. Accelerated stormflow resulting from human activities may produce deep, well-developed ephemeral or intermittent channels which have little or no coarse bottom materials indicative of upstream erosion and downstream transport. The bottom substrate of non-ephemeral systems often has accumulations of coarse sand and larger particles.

The second way this feature can be examined is to look at the distribution of the particles in the substrate in the channel. In lower-gradient, sand-bed streams one may need to look for size variations among sand grains – for instance, coarse versus fine sand. Note, however, the usefulness of this attribute may vary among ecoregions. For instance, in the plateaus or tablelands the variability in the size of substrate particles will probably be less than in the mountains.

Examples of Methods used to determine particle size and gradation:

- Sand Gauge Reference Card (best for sand dominated systems)
- Standard Sieve Analyses
- Wire Screen Method
- Pebble Count Method:
  - EPA's EMAP Pebble Count
  - Wolman Pebble Count
  - Zig Zag Pebble Count
  - USFS Pebble Count Sampling Frame

For whatever method is chosen, repeat procedure for an area close to but not in the channel for comparison purposes. Step outside the bankfull width or above the bank onto the floodplain or first terrace and repeat the procedure used in the bankfull channel. Avoid areas of dense vegetation and soil accumulation. Beware of cactus, snakes, and other hazards when "blindly" picking up particles outside of the channel or even in dry streambeds. For pebble counts, the objective is to measure at least 50 pebbles in the channel and 50 pebbles in areas close to but not in the channel for accurate distributional representations and comparisons.

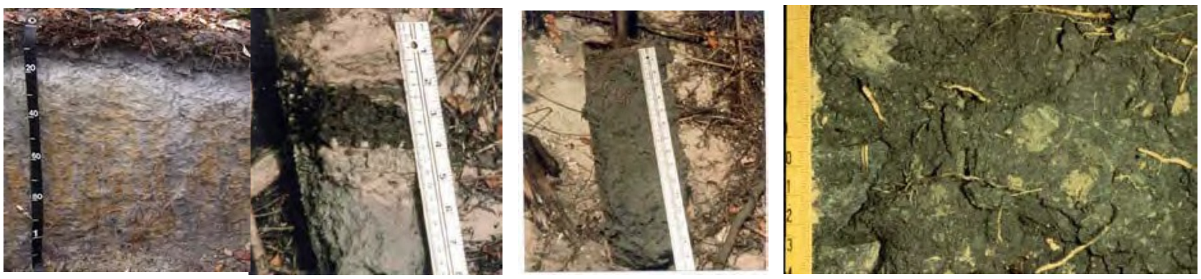
Strong - Particle sizes in the channel are noticeably different from particle sizes outside the channel in the flood-prone area. There is a clear distribution of various sized substrates in the channel with finer particles accumulating in the pools, and larger particles accumulating in the riffles/runs.

Moderate - Particle sizes in the channel are moderately similar to particle sizes outside the channel in the flood-prone area. Various sized substrates are present in the channel and are represented by a higher ratio of larger particles (gravel/cobble).

Weak - Particle sizes in the channel are similar or comparable to particle sizes outside the channel in the flood-prone area. Substrate sorting is not readily observed in the channel.

1.11. Hydric Soils

One of the most reliable methods for differentiating between ephemeral and non-ephemeral stream types during drier conditions requires investigation of the stream bank (i.e. from the stream bed to the top of the bank). Ephemeral streams usually have poor channel development and lack groundwater-induced base flows that normally result in hydric soils dominating the banks of intermittent and perennial streams. The presence of hydric soil indicators above the elevation of the channel bottom in floodplain soils adjacent to the channel indicates the presence of a seasonal high water table that can provide a critical period of base flow. Non-ephemeral stream banks typically are dominated by soils with hydric indicators, such as visually confirmed oxidized rhizospheres, a matrix of gray or black soils, and reducing conditions confirmed by a redox meter. The presence of hydric soils should be determined through visual observations, pungent odors, clay, etc. Additional information on field indicators of hydric soils is available from the Natural Resources Conservation Service at https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/. There are also special considerations regarding the determination of hydric soils in arid regions. The United States Army Corps of Engineers (USACE) Wetlands Regulatory Assistance Program has divided New Mexico into three regions (Arid West, Western Mountains, and Great Plains). A regional map and regional supplements to the Corps of Engineers Wetland Delineation Manual are available at: https://www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/reg_supp.



Examples of Hydric Soils in the Arid West – U.S. Army Corps of Engineers
(photos found at: http://www.usace.army.mil/CECW/Documents/cecwo/reg/trel08-28.pdf)

Note that hydric soil indicators may be poorly developed at the seasonal high-water table elevation in young, coarse textured, alluvial soil materials with low concentrations of clay, iron, and manganese, or floodplain soils where moving water fails to become reduced.

Present – Hydric soils are found within the sample reach.
Absent – Hydric soils are not found within the sample reach.

1.12. Sediment on Plants or Debris

The transportation and processing of sediment is a main function of streams. Therefore, evidence of sediment on plants or other debris in the channel may be an important indicator of recent high flows. Note that sediment production in stable, vegetated watersheds is considerably less than in disturbed watersheds. Are plants in the channel, on the streambank, or in the floodplain covered with sediment? Look for silt/sand accumulating in thin layers on debris or rooted aquatic vegetation in the runs and pools. Be aware of upstream land-disturbing construction activities, which may contribute greater amounts of sediments to the channel and can confound this indicator. Note these activities on the *Field Sheets* if these confounding factors are present.

Strong – Sediment found readily on plants and debris within the channel, on the streambank, and within the floodplain throughout the length of the sample reach.
Moderate – Sediment found on plants or debris within the channel although not prevalent along the sample reach. Mostly accumulated on plants and debris in pools.
Weak – Sediment on plants and debris is isolated in small amounts along the sample reach.
Poor – No sediment is present on plants or debris.

****Refer to Section 2 Overall Score Interpretation, for guidance on overall Level 1 score interpretation****

Level 1 Supplemental Indicators

The following indicators do not occur consistently throughout New Mexico, which may be the reason why they were not statistically significant between waterbody types. Regardless, when they occur they are useful indicators in the determination of perenniality. Record the score on the Level 1 *Field Sheets* and include the score when calculating the total points.

1.13. Seeps and Springs

Seeps: Seeps have water dripping or slowly flowing out from the ground or from the side of a hill or incised streambank. Springs: Look for "mushy" or very wet, black decomposing leaf litter nearby in small depressions or in the channel. Springs and seeps often are present at grade controls and headcuts. The presence of this indicator suggests that groundwater is a source of streamflow except during a period of drought. Score this category based on the presence or absence of these features observed within the sample reach.

Present – Seeps and/or springs present in reach.
Absent – Seeps and/or springs were not present in reach

1.14. Iron Oxidizing Bacteria/Fungi

These features are often (although not exclusively) associated with groundwater. Iron oxidizing bacteria/fungi derive energy by oxidizing iron, originating from groundwater, in the ferrous form (Fe^{2+}) to the ferric form (Fe^{3+}). In large amounts, iron-oxidizing bacteria/fungi discolor the substrate giving it a red, rust-colored appearance. In small amounts, it can be observed as an oily sheen on the water's surface. This indicates that the stream water is derived from a groundwater source, and these features are most commonly seen in standing water on the ground's surface or in slow moving creeks and streams. Filmy deposits on the surface or banks of a stream are often associated with the greasy "rainbow" appearance of iron oxidizing bacteria. This is a naturally occurring phenomenon where there is iron in the groundwater. However, a sudden or unusual occurrence may indicate a petroleum product release from an underground fuel storage tank. One way to differentiate iron-oxidizing bacteria from oil releases is to trail a small stick or leaf through the film. If the film breaks up into small islands or clusters, it is most likely bacterial in origin. However, if the film swirls back together, it is most likely a petroleum discharge.

Present – Iron-oxidizing bacteria/fungi present in reach.
Absent – Iron-oxidizing bacteria/fungi not present in reach.

Oily sheen on water's surface due to iron-oxidizing bacteria
(photos found at:
http://www.arlingtonva.us/departments/EnvironmentalServices/epo/EnvironmentalServicesEpoDr.aspx)

Iron-oxidizing bacteria in seepage spring at La Plata River, Farmington, NM

****Refer to Section 2 Overall Score Interpretation, for guidance on overall Level 1 score interpretation****

G. Level 2 Evaluation: Borderline Determinations

If, after conducting a Level 1 Evaluation, a hydrological determination cannot be made because more information is required, then a Level 2 Evaluation should be conducted between mid-August and mid-November to coincide with SWQB's biological index period.

1. Level 2 Office Procedures

Refer to the results of the **Level 1 Evaluation**. If this step was not completed in the Level 1 Evaluation or cannot be located then refer to *Drought Conditions* and *Recent Rainfall Activity* and the *Level 1 Office Procedures*, particularly *Stream Segment Identification and Sample Reach Selection*, for more information.

Additional Supporting Information

Additional supporting information may not be scored but can be used to support a Level 2 hydrological determination. Unfortunately, not all information listed here will be available for every assessment unit. Additional supporting information includes, but is not limited to:

Observation of flow:

Observation of flow under certain seasonal or hydrological conditions can directly support classifying a sample reach as perennial. Reaches with flow during the dry season or periods of drought are likely perennial. Although the presence of flow during a drought indicates perennial conditions, care must be taken in evaluating the upper limits of perenniality because some perennial systems may only contain isolated pools of water or be dry during periods of drought.

Thermograph Data:

- Historic or recent SWQB thermograph data may provide some insight on flow during certain seasonal or hydrological conditions
- Do thermograph and/or streamflow data (or lack thereof) warrant the use of equipment to estimate the onset and cessation of flow? (See *Indicator #2.1* below)

Key biological indicators:

As discussed below, the presence of aquatic organisms whose life cycle requires residency in flowing water for extended periods (especially those one year or greater) is a strong indication that a sample reach is perennial. If a reach is recognized as borderline, a qualified aquatic biologist or environmental scientist should evaluate the presence and abundance of such macroinvertebrates and vertebrates species before making a final hydrological determination.

- Current and/or historic fisheries data may be found at:
  - Natural Heritage New Mexico (https://nhnm.unm.edu/)
  - Museum of SW Biology (http://www.msb.unm.edu/index.html)
  - Sublette, James E. et al. 1990. *The Fishes of New Mexico – First Edition.* University of New Mexico Press. 393 p.
- SWQB Fisheries Data are available upon request by contacting the Surface Water Quality Bureau (505-827-0187 or https://www.env.nm.gov/surface-water-quality/).

Other information that may be considered:

- Groundwater contour maps and/or nearby, local well logs.
- Information provided by a long-term resident and/or local professional who has observed the stream during various seasons and hydrological conditions.
- Review of historic information such as aerial photography.
- Professional judgment may be used in conjunction with the total score and supporting information in making the final determination.

2. **Level 2 Field Procedures**

In order to distinguish between ephemeral, intermittent, and perennial streams and rivers using the information presented in this protocol, the field evaluator should have experience making geomorphic, hydrological, and biological observations in New Mexico or the semi-arid region of the southwestern U.S. Field evaluations should be performed at least 48 hours after the last known major rainfall event or snowmelt. In addition, it is *strongly* recommended that field evaluations be conducted outside of drought conditions whenever possible. Drought conditions, for the purposes of this *Hydrology Protocol*, are defined as any time the 12-month SPI is less than -1.5, indicating severely to extremely dry conditions (NDMC 1995).

Refer to the results of the **Level 1 Evaluation**. If this step was not completed in the Level 1 Evaluation or cannot be located then refer to the *Level 1 Field Procedures*, specifically *Sample Reach Selection* and *Photodocumentation,* for more information.

Level 2 Field Equipment and Supplies

Copy of *Hydrology Protocol* and associated *Field Sheets*
*Thermograph Deployment/Upload/Retrieval Field Sheet
*Fish Sampling Field Data Sheet
Site maps and aerial photographs (1:250 scale if possible)
Global Positioning System (GPS) –
used to determine latitude and longitude
Camera and Compass –
used to photograph and document site features
Clipboard/pencils/sharpies
Measuring tape
Survey flags for transect locations
Survey rod
Bank pins
Level
Shovel or Soil Auger
Thermographs with caps and tags
Zip ties/bailing wire
Hammer & T-post driver
Rebar & T-posts (various lengths)
Flagging
Wire/tie cutters
Kicknet (18 inch; 500µm net size)
Forceps
Sieve (500µm mesh)
Buckets –
to help sort macroinvertebrates
Sample containers (500-mL or 1-L)
Ethanol
Ethanol-proof sample labels
Ethanol-proof pen
Timepiece
Backpack electrofisher & accessories
Seine net
Buckets & aerators
Dip & aquarium nets
Voucher kit & formalin
Field guide
Collection permits
Measuring Board
One battery per site –
for electrofisher + back-up

*See the SWQB SOP webpage at https://www.env.nm.gov/surface-water-quality/sop for the current version

3. **Level 2 Indicators**

2.1. Water in Channel (OPTIONAL)

Observation of flow under certain seasonal or hydrological conditions can directly support classifying a sample reach as perennial. Reaches with flow during the dry season or periods of drought are likely perennial. The longer the period from the last substantial rainfall the stronger the presence of flow supports the perennial determination. Although the presence of flow during a drought indicates perennial conditions, care must be taken in evaluating the upper limits of perenniality because some perennial systems may only contain isolated pools of water or be dry during periods of drought.

If available, historic or recent flow data from streamgages such as those managed by the USGS, OSE or LANL may clearly indicate ephemeral, intermittent, or perennial flow patterns for the available period of record and will facilitate the scoring of this indicator. If streamgage data are not available, temperature sensors (or electrical resistance sensors or pressure transducers) can be used to estimate the onset and cessation of flow (Constanz et al. 2001; Lawler 2002; Blasch et al. 2002). Periods of flow are characterized by those sections of the thermograph where the amplitude of the diel temperature signal is visibly dampened (Constanz et al. 2001). When the in-stream temperature data are compared graphically to the temperature data from a nearby site out of streamflow where little dampening has occurred, a flow signal is easily identifiable.

Strong – The water sensor is decidedly different from the air sensor. The streamflow signal is easily identifiable and occurs throughout the entire time of deployment (i.e. water sensor has a diel signal that is visibly dampened compared to air sensor throughout the deployment).

Moderate – The water sensor differs from the air sensor. A flow signal is identifiable during the majority of time; however, there are short periods of time when the water sensor has a diel signal that is comparable to the air sensor indicating periods of drying.

Weak – The water sensor differs somewhat from the air sensor. A flow signal is identifiable during certain days or weeks; however, there are long periods of time when the water and air sensors have similar diel signals (i.e. no dampening) indicating dry periods.

Poor – There are no substantial differences between the water and air sensors. The two thermographs are visibly comparable to one another indicating little to no water in the channel.

**If using an electrical resistance sensor or pressure transducer, use the following ratings:

Strong – The streamflow signal is easily identifiable and occurs throughout the entire time of deployment

Moderate – A streamflow signal is identifiable during the majority of time; however, there are short periods of time when the sensor indicates periods of drying.

Weak – A streamflow signal is identifiable during certain weeks or months; however, there are long periods of time when the sensor indicates a dry channel.

Poor – There is no sustained streamflow signal from the sensor (flow signal is only for very brief periods of time – on the timescale of days – indicating a flow response due to storm events). Or there is no discernible streamflow signal.

2.2. Hyporheic Zone/Groundwater Table

Hyporheic zone: Even when there is no visible flow above the channel bottom, there may likely be slow groundwater discharge into and downstream flow in the **hyporheic zone**. The hyporheic zone is the subsurface interface beneath and adjacent to a stream or river where surface water and shallow groundwater mix. It may be recognized by the accumulation of coarse textured sediments in the bottom of the channel that may be up to 2-3 ft deep in small streams. The saturated sediment in the hyporheic zone exchanges water, nutrients, and fauna with surface flowing waters. Consequently, the hyporheic zone is the site of groundwater discharge to the stream channel, downstream flow, and biological and chemical activity associated with aquatic functions of the stream.

Indicators of a hyporheic zone can be observed by digging a bore hole in the streambed when site conditions are conducive to manually digging a bore hole. Water standing in the bore hole or saturated sediment within the bore hole indicates the presence of a hyporheic zone. If conditions are not conducive to boring a hole in the streambed, one can look under rocks. Saturated or moist sediment underneath rocks located within the channel indicates the presence of a hyporheic zone.

Groundwater Table: The presence of a seasonal high water table or groundwater discharge (i.e. seeps or springs) from the bank, above the elevation of the channel bottom, indicates a relatively reliable source of base flow to a stream. When site conditions are conducive to manually digging a bore hole, indicators of a current water table can be observed by digging a bore hole in the adjacent floodplain approximately two feet away from the streambed. The presence of water standing in the hole above the elevation of the channel bottom after waiting for at least 30 minutes (longer for clayey soils) indicates the presence of a high groundwater table.

Strong – Considerable base flow is present. Hyporheic zone and/or groundwater table is readily observable throughout sample reach.

Moderate – Some base flow is present. Hyporheic zone and/or groundwater table is present, but not abundant throughout sample reach.

Weak – Water is standing in pools and the hyporheic zone is saturated, but there is not visible flow above the channel bottom. Indicators of groundwater discharge are present but require considerable time to locate.

Poor – Little to no water in the channel. No indication of a high groundwater table or hyporheic zone.

2.3. Bivalves

Clams cannot survive outside of water, thus one should examine the streambed or look for them where plants are growing in the streambed. Also, look for empty shells washed up on the bank. Some bivalves can be pea-sized or smaller. Since clams require a fairly constant aquatic environment in order to survive, the search for bivalves can be conducted while looking for other benthic macroinvertebrates. A small net may be useful.

Present – Bivalves are found within the sample reach.

Absent – Bivalves are not found within the sample reach.

2.4. Amphibians

Salamanders and tadpoles can be found under rocks, on streambanks and on the bottom of the stream channel. They may also appear in the benthic sample. Frogs will alert you of their presence by jumping into the water for cover. Frogs and tadpoles typically inhabit the shallow, slower moving waters of the pools and near the sides of the bank. Amphibian eggs, also included as an indicator, can be located on the bottom of rocks and in or on other submerged debris. They are usually observed in gelatinous clumps or strings of eggs.

Present – Amphibians are found within the sample reach.
Absent – Amphibians are not found within the sample reach.

Any collection and identification of aquatic species should be performed by a qualified aquatic biologist, environmental scientist, or other professional.

2.5. Benthic Macroinvertebrates (quantitative observations)

The larval stages of many aquatic insects are good indicators that a stream is perennial because a continuous aquatic habitat is required for these species to mature. The Arid West Water Quality Research Project has published a final report on *Aquatic Communities of Ephemeral Stream Ecosystems* (AWWQRR 2006) that may be a useful supplement to this protocol. In addition, SWQB scientists have been looking for the presence of long-lived aquatic species as reliable determinants for perennial channels, North Carolina's Division of Water Quality has developed a list of benthic macroinvertebrate taxa that are perennial stream indicators (NCDWQ 2010) and West Virginia's Department of Environmental Protection maintains a list of macroinvertebrate species that have an extended aquatic life stage (WVDEP – Watershed Assessment Branch, (304) 926-0495). Further information on life histories of specific macroinvertebrates found through the application of this protocol can be researched, if necessary.

Examples of Methods and Equipment used to collect Benthic Macroinvertebrates:

- EPA's EMAP Protocol
- SWQB's Benthic Macroinvertebrate SOP
- Kick Net
- D-Frame Dip Net
- Rectangular Dip Net
- Surber Sampler
- Hess Sampler
- Approaches:
  - Targeted Riffle
  - Reach-Wide, Multi-Habitat
    - top/bottom of riffle, undercut banks, pools/runs, snags/roots/logs

The goal is to collect as many different kinds of aquatic macroinvertebrates from as many different habitats as necessary to ensure an accurate site assessment. Be aware that each habitat type has different sampling protocols, and some have a greater diversity of organisms than others (**Table 2**). If you have many habitats from which to choose, consider sampling from those with the most diversity. If your stream has a rocky bottom, sample at two separate riffle areas and at one other habitat. If your stream has a soft bottom or does not have riffles, collect samples at submerged logs, snags or undercut banks.

Table 2. Relative diversity of various habitat types

Habitat Type	Stream Type	Habitat
Riffles	Rocky bottom	Most diverse
Undercut banks Snags,	Rocky, soft bottoms	↓
tree roots, logs	Rocky, soft bottoms	Least diverse

Strong – More than one taxa of benthic macroinvertebrate that requires water for their entire life cycle (rheophilic taxa) are present as later instar larvae. Overall there is a balanced distribution of taxa. A list of benthic organisms that indicate perennial features are listed in **Tables 3 and 4**.

Moderate – Only one rheophilic taxon was found in the sample, however sample is diverse. Overall there is a balanced distribution of taxa.

Weak – Rheophilic taxa are not present in the sample; however other types of benthic macroinvertebrates are present. Both diversity and abundance are low or not distributed evenly.

Poor – Benthic macroinvertebrates are not present.

Table 3. Ephemeroptera, Plecoptera, and Trichoptera (EPT) perennial indicator taxa

	Ephemeroptera (Mayflies)	Plecoptera (Stoneflies)	Trichoptera (Caddisflies)
Family:	Caenidae	Peltoperlidae	Hydropsychidae
	Ephemerellidae	Perlidae	Lepidostomatidae
	Ephemeridae	Perlodidae	Molannidae
	Heptageniidae		Odontoceridae
			Philopotamidae
			Polycentropodidae
			Psychomyiidae
			Rhyacophilidae

Table 4. Additional indicators of perennial features

	Megaloptera	Odonata	Diptera	Coleoptera	Mollusca
Family:	Corydalidae Sialidae	Aeshnidae Calopterygidae Cordulegastridae Gomphidae	Ptychopteridae	Psephenidae Elmidae	Unionidae Ancylidae Pleuroceridae
Family & *Genus*:			Tipulidae *Tipula* sp.	Dryopidae *Helichus* sp.	

2.6. Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa

The larval stages of many species of these three orders require a period of at least a year, submerged in a constantly flowing aquatic environment before reaching maturity and therefore are commonly associated with perennial systems. Studies conducted by North Carolina State University have found that benthic samples collected in intermittent systems frequently display crustaceans (crayfish, isopods, and amphipods) as the dominant order (NCDWQ 2005). In sample reaches with more perennial characteristics, EPT taxa were collected. In highly urbanized areas, these indicators may be absent due to degradation and, therefore, may not be appropriate to evaluate perennial or intermittent flow conditions. These lists should be carefully evaluated (family or genus level ID) since some genera, such as the *Baetis* mayflies for example, are very short-lived in their aquatic life stages.

Present – EPT taxa are found within the sample reach.
Absent – EPT taxa are not found within the sample reach.

Any collection and identification of aquatic species should be performed by a qualified aquatic biologist, environmental scientist, or other professional.

2.7. Fish (quantitative observations)

Fluctuating water levels of intermittent systems provide unstable and stressful habitat conditions for fish communities. When looking for fish, all available habitats should be observed, including pools, riffles, root clumps, and other obstructions (to greatly reduce surface glare, the use of polarized sunglasses is recommended). In small streams, the majority of species usually inhabit pools and runs. Check several areas along the sample reach, especially underneath undercut banks. In most cases, fish are indicators of perennial systems, since fish will rarely inhabit an intermittent stream.

Fish should be collected, measured, and classified to verify if fish are present in a water body and to help confirm the appropriate hydrological determination. Best professional judgment should be exercised to determine sampling methodology (e.g. shocking, seining, etc.) and to ensure that safety concerns are addressed.

Strong – Fish are present in all habitats (riffles, pools, runs, root clumps, undercut banks, etc.). Multiple age classes are present and evenly represented. Large-bodied fish may be present.

Moderate – Fish are evident in fewer numbers with one age class dominating. Some habitat is not occupied. Large-bodied fish may be present.

Weak – Fish are not readily visible, require 10 or more minutes to locate, and are typically found within one habitat type (e.g. pools, runs). Very sparse.

Poor – Fish are not found within the sample reach.

IV. OVERALL SCORE INTERPRETATION

The final determination of whether a stream is ephemeral, intermittent, or perennial is based on a variety of information including the total score, supporting information, and professional judgment. The use of the Level 1 Evaluation should, in most cases, provide enough information to accurately distinguish between ephemeral, intermittent, and perennial systems. Scores should reflect the persistence of water with higher scores indicating intermittent and perennial systems. However, if a stream is recognized as borderline (i.e. gray zone – see **Table 5**) or if observations are made during a severe or extreme drought (12-month SPI value less than -1.5), then a Level 2 Evaluation that relies on more intensive and focused data collection can be used to make a final hydrological determination or to verify the Level 1 evaluation.

For a Level 1 Evaluation a minimum total score of 9.0 is set as a guideline to distinguish ephemeral channels from non-ephemeral ones unless there are aquatic macroinvertebrates and/or fish, in which case at least one of the Clean Water Act Section 101(a)(2) objectives is attainable and the stream is at least intermittent. In addition, a Level 1 score greater than 22.0 distinguishes perennial streams from non-perennial streams. SWQB recognizes that there is inherent variability in nature, therefore Level 1 scores between 9 and 12 may be ephemeral but will be recognized as intermittent until further data collection and analysis through a Level 2 evaluation or detailed UAA can more clearly determine that the stream is ephemeral. Similarly, Level 1 scores between 19 and 22 may be intermittent but will be recognized as perennial until further data collection and analysis indicate that the stream is intermittent. **Table 5** summarizes interpretation of Level 1 scoring. In most instances, the use of a Level 1 Evaluation should be sufficient to make a final hydrological determination. A hydrological determination does not change the designated use for a waterbody without the completion of a UAA in accordance with 40 CFR 131.10, 20.6.4.15 NMAC and the State's approved Water Quality Management Plan/Continuing Planning Process (WQMP/CPP). **If after conducting Level 1 Evaluation, a hydrological determination <u>cannot be made</u> because more information is required, then a Level 2 Evaluation which uses more intensive data collection can be conducted.**

Table 5. Summary of Level 1 Score Interpretation

Waterbody Type	Level 1 Total Score	Hydrology Determination
Ephemeral	**Less than 9.0***	**Stream is ephemeral**
≥ 9.0 and < 12.0		Stream is recognized as intermittent until further analysis indicates that the stream is ephemeral
Intermittent	**≥ 12.0 and ≤ 19.0**	**Stream is intermittent**
> 19.0 and ≤ 22.0		Stream is recognized as perennial until further analysis indicates that the stream is intermittent
Perennial	**Greater than 22.0**	**Stream is perennial**

* If there are aquatic macroinvertebrates and/or fish the stream is at least intermittent.

If a sample reach is recognized as borderline (within the gray zones), reaches upstream and downstream of the study area should be assessed to better evaluate the changes in stream classifications along a channel. Additional supporting information can be used to help make the final determination. This supporting information may include, but is not limited to:

Observation of flow: Observation of flow under certain seasonal or hydrological conditions can directly support classifying a stream reach as intermittent or perennial. Conditions supporting a perennial stream classification include:

Stream reaches with flow during the dry season or periods of drought are likely perennial. The longer the period from the last substantial rainfall the stronger the presence of flow supports the perennial stream determination. Although the presence of flow during a drought indicates perennial conditions, care must be taken in evaluating the upper limits of perenniality because some perennial streams may only contain isolated pools of water or be dry during periods of drought.

Key biological indicators: As discussed in the Level 2 Evaluation, the presence of aquatic organisms whose life cycle requires residency in flowing water for extended periods (especially those one year or greater) is a strong indication that a stream reach is perennial. If a stream or river is recognized as borderline, a qualified aquatic biologist/environmental scientist should evaluate the presence and abundance of such macroinvertebrate and vertebrate species before determining the final stream classification.

Other additional supporting information that may be considered:

- Groundwater contour maps or nearby, local well logs.
- Information provided by a long-term resident and/or local professional who has observed the stream during the various seasons and hydrological conditions.
- Review of historic information such as aerial photography.
- Professional judgment may be used in conjunction with the total score and supporting information in making the final determination.

The total score can be affected by seasonal or hydrological conditions as well as man-made impacts such as irrigation diversions or livestock impoundments associated with activities in the watershed. For example, a sample reach may score lower in drought conditions due to the lack of biological and/or certain hydrological indicators. However, a reach may score higher on certain indicators such as drift lines and alluvial deposits if directly below a stormwater outfall. The final hydrological determination should take these factors into account.

The *Hydrology Protocol* is considered to be an evolving, living document. Current thresholds are based on data collected by SWQB during the 2008 and 2009 field seasons from 57 stream reaches throughout the state of New Mexico. An analysis of these data was performed to determine which indicators clearly differentiated the three types of streams and to identify threshold values for scoring. In the event that new data indicate the threshold values used in this protocol are not appropriate and/or if new standards are adopted, SWQB will review the protocol, the related threshold values and differentiating scores. Revisions to the protocol will be proposed to the WQCC as needed in accordance with the process for updating the Water Quality Management Plan/Continuing Planning Process.

V. LITERATURE CITED

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New Mexico Environment Department Surface Water Quality Bureau
LEVEL 1 Hydrology Determination Field Sheet

<table>
<tr><td colspan="3">Date:</td><td colspan="2">Time:</td><td colspan="2">Evaluators:</td></tr>
<tr><td colspan="4">Stream Name:</td><td colspan="3">Site Description:</td></tr>
<tr><td colspan="4">WQS as found under NMAC (20.6.4):</td><td colspan="3">Assessment Unit:</td></tr>
<tr><td colspan="4">Starting Latitude:</td><td colspan="3">Ending Latitude:</td></tr>
<tr><td colspan="4">Starting Longitude:</td><td colspan="3">Ending Longitude:</td></tr>
<tr><td colspan="4">Starting Elevation:</td><td colspan="3">Ending Elevation:</td></tr>
<tr><td colspan="7">TOTAL POINTS*:
*See Hydrology Protocol for determination</td></tr>
<tr><td rowspan="3">WEATHER CONDITIONS</td><td colspan="2">DROUGHT CONDITIONS:</td><td>Nearest weather station:</td><td colspan="2">PAST 48 HOURS**:</td><td>CURRENTLY**:</td></tr>
<tr><td colspan="2">12-mo. SPI Value:
12-mo. SPEI Value:
Drought Condition:
Obtained from:
Date Obtained:</td><td>Precipitation past 48 hours:</td><td colspan="2">___ storm (heavy rain)
___ rain (steady rain)
___ intermittant rain
___ % cloud cover
___ clear/sunny</td><td>___ storm (heavy rain)
___ rain (steady rain)
___ intermittant rain
___ % cloud cover
___ clear/sunny</td></tr>
<tr><td colspan="6">**Field evaluations should be performed <u>at least</u> 48 hours after the last major rainfall event.</td></tr>
<tr><td rowspan="4">SITE OBSERVATIONS ALONG ENTIRE REACH</td><td colspan="6">Nearest Stream Modification (description and proximity):</td></tr>
<tr><td colspan="6">Nearest Diversion (description and proximity):</td></tr>
<tr><td colspan="6">Nearest Discharge (description and proximity):</td></tr>
<tr><td colspan="6">Include any and all modifications/discharges and diversions regardless of perceived impact to hydrologic regime along with any field observations</td></tr>
<tr><td rowspan="6">CALCULATIONS FOR DETERMINING FLOODPLAIN AND CHANNEL DIMENSIONS (Use for 1.8 on Field Survey)</td><td>Thalwag Height (#1)</td><td>Bankfull Height (#2)</td><td>Change in Height (#1 - #2)</td><td>Change in Height x 2 (#3)</td><td colspan="2">Flood-prone Area Height (#1-#3)</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
<tr><td colspan="4">Flood-prone width:</td><td colspan="2"></td></tr>
<tr><td colspan="4">Bankfull Width:</td><td colspan="2"></td></tr>
<tr><td colspan="4">Flood-prone Width to Bankfull Width Ratio:</td><td colspan="2"></td></tr>
<tr><td colspan="6">Alternative Methods used (describe)?</td></tr>
<tr><td rowspan="7">PHOTO DOCUMENTATION (include additional photographs as attachment)</td><td>Time</td><td>Photo #</td><td>Description</td><td>Identifiable References</td><td colspan="2">Photographer</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
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<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
<tr><td>OTHER SITE CHARACTERISTIC NOTES/ SCHEMATICS</td><td colspan="6"></td></tr>
</table>

LEVEL 1 INDICATORS	Stream Condition (identify all that apply then choose most prominent score)			
	Strong	**Moderate**	**Weak**	**Poor**
1.1 Water In Channel	☐ Flow is evident throughout reach ☐ Flow is observed in riffles ☐ Flow may not be evident in runs	☐ Wet Channel ☐ Flow is barely discernable ☐ Floating object needed to observe flow	☐ Dry Channel with standing pools ☐ Saturated or moist sediment under rocks/debris ☐ Evidence of base flows	☐ Dry Channel ☐ Dry under rocks/debris ☐ No evidence of base flows
	6	**4**	**2**	**0**
	Notes/Comments:			
1.2 Fish in Channel	☐ Found easily ☐ Found consistently throughout reach	☐ Found with little difficulty ☐ Not consistent throughout reach	☐ Found with difficulty (10 or more minutes of searching)	☐ Not present (after 10 or more minutes of searching)
	3	**2**	**1**	**0**
	Species Observed and Notes/Comments:			
1.3 Benthic Macroinvertebrates in Channel	☐ Found easily ☐ Found consistently throughout reach	☐ Found with little difficulty ☐ Not consistent throughout reach	☐ Found with difficulty (10 or more minutes of searching)	☐ Not present (after 10 or more minutes of searching)
	3	**2**	**1**	**0**
	Species Observed and Notes/Comments:			
1.4 Filamentous Algae/Periphyton in Channel	☐ Found easily ☐ Found consistently throughout reach	☐ Found with little difficulty ☐ Not consistent throughout reach	☐ Found with difficulty (10 or more minutes of searching)	☐ Not present (after 10 or more minutes of searching)
	3	**2**	**1**	**0**
	Notes/Comments:			
1.5 Vegetation along cooridor (within floodplain)	☐ Dramatic compositional species difference between upland and riparian corridor ☐ Distinct riparian corridor exists along entire reach ☐ Riparian, aquatic or wetland species dominate entire reach	☐ Distinct riparian corridor exists but not along entire reach ☐ Compositional species difference between upland and riparian corridor ☐ Riparian species interspersed with upland species	☐ Minimal compositional species difference between upland and riparian corridor ☐ Vegetation growing along the riparian area occurs in greater density or grows more vigorously than in the adjacent uplands	☐ No compositional species difference between upland and riparian corridor ☐ Vegetation growing along the riparian cooridor does not occur in greater density or grow more vigorously than in the adjacent uplands
	3	**2**	**1**	**0**
	Species Observed and Notes/Comments:			
1.6 Rooted Upland Plants in Channel	☐ Rooted upland plants are absent within the streambed/thalweg	☐ There are a few rooted upland plants within the streambed/thalweg	☐ Rooted upland plants are consistently dispersed throughout the streambed/thalweg	☐ Rooted upland plants are prevalent within the streambed/thalweg
	3	**2**	**1**	**0**
	Species Observed and Notes/Comments:			
			SUBTOTAL (1.1-1.6)	

1.7 Sinuosity of Segment (for length no less than two meanders)	☐ Calculated ratio > 1.4 ☐ Numerous closely spaced bends ☐ Few straight sections	☐ Calculated ratio 1.4 <> 1.2 ☐ Mostly bends ☐ Some straight sections	☐ Calculated ratio 1.2 <> 1.0 ☐ Few bends ☐ Mostly straight sections	☐ Calculated ratio = 1.0 ☐ Completely straight
	3	2	1	0
	☐ Calculated ☐ Observed	Notes/Comments:		
1.8 Floodplain and Channel Dimensions	☐ Calculated ratio > 2.5 ☐ Minimally confined ☐ Wide, active floodplain	☐ Calculated ratio 2.5 <> 1.2 ☐ Moderately confined ☐ Floodplain active during larger events	☐ Calculated ratio < 1.2 ☐ Incised/confined channel ☐ Flooplain absent or narrow ☐ Floodplain not connected	
	3	1.5	0	
	☐ Calculated ☐ Observed	Notes/Comments:		
1.9 In-Channel Structure: Riffle-Pool Sequence	☐ Frequent number of riffle and pools observed throughout reach ☐ Obvious transition between riffles and pools	☐ Less frequent number of riffle and pools ☐ Transition between riffles and pools difficult to distinguish	☐ Mostly has areas of pools <u>or</u> of riffles	☐ No riffles or pools observed
	3	2	1	0
	Notes/Comments:			
			SUBTOTAL (1.1-1.9)	
1.10 Particle Size or Stream Substrate Sorting	☐ Particle sizes in the channel are noticeably different from particle sizes outside the channel in the flood-prone area. ☐ Clear distribution of various sized substrates in the stream channel.	☐ Particle sizes in the channel are moderately similar to particle sizes outside the channel in the flood-prone area. ☐ Various sized substrates are present in the stream channel. ☐ Higher ratio of larger particles (gravel/cobble).	☐ Particle sizes in the channel are similar or comparable to particle sizes outside the channel in the flood-prone area. ☐ Substrate sorting is not readily observed in the stream channel.	
	3	1.5	0	
	☐ Calculated ☐ Observed	Notes/Comments:		
1.11 Hydric Soils Within Flood-Prone Area	☐ Hydric soils were observed in reach	☐ Hydric soils were not observed in reach		
	3	0		
	Notes/Comments:			
1.12 Sediment on Plants and Debris	☐ Sediment found readily on plants and debris in: ☐ channel ☐ streambank ☐ floodplain	☐ Sediment found but not prevalent on plants and debris. ☐ Sediment mostly accumlated on plants and debris in pools	☐ Sediment on plants and debris is isolated in small amounts along the sample reach.	☐ No sediment is present on plants or debris.
	1.5	1	0.5	0
	Notes/Comments:			
1.13 Seeps and Springs	☐ Seeps and/or springs present in reach	☐ Seeps and/or springs not present in reach		
	1.5	0		
	Notes/Comments:			
1.14 Iron Oxidizing Bacteria/Fungi	☐ Iron-oxizing bacteria/fungi present in reach	☐ Iron-oxizing bacteria/fungi not pressent in reach		
	1.5	0		
	Notes/Comments:			
			TOTAL POINTS (1.1-1.14)	

Total <9, the stream is determined to be EPHEMERAL.
Total ≤9 and <12, the stream is determined to be INTERMITTENT until further analysis indicates otherwise
Total ≥ 12.0 and ≤ 19.0, the stream is determined to be INTERMITTENT
Total > 19.0 and ≤ 22.0, the stream is determined to be PERENNIAL until further analysis indicates otherwise
Total > 22.0, the stream is determined to be PERENNIAL.

Exhibit 71

United States
Environmental Protection
Agency

Office Of Water
(EN-336)

EPA/505/2-90-001
PB91-127415
March 1991

Technical Support Document For Water Quality-based Toxics Control

value; the more irregular the flow (resulting from curves, sidewall interference, etc.), the higher the value. Values approaching and exceeding 1.0 are normally associated with significant channel meandering [42]. The following equation for shear velocity should be used [16]:

$$u^* = (gds)^{1/2}$$

where

- g = acceleration due to gravity
- s = slope of the channel
- d = water depth.

For diffusers that initially spread the discharge across a significant part of the river width or for cases where the discharge-induced mixing causes mixing across a significant part of the river width, the values of m and X_m can be smaller than the ones indicated here. For distances greater than X_m, the models for completely mixed effluents discussed in Section 4.5 can be used to calculate concentrations at these distances. For shorter distances, maximum concentrations can be much greater than those predicted by "completely mixed" models and should be estimated using the following equation:

$$C_x = \frac{C_e Q_e W}{Q_s (\pi D_y X/u)^{1/2}}$$

where

- C_x = maximum pollutant concentration distance x from the outlet
- C_e = effluent concentration
- Q_e = design effluent flow
- Q_s = design stream flow
- D_y = lateral dispersion coefficient
- X = distance from the outlet
- W = stream width
- u = flow velocity for the design flow.

It should be noted that this estimate of C_x is a worst-case prediction since the equation assumes no significant discharge-induced mixing and a neutrally buoyant effluent. A more accurate way to predict concentrations within this second stage of mixing is to use the methods of Yotsukura and Sayre [42]. To use this approach, however, the value of D_y and pollutant concentrations after discharge-induced mixing must be known from tracer studies and/or from the use of one of the discharge-induced models.

The PSY model can be used to predict ambient mixing in shallow, freshwater streams where water depth is small in proportion to the width. PSY is a steady-state, two-dimensional plume model that predicts dilution of a surface discharge into a shallow receiving water where the plume attaches to both bottom and nearshore [43]. Uniform vertical mixing is assumed to occur at the point of discharge.

Ambient mixing is minor for lakes and reservoirs because flow velocity is assumed to be minimal and mixing is accomplished by means of the discharge momentum and buoyancy. For estuaries that are completely mixed with regard to salinity, the equations presented above can be used to estimate concentrations between the outlet and the point of complete mixing with a slight modification of shear velocity. The above equations will be applicable to only unstratified estuaries since the time required to mix across the estuary must be significantly less than the time required for the effluent to pass out of the unstratified part of the estuary, the time required for the effluent to pass into a segment of greatly changed cross-section, or the time required for the substance to decay. When the above equations for estuaries are used, the velocity of the design flow should include the velocity associated with the inflow of freshwater as well as the tidal velocity; thus u_t, which is based on an average total velocity; is substituted for u in the equations and shear velocity becomes

$$u^* = 0.10\, u_t.$$

The CORMIX expert system model can also be used to obtain predictions for the ambient-induced mixing. In addition to the routines for discharge-induced mixing, this model also includes predictive elements that apply to ambient mixing in riverine, lake, or coastal situations.

4.5 COMPLETELY MIXED DISCHARGE RECEIVING WATER SITUATIONS

At the present time, most States and EPA Regions use steady-state models that assume the wastewater is completely mixed with the receiving waters in order to calculate WLAs for contaminants. This approach is appropriate for conventional contaminants where critical environmental effects are expected to occur far downstream from the source. WLAs for toxic chemicals require a different approach, however, because critical environmental conditions occur near the discharge before complete mixing with the receiving water occurs. Consequently, mixing analyses should be performed because many of these toxicants can exert maximal toxicity in a variety of regions spanning from the discharge point to significant distances downstream.

If complete mixing occurs near the discharge point, such as in effluent-dominated receiving streams, then steady-state models may be used to calculate TMDLs. Recent EPA developments in the identification of critical design flows based on toxicological concerns provide for better use of steady-state models in calculating toxic WLAs. However, if complete mixing does not occur near the discharge point and the effluent plume is discernible downriver, then modeling techniques that can simulate and predict mixing conditions are more appropriate. The mixing zone models presented in the previous section may be used to define the mixing zone. However, they only determine the dispersion and dilution of the effluent and do not account for chemical or biological processes in the mixing zone. TMDL models are available that can simulate mixing processes and predict areas of maximal concentrations in the receiving stream based on chemical, biological, and physical processes.

4.5.1 Wasteload Modeling Techniques

1) Steady-State Modeling Techniques

A steady-state model requires single, constant inputs for effluent flow, effluent concentration, background receiving water concentration (RWC), receiving water flow, and meteorological conditions (e.g., temperature). The frequency and duration of ambient concentrations predicted with a steady-state model must be assumed to equal the frequency and duration of the critical receivnitude of effluent concentrations; no changes are assumed to occur in effluent flows or in the relative variability of effluent concentrations. With these assumptions, no additional model runs are needed to determine the allowable distribution for effluent concentrations. The other approach assumes that the required effluent concentration distribution is the same as the existing distribution except that it is reduced in magnitude by whichever is greater—the percentage necessary for the 1-day average concentrations to meet the CMC, or the 4-day average concentrations to meet the CCC at the desired recurrence interval. Chapter 5 includes details on how permit limits are derived from the mean and coefficient of variation of effluent concentrations determined from this analysis.

The second approach for determining the allowable effluent concentration distribution is based on the assumption that effluent concentrations after treatment will not have the same CV as concentrations before treatment. Studies have documented that advanced secondary treatment increases the CV of BOD and total suspended solids concentrations compared to secondary treatment. Where feasible, investigations should be conducted to evaluate how treatment processes for heavy metals, organic chemicals, and effluent toxicity will change the variability of these constituents. The development documents mentioned above also provide some variability data for treatment processes. To account for a change in variability, an alternative approach should be used to determine the allowable effluent distribution. Iterative model runs can be performed using different concentration means with the effluent "future treatment" variance until a mean is found that meets the criteria at the desired recurrence intervals. These iterative model runs require stochastic generation of effluent input data since daily effluent concentrations will not be available for the hypothetical treatment schemes. The required "future treatment" mean and CV of effluent concentration can then be used to set permit limits (see Chapter 5).

EPA's Office of Water Regulations and Standards developed an interactive preprocessor for DYNTOX that automatically creates input for continuous simulation models, randomly selects the sets of input data required for Monte Carlo simulations, and performs the numerical integration calculation for the lognormal probabilistic model. DYNTOX is available from the EPA CEAM, Environmental Research Laboratory (ERL) [54]. If the observed data base is fairly complete but missing a few points, a linear interpolation scheme is used to fill in the missing data. If data are scarce, a lag-one Markov method is used to generate daily data stochastically. The lag-one Markov method uses the mean, standard deviation, and daily correlation coefficient of the observed data to create random sequences of data having the same statistical properties. The interactive program is written in FORTRAN and is available for use on mainframe or IBM PC-compatible computers.

Two common methods exist to calculate the return period for a given concentration from probabilistic modeling: the **percentile method** and the **extrema method**. The percentile method used by DYNTOX ranks a listing of all individual daily concentrations. The return period for a concentration is then calculated based on the percentile occurrence. In the extrema method, only annual extrema values are used in the ranking. The return periods calculated from these two methods are equally valid statistical representations. When using the percentile method, results express an average return period and multiple occurrences within any year. The extrema method describes the return period for an annual extreme and includes only the extreme of multiple occurrences within a year.

4.5.3 General Recommendations for Model Selection

The reliability of the predictions from any of the modeling techniques depends on the accuracy of the data used in the analysis. The minimum data required for model input include receiving water flow, effluent flow, effluent concentrations, and background concentrations. In many locations, stream flow data should be sufficient for both steady-state and dynamic models. At least 30 years of flow data should be available if excursions of the CMC and CCC must be evaluated at rare frequency of once in 10 or 20 years. Measurements of effluent toxicity or individual toxicity can be much more limited.

If only a few toxicant or effluent toxicity measurements are available, steady-state assessments should be used. Modeling also should be limited to steady-state procedures if a daily receiving water flow record is not available; however, in effluent-dominated situations, critical flow may be used to characterize the receiving stream. Appendix D describes how to select appropriate design flows if State regulations do not require a specific design flow for river WLAs. Fate and transport models or dilution calculations can be used for individual toxicants. At the present time, only dilution calculations or first-order decay equations are recommended for effluent toxicity analyses. Chapter 1 discusses the conservative/additive assumption for toxicity.

If adequate receiving water flow and effluent concentration data are available to estimate frequency distributions, one of the dynamic modeling techniques should be used to develop more cost-effective treatment requirements. If the effluent data exhibit significant seasonal differences or batch process trends, the continuous simulation approach may be the easiest dynamic modeling method to use. The best results will, of course, be obtained if daily effluent flows and concentrations are available for model input for an entire year. The lag-one Markov technique can be used to generate daily effluent data for the entire simulation as long as adequate measurements for the site-specific facility (or a similar one) are available to estimate a day-to-day correlation coefficient and to determine when seasonal or batch process changes in effluent quality occur.

If adequate receiving water flow and effluent concentration data are available and if effluent data exhibit no seasonal or batch process trends, lognormal and Monte Carlo methods may be easier and require less computer time than the continuous simulation approach.

4.5.4 Specific Model Recommendations

The following section recommends models for toxicity and individual toxicants for each type of receiving water—rivers, lakes, and estuaries. Detailed guidelines on the use of fate and transport models of individual toxicants are included in the toxic TMDL guidance available from the Monitoring Branch of EPA's Office of Water Regulations and Standards [5, 6, 7] and Office of Research and Development [55]. These manuals describe in detail the duration. The technical basis for setting these values is discussed in the following sections.

1) Averaging Periods

The duration of the averaging period for the WLA should be selected to be consistent with the assumptions used to derive the water quality criteria. Two categories of pollutants should be recognized: carcinogens and noncarcinogens.

The human health criteria for carcinogens are derived assuming lifetime exposure. The upper-bound risk is directly proportional to the lifetime arithmetic mean dose. The criteria thus apply to the ambient water concentrations averaged over a 70-year period.

The duration of exposure assumed in deriving criteria for noncarcinogens may be ambiguous, particularly where a criterion is derived from animal studies. Furthermore, the duration may be highly variable, ranging as high as 20 to 30 years for cadmium.

2) Dilution Design Conditions

a) Carcinogens: River and Stream Discharge Situations

In well-mixed situations, the RWC, C, is determined by the pollutant load, W (mass/time), and the combined receiving water plus effluent flow, Q, such that, C = W/Q.

The long-term harmonic mean flow is recommended as the design flow for carcinogens. The recommendation of long-term harmonic mean flow has been derived from the definition of the human health criteria (HHC) for carcinogenic pollutants. The adverse impact of carcinogenic pollutants is estimated in terms of receptors (human) lifetime intakes. To be within the acceptable level of life-time body-burden of any carcinogen, such intakes should not exceed the HHC during the average life-time of the receptor. A life-time for exposure to carcinogenic pollutants is defined as 70 years, or approximately 365 (days/year) multiplied by 70 years.

The HHC for carcinogenic pollutants can be numerically expressed as:

$$HHC = C\ (design) = (C_1 + C_2 + C_3 + \text{-----} + C_n)/n$$

where
n = (365 days/year) x 70 years
C = concentrations

Based on an assumption of a constant daily load from a treatment facility, the fully mixed instream concentration will go up or down inversely with the ups and downs of receiving water flows. Therefore, instream concentration is a function of, and inversely proportional to, the streamflow downstream of the discharge. Using this concept, 1/Q can be substituted for C, as follows:

$$1/Q\ (design) = (1/Q_1 + 1/Q_2 + 1/Q_3 + \text{-----} + 1/Q_n)/n.$$

The stream design flow (Q design) can then be shown as follows:

$$Q\ (design) = n/(1/Q_1 + 1/Q_2 + 1/Q_3 + \text{-----} + 1/Q_n)$$

The harmonic mean is expressed as follows:

$$Q\ (design) = n/\sum_{i=1}^{n} (1/Q_i)$$

where
n = the number of recorded flows.

The harmonic mean is always less than the arithmetic mean. The harmonic mean is the appropriate design flow for determining long-term exposures using steady-state modeling of effluents. The arithmetic mean flow is not appropriate as the design flow since it overstates the dilution available. Extreme value statistics (such as 7Q10 or 30Q5) are also not appropriate since they have no consistent relationship with the long-term mean dilution. However, for situations involving seasonably variable effluent discharge rates, hold-and-release treatment systems, and effluent-dominated sites, the harmonic mean may not be appropriate. In these cases, the effluent load and downstream flow are not independent (i.e., they are correlated). Modeling techniques that can calculate an average daily concentration over a long period of time are more appropriate to determine the long-term exposure in these cases.

The harmonic mean flow may be estimated by any of several methods [8], assuming that flows are approximately lognormally distributed:

$$Q_{hm} = \frac{Q_{gm}^2}{Q_{am}}$$

where
Q_{gm} is the geometric mean flow
Q_{am} is the arithmetic mean flow.

For U.S. Geological Survey flow records, summaries of the statistical parameters needed to estimate the harmonic mean can be quickly obtained from STORET, through a user-friendly procedure for permit writers, as described in Appendix D.

WQAB DFLOW is a software package available for computation of harmonic mean flow. The DFLOW program (as discussed below and described in Appendix D) should be used with data that are not lognormally distributed.

To develop some quantitative sense of how a long-term harmonic mean flow of any stream compares with its 7Q10 flow, the Assessment and Watershed Protection Division and the Risk Reduction Engineering Laboratory at Cincinnati, Ohio, analyzed flow records of 60 streams selected at random throughout the United States. These are the same stream flow records that had been analyzed for stream design flow condition for aquatic life protection as listed in EPA guidance [8]. Based on the long-term harmonic flow and 7-day, 10-year low-flow estimates for these 60 streams, the long-term harmonic mean flows of all 60 streams were equal to or greater than two times the 7Q10 low flow. Fifty-four of the streams' harmonic mean flows were equal to or greater than 2.5 times their 7Q10 low flows. Finally, 40 of the 60 streams' harmonic mean flows were equal to or greater than 3.5 times the 7Q10.

Based on the above observations, permit authorities may choose a multiplication factor of 3 x 7Q10 to estimate stream design flow for human health protection for carcinogenic pollutants. How-

For example, some permitting authorities assume a value for the CV and an acute to chronic ratio above which the chronic WLA will always be more limiting. Where such simplifying assumptions are used, the need to compare LTAs derived from acute and chronic steady-state models is unnecessary. Similarly, for assumed values for n, CV, and exceedence probability, the various equations shown in Box 5-2 can be simplified further, such that the AML will always be a constant fraction of the MDL.

These approaches allow the permit writer to rapidly and easily translate the results of WLAs into permit limits. However, the permit writer clearly should understand the underlying procedures and carefully explain the basis for the chosen assumption. Appropriate State or regional guidance documents also should be referenced.

Another approach used by some permit authorities involves the direct use of the WLA as a permit limit. This approach sometimes involves the following steps:

- The WLA value for toxic pollutants is used as the MDL.
- In the absence of other information, permit writers typically divide the MDL by 1.5 or 2.0 to derive an AML (depending on the expected range of variability).

The principal advantage of this approach is that it is very straightforward to implement and requires minimal resources. The disadvantage of this option is that the average monthly limits must be derived without any information about the variability of the effluent parameter; therefore, the permit writer cannot be sure that these procedures are protective of water quality criteria. Conversely, limits derived from this approach may be overly stringent and subject to challenge.

The direct application of both the acute and chronic WLAs as permit limits is another approach that has been used. The WLA developed for protection against chronic effects becomes the average monthly limit and the acute WLA becomes the MDL. **EPA discourages the use of this approach.** Since effluent variability has not been specifically addressed with this approach, compliance with the monthly average (30-day) effluent limit during critical conditions could exceed the chronic (4-day) WLA. Whether standards are violated with excessive frequency under such conditions would depend upon whether the conditions represented by the worst-case assumptions of the model also were occurring at the same time. By contrast, compliance with limits that were developed using statistical procedures have a low chance of leading to WLA excursions before effluent variability is accounted for in deriving the limits (see Figure 5-3).

Another permitting approach is to use a narrative "no toxicity" limit that is measured using a toxicity testing method that employs only a control and a single exposure at the receiving water concentration (RWC). This is sometimes referred to as a "pass/fail" toxicity test. Although these tests can be less expensive than full dilution series testing, they provide no knowledge as to the extent of toxicity present during the test and therefore no data concerning the seriousness of the impact or the amount of toxicity reduction necessary. The death of a single test animal can occur at any concentration level beyond the lethality threshold for the test organism; therefore, such a test is much less powerful from a statistical standpoint. In addition, it is not possible to determine dose-response relationships for the test organisms without using multiple effluent concentrations. Dose-response curves are useful in determining quality assurance of the tests and in defining threshold dosages for regulatory purposes. Because the drawbacks of the approach generally outweigh the benefits, **EPA recommends that whole effluent toxicity limits be established using a statistical derivation procedure that adequately accounts for effluent variability and that monitoring for compliance with whole effluent toxicity limits be conducted using a full dilution series.**

When setting a whole effluent toxicity limit to protect against acute effects, some permitting authorities use an end-of-pipe approach. Typically, these limits are established as an LC_{50}>100-percent effluent at the end of the pipe. These limits are routinely set without any consideration as to the fate of the effluent and the concentrations of toxicant(s) after the discharge enters the receiving water. Limits derived in this way are not water quality-based limits and suffer from significant deficiencies since the toxicity of a pollutant depends mostly upon concentration, duration of exposure, and repetitiveness of the exposure. This is especially true in effluent dominated waters. For example, an effluent that has an LC_{50}=100 percent contains enough toxicity to be lethal to up to 50 percent of the test organisms. If the effluent is discharged to a low-flow receiving waterbody that provides no more than a three-fold dilution at the critical flow, significant mortality can occur in the receiving water. Furthermore, such a limit could not assure protection against chronic effects in the receiving waterbody. Chronic effects could occur if the dilution in the receiving water multiplied by the acute to chronic ratio is greater than 100 percent. Therefore, in effluent dominated situations, limits set using this approach may be severely underprotective. In contrast, whole effluent toxicity limits set using this approach in very high receiving water flow conditions may be overly restrictive. **Because of these problems, EPA recommends that all whole effluent toxicity limits be set as water quality-based limits and that to do so, the statistical permit limit derivation procedures discussed in Section 5.4.1 be followed.**

5.4.3 Special Permitting Requirements

Water quality-based permit limit development for discharges to marine and estuarine waters follows the same basic steps as the water quality-based approach for freshwater discharges. There are some differences in the water quality criteria used as the basis for protection, the designation of mixing zones, and the water quality models used to develop WLAs; however these differences are addressed in the WLA. (See discussions of these elements in previous chapters.) In addition, there are some special regulatory considerations associated with these types of dischargers, including special reviews of permits with such programs as the Coastal Zone Management Program. Some discharges also require an Ocean Discharge Criteria Evaluation under Section 403(c) of the Clean Water Act (CWA).

5.4.4 EPA Recommendations for Permitting for Human Health Protection

Permit development to protect against certain routes of exposure is another key consideration. Ingesting contaminated fish and shellfish is a toxic chemical exposure route of serious potential

Exhibit 72

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

Water Quality Control Commission

REGULATION NO. 31 - THE BASIC STANDARDS AND METHODOLOGIES FOR SURFACE WATER

5 CCR 1002-31

[Editor's Notes follow the text of the rules at the end of this CCR Document.]

31.1 AUTHORITY AND SCOPE

This regulation is promulgated pursuant to 25-8-101 et seq., and in particular, 25-8-203 and 25-8-204, C.R.S. It provides basic standards, an antidegradation rule and implementation process, and a system: for classifying state surface waters; for assigning water quality standards; for granting temporary modifications and for periodic review of the classifications and standards.

31.2 PURPOSE

This regulation establishing basic standards and an antidegradation rule and implementation process and establishing a system for classifying state surface waters, for assigning standards, and for granting temporary modifications (hereinafter referred to as "Regulation") is the foundation for the classification of the state surface waters of Colorado, as prescribed by the Colorado Water Quality Control Act.

It is intended to implement the state Act by maintaining and improving the quality of the state surface waters. This regulation is based on the best available knowledge to insure the suitability of Colorado's waters for beneficial uses including public water supplies, domestic, agricultural, industrial and recreational uses, and the protection and propagation of terrestrial and aquatic life.

It is further intended to be consistent with the 1983 and 1985 goals and objectives of the federal Act. This regulation shall be constructed in a manner consistent with these purposes and shall be considered part of the implementation of the 1983 and 1985 goals and objectives.

31.3 INTRODUCTION

This regulation presents a classification system which establishes beneficial use categories together with basic standards (section 31.11), an antidegradation rule (section 31.8), and numeric tables which define the conditions generally necessary to maintain and attain such beneficial uses. In addition, it establishes procedures for classifying the waters of the state, for assigning water quality standards, and for continued review of the classifications and standards.

The classifications set forth in section 31.13 will be assigned by applying the system to specific state surface waters, in accordance with proper procedures, including public hearings. The basic standards and the antidegradation rule will apply to all state surface waters at the effective date of this regulation. Whenever a specific stream segment or body of water receives a classification for one or more of the uses, additional numeric standards may be assigned. When appropriate, achieving water quality standards through innovative solutions or management approaches may be implemented through control regulations, TMDLs, Waste Load Allocations, antidegradation reviews, and permits. All classified uses will be protected. This does not mean that any entity has the right to rely on the presence of specific pollutants in the stream even though those pollutants may be utilized by the entity.

(10) "COMPENSATORY WETLANDS" means wetlands developed for mitigation of adverse impacts to other wetlands (e.g. wetlands developed pursuant to section 404 of the federal Act).

(11) "CONSTRUCTED WETLANDS" means those wetlands intentionally designed, constructed and operated for the primary purpose of wastewater or stormwater treatment or environmental remediation provided under CERCLA, RCRA, or section 319 of the federal Act, if (a) such wetlands are constructed on non wetland sites that do not contain surface waters of the state, or (b) such wetlands are constructed on previously existing wetland sites, to the extent that approval or authorization under section 404 of the federal Act has been granted for such construction or it is demonstrated that such approval or authorization is not, or was not, required. This term includes, but is not limited to, constructed swales, ditches, culverts, infiltration devices, catch basins, and sedimentation basins that are part of a wastewater or stormwater treatment system or a system for environmental remediation mandated under CERCLA or RCRA. Compensatory wetlands shall not be considered constructed wetlands. Constructed wetlands are not state waters.

(12) "CREATED WETLANDS" means those wetlands other than compensatory wetlands created in areas which would not be wetlands in the absence of human modifications to the environment. Created wetlands include, but are not limited to wetlands created inadvertently by human activities such as mining, channelization of highway runoff, irrigation, and leakage from man-made water conveyance or storage facilities. Wetlands resulting from hydrologic modifications such as on-channel reservoirs or on-channel diversion structures that expand or extend the reach of adjacent classified state waters are not considered created wetlands.

(13) "DAILY MAXIMUM TEMPERATURE (DM)" means the highest two-hour average water temperature recorded during a given 24-hour period.

(14) "DISSOLVED METALS" means that portion of a water and suspended sediment sample which passed through a 0.40 or 0.45 um (Micron) membrane filter. Determinations of "Dissolved" constituents are made using the filtrate. This may include some very small (Colloidal) suspended particles which passed through the membrane filter as well as the amount of substance present in true chemical solution.

(15) "DIVISION" means the Division of Administration of the Colorado Department of Public Health and Environment of which the Water Quality Control Division is a part.

(16) "*E.coli*" means *Escherichia coli*.

(17) "EFFLUENT-DEPENDENT STREAM" means a stream that would be ephemeral without the presence of wastewater effluent, but has continuous or periodic flows for all or a portion of its reach as the result of the discharge of treated wastewater.

(18) "EFFLUENT-DOMINATED STREAM" means a stream that would be intermittent or perennial without the presence of wastewater effluent whose flow for the majority of the time is primarily attributable to the discharge of treated water (i.e. greater than 50 percent of the flow consists of treated wastewater for at least 183 days annually, for eight out of the last ten years).

(19) "EPHEMERAL STREAM" means a stream channel or reach of a stream channel that carries flow during, and for a short duration as the result of, precipitation events or snowmelt. The channel bottom is always above the groundwater table.

(c) Duration of a Variance

When a variance is granted, the duration of the variance will be set by the Commission. The duration of a variance shall be determined on a case-by-case basis, based upon all relevant factors, including the potential for achieving more protective effluent levels.

(d) Considerations for Extending a Variance

A variance shall not be extended if the permittee did not submit the reports required under section 31.9(5) and substantially comply with all other conditions of the variance.

31.8 ANTIDEGRADATION

(1) Antidegradation Rule

(a) The highest level of water quality protection applies to certain waters that constitute an outstanding state or national resource. These waters, which are those designated outstanding waters pursuant to section 31.8(2)(a), shall be maintained and protected at their existing quality. Short-term degradation of existing quality is allowed for activities that result in long-term ecological or water quality benefit or clear public interest.

(b) An intermediate level of water quality protection applies to waters that have not been designated outstanding waters or use-protected waters. These waters shall be maintained and protected at their existing quality unless it is determined that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. For these waters, no degradation is allowed unless deemed appropriate following an antidegradation review in accordance with section 31.8(3), except as specified in (i) and (ii) below. 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.

(i) For dissolved iron, dissolved manganese, and sulfate, concentrations may reach the applicable water supply standard without an antidegradation review provided degradation for Aquatic Life based standards is not significant.

(ii) For all other pollutants, no degradation is allowed, unless deemed appropriate following an antidegradation review in accordance with section 31.8(3).

(c) At a minimum, for all state surface waters existing classified uses and the level of water quality necessary to protect such uses shall be maintained and protected. No further water quality degradation is allowable which would interfere with or become injurious to these uses. The classified uses shall be deemed protected if the narrative and numerical standards are not exceeded.

The antidegradation review requirements in section 31.8(3) are not applicable to waters designated use-protected pursuant to section 31.8(2)(b). For these waters, only the protection specified in this subparagraph applies.

(d) Water quality designations and reviewable water provisions shall not be utilized in a manner that is contrary to the provisions of sections 25-8-102 and 25-8-104, C.R.S.

(2) Water Quality-Based Designations

Waters which satisfy the criteria in subparagraph (a) below may be designated by the Commission as “outstanding waters”. Waters which satisfy the criteria in subparagraph (b) below may be designated “use-protected.” Waters not satisfying either set of criteria will remain undesignated, and will be subject to the antidegradation review provisions set forth in section 31.8(3), below.

(a) Outstanding Waters Designation

Waters may be designated outstanding waters where the Commission makes all of the following three determinations:

(i) The existing quality for each of the following parameters is equal to or better than that specified in tables I, II, and III for the protection of aquatic life class 1, recreation class P and (for nitrate) domestic water supply uses:

Table I: dissolved oxygen, pH, *E. coli*

Table II: chronic ammonia, nitrate

Table III: chronic cadmium, chronic copper, chronic lead, chronic manganese, chronic selenium, chronic silver, and chronic zinc

The determination of existing quality shall be based on adequate representative data, from samples taken within the segment in question. Data must be available for each of the 12 parameters listed; provided, that if *E. coli* samples from within the segment are infeasible due to its location, and a sanitary survey demonstrates that there are no human sources present that are likely to impact quality in the segment in question, *E. coli* data will not be required. “Existing quality” shall be the 85th percentile of the data for ammonia, nitrate, and dissolved metals, the 50th percentile for total recoverable metals, the 15th percentile for dissolved oxygen, the geometric mean for *E. coli*, and the range between the 15th and 85th percentiles for pH.

In addition, the foregoing notwithstanding, this test shall not be considered to be met if the Commission determines that, due to the presence of substantial natural or irreversible human-induced pollution for parameters other than those listed above, the quality of the waters in question should not be considered better than necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water.

(ii) The waters constitute an outstanding natural resource, based on the following:

(A) The waters are a significant attribute of a State Gold Medal Trout Fishery, a National Park, National Monument, National Wildlife Refuge, or a designated Wilderness Area, or are part of a designated wild river under the Federal Wild and Scenic Rivers Act; or

(B) The Commission determines that the waters have exceptional recreational or ecological significance, and have not been modified by human activities in a manner that substantially detracts from their value as a natural resource.

(iii) The water requires protection in addition to that provided by the combination of water quality classifications and standards and the protection afforded reviewable water under section 31.8(3).

(b) Use-Protected Designation

These are waters that the Commission has determined do not warrant the special protection provided by the outstanding waters designation or the antidegradation review process.

(i) Waters shall be designated by the Commission use-protected if any of the criteria below are met, except that the Commission may determine that those waters with exceptional recreational or ecological significance should be undesignated, and deserving of the protection afforded by the antidegradation review provisions of section 31.8(3):

(A) The use classifications of the waters include aquatic life warm water class 2, except as provided in subsection (iii) below;

(B) The existing quality for at least three of the following parameters is worse than that specified in tables I, II and III for the protection of aquatic life class 1, recreation class P and (for nitrate) domestic water supply uses:

Table I: dissolved oxygen, pH, E. coli

Table II: chronic ammonia, nitrate

Table III: chronic cadmium, chronic copper, chronic lead, chronic manganese, chronic selenium, chronic silver, and chronic zinc

The determination of existing quality shall be based on adequate representative data, from samples taken within the segment in question. Data must be available for each of the 12 parameters listed; provided, that if *E. coli* samples from within the segment are infeasible due to its location, and a sanitary survey demonstrates that there are no human sources present that are likely to impact quality in the segment in question, *E. coli* data will not be required. “Existing quality” shall be as defined in 31.5; or

(C) The water body was an effluent-dominated or effluent-dependent stream during the period 2000-2009, except that the Commission may determine that the water body should be undesignated, and subject to the protection provided by the antidegradation review process, based on the water body's public resource value and ecological significance. (This provision shall be repealed effective 12/31/2019)

(ii) In addition, waters may be designated use protected even though none of the preceding criteria apply if the Commission determines that due to the presence of substantial natural or irreversible human induced pollution for parameters other than those listed in section 31.8(2)(b)(i)(B) the quality of the waters in question should not be considered better than necessary to support aquatic life class 1 and/or recreation class P uses. In making such a determination about a use-protected designation, the Commission may take into account evidence of exceedances of one or more of the parameters listed in section 31.8(2)(b)(i)(B).

(iii) Waters classified as aquatic life warm water class 2 shall not be designated use-protected solely on the basis of such classification if:

(A) There is adequate representative data available from samples taken within the segment in question for each of the 12 parameters listed in subsection 31.8(2)(b)(i)(B), above, and that data shows that the existing quality for at least 10 of the 12 parameters is equal to or better than that specified in tables I, II and III for the protection of aquatic life class 1, recreation class P and (for nitrate) domestic water supply uses; and

(B) The segment in question is not listed, and does not qualify for listing, for two or more pollutants on Colorado's Section 303(d) List of Water-Quality-Limited Segments Requiring Total Maximum Daily Loads, for an exceedance of chronic or "30-day" numeric standards.

(3) Antidegradation Review Process

(a) Applicability

These 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, including waters previously designated as high quality class 2. These waters are referred to below as "reviewable waters." "Regulated activities" means any activities which require a discharge permit or water quality certification under federal or state law, or which are subject to state control regulations unless the Commission has specified in the control regulation that the antidegradation review process is not applicable. Where possible, the antidegradation review should be coordinated or consolidated with the review processes of other agencies concerning a proposed activity in an effort to minimize costs and delays for such activities.

(b) Division and Commission Roles

For regulated activities, the significance determination set forth in section 31.8(3)(c) and the determination whether degradation is necessary to accommodate important economic or social development in the area in which the waters are located, pursuant to section 31.8(3)(d), shall be made by the Division, subject to a de novo review by the Commission in an adjudicatory hearing, on the Commission's own motion, pursuant to a petition by any interested person who has submitted written comments during the Division review process, or on the Commission's determination pursuant to section 24-4-105(2), C.R.S.

(c) Significance Determination

The initial step in an antidegradation review shall be a determination whether the regulated activity in question is likely to result in significant degradation of reviewable waters, with respect to adopted narrative or numeric standards. The significance determination will be based on the chronic numeric standard and flow for the pollutant of concern except for those pollutants which have only acute numeric standards in which case the acute standard and flow will be used. 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 mitigation measures impacting the segment or segments under review, if such measures are incorporated with the proposed regulated activity. The regulated activity shall be considered not to result in significant degradation, as measured in the reviewable waters segment, if:

Exhibit 73

TITLE 18. ENVIRONMENTAL QUALITY

CHAPTER 11. DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER QUALITY STANDARDS

ARTICLE 1. WATER QUALITY STANDARDS FOR SURFACE WATERS

Tables in Article 1, Appendix A have been updated and now include historical notes (Supp. 16-4).

Article 1, consisting of Appendices A through C, repealed April 24, 1996 (Supp. 96-2).

Article 1, consisting of Section R18-11-103, reserved effective April 24, 1996 (Supp. 96-2).

Article 1, consisting of Sections R18-11-105 and R18-11-106, and Appendices A and B, adopted April 24, 1996 (Supp. 96-2).

Article 1, consisting of Sections R18-11-101 and R18-11-102, R18-11-104, R18-11-107 through R18-11-109, R18-11-111 through R18-11-113, R18-11-115, R18-11-117 and R18-11-118, R18-11-120 and R18-11-121, amended effective April 24, 1996 (Supp. 96-2).

Article 1, consisting of Sections R18-11-101 through R18-11-121 and Appendices A through C, adopted effective February 18, 1992 (Supp. 92-1).

Article 1, consisting of Section R18-11-101, repealed effective February 18, 1992 (Supp. 92-1).

Article 1 consisting of Section R9-21-101 renumbered as Article 1, Section R18-11-101 (Supp. 87-3).

Section

ARTICLE 2. REPEALED

Article 2, consisting of Sections R18-11-201 through R18-11-205, adopted effective February 18, 1992 (Supp. 92-1).

Article 2, consisting of Sections R18-11-201 through R18-11-214 and Appendices A and B, repealed effective February 18, 1992 (Supp. 92-1).

Article 2 consisting of Sections R9-21-201 through R9-21-214 and Appendices A and B renumbered as Article 2, Sections R18-11-201 through R18-11-214 and Appendices A and B (Supp. 87-3).

Section

2020 TR LANL-01649

ARTICLE 1. WATER QUALITY STANDARDS FOR SURFACE WATERS

R18-11-101. Definitions

The following terms apply to this Article:

1. "Acute toxicity" means toxicity involving a stimulus severe enough to induce a rapid response. In aquatic toxicity tests, an effect observed in 96 hours or less is considered acute.
2. "Agricultural irrigation (AgI)" means the use of a surface water for crop irrigation.
3. "Agricultural livestock watering (AgL)" means the use of a surface water as a water supply for consumption by livestock.
4. "Annual mean" is the arithmetic mean of monthly values determined over a consecutive 12-month period, provided that monthly values are determined for at least three months. A monthly value is the arithmetic mean of all values determined in a calendar month.
5. "Aquatic and wildlife (cold water) (A&Wc)" means the use of a surface water by animals, plants, or other cold-water organisms, generally occurring at an elevation greater than 5000 feet, for habitation, growth, or propagation.
6. "Aquatic and wildlife (effluent-dependent water) (A&Wedw)" means the use of an effluent-dependent water by animals, plants, or other organisms for habitation, growth, or propagation.
7. "Aquatic and wildlife (ephemeral) (A&We)" means the use of an ephemeral water by animals, plants, or other organisms, excluding fish, for habitation, growth, or propagation.
8. "Aquatic and wildlife (warm water) (A&Ww)" means the use of a surface water by animals, plants, or other warm-water organisms, generally occurring at an elevation less than 5000 feet, for habitation, growth, or propagation.
9. "Arizona Pollutant Discharge Elimination System (AZPDES)" means the point source discharge permitting program established under 18 A.A.C. 9, Article 9.
10. "Assimilative capacity" means the difference between the baseline water quality concentration for a pollutant and the most stringent applicable water quality criterion for that pollutant.
11. "Clean Water Act" means the Federal Water Pollution Control Act [33 U.S.C. 1251 to 1387].
12. "Criteria" means elements of water quality standards that are expressed as pollutant concentrations, levels, or narrative statements representing a water quality that supports a designated use.
13. "Critical flow condition" means the lowest flow over seven consecutive days that has a probability of occurring once in 10 years (7 Q 10).
14. "Deep lake" means a lake or reservoir with an average depth of more than 6 meters.
15. "Designated use" means a use specified in Appendix B of this Article for a surface water.
16. "Domestic water source (DWS)" means the use of a surface water as a source of potable water. Treatment of a surface water may be necessary to yield a finished water suitable for human consumption.
17. "Effluent-dependent water (EDW)" means a surface water, classified under R18-11-113, that consists of a point source discharge of wastewater. An effluent-dependent water is a surface water that, without the point source discharge of wastewater, would be an ephemeral water.
18. "Ephemeral water" means a surface water that has a channel that is at all times above the water table and flows only in direct response to precipitation.
19. "Existing use" means a use attained in the waterbody on or after November 28, 1975, whether or not it is included in the water quality standards.
20. "Fish consumption (FC)" means the use of a surface water by humans for harvesting aquatic organisms for consumption. Harvestable aquatic organisms include, but are not limited to, fish, clams, turtles, crayfish, and frogs.
21. "Full-body contact (FBC)" means the use of a surface water for swimming or other recreational activity that causes the human body to come into direct contact with the water to the point of complete submergence. The use is such that ingestion of the water is likely and sensitive body organs, such as the eyes, ears, or nose, may be exposed to direct contact with the water.
22. "Geometric mean" means the nth root of the product of n items or values. The geometric mean is calculated using the following formula:

$$GM_Y = \sqrt[n]{(Y_1)(Y_2)(Y_3)\ldots(Y_n)}$$

23. "Hardness" means the sum of the calcium and magnesium concentrations, expressed as calcium carbonate ($CaCO_3$) in milligrams per liter.
24. "Igneous lake" means a lake located in volcanic, basaltic, or granite geology and soils.
25. "Intermittent water" means a stream or reach that flows continuously only at certain times of the year, as when it receives water from a spring or from another surface source, such as melting snow.
26. "Mixing zone" means an area or volume of a surface water that is contiguous to a point source discharge where dilution of the discharge takes place.
27. "Oil" means petroleum in any form, including crude oil, gasoline, fuel oil, diesel oil, lubricating oil, or sludge.
28. "Outstanding Arizona water (OAW)" means a surface water that is classified as an outstanding state resource water by the Director under R18-11-112.
29. "Partial-body contact (PBC)" means the recreational use of a surface water that may cause the human body to come into direct contact with the water, but normally not to the point of complete submergence (for example, wading or boating). The use is such that ingestion of the water is not likely and sensitive body organs, such as the eyes, ears, or nose, will not normally be exposed to direct contact with the water.
30. "Perennial water" means a surface water that flows continuously throughout the year.
31. *"Pollutant" means fluids, contaminants, toxic wastes, toxic pollutants, dredged spoil, solid waste, substances and chemicals, pesticides, herbicides, fertilizers and other agricultural chemicals, incinerator residue, sewage, garbage, sewage sludge, munitions, petroleum products, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and mining, industrial, municipal, and agricultural wastes or any other liquid, solid, gaseous, or hazardous substance.* A.R.S § 49-201(29)
32. "Practical quantitation limit" means the lowest level of quantitative measurement that can be reliably achieved during a routine laboratory operation.
33. "Reference condition" means a set of ecological measurements from a population of relatively undisturbed waterbodies within a region that establish a basis for making comparisons of biological condition among samples.

19. Stinky Creek, from the White Mountain Apache Indian Reservation boundary to its confluence with the West Fork of the Black River (approximately 3.0 river miles);
20. KP Creek, from its headwaters to its confluence with the Blue River (approximately 12.7 river miles);
21. Davidson Canyon, from the unnamed spring at 31°59'00"/110°38'49" to its confluence with Cienega Creek; and
22. Fossil Creek, from its headwaters at the confluence of Sandrock and Calf Pen Canyons above Fossil Springs to its confluence with the Verde River (approximately 17.2 river miles).

Historical Note

Adopted effective February 18, 1992 (Supp. 92-1). Amended effective April 24, 1996 (Supp. 96-2). Added "water quality standards" to R18-11-112, previously omitted in error (Supp. 96-3). Amended by final rulemaking at 8 A.A.R. 1264, effective March 8, 2002 (Supp. 02-1). Amended by final rulemaking at 14 A.A.R. 4708, effective January 31, 2009 (Supp. 08-4). Amended by final rulemaking at 22 A.A.R. 2328, effective August 2, 2016 (Supp. 16-4).

R18-11-113. Effluent-Dependent Waters

A. The Director shall classify a surface water as an effluent-dependent water by rule.
B. The Director may adopt, under R18-11-115, a site-specific water quality standard for an effluent-dependent water.
C. Any person may submit a petition for rule adoption requesting that the Director classify a surface water as an effluent-dependent water. The petition shall include:
1. A map and a description of the surface water;
2. Information that demonstrates that the surface water consists of a point source discharge of wastewater; and
3. Information that demonstrates that, without a point source discharge of a wastewater, the receiving water is an ephemeral water.

D. The Director shall use the water quality standards that apply to an effluent-dependent water to derive water quality-based effluent limits for a point source discharge of wastewater to an ephemeral water.
E. The Director may use aquatic and wildlife (edw) acute standards only to derive water quality based effluent limits for a sporadic, infrequent, or emergency point source discharge to an ephemeral water or to an effluent-dependent water. The Director shall consider the following factors when deciding whether to apply A&Wedw (acute) standards:
1. The amount, frequency, and duration of the discharge;
2. The length of time water may be present in the receiving water;
3. The distance to a downstream water with aquatic and wildlife chronic standards; and
4. The likelihood of chronic exposure to pollutants.

F. The Director may establish alternative water quality-based effluent limits in an AZPDES permit based on seasonal differences in the discharge.

Historical Note

Adopted effective February 18, 1992 (Supp. 92-1). Amended effective December 18, 1992 (Supp. 92-4). Amended effective April 24, 1996 (Supp. 96-2). Amended by final rulemaking at 8 A.A.R. 1264, effective March 8, 2002 (Supp. 02-1). Amended by final rulemaking at 14 A.A.R. 4708, effective January 31, 2009 (Supp. 08-4).

R18-11-114. Mixing Zones

A. The Director may establish a mixing zone for a point source discharge to a surface water as a condition of an AZPDES permit. A mixing zone is prohibited in an ephemeral water or where there is no water for dilution.
B. The owner or operator of a point source seeking the establishment of a mixing zone shall submit a request to the Director for a mixing zone as part of an application for an AZPDES permit. The request shall include:
1. An identification of the pollutant for which the mixing zone is requested;
2. A proposed outfall design;
3. A definition of the boundary of the proposed mixing zone. For purposes of this subsection, the boundary of a mixing zone means the location where the concentration of wastewater across a transect of the surface water differs by less than five percent; and
4. A complete and detailed description of the existing physical, biological, and chemical conditions of the receiving water and the predicted impact of the proposed mixing zone on those conditions.

C. The Director shall review the request for a mixing zone to determine whether the written request is complete. If the request is incomplete, the Director shall provide the applicant with a list of the additional information required.
D. The Director shall consider the following factors when deciding whether to grant or deny a request for a mixing zone:
1. The assimilative capacity of the receiving water;
2. The likelihood of adverse human health effects;
3. The location of drinking water plant intakes and public swimming areas;
4. The predicted exposure of biota and the likelihood that resident biota will be adversely affected;
5. Bioaccumulation;
6. Whether there will be acute toxicity in the mixing zone, and, if so, the size of the zone of initial dilution;
7. The known or predicted safe exposure levels for the pollutant for which the mixing zone is requested;
8. The size of the mixing zone;
9. The location of the mixing zone relative to biologically sensitive areas in the surface water;
10. The concentration gradient of the pollutant within the mixing zone;
11. Sediment deposition;
12. The potential for attracting aquatic life to the mixing zone; and
13. The cumulative impacts of other mixing zones and other discharges to the surface water.

E. Director determination.
1. The Director shall deny a request to establish a mixing zone if a water quality standard will be violated outside the boundaries of the proposed mixing zone. The Director shall notify the owner or operator of the denial in writing and shall state the reason for the denial.
2. If the Director approves the request to establish a mixing zone, the Director shall establish the mixing zone as a condition of an AZPDES permit. The Director shall include any mixing zone condition in the AZPDES permit that is necessary to protect human health and the designated uses of the surface water.

F. Any person who is adversely affected by the Director's decision to grant or deny a request for a mixing zone may appeal the decision under A.R.S. § 49-321 et seq. and A.R.S. § 41-1092 et seq.
G. The Director shall reevaluate a mixing zone upon issuance, reissuance, or modification of the AZPDES permit for the point source or a modification of the outfall structure.
H. Mixing zone requirements.

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Appendix A. Numeric Water Quality Standards

Table 1. Water Quality Criteria By Designated Use (see f)

Parameter	CAS NUMBER	DWS (µg/L)	FC (µg/L)	FBC (µg/L)	PBC (µg/L)	A&Wc Acute (µg/L)	A&Wc Chronic (µg/L)	A&Ww Acute (µg/L)	A&Ww Chronic (µg/L)	A&Wedw Acute (µg/L)	A&Wedw Chronic (µg/L)	A&We Acute (µg/L)	AgI (µg/L)	AgL (µg/L)
Acenaphthene	83329	420	198	56,000	56,000	850	550	850	550	850	550			
Acrolein	107028	3.5	1.9	467	467	34	30	34	30	34	30			
Acrylonitrile	107131	0.06	0.2	3	37,333	3,800	250	3,800	250	3,800	250			
Alachlor	15972608	2		9,333	9,333	2,500	170	2,500	170	2,500	170			
Aldrin	309002	0.002	0.00005	0.08	28	3		3		3		4.5	0.003	See (b)
Alpha Particles (Gross) Radioactivity		15 pCi/L See (h)												
Ammonia	7664417					See (e) & Table 11	See (e) & Table 12	See (e) & Table 11	See (e) & Table 12	See (e) & Table 11	See (e) & Table 12			
Anthracene	120127	2,100	74	280,000	280,000									
Antimony	7440360	6 T	640 T	747 T	747 T	88 D	30 D	88 D	30 D	1,000 D	600 D			
Arsenic	7440382	10 T	80 T	30 T	280 T	340 D	150 D	340 D	150 D	340 D	150 D	440 D	2,000 T	200 T
Asbestos	1332214	See (a)												
Atrazine	1912249	3		32,667	32,667									
Barium	7440393	2,000 T		98,000 T	98,000 T									
Benz(a)anthracene	56553	0.005	0.02	0.2	0.2									
Benzene	71432	5	140	93	3,733	2,700	180	2,700	180	8,800	560			
3, 4 Benzfluoranthene	205992	0.005	0.02	1.9	1.9									
Benzidine	92875	0.0002	0.0002	0.01	2,800	1,300	89	1,300	89	1,300	89	10,000	0.01	0.01
Benzo(a)pyrene	50328	0.2	0.02	0.2	0.2									
Benzo(k)fluoranthene	207089	0.005	0.02	1.9	1.9									
Beryllium	7440417	4 T	84 T	1,867 T	1,867 T	65 D	5.3 D	65 D	5.3 D	65 D	5.3 D			
Beta particles and photon emitters		4 millirems /year See (i)												
Bis(2-chloroethyl) ether	111444	0.03	0.5	1	1	120,000	6,700	120,000	6,700	120,000	6,700			
Bis(2-chloroisopropyl) ether	108601	280	3,441	37,333	37,333									
Boron	7440428	1,400 T		186,667 T	186,667 T								1,000 T	
Bromodichloromethane	75274	TTHM See (g)	17	TTHM	18,667									
p-Bromodiphenyl ether	101553					180	14	180	14	180	14			
Bromoform	75252	TTHM See (g)	133	180	18,667	15,000	10,000	15,000	10,000	15,000	10,000			
Bromomethane	74839	9.8	299	1,307	1,307	5,500	360	5,500	360	5,500	360			
Butyl benzyl phthalate	85687	1,400	386	186,667	186,667	1,700	130	1,700	130	1,700	130			
Cadmium	7440439	5 T	84 T	700 T	700 T	See (d) & Table 2	See (d) & Table 3	See (d) & Table 2	See (d) & Table 3	See (d) & Table 2	See (d) & Table 3	See (d) & Table 2	50	50
Carbofuran	1563662	40		4,667	4,667	650	50	650	50	650	50			
Carbon tetrachloride	56235	5	2	11	980	18,000	1,100	18,000	1,100	18,000	1,100			
Chlordane	57749	2	0.0008	4	467	2.4	0.004	2.4	0.2	2.4	0.2	3.2		
Chlorine (total residual)	7782505	4,000		4,000	4,000	19	11	19	11	19	11			
Chlorobenzene	108907	100	1,553	18,667	18,667	3,800	260	3,800	260	3,800	260			
2-Chloroethyl vinyl ether	110758					180,000	9,800	180,000	9,800	180,000	9,800			
Chloroform	67663	TTHM See (g)	470	230	9,333	14,000	900	14,000	900	14,000	900			
p-Chloro-m-cresol	59507					15	4.7	15	4.7	15	4.7	48,000		
Chloromethane	74873					270,000	15,000	270,000	15,000	270,000	15,000			
2-Chloronapthalene	91587	560	317	74,667	74,667									
2-Chlorophenol	95578	35	30	4,667	4,667	2,200	150	2,200	150	2,200	150			
Chloropyrifos	2921882	21		2,800	2,800	0.08	0.04	0.08	0.04	0.08	0.04			
Chromium III	16065831		75,000 T	1,400,000 T	1,400,000 T	See (d) & Table 4	See (d) & Table 4	See (d) & Table 4	See (d) & Table 4	See (d) & Table 4	See (d) & Table 4	See (d) & Table 4		
Chromium VI	18540299	21 T	150 T	2,800 T	2,800 T	16 D	11 D	16 D	11 D	16 D	11 D	34 D		
Chromium (Total)	7440473	100 T											1,000	1,000
Chrysene	218019	0.005	0.02	19	19									
Copper	7440508	1,300 T		1,300 T	1,300 T	See (d) & Table 5	See (d) & Table 5	See (d) & Table 5	See (d) & Table 5	See (d) & Table 5	See (d) & Table 5	See (d) & Table 5	5,000 T	500 T
Cyanide (as free cyanide)	57125	200 T	16,000 T	18,667 T	18,667 T	22 T	5.2 T	41 T	9.7 T	41 T	9.7 T	84 T		200 T
Dalapon	75990	200	8,000	28,000	28,000									
Dibenz (ah) anthracene	53703	0.005	0.02	1.9	1.9									
Dibromochloromethane	124481	TTHM See (g)	13	TTHM	18,667									
1,2-Dibromo-3-chloropropane	96128	0.2		2,800	2,800									
1,2-Dibromoethane	106934	0.05		8,400	8,400									
Dibutyl phthalate	84742	700	899	93,333	93,333	470	35	470	35	470	35	1,100		
1,2-Dichlorobenzene	95501	600	205	84,000	84,000	790	300	1,200	470	1,200	470	5,900		
1,3-Dichlorobenzene	541731					2,500	970	2,500	970	2,500	970			
1,4-Dichlorobenzene	106467	75	5,755	373,333	373.333	560	210	2,000	780	2,000	780	6,500		
3,3'-Dichlorobenzidine	91941	0.08	0.03	3	3									
p,p'-Dichlorodiphenyltrichloroethane (DDT) and metabolites (DDD) and (DDE)	50293	0.1	0.0002	4	467	1.1	0.001	1.1	0.001	1.1	0.001	1.1	0.001	0.001
1,2-Dichloroethane	107062	5	37	15	186,667	59,000	41,000	59,000	41,000	59,000	41,000			
1,1-Dichloroethylene	75354	7	7,143	46,667	46,667	15,000	950	15,000	950	15,000	950			
1,2-cis-Dichloroethylene	156592	70		70	70									
1,2-trans-Dichloroethylene	156605	100	10,127	18,667	18,667	68,000	3,900	68,000	3,900	68,000	3,900			

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Exhibit 74

Environmental Quality, Dept. of

Water Quality

Chapter 1: Wyoming Surface Water Quality Standards

Effective Date:	04/24/2018 to Current
Rule Type:	Current Rules & Regulations
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(xii) "*E. coli*" means any of the bacterium in the family Enterobacteriaceae named *Escherichia* (genus) *coli* (species).

(xiii) "Effluent dependent water" means a water body with insufficient natural flow to support aquatic life, but which has perennial or intermittent flows for all or a portion of its length as the result of the discharge of wastewater.

(xiv) "Effluent limitations" means any restriction established by the state or by the administrator of the Environmental Protection Agency on quantities, rates and concentrations of chemical, physical, biological and other constituents which are discharged from point sources into waters of the state, including schedules of compliance.

(xv) "Environmental Protection Agency" means the federal Environmental Protection Agency (EPA).

(xvi) "Ephemeral stream" means a stream which flows only in direct response to a single precipitation event in the immediate watershed or in response to a single snow melt event, and which has a channel bottom that is always above the prevailing water table.

(xvii) "Eutrophic" means the condition whereby waters or environments saturated with water become nutrient enriched (especially with phosphorus or nitrogen). This action leads to those waters becoming oxygen depleted or anaerobic.

(xviii) "Existing quality" as used in these regulations refers only to Class 1 waters and means the established chemical, physical and biological water quality as of the date the specific water segment was designated Class 1 with recognition that water quality will fluctuate on a seasonal and year-to-year basis depending upon natural variations in water quantity.

(xix) "Existing use" means those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards.

(xx) "Federal Act" means the Federal Water Pollution Control Act (Clean Water Act) and amendments as of November 27, 2002.

(xxi) "Full body contact water recreation" means any recreational or other surface water use in which there is contact with the water sufficient to pose a significant health hazard (i.e. water skiing, swimming).

(xxii) "Game fish" means bass (genera *Micropterus* and *Ambloplites*), catfish and bullheads (genera *Ameiurus*, *Ictalurus and Noturus*), crappie (genus *Pomoxis*), freshwater drum (genus *Aplodinotus*), grayling (genus *Thymallus*), burbot (genus *Lota*), pike (genus *Esox*), yellow perch (genus *Perca*), sturgeon (genus *Scaphirhynchus*), sunfish (genus *Lepomis*), trout, salmon and char (genera *Salmo*, *Oncorhynchus* and *Salvelinus*), walleye and sauger (genus *Sander*) and whitefish (genus *Prosopium*).

(iv) Class 2C. Class 2C waters are those known to support or have the potential to support only nongame fish populations or spawning and nursery areas at least seasonally including their perennial tributaries and adjacent wetlands. Class 2C waters include all permanent and seasonal nongame fisheries and are considered warm water. Uses designated on Class 2C waters include nongame fisheries, fish consumption, aquatic life other than fish, recreation, wildlife, industry, agriculture and scenic value.

(v) Class 2D. Effluent dependent waters which are known to support fish populations and where the resident fish populations would be significantly degraded in terms of numbers or species diversity if the effluent flows were removed or reduced. Class 2D waters are protected to the extent that the existing fish communities and other designated uses are maintained and that the water quality does not pose a health risk or hazard to humans, livestock or wildlife. Uses designated on Class 2D waters include game or nongame fisheries, fish consumption, aquatic life other than fish, recreation, wildlife, industry, agriculture and scenic value.

(c) Class 3, Aquatic Life Other than Fish. Class 3 waters are waters, other than those designated as Class 1, that are intermittent, ephemeral or isolated waters and because of natural habitat conditions, do not support nor have the potential to support fish populations or spawning, or certain perennial waters which lack the natural water quality to support fish (e.g. geothermal areas). Class 3 waters provide support for invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles. Uses designated on Class 3 waters include aquatic life other than fish, recreation, wildlife, industry, agriculture and scenic value. Generally, waters suitable for this classification have wetland characteristics, and such characteristics will be a primary indicator used in identifying Class 3 waters. There are four subcategories of Class 3 waters.

(i) Class 3A. Class 3A waters are isolated waters including wetlands that are not known to support fish populations or drinking water supplies and where those uses are not attainable.

(ii) Class 3B. Class 3B waters are tributary waters including adjacent wetlands that are not known to support fish populations or drinking water supplies and where those uses are not attainable. Class 3B waters are intermittent and ephemeral streams with sufficient hydrology to normally support and sustain communities of aquatic life including invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles. In general, 3B waters are characterized by frequent linear wetland occurrences or impoundments within or adjacent to the stream channel over its entire length. Such characteristics will be a primary indicator used in identifying Class 3B waters.

(iii) Class 3C. Class 3C waters are perennial streams without the natural water quality potential to support fish or drinking water supplies but do support wetland characteristics. These may include geothermal waters and waters with naturally high concentrations of dissolved salts or metals or pH extremes.

(iv) Class 3D. Effluent dependent waters which are known to support communities of aquatic life other than fish and where the existing aquatic habitat would be significantly reduced in terms of aerial extent, habitat diversity or ecological value if the effluent flows are removed or reduced. Class 3D waters are protected to the extent that the existing aquatic community, habitat and other designated uses are maintained and the water quality does not pose a health risk or hazard to humans, livestock or wildlife.

(d) Class 4, Agriculture, Industry, Recreation and Wildlife. Class 4 waters are waters, other than those designated as Class 1, where it has been determined that aquatic life uses are not attainable pursuant to the provisions of Section 33 of these regulations. Uses designated on Class 4 waters include recreation, wildlife, industry, agriculture and scenic value.

(i) Class 4A. Class 4A waters are artificial canals and ditches that are not known to support fish populations.

(ii) Class 4B. Class 4B waters are intermittent and ephemeral stream channels that have been determined to lack the hydrologic potential to normally support and sustain aquatic life pursuant to the provisions of Section 33(b)(ii) of these regulations. In general, 4B streams are characterized by only infrequent wetland occurrences or impoundments within or adjacent to the stream channel over its entire length. Such characteristics will be a primary indicator used in identifying Class 4B waters.

(iii) Class 4C. Class 4C waters are isolated waters that have been determined to lack the potential to normally support and sustain aquatic life pursuant to the provisions of Section 33(b)(i), (iii), (iv), (v) or (vi) of these regulations. Class 4C includes, but is not limited to, off-channel effluent dependent ponds where it has been determined under Section 33(b)(iii) that removing a source of pollution to achieve full attainment of aquatic life uses would cause more environmental damage than leaving the source in place.

(e) Specific stream segment classifications are contained in a separate document entitled *Wyoming Surface Water Classification List* which is published by the department and periodically revised and updated according to the provisions of Sections 4, 33, 34, 35 and Appendix A of this chapter. Class 1 waters are those waters that have been specifically designated by the council. Class 2AB, 2A, 2B and 2C designations are based upon the fisheries information contained in the Wyoming Game and Fish Department's *Streams and Lakes Database* submitted to the department in June 2000. This database represents the best available information and is considered conclusive. Class 2D and 3D designations are based upon use attainability analyses demonstrating that the waters are effluent dependent and do not pose a hazard to humans, wildlife or livestock. Class 4 designations are based upon knowledge that a water body is an artificial, man-made conveyance, or has been determined not to support aquatic life uses through an approved use attainability analysis. All other waters are designated as Class 3A, 3B or 3C. Section 27 of these regulations describes how recreation use designations are made for specific water bodies.

Section 5. Standards Enforcement. The numerical and narrative standards contained within these regulations shall be used to establish effluent limitations for those influences of man upon the system. These data in combination with other available and applicable information shall be used through a weight-of-evidence approach to designate uses and determine whether those uses are being attained. In those instances where numerical standards contained in these rules are exceeded or on ephemeral and intermittent water bodies where chemical and biological sampling may not be practical or feasible, less than a complete set of data may be used to make a decision on attainment.

(c) All changes to use designations after the effective date of this rule shall include the consideration of credible data relevant to the decision. Changes which involve the removal of a use designation or the replacement of a designation shall be supported by a use attainability analysis (UAA).

(d) After the effective date of this rule, credible data shall be utilized in determining a water body's attainment of designated uses.

Section 36. Effluent Dependent Criteria. In addition to the provisions of Section 33 of these regulations, the administrator may make modifications to the numeric criteria for pollutants listed in Appendix B on Class 2D and 3D waters. These modifications may be made on a categorical or site-specific basis by application of the following process:

(a) The adopted statewide numeric criteria may be modified on Class 2D and 3D waters to reflect ambient conditions by developing a UAA demonstrating that the water body is effluent dependent and that continued discharge of a permitted effluent to the water body has been shown to create a net environmental benefit. Criteria modification based on a finding of net environmental benefit is authorized where:

(i) The water body is effluent dependent;

(ii) The discharge has been shown to create an environmental benefit and removal of the discharge would cause more environmental harm than leaving it in place;

(iii) There is a credible threat to remove the discharge; and

(iv) Appropriate safeguards are in place, ensuring that downstream uses will be protected and the discharge will pose no health risk or hazard to humans, livestock or wildlife.

(b) Where the above factors have been satisfied, site-specific criteria may be set equal to the background concentration plus a margin of error for each parameter where the highest background concentration exceeds the statewide numeric criteria. Such site-specific criteria will be implemented as instantaneous maximum values.

(i) The background concentration shall be the highest concentration recorded over the course of a one year period where samples have been taken at least once in each month.

(ii) The margin of error shall be one standard deviation calculated from the same data set used to establish background.

(iii) In addition to water column values, aquatic life tissue criteria shall also be established for all parameters known to be bioaccumulating and where recommended criteria have been developed by EPA. Such criteria shall be at least equal to the nationally recommended tissue criteria published by EPA under Section 304(a) of the Clean Water Act.

(c) The procedures used to implement this section are described in the *Use Attainability Analysis Implementation Policy*.

Section 37. Discharger Specific Variances.

(a) Following public notice and opportunity for comment, including at least one public hearing with a minimum of 45-day notice, the administrator may grant a permittee a variance to a designated use and water quality criteria for ammonia and/or nutrients (e.g., total nitrogen, total phosphorus). The administrator may also grant subsequent variances consistent with this section.

(b) A variance shall not be granted if:

(i) the ammonia and/or nutrient water quality-based effluent limit can be achieved by implementing technology-based effluent limits under sections 301(b) and 306 of the Clean Water Act; or

(ii) the variance will result in an increase in the discharge of the pollutant.

(c) A variance may be granted in circumstances where:

(i) a comprehensive alternatives analysis demonstrates that the most cost-effective pollutant removal alternative capable of achieving the water quality-based effluent limit would create substantial and widespread economic and social impacts; and

(ii) the permittee implements actions necessary to achieve the highest attainable condition of the receiving water. The highest attainable condition shall be identified through a comprehensive alternatives analysis and/or other supporting documentation at the time the variance is granted or during any reevaluation and shall include:

(A) meeting an interim effluent condition that represents the greatest pollutant reduction achievable; and

(B) developing and implementing a pollutant minimization program.

(d) The duration of the variance shall only be as long as necessary to achieve the highest attainable condition as specified in Sections 2(b)(xxiii) and 37(c)(ii).

(e) Once granted, the variance shall only apply for the purpose of developing interim effluent limits. A discharge permit based on a variance shall include the interim effluent limit

Exhibit 75

United States Environmental Protection Agency

Office of Water
EPA-823-B-12-002
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Water Quality Standards Handbook

Chapter 4: Antidegradation

Water Quality Standards Handbook
CHAPTER 4: ANTIDEGRADATION

(40 CFR 131.12)

CHAPTER 4 ANTIDEGRADATION

This chapter provides guidance on the antidegradation component of water quality standards, its application in conjunction with the other parts of the water quality standards regulation, and its implementation by the States. Antidegradation implementation by the States is based on a set of procedures to be followed when evaluating activities that may impact the quality of the waters of the United States. Antidegradation implementation is an integral component of a comprehensive approach to protecting and enhancing water quality.

4.1 History of Antidegradation

The first antidegradation policy statement was released on February 8, 1968, by the Secretary of the U.S. Department of the Interior. It was included in EPA's first Water Quality Standards Regulation (40 CFR 130.17, 40 F.R. 55340-41, November 28, 1975), and was slightly refined and re-promulgated as part of the current program regulation published on November 8, 1983 (48 F.R. 51400, 40 CFR 131.12). Antidegradation requirements and methods for implementing those requirements are minimum conditions to be included in a State's water quality standards. Antidegradation was originally based on the spirit, intent, and goals of the Act, especially the clause ". . . restore and maintain the chemical, physical and biological integrity of the Nation's waters" (101(a)) and the provision of 303(a) that made water quality standards under prior law the "starting point" for CWA water quality requirements. Antidegradation was explicitly incorporated in the CWA through:

- a 1987 amendment codified in section 303(d)(4)(B) requiring satisfaction of antidegradation requirements before making certain changes in NPDES permits; and
- the 1990 Great Lakes Critical Programs Act codified in CWA section 118(c)(2) requiring EPA to publish Great Lakes water quality guidance including antidegradation policies and implementation procedures.

4.2 Summary of the Antidegradation Policy

Section 131.12(a)(l), or "Tier 1," protecting "existing uses," provides the absolute floor of water quality in all waters of the United States. This paragraph applies a minimum level of protection to all waters.

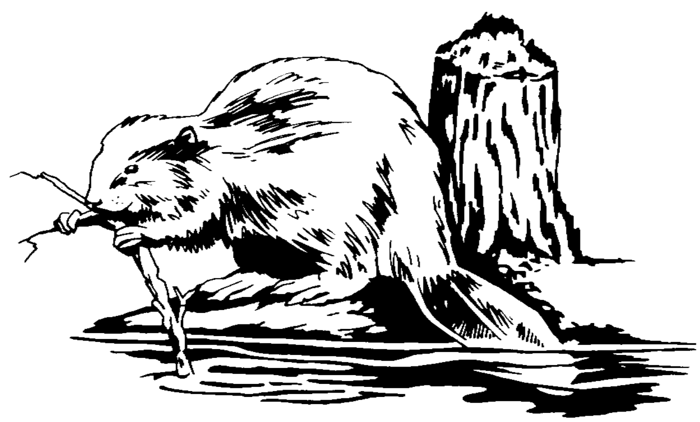
Section 131.12(a)(2), or "Tier 2," applies to waters whose quality exceeds that necessary to protect the section 101(a)(2) goals of the Act. In this case, water quality may not be lowered to less than the level necessary to fully protect the "fishable/swimmable" uses and other existing uses and may be lowered even to those levels only after following all the provisions described in section 131.12(a)(2).

Section 131.12(a)(3), or "Tier 3," applies to Outstanding National Resource Waters (ONRW) where the ordinary use classifications and supporting criteria may not be sufficient or appropriate. As described in the preamble to the Water Quality Standards Regulation, "States may allow some limited activities which result in temporary and short-term changes in water quality," but such changes in water quality should not impact existing uses or alter the essential character or special use that makes the water an ONRW.

The requirement for potential water quality impairment associated with thermal discharges contained in section 131.12 (a)(4) of the regulation is intended to coordinate the requirements and procedures of the antidegradation policy with those established in the Act for setting thermal discharge limitations. Regulations implementing section 316 may be found at 40 CFR 124.66. The statutory scheme and legislative history indicate that limitations developed under section 316 take precedence over other requirements of the Act.

As the States began to focus more attention on implementing their antidegradation policies, an additional concept was developed by the States, which EPA has accepted even though not directly mentioned in previous EPA guidance or in the regulation. This concept, commonly known as "Tier 2½," is an application of the antidegradation policy that has implementation requirements that are more stringent than for "Tier 2" (high-quality waters), but somewhat less stringent than the prohibition against any lowering of water quality in "Tier 3" (ONRWs). EPA accepts this additional tier in State antidegradation policies because it is clearly a more stringent application of the Tier 2 provisions of the antidegradation policy and, therefore, permissible under section 510 of the CWA.

The supporting rationale that led to the development of the Tier 2½ concept was a concern by the States that the Tier 3 ONRW provision was so stringent that its application would likely prevent States from taking actions in the future that were consistent with important social and economic development on, or upstream of, ONRWs. This concern is a major reason that relatively few water bodies are designated as ONRWs. The Tier 2½ approach allows States to provide a very high level of water quality protection without precluding unforeseen future economic and social development considerations.



4.3 State Antidegradation Requirements

UPDATED INFORMATION

State-Specific Water Quality Standards Effective Under the Clean Water Act- This website provides access to state, authorized tribal and territorial water quality standards, including antidegradation policies, that EPA has approved or are otherwise in effect for Clean Water Act purposes.

Federal Rules Involving Antidegradation

Water Quality Standards for Puerto Rico: Final Rule (2007) - This federal register notice promulgated methods to implement Puerto Rico's existing antidegradation policy.

Advanced Notice of Proposed Rulemaking for Water Quality Standards (1998) See pages 36779 to 36787 for an overview of antidegradation policy and EPA's thinking on program development in 1998.

Final Water Quality Guidance for the Great Lakes System: Final Rule (1995) See Appendix E for Antidegradation Provisions.

Each State must develop, adopt, and retain a statewide antidegradation policy regarding water quality standards and establish procedures for its implementation through the water quality management process. The State antidegradation policy and implementation procedures must be consistent with the components detailed in 40 CFR 131.12. If not included in the standards regulation of a State, the policy must be specifically referenced in the water quality standards so that the functional relationship between the policy and the standards is clear. Regardless of the location of the policy, it must meet all applicable requirements. States may adopt antidegradation statements more protective than the Federal requirement. The antidegradation implementation procedures specify how the State will determine on a case-by-case basis whether, and to what extent, water quality may be lowered.

State antidegradation polices and implementation procedures are subject to review by the Regional Administrator. EPA has clear authority to review and approve or disapprove and promulgate an antidegradation policy for a State. EPA's review of the implementation procedures is limited to ensuring that procedures are included that describe how the State will implement the required elements of the antidegradation review. EPA may disapprove and federally promulgate all or part of an implementation process for antidegradation if, in the judgment of the Administrator, the State's process (or certain provisions thereof) can be implemented in such a way as to circumvent the intent and purpose of the antidegradation policy. EPA encourages submittal of any amendments to the statement and implementing procedures to the Regional Administrator for pre-adoption review so that the State may take EPA comments into account prior to final action.

If a State's antidegradation policy does not meet the Federal regulatory requirements, either through State action to revise its policy or through revised Federal requirements, the State would be given the opportunity to make its policy consistent with the regulation. If this is not done, EPA has the authority to promulgate the policy for the State pursuant to section 303(c)(4) of the Clean Water Act (see section 6.3, this Handbook).

4.4 Protection of Existing Uses – 40 CFR 131.12(a)(1)

UPDATED INFORMATION

Letter: Mr. Derek Smithee, State of Oklahoma Water Resources Board. Questions and Answers on EPA's Existing Use Policy (2008) (PDF) - This letter answers Oklahoma's questions on several issues related to existing uses.

This section requires the protection of existing uses and the level of water quality to protect those uses. An "existing use" can be established by demonstrating that:

- fishing, swimming, or other uses have actually occurred since November 28, 1975; or
- that the water quality is suitable to allow the use to be attained—unless there are physical problems, such as substrate or flow, that prevent the use from being attained.

An example of the latter is an area where shellfish are propagating and surviving in a biologically suitable habitat and are available and suitable for harvesting although, to date, no one has attempted to harvest them. Such facts clearly establish that shellfish harvesting is an "existing" use, not one dependent on improvements in water quality. To argue otherwise would be to say that the only time an aquatic protection use "exists" is if someone succeeds in catching fish.

Full protection of the existing use requires protection of the entire water body with a few limited exceptions such as certain physical modifications that may so alter a water body that species composition cannot be maintained (see section 4.4.3, this Handbook), and mixing zones (see section 4.4.4, this Handbook). For example, an activity that lowers water quality such that a buffer zone must be established within a previous shellfish harvesting area is inconsistent with the antidegradation policy.

Section 131.12(a)(l) provides the absolute floor of water quality in all waters of the United States. This paragraph applies a minimum level of protection to all waters. However, it is most pertinent to waters having beneficial uses that are less than the section 101(a)(2) goals of the Act. If it can be proven, in that situation, that water quality exceeds that necessary to fully protect the existing use(s) and exceeds water quality standards but is not of sufficient quality to cause a better use to be achieved, then that water quality may be lowered to the level required to fully protect the existing use as long as existing water quality standards and downstream water quality standards are not affected. If this does not involve a change in standards, no public hearing would be required under section 303(c). However, public participation would still be provided in connection with the issuance of a NPDES permit or amendment of a section 208 plan or section 319 program. If, however, analysis indicates that the higher water quality does result in a better use, even if not up to the section 101(a)(2) goals, then the water quality standards must be upgraded to reflect the uses presently being attained (131.10(i)).

If a planned activity will foreseeably lower water quality to the extent that it no longer is sufficient to protect and maintain the existing uses in that water body, such an activity is inconsistent with EPA's antidegradation policy, which requires that existing uses are to be maintained. In such a circumstance, the planned activity must be avoided or adequate mitigation or preventive measures must be taken to ensure that the existing uses and the water quality to protect them will be maintained.

Section 4.4.1, this Handbook, discusses the determination and protection of recreational "existing" uses, and section 4.4.2, this Handbook, discusses aquatic life protection "existing" uses (of course, many other types of existing uses may occur in a water body).

4.4.1 Recreational Uses

Recreational uses traditionally are divided into primary contact and secondary contact recreation (e.g., swimming vs. boating; that is, recreation "in" or "on" the water.) However, these two broad uses can logically be subdivided into a variety of subcategories (e.g., wading, sailing, power boating, rafting). The water quality standards regulation does not establish a level of specificity that each State must apply in determining what recreational "uses" exist. However, the following principles apply.

- The State selects the level of specificity it desires for identifying recreational existing uses (that is, whether to treat secondary contact recreation as a single use or to define subcategories of secondary recreation). The State has two limitations:
    - the State must be at least as specific as the uses listed in sections 101(a) and 303(c) of the Clean Water Act; and
    - the State must be at least as specific as the written description of the designated use classifications adopted by the State.

- If the State designated use classification system is very specific in describing subcategories of a use, then such specifically defined uses, if they exist, must be protected fully under antidegradation. A State with a broadly written use classification system may, as a matter of policy, interpret its classifications more specifically for determining existing uses—as long as it is done consistently. A State may also redefine its use classification system, subject to the constraints in 40 CFR 131.10, to more adequately reflect existing uses.
- If the use classification system in a State is defined in broad terms such as primary contact recreation, secondary contact recreation, or boating, then it is a State determination whether to allow changes in the type of primary or secondary contact recreation or boating activity that would occur on a specific water body as long as the basic use classification is met. For example, if a State defines a use simply as "boating," it is the State's decision whether to allow something to occur that would change the type of boating from canoeing to power boating as long as the resulting water quality allows the "boating" use to be met. (The public record used originally to establish the use may provide a clearer indication of the use intended to be attained and protected by the State.)

The rationale is that the required water quality will allow a boating use to continue and that use meets the goal of the Act. Water quality is the key. This interpretation may allow a State to change activities within a specific use category but it does not create a mechanism to remove use classifications; this latter action is governed solely by the provisions of the standards regulation (CWA section 131.10(g)).

One situation where EPA might conceivably be called upon to decide what constitutes an existing use is where EPA is writing an NPDES permit. EPA has the responsibility under CWA section 301(b)(1)(C) to determine what is needed to protect existing uses under the State's antidegradation requirement, and accordingly may define "existing uses" or interpret the State's definition to write that permit if the State has not done so. Of course, EPA's determination would be subject to State section 401 certification in such a case.

4.4.2 Aquatic Life/Wildlife Uses

No activity is allowable under the antidegradation policy which would partially or completely eliminate any existing use whether or not that use is designated in a State's water quality standards. The aquatic protection use is a broad category requiring further explanation. Non-aberrational resident species must be protected, even if not prevalent in number or importance. Water quality should be such that it results in no mortality and no significant growth or reproductive impairment of resident species. Any lowering of water quality below this full level of protection is not allowed.

A State may develop subcategories of aquatic protection uses but cannot choose different levels of protection for like uses. The fact that sport or commercial fish are not present does not mean that the water may not be supporting an aquatic life protection function. An existing aquatic community composed entirely of invertebrates and plants, such as may be found in a pristine alpine tributary stream, should still be protected whether or not such a stream supports a fishery.

Even though the shorthand expression "fishable/swimmable" is often used, the actual objective of the Act is to "restore and maintain the chemical, physical, and biological integrity of our Nation's waters" (section 101(a)). The term "aquatic life" would more accurately reflect the protection of the aquatic community that was intended in section 101(a)(2) of the Act.

Section 131.12(a)(1) states, "Existing instream water uses and level of water quality necessary to protect the existing uses shall be maintained and protected." For example, while sustaining a small coldwater fish population, a stream does not support an existing use of a "coldwater fishery." The existing stream temperatures are unsuitable for a thriving coldwater fishery. The small marginal population is an artifact and should not be employed to mandate a more stringent use (true coldwater fishery) where natural conditions are not suitable for that use.

A use attainability analysis or other scientific assessment should be used to determine whether the aquatic life population is in fact an artifact or is a stable population requiring water quality protection. Where species appear in areas not normally expected, some adaptation may have occurred and site-specific criteria may be appropriately developed. Should the coldwater fish population consist of a threatened or endangered species, it may require protection under the Endangered Species Act. Otherwise, the stream need only be protected as a warmwater fishery.

4.4.3 Existing Uses and Physical Modifications

A literal interpretation of 40 CFR 131.12(a)(1) could prevent certain physical modifications to a water body that are clearly allowed by the Clean Water Act, such as wetland fill operations permitted under section 404 of the Clean Water Act. EPA interprets section 131.12(a)(l) of the antidegradation policy to be satisfied with regard to fills in wetlands if the discharge did not result in "significant degradation" to the aquatic ecosystem as defined under section 230.10(c) of the section 404(b)(l) Guidelines.

The section 404(b)(1) Guidelines state that the following effects contribute to significant degradation, either individually or collectively:

… significant adverse effects on (1) human health or welfare, including effects on municipal water supplies, plankton, fish, shellfish, wildlife, and special aquatic sites (e.g., wetlands); (2) on the life stages of aquatic life and other wildlife dependent on aquatic ecosystems, including the transfer, concentration, or spread of pollutants or their byproducts beyond the site through biological, physical, or chemical process; (3) on ecosystem diversity, productivity, and stability, including loss of fish and wildlife habitat or loss of the capacity of a wetland to assimilate nutrients, purify water, or reduce wave energy; or (4) on recreational, aesthetic, and economic values.

These Guidelines may be used by States to determine "significant degradation" for wetland fills. Of course, the States are free to adopt stricter requirements for wetland fills in their own antidegradation polices, just as they may adopt any other requirement more stringent than Federal law requires. For additional information on the linkage between water quality standards and the section 404 program, see Appendix D.

If any wetlands were found to have better water quality than "fishable/swimmable," the State would be allowed to lower water quality to the no significant degradation level as long as the requirements of section 131.12(a)(2) were followed. As for the ONRW provision of antidegradation (131.12(a)(3)), there is no difference in the way it applies to wetlands and other water bodies.

4.4.4 Existing Uses and Mixing Zones

Mixing zones are another instance when the entire extent of the water body is not required to be given full existing use protection. The area within a properly designated mixing zone (see section 5.1) may have altered benthic habitat and a subsequent alteration of the portions of the aquatic community. Any effect on the existing use must be limited to the area of the regulatory mixing zone.

4.5 Protection of Water Quality in High-Quality Waters - 40 CFR 131.12(a)(2)

UPDATED INFORMATION

Memo: Tier 2 Antidegradation Reviews and Significance Thresholds (2005) (PDF) - Recommendation regarding significance thresholds and lowering of water quality in high quality waters in the context of tier 2 antidegradation reviews.
Interim Economic Guidance for Water Quality Standards (1995) – This document provides guidance for use by states and tribes in understanding the economic factors that may be considered, and the types of tests that can be used to determine if a designated use cannot be attained, if a variance can be granted, or if degradation of high-quality water is warranted.

This section provides general program guidance in the development of procedures for the maintenance and protection of water quality where the quality of the water exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water. Water quality in "high-quality waters" must be maintained and protected as prescribed in section 131.12(a)(2) of the WQS regulation.

High-quality waters are those whose quality exceeds that necessary to protect the section 101(a)(2) goals of the Act, regardless of use designation. All parameters do not need to be better quality than the State's ambient criteria for the water to be deemed a "high-quality water." EPA believes that it is best to apply antidegradation on a parameter-by-parameter basis. Otherwise, there is potential for a large number of waters not to receive antidegradation protection, which is important to attaining the goals of the Clean Water Act to restore and maintain the integrity of the Nation's waters. However, if a State has an official interpretation that differs from this interpretation, EPA will evaluate the State interpretation for conformance with the statutory and regulatory intent of the antidegradation policy. EPA has accepted approaches that do not use a strict pollutant-by-pollutant basis (USEPA, 1989c).

In "high-quality waters," under 131.12(a)(2), before any lowering of water quality occurs, there must be an antidegradation review consisting of:

- a finding that it is necessary to accommodate important economic or social development in the area in which the waters are located (this phrase is intended to convey a general concept regarding what level of social and economic development could be used to justify a change in high-quality waters);
- full satisfaction of all intergovernmental coordination and public participation provisions (the intent here is to ensure that no activity that will cause water quality to decline in existing high-quality waters is undertaken without adequate public review and intergovernmental coordination); and

- assurance that the highest statutory and regulatory requirements for point sources, including new source performance standards, and best management practices for nonpoint source pollutant controls are achieved (this requirement ensures that the limited provision for lowering water quality of high-quality waters down to "fishable/swimmable" levels will not be used to undercut the Clean Water Act requirements for point source and nonpoint source pollution control; furthermore, by ensuring compliance with such statutory and regulatory controls, there is less chance that a lowering of water quality will be sought to accommodate new economic and social development).

In addition, water quality may not be lowered to less than the level necessary to fully protect the "fishable/swimmable" uses and other existing uses. This provision is intended to provide relief only in a few extraordinary circumstances where the economic and social need for the activity clearly outweighs the benefit of maintaining water quality above that required for "fishable/swimmable" water, and both cannot be achieved. The burden of demonstration on the individual proposing such activity will be very high. In any case, moreover, the existing use must be maintained and the activity shall not preclude the maintenance of a "fishable/swimmable" level of water quality protection.

The antidegradation review requirements of this provision of the antidegradation policy are triggered by any action that would result in the lowering of water quality in a high-quality water. Such activities as new discharges or expansion of existing facilities would presumably lower water quality and would not be permissible unless the State conducts a review consistent with the previous paragraph. In addition, no permit may be issued, without an antidegradation review, to a discharger to high-quality waters with effluent limits greater than actual current loadings if such loadings will cause a lowering of water quality (USEPA, 1989c).

Antidegradation is not a "no growth" rule and was never designed or intended to be such. It is a policy that allows public decisions to be made on important environmental actions. Where the State intends to provide for development, it may decide under this section, after satisfying the requirements for intergovernmental coordination and public participation, that some lowering of water quality in "high-quality waters" is necessary to accommodate important economic or social development. Any such lower water quality must protect existing uses fully, and the State must assure that the highest statutory and regulatory requirement for all new and existing point sources and all cost-effective and reasonable BMPs for nonpoint source control are being achieved on the water body.

Section 131.12(a)(2) does not <u>REQUIRE</u> a State to establish BMPs for nonpoint sources where such BMP requirements do not exist. We interpret Section 131.12(a)(2) as <u>REQUIRING</u> States to adopt an antidegradation policy that includes a provision that will assure that all cost-effective and reasonable BMPs established under State authority are implemented for nonpoint sources before the State authorizes degradation of high quality waters by point sources (see USEPA, 1994a.)

Section 131.12(a)(2) does not mandate that States establish controls on nonpoint sources. The Act leaves it to the States to determine what, if any, controls on nonpoint sources are needed to provide for attainment of State water quality standards (See CWA Section 319.) States may adopt enforceable requirements, or voluntary programs to address nonpoint source pollution. Section 40 CFR 131.12(a)(2) does not require that States adopt or implement best management practices for nonpoint sources prior to allowing point source degradation of a high quality water. However, States that have adopted nonpoint source controls must assure that such controls are properly implemented before authorization is granted to allow point source degradation of water quality.

The rationale behind the antidegradation regulatory statement regarding achievement of statutory requirements for point sources and all cost effective and reasonable BMPs for nonpoint sources is to assure that, in high quality waters, where there are existing point or nonpoint source control compliance problems, proposed new or expanded point sources are not allowed to contribute additional pollutants that could result in degradation. Where such compliance problems exist, it would be inconsistent with the philosophy of the antidegradation policy to authorize the discharge of additional pollutants in the absence of adequate assurance that any existing compliance problems will be resolved.

EPA's regulation also requires maintenance of high quality waters except where the State finds that degradation is "necessary to accommodate important economic and social development in the area in which the waters are located." (40 CFR Part 131.12(a) (Emphasis added)). We believe this phrase should be interpreted to prohibit point source degradation as unnecessary to accommodate important economic and social development if it could be partially or completely prevented through implementation of existing State-required BMPs.

EPA believes that its antidegradation policy should be interpreted on a pollutant-by-pollutant and waterbody-by-waterbody basis. For example, degradation of a high quality waterbody by a proposed new BOD source prior to implementation of required BMPs on the same waterbody that are related to BOD loading should not be allowed. However, degradation by the new point source of BOD should not be barred solely on the basis that BMPs unrelated to BOD loadings, or which relate to other waterbodies, have not been implemented.

We recommend that States explain in their antidegradation polices or procedures how, and to what extent, the State will require implementation of otherwise non-enforceable (voluntary) BMPs before allowing point source degradation of high quality waters. EPA understands this recommendation exceeds the Federal requirements discussed in this guidance. For example, nonpoint source management plans being developed under section 319 of the Clean Water Act are likely to identify potential problems and certain voluntary means to correct those problems. The State should consider how these provisions will be implemented in conjunction with the water quality standards program.

4.6 Applicability of Water Quality Standards to Nonpoint Sources Versus Enforceability of Controls

The requirement in Section 131.21(a)(2) to implement existing nonpoint source controls before allowing degradation of a high quality water, is a subset of the broader issue of the applicability of water quality standards versus the enforceability of controls designed to implement standards. A discussion of the broader issue is included here with the intent of further clarifying the nonpoint source antidegradation question. In the following discussion, the central message is that water quality standards apply broadly and it is inappropriate to exempt whole classes of activities from standards and thereby invalidate that broader, intended purpose of adopted State water quality standards.

Water quality standards serve the dual function of establishing water quality goals for a specific waterbody and providing the basis for regulatory controls. Water quality standards apply to both point and nonpoint sources. There is a direct Federal implementation mechanism to regulate point sources of pollution but no parallel Federal regulatory process for nonpoint sources. Under State law, however, States can and do adopt mandatory nonpoint source controls.

State water quality standards play the central role in a State's water quality management program, which identifies the overall mechanism States use to integrate the various Clean Water Act water quality control elements into a coherent management framework. This includes, for example: (1) setting and revising water quality standards for all surface waterbodies, (2) monitoring water quality to provide information upon which water quality-based decisions will be made, progress evaluated, and success measured, (3) preparing a water quality inventory report under section 305(b) which documents the status of the State's water quality, (4) developing a water quality management plan which lists the standards, and prescribes the regulatory and construction activities necessary to meet the standards, (5) calculating total maximum daily loads and wasteload allocations for point sources of pollution and load allocations for nonpoint sources of pollution in the implementation of standards,(6) implementing the section 319 management plan which outlines the State's control strategy for nonpoint sources of pollution, and (7) developing permits under Section 402.

Water quality standards describe the desired condition of the aquatic environment, and, as such, reflect any activity that affects water quality. Water quality standards have broad application and use in evaluating potential impacts of water quality from a broad range of causes and sources and are not limited to evaluation of effects caused by the discharge of pollutants from point sources. In this regard, States should have in place methods by which the State can determine whether or not their standards have been achieved (including uses, criteria, and implementation of an antidegradation policy). Evaluating attainment of standards is basic to successful application of a State's water quality standards program. In the broad application of standards, these evaluations are not limited to those activities which are directly controlled through a mandatory process. Rather, these evaluations are an important component of a State's water quality management program regardless of whether or not an enforcement procedure is in place for the activity under review.

Water quality standards are implemented through State or EPA-issued water quality-based permits and through State nonpoint source control programs. Water quality standards are implemented through enforceable NPDES permits for point sources and through the installation and maintenance of BMPs for nonpoint sources. Water quality standards usually are not considered self-enforcing except where they are established as enforceable under State law. Application of water quality standards in the overall context of a water quality management program, however, is not limited to activities for which there are enforceable implementation mechanisms.

In simple terms, applicability and enforceability are two distinctly separate functions in the water quality standards program. Water quality standards are applicable to all waters and in all situations, regardless of activity or source of degradation. Implementation of those standards may not be possible in all circumstances; in such cases, the use attainability analysis may be employed. In describing the desired condition of the environment, standards establish a benchmark against which all activities which might affect that desired condition are, at a minimum, evaluated. Standards serve as the basis for water quality monitoring and there is value in identifying the source and cause of a exceedance even if, at present, those sources of impact are not regulated otherwise controlled.

It is acceptable for a State to specify particular classes of activities for which no control requirements have been established in State law. It is not acceptable, however, to specify that standards do not apply to particular classes of activities (e.g. for purposes of monitoring and assessment). To do so would abrogate one of the primary functions of water quality standards.

4.7 Outstanding National Resource Waters (ONRW) - 40 CFR 131.12(a)(3)

Outstanding National Resource Waters (ONRWs) are provided the highest level of protection under the antidegradation policy. The policy provides for protection of water quality in high-quality waters that constitute an ONRW by prohibiting the lowering of water quality. ONRWs are often regarded as highest quality waters of the United States: That is clearly the thrust of 131.12(a)(3). However, ONRW designation also offers special protection for waters of "exceptional ecological significance." These are water bodies that are important, unique, or sensitive ecologically, but whose water quality, as measured by the traditional parameters such as dissolved oxygen or pH, may not be particularly high or whose characteristics cannot be adequately described by these parameters (such as wetlands).

The regulation requires water quality to be maintained and protected in ONRWs. EPA interprets this provision to mean no new or increased discharges to ONRWs and no new or increased discharge to tributaries to ONRWs that would result in lower water quality in the ONRWs. The only exception to this prohibition, as discussed in the preamble to the Water Quality Standards Regulation (48 F.R. 51402), permits States to allow some limited activities that result in temporary and short-term changes in the water quality of ONRW. Such activities must not permanently degrade water quality or result in water quality lower than that necessary to protect the existing uses in the ONRW. It is difficult to give an exact definition of "temporary" and "short-term" because of the variety of activities that might be considered. However, in rather broad terms, EPA's view of temporary is weeks and months, not years. The intent of EPA's provision clearly is to limit water quality degradation to the shortest possible time. If a construction activity is involved, for example, temporary is defined as the length of time necessary to construct the facility and make it operational. During any period of time when, after opportunity for public participation in the decision, the State allows temporary degradation, all practical means of minimizing such degradation shall be implemented. Examples of situations in which flexibility is appropriate are listed in Exhibit 4-1.

Exhibit 4-1. Examples of Allowable Temporary Lowering of Water Quality in Outstanding National Resource Waters

Example 1. A national park wishes to replace a defective septic tank-drainfield system in a campground. The campground is located immediately adjacent to a small stream with the ONRW use designation. • Under the regulation, the construction could occur if best management practices were scrupulously followed to minimize any disturbance of water quality or aquatic habitat.
Example 2. Same situation except the campground is served by a small sewage treatment plant already discharging to the ONRW. It is desired to enlarge the treatment system and provide higher levels of treatment. • Under the regulation, this water-quality-enhancing action would be permitted if there was only temporary increase in sediment and, perhaps, in organic loading, which would occur during the actual construction phase.
Example 3. A National forest with a mature, second growth of trees which are suitable for harvesting, with associated road repair and re-stabilization. Streams in the area are designated as ONRW and support trout fishing. • The regulation intends that best management practices for timber harvesting be followed and might include preventive measures more stringent than for similar logging in less environmentally sensitive areas. Of course, if the lands were being considered for designation as wilderness areas or other similar designations, EPA's regulation should not be construed as encouraging or condoning timbering operations. The regulation allows only temporary and short-term water quality degradation while maintaining existing uses or new uses consistent with the purpose of the management of the ONRW area.

Other examples of these types of activities include maintenance and/or repair of existing boat ramps or boat docks, restoration of existing sea walls, repair of existing stormwater pipes, and replacement or repair of existing bridges.

4.8 Antidegradation Application and Implementation

Any one or a combination of several activities may trigger the antidegradation policy analysis. Such activities include a scheduled water quality standards review, the establishment of new or revised load allocations, waste load allocations, total maximum daily loads, issuance of NPDES permits, and the demonstration of need for advanced treatment or request by private or public agencies or individuals for a special study of the water body.

Nonpoint source activities are not exempt from the provisions of the antidegradation policy. The language of section 131.12 (a)(2) of the regulation: "Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control . . ." reflects statutory provisions of the Clean Water Act. While it is true that the Act does not establish a federally enforceable program for nonpoint sources, it clearly intends that the BMPs developed and approved under sections 205(j), 208, 303(e), and 319 be aggressively implemented by the States.

4.8.1 Antidegradation, Load Allocation, Waste Load Allocation, Total Maximum Daily Load, and Permits

In developing or revising a load allocation (LA), waste load allocation (WLA), or total maximum daily load (TMDL) to reflect new information or to provide for seasonal variation, the antidegradation policy, as an integral part of the State water quality standards, must be applied as discussed in this section.

The TMDL/WLA/LA process distributes the allowable pollutant loadings to a water body. Such allocations also consider the contribution to pollutant loadings from nonpoint sources. This process must reflect applicable State water quality standards including the antidegradation policy. No waste load allocation can be developed or NPDES permit issued that would result in standards being violated. With respect to antidegradation, that means existing uses must be protected, water quality may not be lowered in ONRWs, and in the case of waters whose quality exceeds that necessary for the section 101(a)(2) goals of the Act, an activity cannot result in a lowering of water quality unless the applicable public participation, intergovernmental review, and baseline control requirements of the antidegradation policy have been met. Once the LA, WLA, or TMDL revision is completed, the resulting permits must incorporate discharge limitations based on this revision.

When a pollutant discharge ceases for any reason, the waste load allocations for the other dischargers in the area may be adjusted to reflect the additional loading available consistent with the antidegradation policy under two circumstances:

- In "high-quality waters" where after the full satisfaction of all public participation and intergovernmental review requirements, such adjustments are considered necessary to accommodate important economic or social development, and the "threshold"

level requirements (required point and nonpoint source controls) are met.
- In less than "high-quality waters," when the expected improvement in water quality (from the ceased discharge) would not cause a better use to be achieved.

The adjusted loads still must meet water quality standards, and the new waste load allocations must be at least as stringent as technology-based limitations. Of course, all applicable requirements of the section 402 NPDES permit regulations would have to be satisfied before a permittee could increase its discharge.

If a permit is being renewed, reissued or modified to include less stringent limitations based on the revised LA/WLA/TMDL, the same antidegradation analysis applied during the LA/WLA/TMDL stage would apply during the permitting stage. It would be reasonable to allow the showing made during the LA/WLA/TMDL stage to satisfy the antidegradation showing at the permit stage. Any restrictions to less stringent limits based on antibacksliding would also apply.

If a State issues an NPDES permit that violates the required antidegradation policy, it would be subject to a discretionary EPA veto under section 402(d) or to a citizen challenge. In addition to actions on permits, any waste load allocations and total maximum daily loads violating the antidegradation policy are subject to EPA disapproval and EPA promulgation of a new waste load allocation/total maximum daily load under section 303(d) of the Act. If a significant pattern of violation was evident, EPA could constrain the award of grants or possibly revoke any Federal permitting capability that had been delegated to the State. Where EPA issues an NPDES permit, EPA will, consistent with its NPDES regulations, add any additional or more stringent effluent limitations required to ensure compliance with the State antidegradation policy incorporated into the State water quality standards. If a State fails to require compliance with its antidegradation policy through section 401 certification related to permits issued by other Federal agencies (e.g., a Corps of Engineers section 404 permit), EPA could comment unfavorably upon permit issuance. The public, of course, could bring pressure upon the permit issuing agency.

For example applications of antidegradation in the WLA and permitting process, see Exhibit 4-2.

Exhibit 4-2. Examples of the Application of Antidegradation in the Waste Load/Load Allocation and NPDES Permitting Process

Example 1. Several facilities on a stream segment discharge phosphorus-containing wastes. Ambient phosphorus concentrations meet the designated class B (non-fishable/swimmable) standards, but barely. Three dischargers achieve elimination by developing land treatment systems. As a result, actual water quality improves (i.e., phosphorus levels decline) but not quite to the level needed to meet class A (fishable/swimmable) standards. Can the remaining dischargers now be allowed to increase their phosphorus discharge without an antidegradation analysis with the result that water quality declines (phosphorus levels increase) to previous levels? • Nothing in the water quality standards regulation explicitly prohibits this. Of course, changes in their NPDES permit limits may be subject to non-water quality constraints, such as BPT, BAT, or the NPDES antibacksliding provisions, which may restrict the increased loads.
Example 2. Suppose, in the above situation, water quality improves to the point that actual water quality now meets class A requirements. Is the answer different? • Yes. The standards must be upgraded (see section 2.8).
Example 3. As an alternative case, suppose phosphorus loadings go down and water quality improves because of a change in farming practices (e.g., initiation of a successful nonpoint source program.) Are the above answers the same? • Yes. Whether the improvement results from a change in point or nonpoint source activity is immaterial to how any aspect of the standards regulation operates. Section 131.10(d) clearly indicates that uses are deemed attainable if they can be achieved by "... cost-effective and reasonable best management practices for nonpoint source control." Section 131.12(a)(2) of the antidegradation policy contains essentially the same wording.

Antidegradation, as with other water quality standards activities, requires public participation and intergovernmental coordination to be an effective tool in the water quality management process. 40 CFR 131.12(a)(2) contains explicit requirements for public participation and intergovernmental coordination when determining whether to allow lower water quality in high-quality waters. Nothing in either the water quality standards or the waste load allocation regulations requires the same degree of public participation or intergovernmental coordination for such non-high-quality waters as is required for high-quality waters. However public participation would still be provided in connection with the issuance of a NPDES permit or amendment of a 208 plan. Also, if the action that causes reconsideration of the existing waste loads (such as dischargers withdrawing from the area) will result in an improvement in water quality that makes a better use attainable, even if not up to the "fishable/swimmable" goal, then the water quality standards must be upgraded and full public review is required for any action affecting changes in standards.

Although not specifically required by the standards regulation between the triennial reviews, we recommend that the State conduct a use attainability analysis to determine if water quality improvement will result in attaining higher uses than currently designated in situations where significant changes in waste loads are expected.

The antidegradation public participation requirement may be satisfied in several ways. The State may hold a public hearing or hearings. The State may also satisfy the requirement by providing public notice and the opportunity for the public to request a hearing. Activities that may affect several water bodies in a river basin or sub-basin may be considered in a single hearing. To ease the resource burden on both the State and public, standards issues may be combined with hearings on environmental impact statements, water management plans, or permits. However, if this is done, the public must be clearly informed that possible changes in water quality standards are being considered along with other activities. It is inconsistent with the water quality standards regulation to "back-door" changes in standards through actions on EIS's, waste load allocations, plans, or permits.

Exhibit 76

EPA-823-Z-83-100

federal register

Tuesday
November 8, 1983

Part II

Environmental Protection Agency

Water Quality Standards Regulation

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 35, 120, and 131

[WH-FRL 2466-3]

Water Quality Standards Regulation

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: This Regulation revises and consolidates in a new Part 131 the existing regulations now codified in 40 CFR Parts 120 and 35 that govern the development, review, revision and approval of water quality standards under Section 303 of the Clean Water Act (the Act). The Regulation was revised to reflect the experiences gained in the program by both EPA and the States. More explicit information is included in the Regulation on what EPA expects as part of State water quality standards reviews. The Regulation also clarifies that in promulgating Federal standards, EPA is subject to the same requirements as the States.

EFFECTIVE DATE: December 8, 1983.

FOR FURTHER INFORMATION CONTACT: David K. Sabock, Environmental Protection Agency, Chief, Criteria Branch (WH-585), 401 M Street SW., Washington, 20460 (202) 245-3042.

SUPPLEMENTARY INFORMATION: The Environmental Protection Agency (EPA) proposed changes to 40 CFR 120 and 35 on October 29, 1982 (47 FR 49234) and invited comments until February 10, 1983. Eleven public meetings were held nationwide on the proposed revisions. Nine hundred twenty people attended those meetings. EPA received 1405 letters and statements on the proposal prior to the closing of the public comment period. Comments received on the proposed Regulation may be inspected at the Environmental Protection Agency, Room 2818M, 401 M Street, SW., Washington, D.C. 20460 during the Agency's normal working hours of 8:00 a.m. to 4:30 p.m. For further information contact the individual listed above.

Information in this preamble is organized as follows:

A. Major changes made in the Proposed Rule
B. Regulatory Impact Analyses, Regulatory Flexibility Act and Paperwork Reduction Act Requirements
C. List of Subjects in 40 CFR 131
Appendix A—Response to Public Comments

A. Major Changes Made in the Proposed Regulation

The major additions and deletions made in the proposed Rule are discussed in this section. We have also included a table summarizing all the changes.

Commitment to the Goals of the Clean Water Act

Several changes were made in the Regulation to reassure the public that EPA is committed to achieving the goals of the Act. EPA accepted the recommendations for including regulatory language explicitly affirming EPA's commitment to have standards move toward the Section 101(a)(2) goals of the Act and to use standards as a basis of restoring and maintaining the integrity of the Nation's waters.

A "Purpose" section (§ 131.2) has been added to the Regulation. The Purpose states that standards are to protect public health or welfare, enhance the quality of water and provide water quality for the protection and propagation of fish, shellfish and wildlife and recreation in and on the water, as well as for agricultural and industrial purposes and navigation. In addition, this section describes the dual role of water quality standards in establishing the water quality goals for a specific water body and in serving as the regulatory basis for the establishment of water quality based treatment controls and strategies beyond that level of treatment required by sections 301(b) and 306 of the Act.

The final regulation also clarifies that when a State changes the designated uses of its waters such that the uses of the water body do not include the uses specified in the Section 101(a)(2) goals of the Act (i.e., the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water), the State will have to demonstrate, through a use attainability analysis, that these uses are not attainable based on physical, chemical, biological or economic factors. This use attainability analysis is required for future changes that the State may make and for previous actions that the State took to designate uses for a water body which did not include the uses specified in Section 101(a)(2). Where water quality improvements result in new uses, States must revise their standards to reflect these new uses (See § 131.10(i)). This provision continues an existing EPA requirement although it was omitted from the proposed Regulation.

In addition, as discussed below, we have revised the proposed Antidegradation Policy to provide special protection for high quality waters and waters which constitute an outstanding National resource (See § 131.12) and we have eliminated the benefit-cost analysis.

We believe that these and other changes and clarifications in the Final Rule demonstrate EPA's commitment to the objectives, goals and spirit of the Clean Water Act.

Changes in Uses

The provisions included in § 131.10(h)(1)-(6) of the proposed Regulations, which dealt with circumstances under which uses could be changed, received substantial comment. Many commenters objected that the change in the phrase "States must demonstrate" to "States must determine" that certain conditions exist would mean that EPA would require less rigorous analyses for changing a use. They indicated that "determine" merely connotates a political process whereas "demonstrate" implies substantial proof supported by exacting analyses. EPA believes that structured scientific and technical analyses should be required to justify removing or modifying designated uses that are included in Section 101(a)(2) of the Act or to justify continuation of standards which do not include these uses. EPA agrees that the word "demonstrate" better reflects Agency policy and has made that change (see § 131.10(g)).

Some commenters asked whether modifications in water quality standards, such as defining a level of protection for aquatic life or setting seasonal standards, were changes in standards subject to the public participation requirements of § 131.20(b) of the regulation. Yes, any modification or change that a State makes in its standards is subject to those requirements.

Many commenters also objected to the inclusion of a benefit-cost assessment in justifying changes in uses. Historically, economic considerations have been a part of water quality standards decisions. Senate Report No. 10 on the Federal Water Pollution Control Amendments of 1965, 89th Congress, 1st Session, included the statement that "Economic, health, esthetic, and conservation values which contribute to the social and economic welfare of an area must be taken into account in determining the most appropriate use or uses of a stream". Section 303(c)(2) of the Act provides that ". . . standards shall be established taking into consideration their use and value for . . ." various water uses. Under the 1975 regulation governing the establishment of standards in Part § 35.1550(c)(1), States were to ". . . take into consideration environmental,

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technological, social, economic, and institutional factors" in determining the attainability of standards for any particular water segment. In addition, there is and has been an economic consideration in the antidegradation policy. The Agency recognizes that there are inherent difficulties in a balancing of the benefits of achieving the Section 101(a)(2) goals of the Act with the costs. As a result, the Agency was persuaded that the provision in the existing rule allowing changes in designated uses where there would be substantial and widespread economic impact better reflected the process required by the Act. For these reasons, the wording of the existing regulation has been retained.

Several commenters objected to proposed § 131.10(h)(5) which allowed States to remove or to modify designated uses which are not attainable based on physical factors. After considering the comments, the Agency decided to limit the reference to physical factors to aquatic life protection uses and to clarify the existing policy.

Physical factors may be important in evaluating whether uses are attainable. However, physical limitations of the stream may not necessarily be an overriding factor. Common sense and good judgment play an important role in setting appropriate uses and criteria. In setting criteria and uses, States must assure the attainment of downstream standards. The downstream uses may not be affected by the same physical limitations as the upstream uses. There are instances where non-water quality related factors preclude the attainment of uses regardless of improvements in water quality. This is particularly true for fish and wildlife protection uses where the lack of a proper substrate may preclude certain forms of aquatic life from using the stream for propagation, or the lack of cover, depth, flow, pools, riffles or impacts from channelization, dams, diversions may preclude particular forms of aquatic life from the stream altogether. EPA recognizes that while physical factors also affect the recreational uses appropriately designated for a water body. States need to give consideration to the incidental uses which may be made of the water body. Even though it may not make sense to encourage use of a stream for swimming because of the flow, depth or the velocity of the water, the States and EPA must recognize that swimming and/or wading may occur anyway. In order to protect public health, States must set criteria to reflect recreational uses if it appears that recreation will in fact occur in the stream.

In keeping with the purposes of the Act, the wording of § 131.10(h)(4) of the proposed Rule (now § 131.10(g)(4)) was modified so that changes in uses could only occur if dams, diversions or other types of hydrologic modifications *preclude* rather than just interfere with the attainment of the designated uses. It should also be pointed out that if physical limitations of the water body were used as the basis of not including uses for a water body that are specified in Section 101(a)(2) of the Act, those physical factors must be reviewed every three years.

While many commenters objected to the number of reasons the States could use in justifying changes in uses, the Agency decided to keep the six factors, with the changes described above, because they better explain when changes may be made. The terse wording of the existing Rule does not adequately explain when changes can be made.

A number of comments related to use attainability analyses. In demonstrating that a use is not attainable, States will be required to prepare and submit to EPA a use attainability analysis. A use attainability analysis is a multi-step scientific assessment of the physical, chemical, biological and economic factors affecting the attainment of a use. It includes a water body survey and assessment, a wasteload allocation, and an economic analysis, if appropriate.

A water body survey and assessment examines the physical, chemical and biological characteristics of the water body to: identify and define the existing uses of that water body; determine whether the designated uses in the State water quality standards are impaired, and the reasons for the impairment; and assist States in projecting the potential uses that the water body could support in the absence of pollution. A wasteload allocation utilizes mathematical models to predict the amount of reduction necessary in pollutant loadings to achieve the designated use. Economic analyses are appropriate in determining whether the more stringent requirements would cause substantial and widespread economic and social impact. These analyses should address the incremental effects of water quality standards beyond technology-based or other State requirements. The Agency's guidance suggests that States consider effects due to compliance by private and municipal dischargers. If the requirements are not demonstrated to have a substantial and widespread impact on the affected community, the standard must be maintained or made compatible with the goals of the Act.

There was considerable comment on whether the use attainability analyses should be required, and if so when. In keeping with section 510 of the Act, EPA is *not* requiring States to conduct and submit a use attainability analysis if adding a use specified in Section 101(a)(2) of the Act or a use requiring more stringent criteria. In the final rule, EPA is requiring that States conduct and submit to EPA a use attainability analysis if the State (a) is designating uses for the water body such that the water body will not have all uses which are included in Section 101(a)(2) of the Act, (b) maintaining uses for the water body which do not include all of the uses in Section 101(a)(2) of the Act, (c) removing a use included in Section 101(a)(2) of the Act or (d) modifying a use included in Section 101(a)(2) of the Act to require less stringent criteria. A State need only conduct a use attainability once for a given water body and set of uses. During subsequent triennial review, States will be required to review the basis of not including uses for the water body that are specified in Section 101(a)(2) of the Act to show that circumstances have not changed and that protection and propagation of fish, shellfish and wildlife and/or recreation in and on the water remain unattainable. If such uses have become attainable, the standard must be revised accordingly (See § 131.20(a)). However, States may wish to conduct a use attainability analysis, even where not required, if they believe that there will be questions as to whether the protection and propagation of fish, shellfish and wildlife and recreation in and on the water is, in fact, attainable.

The guidance on conducting the water body survey and assessment is included in the *Water Quality Standards Handbook*. The earlier draft of the Handbook has been revised and expanded. Test cases illustrating the water body survey and assessment guidance have been completed and are included in the Handbook. In addition, the Agency has published a *Technical Support Manual: Water Body Surveys and Assessments for Conducting a Use Attainability Analyses*. These publications may be obtained by writing or calling David K. Sabock at the address and phone number listed under **FOR FURTHER INFORMATION CONTACT.**

By publishing guidance on conducting use attainability analyses, EPA is not requiring that specific approaches, methods or procedures be used. Rather, States are encouraged to consult with EPA early in the process to agree on

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appropriate methods and procedures for conducting any of the analyses before the analyses are initiated and carried out. States will have the flexibility of tailoring the analyses to the specific water body being examined as long as the methods used are scientifically and technically supportable.

EPA will review the adequacy of the data, the suitability and appropriateness of the analyses and how the analyses were applied. In cases where the analyses are inadequate, EPA will identify how the analyses need to be improved and will suggest the type of evaluation or data needed. When the State has initially consulted EPA on the analyses to be used, EPA will be able to expedite its review of the State's analyses of any new or revised State standard.

Criteria

EPA has revised the section on criteria (§ 131.12 in the proposal; renumbered to § 131.11 in the final rule) in several respects. First, EPA has accepted the recommendation that the phrase "criteria are compatible with" protecting a designated use is confusing, and unnecessary and should be removed. The provision now reads: "States must adopt those water quality criteria that protect the designated use."

In addition, EPA consolidated parts of the provisions and stated more concisely the basis of EPA's review of the appropriateness of State criteria. Section 131.11(a) now reads: "Such criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use. For waters with multiple use designations, the criteria shall support the most sensitive use," eliminating the need for proposed § 131.12(c) (1)–(3).

A number of comments concerned criteria for toxic pollutants. Some questioned EPA's commitment to controlling toxic pollutants based on the fact that EPA was not "requiring" States to adopt specific *numerical* toxic pollutant criteria. EPA has made a number of changes to more clearly reflect our commitment. For example, EPA has tried to restructure § 131.11(a)(2) on toxic pollutants to assist States in providing the most effective control of toxic pollutants as possible. All States have a requirement in their standards that their waters be free from toxic pollutants in toxic amounts. States are to review their water quality data and information on discharges to identify specific water bodies where toxic pollutants may be adversely impacting water quality or the designated uses or where the level of a toxic pollutant in the water is at a level to warrant concern. States are expected to conduct such reviews beginning with an in-depth analysis of water bodies with known toxic pollutant problems. States are to adopt numerical or narrative criteria for those toxic pollutants of concern. Numerical criteria are appropriate where a few specific pollutants have been identified as the concern, or where human health rather than aquatic life is the controlling factor. To implement such criteria, models are used to translate the specific criterion on a chemical-by-chemical basis into a wasteload allocation to obtain a specific permit limit.

However, where the effluent or ambient conditions are complex, due to multiple dischargers or multiple pollutants, toxic pollutant limits may be more appropriately set through narrative criteria (such as the "free from statements"). Where narrative criteria are adopted, the State should indicate as part of its water quality standards submission, how it intends to regulate the discharge of the toxic pollutants. Biological monitoring is one mechanism to test compliance with "free from" narrative criteria. Biological monitoring may include periodic sampling of the ecosystem, trend monitoring and/or periodic bioassays using the effluent. Acute and chronic toxicity testing methods have been developed that enable a permit writer to ensure that the discharge will not be toxic to aquatic life. When using biological monitoring to test compliance with narrative criteria, reference should be made to the maximum acceptable levels of toxicity and the basic means by which these levels are to be measured or otherwise determined.

Both the pollutant-by-pollutant and biological methods are being refined and need to be applied in a conservative fashion. They hold great promise and are relatively inexpensive. In many cases a combination of biological monitoring and a chemical-by-chemical approach will provide the best toxic pollutant control.

Finally, a number of comments dealt with site-specific criteria. It was apparent from the comments that some commenters had the mistaken impression that EPA was advocating that States use site-specific criteria development procedures for setting all criteria as opposed to using the national Section 304(a) criteria. Site-specific criteria development procedures are not needed in all situations. Many of the procedures are expensive. Site-specific criteria development appears most appropriate on water quality limited water bodies where:

- Background water quality parameters, such as pH, hardness temperature, suspended solids, etc., appear to differ significantly from the laboratory water used in developing the Section 304(a) criteria; or
- The types of local aquatic organisms in the region differ significantly from those actually tested in developing the Section 304(a) criteria.

The protocols for establishing site-specific criteria, as well as the test cases illustrating use of the protocols, are included in the *Water Quality Standards Handbook*. EPA also has a limited number of copies of *Recalculation of State Toxic Criteria* using the family recalculation procedure. These publications may be obtained by writing or calling David K. Sabock at the address and phone number listed under **FOR FURTHER INFORMATION CONTACT** at the beginning of this Rule.

Antidegradation Policy

The preamble to the proposed rule discussed three options for changing the existing antidegradation policy. Option 1, the proposed option, provided simply that uses attained would be maintained. Option 2 stated that not only would uses attained be maintained but that high quality waters, i.e. waters with quality better than that needed to protect fish and wildlife, would be maintained (that is, the existing antidegradation policy minus the "outstanding natural resource waters" provision). Option 3 would have allowed changes in an existing use if maintaining that use would effectively prevent any future growth in the community or if the benefits of maintaining the use do not bear a reasonable relationship to the costs.

Although there was support for Option 2, there was greater support for retaining the full existing policy, including the provision on outstanding National resource waters. Therefore, EPA has retained the existing antidegradation policy (Section 131.12) because it more accurately reflects the degree of water quality protection desired by the public, and is consistent with the goals and purposes of the Act.

In retaining the policy EPA made four changes. First, the provisions on maintaining and protecting existing instream uses and high quality waters were retained, but the sentences stating that no further water quality degradation which would interfere with or become injurious to existing instream uses is allowed were deleted. The deletions were made because the terms "interfere" and "injurious" were subject to misinterpretation as precluding any activity which *might* even momentarily add pollutants to the water. Moreover, we believe the deleted sentence was intended merely as a restatement of the basic policy. Since the rewritten provision, with the addition of a phrase on water quality described in the next sentence, stands alone as expressing the basic thrust and intent of the antidegradation policy, we deleted the confusing phrases. Second, in § 131.12(a)(1) a phrase was added requiring that the level of water quality necessary to protect an existing use be maintained and protected. The previous policy required only that an existing use be maintained. In § 131.12(a)(2) a phrase was added that "In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully". This means that the full use must continue to exist even if some change in water quality may be permitted. Third, in the first sentence of § 131.12(a)(2) the wording was changed from ". . . significant economic or social development . . ." to ". . . important economic or social development. . . ." In the context of the antidegradation policy the word "important" strengthens the intent of protecting higher quality waters. Although common usage of the words may imply otherwise, the correct definitions of the two terms indicate that the greater degree of environmental protection is afforded by the word "important."

Fourth, § 131.12(a)(3) dealing with the designation of outstanding National resource waters (ONRW) was changed to provide a limited exception to the absolute "no degradation" requirement. EPA was concerned that waters which properly could have been designated as ONRW were not being so designated because of the flat no degradation provision, and therefore were not being given special protection. The no degradation provision was sometimes interpreted as prohibiting *any* activity (including temporary or short-term) from being conducted. States may allow some limited activities which result in temporary and short-term changes in water quality. Such activities are considered to be consistent with the intent and purpose of an ONRW. Therefore, EPA has rewritten the provision to read ". . . that water quality shall be maintained and protected," and removed the phrase "No degradation shall be allowed. . . ."

In its entirety, the antidegradation policy represents a three-tiered approach to maintaining and protecting various levels of water quality and uses. At its base (Section 131.12(a)(1)), all existing uses and the level of water quality necessary to protect those uses must be maintained and protected. This provision establishes the absolute floor of water quality in all waters of the United States. The second level (Section 131.12(a)(2)) provides protection of actual water quality in areas where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water ("fishable/swimmable"). There are provisions contained in this subsection to allow some limited water quality degradation after extensive public involvement, as long as the water quality remains adequate to be "fishable/swimmable." Finally § 131.23(a)(3) provides special protection of waters for which the ordinary use classifications and water quality criteria do not suffice, denoted "outstanding National resource water." Ordinarily most people view this subsection as protecting and maintaining the highest quality waters of the United States: that is clearly the thrust of the provision. It does, however, also offer special protection for waters of "ecological significance." These are water bodies which are important, unique, or sensitive ecologically, but whose water quality as measured by the traditional parameters (dissolved oxygen, pH, etc.) may not be particularly high or whose character cannot be adequately described by these parameters.

General Policies

Except for a general statement that States may adopt policies affecting the application and implementation of standards and that such policies are subject to EPA review and approval, all other elements of proposed Section 131.13 have been deleted, including the detailed statements on mixing zones, low flow exemptions, and variances.

Specific subsections on mixing zones, low flow exemptions and variances were deleted because, as the public comments suggested, they were not regulatory in nature and therefore were more appropriately addressed in guidance. More detailed information on these subjects is included as guidance in the *Water Quality Standards Handbook.*

Many objected to the temporary variance policy because it appeared to be outside the normal water quality standards setting process and because the test for granting a variance was different from that applied to changing a designated use. While a variance does not change a standard *per se*, there was concern that such a policy would stimulate "pollution shopping" or would unfairly penalize firms that had managed their operations to maintain a profit while installing pollution control equipment, to the advantage of those that had not.

EPA has approved State-adopted variances in the past and will continue to do so if: each individual variance is included as part of the water quality standard, subject to the same public review as other changes in water quality standards and if each individual variance is granted based on a demonstration that meeting the standard would cause substantial and widespread economic and social impact, the same test as if the State were changing a use based on substantial and widespread social and economic impact. EPA will review for approval individual variances, not just an overall State variance policy. A State may wish to include a variance as part of a water quality standard rather than change the standard because the State believes that the standard ultimately can be attained. By maintaining the standard rather than changing it, the State will assure further progress is made in improving water quality and attaining the standard. With the variance provision, NPDES permits may be written such that reasonable progress is made toward attaining the standards without violating Section 402(a)(1) of the Act which states that NPDES permits must meet the applicable water quality standards.

State Review

Section 131.20(a) was changed from the proposal in several respects. These changes were made in response to the public's concern that the language in the proposed regulation either removed or diluted the Act's requirement to review all standards every three years and that EPA's proposed regulatory language did not provide adequate recognition of the goals of the Act. First, the language on the 3-year review requirement was changed to read exactly as the Act. It now reads that "the State shall, from time to time, but at least once every three years, hold public hearings for the purpose of reviewing applicable water quality standards and, as appropriate, modifying and adopting standards."

Second, a mandatory review and upgrading requirement has been added. On segments with water quality standards that do not include all of the uses specified in Section 101(a)(2) of the Act, States must reexamine the basis of that decision every three years to determine whether any new information, technology, etc. has become available that would warrant adding the protection and propagation of fish, shellfish and wildlife and/or recreation in and on the water.

Third, EPA has retained the concept of allowing a State to select specific water bodies for an in-depth review of the appropriateness of the water quality standard. This was done in order to make maximum use of limited resources and ensure that the most critical environmental problems are addressed. This review could include an examination of the use, the existing water quality criteria, and the need for revised or additional criteria on segments where the standards are not projected to be achieved with implementation of the technology-based requirements of the Act. Factors which may cause a State to select a water body for review include areas where advanced treatment and combined sewer overflow funding decisions are pending, major water quality-based permits are scheduled for issuance or renewal, toxic pollutants have been identified or are suspected of precluding the attainment of water quality standards. This list is not meant to be all inclusive, and a State may have other reasons for examining a particular standard. The procedures established for identifying and reviewing such water bodies should be incorporated into the State's Continuing Planning Process.

There were numerous comments either advocating mechanisms to ensure the right of dischargers to petition the State to review particular standards or advocating the burden of proof be on the discharger to justify any changes in standards. EPA does not believe that it should dictate particular administrative mechanisms that States use to initiate the review of standards on particular water bodies. However, we do believe that whatever mechanism the State uses, it should be made known to the public and included in the State's Continuing Planning Process document.

SUMMARY OF THE CHANGES MADE IN THE PROPOSED REGULATION

Section No. in the proposed regulation	Section No in the final regulation	Title	Summary of changes
131.1	131.1	Scope	No change made.
	131.2	Purpose	New section *Purpose.* Defines the dual purpose of water quality standards. Standards establish the water quality goals for a specific water body and serve as a regulatory basis for the establishment of water quality based controls beyond the technology required under the Act consistent with Section 101(a)(2) and 303(c) of the Act.
131.2	131.3	Definitions	Minor changes made in the definitions of "criteria", "Section 304(a) criteria" and "water quality standards". Definition of "uses" and "attain" were removed. A definition of a "Use Attainability Analysis" was added.
131.3	131.4	State Authority	Word "reviewing" added to sentence "States are responsible for reviewing, establishing and revising water quality standards.
131.4	131.5	EPA Authority	The wording of this section has been slightly revised to show that EPA makes a determination of "whether" State standards meet the five criteria. Subsection (c) revised to read "whether the State has followed its legal procedures for revising or *adopting* standards. Subsection (d) modified to read "whether the State standards are based on appropriate technical and scientific data and analyses" rather than whether the decision making process is based on appropriate technical and scientific data and analyses. Subsection (e) added to include minimum requirements for State submission.
131.5	131.6	Minimum Requirements for Water Quality Stds. Submissions.	Under (d) the statement now reads: "An Antidegradation policy consistent with § 131.12." Under (e) after Attorney General the phrase "or other appropriate legal authority within the State" was added.
131 10	131.10	Designation of Uses.	Statement added to (a) prohibiting designating a stream for waste transport or assimilation. Added a new (b) that in designating uses of a water body and the appropriate criteria, States are to ensure the attainment and maintenance of downstream standards. Removed (c). The Antidegradation Policy is now described in § 131.12. Section (b) renumbered (c), removed (e), Section (f) renumbered (e), and Section (g) renumbered (f). Paragraph (h) now (g) has been changed. It now requires that a State must *demonstrate* that the designated use, which is not an existing use, is not attainable. Items 4 and 6 were also reworded. Item 4 now reads that changes in uses can be justified if dams, diversions or other types of hydrologic modifications *preclude* the attainment of a use rather than just interfere with the attainment of a use. Item 5 limits the consideration of physical factors to aquatic life protection uses. Item 6 has been totally changed. It now reads that changes in uses can be made if controls more stringent than those required by Section 301(b) and 306 of the Act would result in substantial and widespread economic and social impact. In paragraph (i) now (h), (2) and (3) are consolidated. Subparagraph (4) has been eliminated because of the revision to the Antidegradation Policy (see § 131.12). Subparagraph (5) now appears in § 131.6(b). New paragraph (i) requires States to revise their standards to reflect improvements in water quality. In paragraph (j), EPA has defined that States must conduct a Use Attainability Analysis if designating uses not specified in Section 101(a)(2) of the Act, when removing a use specified in Section 101(a)(2) or if modifying uses specified in Section 101(a)(2) by requiring less stringent criteria. Paragraph (k) clarifies that States are not required to conduct a Use Attainability Analysis when designating uses specified in Section 101(a)(2) of the Act.
131 11		Analyses for Changing or Modifying Uses.	Elimated.
131 12	131.11	Criteria	Eliminated. Under (a)(1) the phrase "are compatible with" has been removed and following the first sentence the following has been added: "Such criteria must be based on sound scientific rationale and must contain sufficient parameters or constitutents to protect the designated use. For water with multiple use designations, the criteria shall support the most sensitive use." Subparagraph (a)(2) has been revised to read that States *must* review water quality data and information and where toxic pollutants may be adversely affecting the attainment of the water quality or the attainment of the designated use or where the levels of toxic pollutants are at a level to warrant concern must adopt criteria for the toxic pollutants. Where States adopt narrative criteria for toxic pollutants, the State must adopt a policy indentifying the method by which the State intends to regulate point source discharges based on such narrative criteria. Subparts (b)(2) and (3) were combined. Paragraph (c) has been removed because the concepts are now included in paragraph (a).
	131.12	Antidegradation Policy.	The Antidegradation Policy found in the former 40 CFR 35.1550(e) has been adopted into the final Regulation with several modifications. The phrase "interfere with or become injurious to" was removed, a phrase was added in (a)(1), (2), and (3) to maintain and protect instream water quality to protect existing uses, in (a)(2) "important" replaces "significant" in the phrase on economic and social development, and "no degradation" was deleted from (a)(3).
131.13	131.13	General Policies	Paragraph (a) revised to clarify that General Policies if adopted are to be included in a State's water quality standards and are subject to EPA review and approval. Subsections (b)(c)(d) removed.
131.20	131 20	State Review and Revision of Water Quality Standards.	Paragraph (a) State Review has been rewritten to track the wording in the Act on the three year review of water quality standards. States are required to review every three years State standards on segments that do not include uses specified in Section 101(a)(2) of the Act to determine whether these standards are still appropriate. Finally a statement has been added that procedures States use to identify water bodies for review should be incorporated into their Continuing Planning Process document. Under paragraph (c) after 30 days we added a phrase, "of the final State action to adopt and certify" to clarify when the 30 day time period starts.

SUMMARY OF THE CHANGES MADE IN THE PROPOSED REGULATION—Continued

Section No. in the proposed regulation	Section No. in the final regulation	Title	Summary of changes
131.21	131.21	EPA Review and Approval of Water Quality Standards.	No Change.
131.22	131.22	EPA Promulgation of Water Quality Standards.	Paragraphs (a) and (b) were clarified to indicate Administrator may promulgate as well as just propose standards. Under paragraph (c), a requirement was added that EPA in promulgating water quality standards is also subject to the public participation requirements of this Regulation.

B. Regulatory Impact Analysis and Regulatory Flexibility Analysis and Paperwork Reduction Act Requirements

Under Executive Order 12291, EPA must judge whether a Regulation is "major" and therefore subject to the requirement of a Regulatory Impact Analysis. It is difficult for EPA to assess the likely net cost of this Regulation because of the offsetting character of its basic provisions. The Regulation does establish new obligations on the States for control of toxic pollutants. However, the Regulation also increase the ability of the States to determine the attainability of stream uses, to set site-specific criteria sufficient to protect those uses, and to focus limited State and Federal resources on reviewing standards for priority water quality limited segments. These changes are designed to enable States to better use water quality standards as a pragmatic tool in improving water quality where necessary to protect water uses. For these reasons the Agency judges this not to be a major Regulation under Executive Order 12291.

This notice was submitted to the Office of Management and Budget (OMB) for review as required by Executive Order 12291. Any comments from OMB to EPA and any EPA response to those comments are available for public inspection through contracting the person listed at the beginning of this notice.

Under the Regulatory Flexibility Act, 5 U.S.C. Section 601 et seq., EPA must prepare a Regulatory Flexibility Analysis for all proposed regulations that have a significant impact on a substantial number of small entities. EPA has determined that, for reasons discussed above, this Rule does not have significant adverse impact on small entities.

The information collection provisions in this rule have been approved by OMB under the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 *et seq.*, and have been assigned control number 2040-0049.

List of Subjects

40 CFR Part 35

Water pollution control.

40 CFR Part 120

Water pollution control.

40 CFR Part 131

Water pollution control, Intergovernmental relations, Administrative practices and procedures, Reporting and record keeping.

Dated: November 2, 1983.
William D. Ruckelshaus,
Administrator.

PART 35—STATE AND LOCAL ASSISTANCE

§ 35.1550 [Removed]

1. Section 35.1550 is removed.

PART 120—WATER QUALITY STANDARDS

§§ 120.1–120.3 [Removed]

2. Sections 120.1 through 120.3 are removed.

§§ 120.27 and 120.43 [Removed]

3. Sections 120.27 and 120.43 are removed.

4. Part 131 is added as set forth below:

4A. Subparts A, B, and C are added as follows:

PART 131—WATER QUALITY STANDARDS

Subpart A—General Provisions

Subpart B—Establishment of Water Quality Standards

Subpart C—Procedures for Review and Revision of Water Quality Standards

Authority: Clean Water Act, P.L. 92-500, as amended: 33 U.S.C. 1251 *et seq.*

Subpart A—General Provisions

§ 131.1 Scope.

This part describes the requirements and procedures for developing, reviewing, revising and approving water quality standards by the States as authorized by Section 303(c) of the Clean Water Act. The reporting or recordkeeping (information) provisions in this rule were approved by the Office of Management and Budget under 3504(b) of the Paperwork Reduction Act of 1980, U.S.C. 3501 *et seq.* (approval number 2040-0049).

§ 131.2 Purpose.

A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses. States adopt water quality standards to protect public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act (the Act). "Serve the purposes of the Act" (as defined in Sections 101(a)(2) and 303(c) of the Act) means that water quality standards should, wherever attainable, provide water quality for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water and take into consideration their use and value of public water supplies, propagation of fish, shellfish, and wildlife, recreation in and on the water and agricultural, industrial, and other purposes including navigation.

Such standards serve the dual purposes of establishing the water quality goals for a specific water body and serve as the regulatory basis for the establishment of water-quality-based treatment controls and strategies beyond the technology-based levels of treatment required by sections 301(b) and 306 of the Act.

§ 131.3 Definitions.

(a) *The Act* means the Clean Water Act (Public Law 92-500, as amended, (33 U.S.C. 1251 *et seq.*)).

(b) *Criteria* are elements of State water quality standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use. When criteria are met, water quality will generally protect the designated use.

(c) *Section 304(a) criteria* are developed by EPA under authority of Section 304(a) of the Act based on the latest scientific information on the relationship that the effect of a constituent concentration has on particular aquatic species and/or human health. This information is issued periodically to the States as guidance for use in developing criteria.

(d) *Toxic pollutants* are those pollutants listed by the Administrator under Section 307(a) of the Act.

(e) *Existing uses* are those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards.

(f) *Designated uses* are those uses specified in water quality standards for each water body or segment whether or not they are being attained.

(g) *Use Attainability Analysis* is a structured scientific assessment of the factors affecting the attainment of the use which may include physical, chemical, biological, and economic factors as described in § 131.10(g).

(h) *Water quality limited segment* means any segment where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after the application of the technology-bases effluent limitations required by Sections 301(b) and 306 of the Act.

(i) *Water quality standards* are provisions of State or Federal law which consist of a designated use or uses for the waters of the United States and water quality criteria for such waters based upon such uses. Water quality standards are to protect the public health or welfare, enhance the quality of water and serve the purposes of the Act.

(j) *States* include: the 50 States, the District of Columbia, Guam, the Commonwealth of Puerto Rico, Virgin Islands, American Samoa, the Trust Territory of the Pacific Islands, and the Commonwealth of the Northern Mariana Islands.

§ 131.4 State authority.

States are responsible for reviewing, establishing and revising water quality standards. Under Section 510 of the Act, States may develop water quality standards more stringent than required by this regulation.

§ 131.5 EPA authority.

Under Section 303(c) of the Act, EPA is to review and to approve or disapprove State-adopted water quality standards. The review involves a determination of: (a) Whether the State has adopted water uses which are consistent with the requirements of the Clean Water Act; (b) whether the state has adopted criteria that protect the designated water uses; (c) whether the State has followed its legal procedures for revising or adopting standards; (d) whether the State standards which do not include the uses specified in Section 101(a)(2) of the Act are based upon appropriate technical and scientific data and analyses, and (e) whether the State submission meets the requirements included in Section 131.6 of this part. If EPA determines that State water quality standards are consistent with the factors listed in (a)—(e) of this subsection, EPA approves the standards. EPA must disapprove the State water quality standards and promulgate Federal standards under Section 303(c)(4) of the Act, if State adopted standards are not consistent with the factors listed in (a)—(e) of this subsection. EPA may also promulgate a new or revised standard where necessary to meet the requirements of the Act.

§ 131.6 Minimum requirements for water quality standards submission.

The following elements must be included in each State's water quality standards submitted to EPA for review:

(a) Use designations consistent with the provisions of Sections 101(a)(2) and 303(c)(2) of the Act.

(b) Methods used and analyses conducted to support water quality standards revisions.

(c) Water quality criteria sufficient to protect the designated uses.

(d) An antidegradation policy consistent with § 131.12.

(e) Certification by the State Attorney General or other appropriate legal authority within the State that the water quality standards were duly adopted pursuant to State law.

(f) General information which will aid the Agency in determining the adequacy of the scientific basis of the standards which do not include the uses specified in Section 101(a)(2) of the Act as well as information on general policies applicable to State standards which may affect their application and implementation.

Subpart B—Establishment of Water Quality Standards

§ 131.10 Designation of uses.

(a) Each State must specify appropriate water uses to be achieved and protected. The classification of the waters of the State must take into consideration the use and value of water for public water supplies, protection and propagation of fish, shellfish and wildlife, recreation in and on the water, agricultural, industrial, and other purposes including navigation. In no case shall a State adopt waste transport or waste assimilation as a designated use for any waters of the United States.

(b) In designating uses of a water body and the appropriate criteria for those uses, the State shall take into consideration the water quality standards of downstream waters and shall ensure that its water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters.

(c) States may adopt sub-categories of a use and set the appropriate criteria to reflect varying needs of such sub-categories of uses, for instance, to differentiate between cold water and warm water fisheries.

(d) At a minimum, uses are deemed attainable if they can be achieved by the imposition of effluent limits required under Sections 301(b) and 306 of the Act and cost-effective and reasonable best management practices for nonpoint source control.

(e) Prior to adding or removing any use, or establishing sub-categories of a use, the State shall provide notice and an opportunity for a public hearing under § 131.20(b) of this regulation.

(f) States may adopt seasonal uses as an alternative to reclassifying a water body or segment thereof to uses requiring less stringent water quality criteria. If seasonal uses are adopted, water quality criteria should be adjusted to reflect the seasonal uses, however, such criteria shall not preclude the attainment and maintenance of a more protective use in another season.

(g) States may remove a designated use which is *not* an existing use, as defined in § 131.3, or establish sub-categories of a use if the State can demonstrate that attaining the designated use is not feasible because:

(1) Naturally occurring pollutant concentrations prevent the attainment of the use; or

(2) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or

(3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or

(4) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or

(5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or

(6) Controls more stringent than those required by Sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.

(h) States may not remove designated uses if:

(1) They are existing uses, as defined in Section 131.3, unless a use requiring more stringent criteria is added; or

(2) Such uses will be attained by implementing effluent limits required under Sections 301(b) and 306 of the Act and by implementing cost-effective and reasonable best management practices for nonpoint source control.

(i) Where existing water quality standards specify designated uses less than those which are presently being attained, the State shall revise its standards to reflect the uses actually being attained.

(j) A State must conduct a use attainability analysis as described in § 131.3(g) whenever:

(1) The State designates or has designated uses that do not include the uses specified in Section 101(a)(2) of the Act, or

(2) The State wishes to remove a designated use that is specified in Section 101(a)(2) of the Act or to adopt subcategories of uses specified in Section 101(a)(2) of the Act which require less stringent criteria.

(k) A State is not required to conduct a use attainability analysis under this Regulation whenever designating uses which include those specified in Section 101(a)(2) of the Act.

§ 131.11 Criteria.

(a) Inclusion of pollutants:

(1) States must adopt those water quality criteria that protect the designated use. Such criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use. For waters with multiple use designations, the criteria shall support the most sensitive use.

(2) Toxic Pollutants—States must review water quality data and information on discharges to identify specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern and must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use. Where a State adopts narrative criteria for toxic pollutants to protect designated uses, the State must provide information identifying the method by which the State intends to regulate point source discharges of toxic pollutants on water quality limited segments based on such narrative criteria. Such information may be included as part of the standards or may be included in documents generated by the State in response to the Water Quality Planning and Management Regulations (40 CFR Part 35).

(b) Form of criteria: In establishing criteria, States should:

(1) Establish numerical values based on:

(i) 304(a) Guidance; or

(ii) 304(a) Guidance modified to reflect site-specific conditions; or

(iii) other scientifically defensible methods;

(2) establish narrative criteria or criteria based upon biomonitoring methods where numerical criteria cannot be established or to supplement numerical criteria.

§ 131.12 Antidegradation policy.

(a) The State shall develop and adopt a statewide antidegradation policy and identify the methods for implementing such policy pursuant to this subpart. The antidegradation policy and implementation methods shall, at a minimum, be consistent with the following:

(1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

(2) Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.

(3) Where high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

(4) In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with section 316 of the Act.

§ 131.13 General policies.

States may, at their discretion, include in their State standards, policies generally affecting their application and implementation, such as mixing zones, low flows and variances. Such policies are subject to EPA review and approval.

Subpart C—Procedures for Review and Revision of Water Quality Standards

§ 131.20 State review and revision of water quality standards.

(a) State Review: The State shall from time to time, but at least once every three years, hold public hearings for the purpose of reviewing applicable water quality standards and, as appropriate, modifying and adopting standards. Any water body segment with water quality standards that do not include the uses specified in Section 101(a)(2) of the Act shall be re-examined every three years to determine if any new information has become available. If such new information indicates that the uses specified in Section 101(a)(2) of the Act are attainable, the State shall revise its standards accordingly. Procedures States establish for identifying and reviewing water bodies for review should be incorporated into their Continuing Planning Process.

(b) *Public Participation:* The State shall hold a public hearing for the purpose of reviewing water quality standards, in accordance with provisions of State law, EPA's water quality management regulation (40 CFR 130.3(b)(6)) and public participation regulation (40 CFR Part 25). The proposed water quality standards revision and supporting analyses shall be made available to the public prior to the hearing.

(c) *Submittal to EPA:* The State shall submit the results of the review, any supporting analysis for the use attainability analysis, the methodologies used for site-specific criteria development, any general policies applicable to water quality standards and any revisions of the standards to the Regional Administrator for review and approval, within 30 days of the final State action to adopt and certify the revised standard, or if no revisions are made as a result of the review, within 30 days of the completion of the review.

§ 131.21 EPA review and approval of water quality standards.

(a) After the State submits its officially adopted revisions, the Regional Administrator shall either:

(1) notify the State within 60 days that the revisions are approved, or

(2) notify the State within 90 days that the revisions are disapproved. Such notification of disapproval shall specify the changes needed to assure compliance with the requirements of the Act and this regulation, and shall explain why the State standard is not in compliance with such requirements. Any new or revised State standard must be accompanied by some type of supporting analysis.

(b) The Regional Administrator's approval or disapproval of a State water quality standard shall be based on the requirements of the Act as described in §§ 131.5, and 131.6.

(c) A State water quality standard remains in effect, even though disapproved by EPA, until the State revises it or EPA promulgates a rule that supersedes the State water quality standard.

(d) EPA shall, at least annually, publish in the Federal Register a notice of approvals under this section.

§ 131.22 EPA promulgation of water quality standards.

(a) If the State does not adopt the changes specified by the Regional Administrator within 90 days after notification of the Regional Administrator's disapproval, the Administrator shall promptly propose and promulgate such standard.

(b) The Administrator may also propose and promulgate a regulation, applicable to one or more States, setting forth a new or revised standard upon determining such a standard is necessary to meet the requirements of the Act.

(c) In promulgating water quality standards, the Administrator is subject to the same policies, procedures, analyses, and public participation requirements established for States in these regulations.

§§ 120.12 and 120.34 [Redesignated as §§ 131.31 and 131.33]

4B. Sections 120.12 and 120.34 are redesignated as §§ 131.31 and 131.33 respectively and constitute Subpart D, of new Part 131. The heading of new § 131.31 is revised to read "§ 131.31 Arizona". The table of contents for new Subpart D is set forth below:

Subpart D—Federally Promulgated Water Quality Standards

Authority: Clean Water Act, Pub. L. 92-500, as amended; 33 U.S.C. 1251 *et seq.*

5. The heading for Part 120 is removed and reserved.

[Note.—Appendix A will not appear in the CFR.]

Appendix A—Response to Public Comments

The public comments and statements submitted to EPA on the proposed Water Quality Standards Regulation before the close of the comment period are summarized in a separate publication, "Summary of Public Comments on the Proposed Water Quality Standards Regulation," March 11, 1983. Limited numbers of the Summary are available from David K. Sabock at the address listed under FOR FURTHER INFORMATION CONTACT.

This appendix describes EPA's response to the recommendations for changes in the proposed Regulation. Similar recommendations have been grouped together. Major additions and deletions made in the Rule in response to public comments are described in greater detail in the Preamble. Subjects discussed in the Preamble, along with EPA's rationale for accepting or rejecting the public's suggestions include: commitment to the goals of the Clean Water Act, changes in uses (including comments on benefit-cost assessments), criteria, the antidegradation policy, general policies, and State review.

Definitions

Several commenters asked what waters were included in the Standards program. We changed the term "navigable waters" to "waters of the United States" in the Regulation to avoid confusion. The CWA defines "navigable waters" as "waters of the United States," a broader class of waters than considered "navigable" under some other statutes.

A number of recommendations were made to improve the series of definitions relating to uses. The terms "uses" and "attain" were removed from the list of definitions as being unnecessary to define. A definition of "Use Attainability Analysis" was added as a means of providing a common basis for understanding this analysis. This definition is derived from the language of the existing Regulation. The recommendation that the definition of "water quality limited segment" be moved from the Preamble of the proposed Rule to the definition section of the final Rule was accepted. The definition is important to understanding certain provisions of the Rule and is, therefore, logically part of the Rule.

Several suggestions were offered regarding the definition of "criteria" which resulted in the addition of "or narrative statement" after "concentration or level" and the deletion of the final sentence to remove the erroneous implication that only numerical values may be established. However, we rejected the suggestion that we include in the definition of criteria a statement that criteria are purely scientific determinations and do not consider the availability of treatment technology or the costs or economic impact of such treatment requirements, because to do so would be misleading. Section 304(a) criteria developed by EPA are purely scientific determinations, published as guidance for the State's use. They are not enforceable. Criteria adopted as part of State water quality standards are set taking into consideration the protection of a particular designated use, and thus may indirectly reflect a judgment as to the availability of treatment technologies needed to attain that use and the associated economic impacts. Such criteria, adopted as part of a State standard, are enforceable.

State Review of Water Quality Standards

There was considerable public comment on the subject of *State Review* *of Water Quality Standards*, primarily directed to the apparent lack of EPA's commitment to the goals and philosophy of the Clean Water Act and the substitution of a review of standards for a limited number of priority water bodies in lieu of a Statewide review of standards at least once every 3 years. These concerns were addressed in detail in the Preamble and will only be briefly discussed here.

Because of the overwhelming support for the Section 101(a)(2) goals of the Act, EPA added a requirement that any stream segment with uses not specified in Section 101(a)(2) of the Act be re-examined every 3 years by the State to determine if new information has become available. If such new information indicates that the uses specified in Section 101(a)(2) are attainable, the State shall revise its standards accordingly. This provision in effect established a mandatory requirement to "upgrade" water quality standards as a balance to the provisions allowing the "downgrading" of standards. This policy also removes problems dealing with equity considerations among competing dischargers. Dischargers on a stream with an unduly "low" designated use should not be given an advantage over dischargers on streams whose designated uses and criteria were properly set to reflect attainable uses.

We have retained the statutory 3-year review requirement. The proposed regulation was intended to implement that requirement, but subsequent statements on priority water bodies in that subsection of the proposal and discussions in the Preamble and *Water Quality Standards Handbook* tended to confuse the issue. Many commenters thought EPA was attempting to delete or minimize that requirement. This is not EPA's intention.

EPA has changed the language in part 131.20 to emphasize the statutory nature of the 3-year review of all State standards. However, EPA continues to believe that the concept of focusing limited State resources on specific water bodies is an appropriate management technique to ensure that the most critical environmental problems are adequately addressed. The Preamble discusses this in more detail.

In addition, many commenters erroneously assumed that EPA was proposing a rigid system for determining priority water bodies. EPA has no rigid priority system in mind other than assuming the States will address known problems first. Rather, EPA views setting priorities as a basic management tool and a necessary step for States to make the best use of limited resources. Priority lists are viewed as flexible working documents, not as mandatory lists. Public involvement in developing these lists is encouraged.

Although there were suggestions that EPA define for States the processes that should be used in establishing the list of priority water bodies, the Act does not require such guidance and EPA does not believe it is appropriate to do so. However, whatever procedures States establish should be incorporated into the States Continuing Planning Process document and be made known to the public-at-large.

Antidegradation Policy

EPA's proposal, which would have limited the antidegradation policy to the maintenance of existing uses, plus three alternative policy statements described in the preamble to the proposal notice, generated extensive public comment. EPA's response is described in the Preamble to this final rule and includes a response to both the substantive and philosophical comments offered. Public comments overwhelmingly supported retention of the existing policy and EPA did so in the final rule.

EPA's response to several comments dealing with the antidegradation policy, which were not discussed in the Preamble are discussed below.

Option three contained in the Agency's proposal would have allowed the possibility of exceptions to maintaining existing uses. This option was either criticized for being illegal or was supported because it provided additional flexibility for economic growth. The latter commenters believed that allowances should be made for carefully defined exceptions to the absolute requirement that uses attained must be maintained. EPA rejects this contention as being totally inconsistent with the spirit and intent of both the Clean Water Act and the underlying philosophy of the antidegradation policy. Moreover, although the Agency specifically asked for examples of where the existing antidegradation policy had precluded growth, no examples were provided. Therefore, wholly apart from technical legal concerns, there appears to be no justification for adopting Option 3.

Most critics of the proposed antidegradation policy objected to removing the public's ability to affect decisions on high quality waters and outstanding national resource waters. In attempting to explain how the proposed antidegradation policy would be implemented, the Preamble to the proposed rule stated that no public participation would be necessary in certain instances because no change was being made in a State's water quality standard. Although that statement was technically accurate, it left the mistaken impression that all public participation was removed from the discussions on high quality waters and that is not correct. A NPDES permit would have to be issued or a 208 plan amended for any deterioration in water quality to be "allowed". Both actions require notice and an opportunity for public comment. However, EPA retained the existing policy so this issue is moot. Other changes in the policy affecting ONRW are discussed in the Preamble.

Designation of Uses

The question of whether there is a hierarchy of uses generated much discussion. Many indicated there is no hierarchy of uses since none of the uses mentioned in Section 303(c) of the Clean Air Water Act are ranked or were put into any order of priority. However, others believed that fish, wildlife and recreation or potable water supply clearly have precedence. The short answer is that Congress, in setting the goals in Section 101(a)(2), established that, where attainable, water quality "shall provide for the protection of fish, shellfish, wildlife and recreation in and on the water. . .". Therefore, EPA has revised the proposed regulation to better emphasize the uses specified in the Section 101(a)(2) goals of the Act. Under the final regulation, wherever States have set or set uses for a water body which do not include all of the uses specified in Section 101(a)(2) of the Act, they must conduct a use attainability analysis to demonstrate that these uses are not attainable. Of course, if they are not attainable, the State must select one or more of the other uses included in 303(c)(2). While the States need only conduct a use attainability analysis once, every three years States will have to review the basis of prior decisions to designate uses a water body which do not include uses specified in Section 101(a)(2) of the Act to determine if there is any information which would warrant a change in the standards. This change responds positively to the criticism that the proposed regulation settled for the status quo and did not adequately support the improvement of water quality.

The provision in the proposal allowing States to designate subcategories of aquatic use (Section 131.10(b)) has been changed slightly in the final rule (Section 131.10(c)) in response to suggestions made by various commenters. EPA is attempting to convey the concept that some use classifications included in the Act and in State standards are so broad that they do not adequately describe to the public the actual use to be protected. The final rule provides that a State may, because of physical, chemical, biological, and economic factors, wish to adopt sub-categories of a use and set criteria appropriate to protect a particular use sub-category. The alteration of the language from the proposal to the final rule specifically follows suggestions that uses other than aquatic life protection should be covered, and that factors other than economics should be considered, in designating particular sub-categories of uses.

Many of the comments on setting sub-categories of uses levels of aquatic protection, and seasonal uses were similar, focusing primarily on the availability of guidance and the adequacy of information on how to establish levels of protection or seasonal uses. Guidance is available in the *Water Quality Standards Handbook* on what considerations are involved in determining levels of protection and seasonal uses to designating appropriate uses for a water body. The availability of information will vary depending on the site involved. EPA intends to continually improve the scientific and technical basis of the guidance and to revise such guidance from time to time. Moreover, EPA will not approve standards unless they are based on sound scientific and technical analysis. Establishing sub-categories of uses and seasonal uses are optional considerations on the part of the State.

Several commenters suggested that EPA establish a minimum level of protection. EPA believes it provides the basic scientific information on various levels of protection with the water quality criteria recommendations under Section 304(a) of the Act. However, for EPA to mandate certain levels of aquatic life protection within a use would override the primary authority of the State to adopt use classifications and supporting criteria through public hearings. EPA does not believe as being valid the concern expressed by the public that when establishing various levels of protection that the most sensitive species will not be protected. The degree of protection may vary depending upon what life stage of the most sensitive species the public wishes to protect. For example, water quality criteria necessary to protect spawning of aquatic life generally requires more stringent water quality criteria than does protection of the species during other stages of its life cycle. If spawning is not part of a designated use for a specific water body, then less stringent criteria levels may be established and they will be adequate to protect the use fully.

The public also was concerned that uses or sub-categories of uses would not be based on original habitat conditions. It has never been the intention of the water quality standards program to bring all waters to a pristine condition or necessarily to set standards based on original habitat conditions. In the first instance, some waters are naturally of "poor" quality, and in the second, man has changed the environment and there are instances where an attempt to correct or control some sources of pollution either simply cannot be effected or would cause more environmental damage to correct than to leave in place.

In response to comments that the provision on seasonal uses was too loose, we revised the wording to clarify that the criteria may not be adjusted in a way that precludes a more protective use in another season.

A basic policy of the standards program throughout its history has been that the designation of a water body for the purposes of waste transport or waste assimilation is unacceptable. At the public's suggestion, an explicit statement of this policy has been added to § 131.10(a). The objective is to prevent water bodies from being used as open sewers. Thus, this "no waste transport" policy does not mean that wastes cannot be conveyed by barge or boat; such activity is encompassed by the navigation use designation.

Use Attainability Analysis

Because of the wide range of comments on the use attainability analysis, EPA revised the regulation to better define when such an analysis is appropriate. The changes were described in the Preamble:

EPA also reworded the proposed concept of the use attainability analysis to include, where appropriate, an analysis of the economic impacts of attaining a use consistent with or more stringent than the Section 101(a)(2) goals of the Act. EPA agrees with the comments that attainability and affordability are integral components of the same analyses. This is consistent with the previous regulation, which provided that, in determining attainability, States were to consider economic factors (§ 35.1550(c)(1)).

In the proposed Rule, EPA recommended conducting a benefit-cost assessment in determining whether the benefits of attaining a use bear a reasonable relationship to the costs. That concept has been removed from the final Rule. As explained in the preamble, the Agency was persuaded by the arguments that there are inherent conceptual and procedural difficulties in *balancing* the benefits of achieving the Section 101(a)(2) goals versus the costs. The final regulation avoids these problems while still recognizing the relevance of economic factors in determining attainability. The Agency has retained the concept that economic analysis be judged on substantial and widespread economic and social impact.

Defining Attainable Uses

Several recommendations were made to delete references to Section 301(c) from the definition of the minimum baseline technology defining when a use is considered attainable and cannot be modified or removed. They also suggested making 301(c) waivers subject to the requirements of proposed § 131.13(c). The Agency believes that it is appropriate to use all applicable sections of the Act in defining the minimum technology based requirements of the Act; section 301(c) is one such section. In addition, Section 301(c) prescribes the eligibility requirements for a Section 301 waiver. Therefore, EPA has not made the suggested changes relating to Section 301(c).

Others pointed out that the proposed rule did not, but should, allow a mix of point and nonpoint source controls in determining whether a use is attainable. It was not EPA's intent to prevent that type of analysis, and the final regulation has been clarified by combining the two paragraphs on point and nonpoint source controls with the word "and" in § 131.10(h)

Other comments on nonpoint sources focused on the use of the terminology "cost effective and reasonable best management practices." EPA used the term "cost effective and reasonable best management practices" to cover the development of nonpoint source controls with Section 205(j) funding. We believe generally that nonpoint source controls developed as part of a State's water quality management plan are cost effective and reasonable. If a designated use can be attained through such BMPs; it would be inconsistent to allow a change in the use. Some comments also expressed concern that the Agency was forcing a mandatory regulatory program for nonpoint source controls through the Water Quality Standards Regulation. The Agency does not believe that the wording will impose any new requirements for the development of regulatory programs for nonpoint source controls; rather, the regulation simply takes into account those programs which exist in ascertaining the minimum requirements. States are still free to review and revise their non-point source requirements in accordance with 208, 303(e), and 205(j).

One commenter recommended that the Agency include in the section on use attainability a discussion of the relationship between best management practices and water quality standards similar to that in *U.S. EPA, State and Areawide Memorandum,* Number 32, Nov. 14, 1978. EPA has included that memorandum in the chapter on "Water Body Survey and Assessments for Conducting Use Attainability Analyses" in the *Water Quality Standards Handbook.*

Changes in Uses

EPA received substantial comment on § 131.10(h)(1)–(6) and (i)(1)–(6) of the proposed regulation, which deal with the circumstances under which changes may (or may not) be made in designated uses. These sections have been revised; the changes are discussed in Section A of the Preamble.

Criteria

We accepted the comment that the added test of criteria being "compatible with" protecting a designated use might raise the possibility of unnecessary debate over what is compatible with protecting a designated use. The sentence was revised to read "States must adopt water quality criteria that protect a designated use." In response to several comments, EPA also added language to clarify that criteria must be based on sound scientific rational and must contain sufficient parameters or constituents to protect the designated use. Some commenters apparently believe that the Agency continues to have a policy of "presumptive applicability" applied to the Federal water quality criteria or that the proposed Regulation recreated that policy. That policy existed from July 10, 1978 to Nov. 28, 1980, when it was rescinded. No such policy now exists nor is intended in the final rule. While States are free to draw on EPA's 304(a) criteria as support for State criteria, they are equally free to use any other criteria for which they have sound scientific support.

Comments received from the public clearly indicated concern that the proposed rule did not appear to provide sufficient emphasis on the control of toxic pollutants. The proposed paragraph on toxic pollutants was therefore strengthened to provide that States "must" review water quality data and information on dischargers to identify where toxic pollutants may be adversely affecting the attainment of designated water uses and "must" adopt criteria to ensure the protection of the designated uses. Furthermore, where States adopt narrative statements for toxic pollutants, EPA is requiring that States submit along with their standards submission information identifying the method by which the State intends to regulate point source discharges of toxic pollutants based on the narrative provisions. For example, States may require biological monitoring of dischargers' effluents such that a particular tolerance or LC_{50} value is not exceeded. EPA made these changes because it agrees that more emphasis needs to be placed on the control of toxic dischargers. Information on implementing methods will ensure that EPA and State have a common understanding of what the narrative criteria really mean, and will facilitate permit writing on water quality limited streams.

The regulation provides several ways of establishing water quality criteria, including criteria development based on site-specific characteristics. EPA's field tests of the proposed guidance supporting the concept of developing site-specific criteria, the comments received during the public review, and the review conducted by the Agency's Science Advisory Board identified difficulties with the proposed guidance. The final guidance has been carefully revised to reflect the concerns and comments received to ensure that the mechanisms used to develop site-specific criteria are scientifically credible. Research will also continue on improved techniques, and as validated they will be made available to the States.

General Policies

While many commenters supported including the General Policies provision (Section 131.13) in the framework of the Regulation, others recommended deleting the General Policies section from the Regulation and including it in guidance documents. Since much of the language in that proposed part was in fact guidance, EPA decided to delete paragraphs (b)–(d). Only the first part of the section which recognizes that States do adopt policies that impact on the implementation and application of water quality standards and that such policies, if adopted, are subject to EPA review and approval was retained.

EPA believes that it is important for the public to understand that while the adoption of these policies is optional, if adopted they are subject to EPA review and approval. EPA will continue to include a discussion of mixing zones, low flows, variance and other general program policies in a guidance document, as has been done since 1975. Detailed guidance on these optional policies is included in the *Water Quality Standards Handbook.*

Resource Capabilities

The issue of resources was of concern to many. While some States over the years have collected the scientific and technical information to set appropriate water quality standards, others have done significantly less data collection. EPA recognizes that use attainability analyses and site specific criteria studies may require some States to program more resources for setting their water quality standards than in the past. However, the use attainability analyses apply only to water quality limited segments—segments where standards will not be attained even with implementation of technology-based controls of the Act, where the State wishes to justify uses less than "fishable/swimmable". Moreover, nothing in the guidance or in the requirement for conducting use attainability analyses suggests that every analysis be similar in scope and detail or that they must be intrinsically expensive and difficult. EPA expects quite the opposite to be true; the analyses only need to be sufficiently detailed to support the specific standards decision in question. Consequently, when attempting to establish appropriate aquatic protection uses it will, for example, be relatively simple to demonstrate to EPA that certain aquatic life forms will be unable to exist in an area because of physical factors regardless of the level of water quality attained, i.e., no level of water quality will induce fish to spawn in areas where the bottom strata are not what the particular species requires for spawning. In other instances, given the environmental problems, number of people involved, the cost of pollution control to municipalities and industries, and the political aspects of the situation, the use attainability analyses may be quite costly. Because resources are and will likely continue to be a problem, EPA recommends that States set priorities for conducting these analyses. The Agency also believes that it is appropriate for States to enlist the cooperation and resources of dischargers in conducting these analyses. EPA continues to believe that there is considerable expertise and data available from various State agencies that can be tapped to assist in establishing attainable standards. This expertise does, of course, vary from State to State but that situation exists under any regulation EPA may promulgate.

In addition to the technical concerns on the development of site-specific criteria addressed earlier in both the Preamble and this Appendix, the public expressed concern with the cost of the procedures and the availability of State personnel to conduct and manage such procedures. Because it is a new concept in terms of application in a regulation, the Preamble to the proposed rule discussed the procedures in detail. This conveyed the impression that site-specific criteria development would be the basic method of setting water quality criteria. EPA believes the States will continue to base most of their standards on EPA developed Section 304(a) criteria because of the resource question and because of the fact that site-specific criteria will not be necessary in most water bodies. The Final Rule allows States to develop site-specific criteria; it does not require them to do so. As with use attainability analyses, States should set priorities and enlist the assistance of dischargers in conducting site specific criteria. EPA will be providing training seminars for State personnel in applying site-specific criteria development procedures. EPA is also developing simpler and improved techniques.

State/Federal Roles

There were a number of diverse comments on the sections of the proposed rule dealing with "State Review and Revision of Water Quality Standards", "EPA Review and Approval of Water Quality Standards" and "EPA Promulgation of Water Quality Standards".

Several comments on § 131.20 of the proposed regulation "State Review and Revision of Water Quality Standards", requested specific mechanisms be included in the regulation on how States should generate data and information, how to involve local government and industry in the data collection and decision making, how permittees could request a review of inappropriate water quality standards and how the public participates in the water quality standards revision process. All of these comments were evaluated but few changes were made other than those in § 131.20 which were described earlier. States are responsible, within the guidelines of Section 303(c) of the Act and the Water Quality Standards Regulation, for setting water quality standards. EPA does not believe it is appropriate to specify particular administrative mechanisms States must use in that process. Ensuring such administrative uniformity would be disruptive to the States without yielding any significant environmental benefit.

There was also a recommendation to include in the rule the policy statement that was in the preamble to the proposal on the relationship of Section 24 of the "Municipal Waste Water Treatment Construction Grant Amendments of 1981" (Pub. L. 97-117, December 29, 1981, 33 U.S.C. 1313(a)), to water quality standards reviews. The Agency chose not to do so because, for the purposes of Section 24, water quality standards reviews are synonymous with the water quality standards reviews under Section 303(c) of the Act and the one final rule.

A number of letters and statements expressed concern that the various EPA Regional Offices will interpret the regulation differently. It is recognized that with 10 Regional Offices responsible for the review and approval of State water quality standards, there is potential for inconsistencies between Regions on recommended data and analyses. Of course, since water quality problems in different regions may vary considerably, the regions must also be able to respond to those problems in ways that make the most sense under the particular circumstances. However, it is believed that EPA's guidance and Headquarters evaluations of the Regional Offices will, to the extent possible, minimize inconsistencies in the interpretation of the Regulation by our Regional Offices.

There were suggestions that EPA change the rule to read that the State water quality standards go into effect only after EPA approval. Standards are adopted by States under State law. Consistent with the Clean Water Act, EPA's policy has always been that a State standard goes into effect when adopted by the State and remains in effect, even if disapproved, until the State revises its standards or EPA promulgates a Federal standard. This interpretation is necessary because otherwise there would be no standard at all until Federal action was completed. A State rescinds its prior standard whenever it adopts a revised standard. In addition, EPA approval of a standard should not be interpreted as superseding the State's right to amend its own laws. By the same token, if EPA promulgates a Federal standard, the State is obliged to apply that standard in its pollution control programs or until the State adopts a State standard identical to or more stringent than the Federal standards.

EPA proposed to publish a notice of approvals of State water quality standards in the Federal Register at least annually. One letter requested that EPA publish the notice of approvals at the time the Agency take action. EPA believes that this action is unnecessary since publication of these notices (or any delay in publishing them) in no way affects the legal standing of the standards or the status of EPA's approval action. When a State adopts a standard, it publishes a notice under State law. This should be sufficient to ensure that the regulated community is informed of any changes in State water quality standards. EPA's annual publication will serve as a convenient check.

A number of respondents recommended that in promulgating State standards, EPA move expeditiously to avoid excessive delays. EPA's approach in disapproving State standards is to work with the State to assist the State in revising its standard to meet the Act's requirements. Only as a last resort will EPA promulgate Federal standards. In working with a State to revise its standard, EPA will try to do so within the timeframe of the Act. However, this may not always be possible depending on State administrative and/or legislative procedures. However, we intend to try harder to eliminate unnecessary delay.

In response to a number of questions raised, the final rule clearly states that in promulgating State standards, the Administrator will be subject to the same public participation policies and procedures established for States.

Interstate/International Water Quality Standards Issues

In the Preamble to the proposed water quality standards regulation, EPA discussed its role in interstate and international water quality standards issues. There were those that believed that EPA should include in the regulation specific procedures for resolving interstate/international conflicts and require States to adopt standards that meet treaty requirements. Since these issues have been associated with the standards program since its inception and have been adequately resolved previously without the need for regulatory language, EPA sees no need to include such language in the Final Rule.

When interstate/international conflicts arise, EPA will play a stronger role in the standards process in addition to the ordinary review and approval procedures described in the regulation. First, if an interstate conflict occurs between States in the same EPA region, the EPA Regional Administrator is in a position to help resolve the dispute through the ability to review and approve each State's standards and by participating in the standards development process.

Interstate and interregional organizations can also play a positive role in this situation. Second, if the issue involves more than one EPA region and the EPA regions are unable to resolve the issues, then the EPA Administrator can be requested to render a judgment. While it is theroretically possible that two States might have incompatible standards, both of which meet the requirements of the Act and this regulation, such as situation is likely to be rare. If it occurs, EPA will assist the States in resolving the inconsistency. The exact procedures will depend upon the specific circumstances. Therefore, we do not believe it is appropriate to include specific procedures in the Water Quality Standards Regulation to resolve interstate conflicts.

Any specific treaty requirements have the force of law. Therefore, State water quality standards will have to meet any treaty requirements.

Finally, in response to commenters' suggestions, we have made some editorial and format changes to clarify the regulation. In addition, the substantive changes made to demonstrate the Agency's commitment to the goals of the Act should also help clarify the regulation.

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Exhibit 77

United States
Environmental Protection
Agency

Office of Water
Regulations and Standards
Washington, DC 20460

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Water

EPA

Questions & Answers on: Antidegradation

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QUESTIONS AND ANSWERS ON ANTIDEGRADATION

INTRODUCTION

This document provides guidance on the antidegradation policy component of water quality standards and its application. The document begins with the text of the policy as stated in the water quality standards regulation, 40 CFR 131.12 (40 FR 51400, November 8, 1983), the portion of the Preamble discussing the antidegradation policy, and the response to comments generated during the public comment period on the regulation.

The document then uses a question and answer format to present information about the origin of the policy, the meaning of various terms, and its application in both general terms and in specific examples. A number of the questions and answers are closely related; the reader is advised to consider the document in its entirety, for a maximum understanding of the policy, rather than to focus on particular answers in isolation. While this document obviously does not address every question which could arise concerning the policy, we hope that the principles it sets out will aid the reader in applying the policy in other situations. Additional guidance will be developed concerning the application of the antidegradation policy as it affects pollution from nonpoint sources. Since Congress is actively considering amending the Clean Water Act to provide additional programs for the control of nonpoint sources, EPA will await the outcome of congressional action before proceeding further.

EPA also has available, for public information, a summary of each State's antidegradation policy. For historical interest, limited copies are available of a Compendium of Department of the Interior Statements on Non-Degradation of Interstate Waters, August, 1968. Information on any aspect of the water quality standards program and copies of these documents may be obtained from:

David Sabock, Chief
Standards Branch (WH-585)
Office of Water Regulations and Standards
Environmental Protection Agency
401 M. Street, S.W.
Washington, D.C. 20460

This document is designated as Appendix A to Chapter 2 - General Program Guidance (antidegradation) of the Water Quality Standards Handbook, December 1983.

James M. Conlon, Acting Director
Office of Water Regulations
and Standards

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§ 131.12 Antidegradation policy.

(a) The State shall develop and adopt a statewide antidegradation policy and identify the methods for implementing such policy pursuant to this subpart. The antidegradation policy and implementation methods shall, at a minimum, be consistent with the following:

(1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

(2) Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.

(3) Where high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

(4) In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with section 316 of the Act.

Antidegradation Policy

The preamble to the proposed rule discussed three options for changing the existing antidegradation policy. Option 1, the proposed option, provided simply that uses attained would be maintained. Option 2 stated that not only would uses attained be maintained but that high quality waters, i.e. waters with quality better than that needed to protect fish and wildlife, would be maintained (that is, the existing antidegradation policy minus the "outstanding natural resource waters" provision). Option 3 would have allowed changes in an existing use if maintaining that use would effectively prevent any future growth in the community or if the benefits of maintaining the use do not bear a reasonable relationship to the costs.

Although there was support for Option 2, there was greater support for retaining the full existing policy, including the provision on outstanding National resource waters. Therefore, EPA has retained the existing antidegradation policy (Section 131.12) because it more accurately reflects the degree of water quality protection desired by the public, and is consistent with the goals and purposes of the Act.

In retaining the policy EPA made four changes. First, the provisions on maintaining and protecting existing instream uses and high quality waters were retained, but the sentences stating that no further water quality degradation which would interfere with or become injurious to existing instream uses is allowed were deleted. The deletions were made because the terms "interfere" and "injurious" were subject to misinterpretation as precluding any activity which might even momentarily add pollutants to the water. Moreover, we believe the deleted sentence was intended merely as a restatement of the basic policy. Since the rewritten provision, with the addition of a phrase on water quality described in the next sentence, stands alone as expressing the basic thrust and intent of the antidegradation policy, we deleted the confusing phrases. Second, in § 131.12(a)(1) a phrase was added requiring that the level of water quality necessary to protect an existing use be maintained and protected. The previous policy required only that an existing use be maintained. In § 131.12(a)(2) a phrase was added that "In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully". This means that the full use must continue to exist even if some change in water quality may be permitted. Third, in the first sentence of § 131.12(a)(2) the wording was changed from ". . . significant economic or social development. . ." to ". . . important economic or social development. . . ." In the context of the antidegradation policy the word "important" strengthens the intent of protecting higher quality waters. Although common usage of the words may imply otherwise, the correct definitions of the two terms indicate that the greater degree of environmental protection is afforded by the word "important."

Fourth, § 131.12(a)(3) ~~dealing~~ with the designation of outstanding National resource waters (ONRW) was changed to provide a limited exception to the absolute "no degradation" requirement. EPA was concerned that waters which properly could have been designated as ONRW were not being so designated because of the flat no degradation provision, and therefore were not being given special protection. The no degradation provision was sometimes interpreted as prohibiting *any* activity (including temporary or short-term) from being conducted. States may allow some limited activities which result in temporary and short-term changes in water quality. Such activities are considered to be consistent with the intent and purpose of an ONRW. Therefore, EPA has rewritten the provision to read ". . . that water quality shall be maintained and protected," and removed the phrase "No degradation shall be allowed. . . ."

In its entirety, the antidegradation policy represents a three-tiered approach to maintaining and protecting various levels of water quality and uses. At its base (Section 131.12(a)(1)), all existing uses and the level of water quality necessary to protect those uses must be maintained and protected. This provision establishes the absolute floor of water quality in all waters of the United States. The second level (Section 131.12(a)(2)) provides protection of actual water quality in areas where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water ("fishable/swimmable"). There are provisions contained in this subsection to allow some limited water quality degradation after extensive public involvement, as long as the water quality remains adequate to be "fishable/swimmable." Finally § 131.23(a)(3) provides special protection of waters for which the ordinary use classifications and water quality criteria do not suffice, denoted "outstanding National resource water." Ordinarily most people view this subsection as protecting and maintaining the highest quality waters of the United States: that is clearly the thrust of the provision. It does, however, also offer special protection for waters of "ecological significance." These are water bodies which are important, unique, or sensitive ecologically, but whose water quality as measured by the traditional parameters (dissolved oxygen, pH, etc.) may not be particularly high or whose character cannot be adequately described by these parameters.

Antidegradation Policy

EPA's proposal, which would have limited the antidegradation policy to the maintenance of existing uses, plus three alternative policy statements described in the preamble to the proposal notice, generated extensive public comment. EPA's response is described in the Preamble to this final rule and includes a response to both the substantive and philosophical comments offered. Public comments overwhelmingly supported retention of the existing policy and EPA did so in the final rule.

EPA's response to several comments dealing with the antidegradation policy, which were not discussed in the Preamble are discussed below.

Option three contained in the Agency's proposal would have allowed the possibility of exceptions to maintaining existing uses. This option was either criticized for being illegal or was supported because it provided additional flexibility for economic growth. The latter commenters believed that allowances should be made for carefully defined exceptions to the absolute requirement that uses attained must be maintained. EPA rejects this contention as being totally inconsistent with the spirit and intent of both the Clean Water Act and the underlying philosophy of the antidegradation policy. Moreover, although the Agency specifically asked for examples of where the existing antidegradation policy had precluded growth, no examples were provided. Therefore, wholly apart from technical legal concerns, there appears to be no justification for adopting Option 3.

Most critics of the proposed antidegradation policy objected to removing the public's ability to affect decisions on high quality waters and outstanding national resource waters. In attempting to explain how the proposed antidegradation policy would be implemented, the Preamble to the proposed rule stated that no public participation would be necessary in certain instances because no change was being made in a State's water quality standard. Although that statement was technically accurate, it left the mistaken impression that all public participation was removed from the discussions on high quality waters and that is not correct. A NPDES permit would have to be issued or a 208 plan amended for any deterioration in water quality to be "allowed". Both actions require notice and an opportunity for public comment. However, EPA retained the existing policy so this issue is moot. Other changes in the policy affecting ONRW are discussed in the Preamble.

QUESTIONS AND ANSWERS ON ANTIDEGRADATION

1. WHAT IS THE ORIGIN OF THE ANTIDEGRADATION POLICY?

The basic policy was established on February 8, 1968, by the Secretary of the U.S. Department of the Interior. It was included in EPA's first water quality standards regulation 40 CFR 130.17, 40 FR 55340-41, November 28, 1975. It was slightly refined and repromulgated as part of the current program regulation published on November 8, 1983 (48 FR 51400, 40 CFR §131.12). An antidegradation policy is one of the minimum elements required to be included in a State's water quality standards.

2. WHERE IN THE CLEAN WATER ACT (CWA) IS THERE A REQUIREMENT FOR AN ANTIDEGRADATION POLICY OR SUCH A POLICY EXPRESSED?

There is no explicit requirement for such a policy in the Act. However, the policy is consistent with the spirit, intent, and goals of the Act, especially the clause "... restore and maintain the chemical, physical and biological integrity of the Nation's waters" (§101(a)) and arguably is covered by the provision of 303(a) which made water quality standard requirements under prior law the "starting point" for CWA water quality requirements.

3. CAN A STATE JUSTIFY NOT HAVING AN ANTIDEGRADATION POLICY IN ITS WATER QUALITY STANDARDS?

EPA's water quality standards regulation requires each State to adopt an antidegradation policy and specifies the minimum requirements for a policy. If not included in the standards regulation of a State, the policy must be specifically referenced in the water quality standards so that the functional relationship between the policy and the standards is clear. Regardless of the location of the policy, it must meet all applicable requirements.

4. WHAT HAPPENS IF A STATE'S ANTIDEGRADATION POLICY DOES NOT MEET THE REGULATORY REQUIREMENTS?

If this occurs either through State action to revise its policy or through revised Federal requirements, the State would be given an opportunity to make its policy consistent with the regulation. If this is not done, EPA has the authority to promulgate the policy for the State pursuant to Section 303(c)(4) of the Clean Water Act.

5. WHAT COULD HAPPEN IF A STATE FAILED TO IMPLEMENT ITS ANTI-DEGRADATION POLICY PROPERLY?

If a State issues an NPDES permit which violates the required antidegradation policy, it would be subject to a discretionary EPA veto under Section 402(d) or to a citizen challenge. In addition to actions on permits, any wasteload allocations and total maximum daily loads violating the antidegradation policy are subject to EPA disapproval and EPA promulgation of a new wasteload allocation/total maximum daily load under Section 303(d) of the Act. If a significant pattern of violation was evident, EPA could constrain the award of grants or possibly revoke any Federal permitting capability that had been delegated to the State. If the State issues a §401 certification (for an EPA-issued NPDES permit) which fails to reflect the requirements of the antidegradation policy, EPA will, on its own initiative, add any additional or more stringent effluent limitations required to ensure compliance with Section 301(b)(1)(C). If the faulty §401 certification related to permits issued by other Federal agencies (e.g. a Corp of Engineers Section 404 permit), EPA could comment unfavorably upon permit issuance. The public, of course, could bring pressure upon the permit issuing agency.

6. WILL THE APPLICATION OF THE ANTIDEGRADATION POLICY ADVERSELY IMPACT ECONOMIC DEVELOPMENT?

This concern has been raised since the inception of the antidegradation policy. The answer remains the same. The policy has been carefully structured to minimize adverse effects on economic development while protecting the water quality goals of the Act. As Secretary Udall put it in 1968, the policy serves "...the dual purpose of carrying out the letter and spirit of the Act without interfering unduly with further economic development" (Secretary Udall, February 8, 1968). Application of the policy could affect the levels and/or kinds of waste treatment necessary or result in the use of alternate sites where the environmental impact would be less damaging. These effects could have economic implications as do all other environmental controls.

7. WHAT IS THE PROPER INTERPRETATION OF THE TERM "AN EXISTING USE"?

An existing use can be established by demonstrating that fishing, swimming, or other uses have actually occurred since November 28, 1975, or that the water quality is suitable to allow such uses to occur (unless there are physical problems which prevent the use regardless of water quality). An example of the latter is an area where shellfish are propagating and surviving in a biologically suitable habitat and are available and suitable for harvesting. Such facts clearly establish that shellfish harvesting is an "existing" use, not one dependent on improvements in water quality. To argue otherwise would be to say that the only time an aquatic protection use "exists" is if someone succeeds in catching fish.

8. THE WATER QUALITY STANDARDS REGULATION STATES THAT "EXISTING USES AND THE LEVEL OF WATER QUALITY NECESSARY TO PROTECT THE EXISTING USES SHALL BE MAINTAINED AND PROTECTED." HOW FULLY AND AT WHAT LEVEL OF PROTECTION IS AN EXISTING USE TO BE PROTECTED IN ORDER TO SATISFY THE ABOVE REQUIREMENT?

No activity is allowable under the antidegradation policy which would partially or completely eliminate any existing use whether or not that use is designated in a State's water quality standards. The aquatic protection use is a broad category requiring further explanation. Species that are in the water body and which are consistent with the designated use (i.e., not aberrational) must be protected, even if not prevalent in number or importance. Nor can activity be allowed which would render the species unfit for maintaining the use. Water quality should be such that it results in no mortality and no significant growth or reproductive impairment of resident species. (See Question 16 for situation where an aberrant sensitive species may exist.) Any lowering of water quality below this full level of protection is not allowed. A State may develop subcategories of aquatic protection uses but cannot choose different levels of protection for like uses. The fact that sport or commercial fish are not present does not mean that the water may not be supporting an aquatic life protection function. An existing aquatic community composed entirely of invertebrates and plants, such as may be found in a pristine alpine tributary stream, should still be protected whether or not such a stream supports a fishery. Even though the shorthand expression "fishable/swimmable" is often used, the actual objective of the act is to "restore and maintain the chemical, physical, and biological integrity of our Nation's waters (section 101(a)).1/ The term "aquatic life" would more accurately reflect the protection of the aquatic community that was intended in Section 101(a)(2) of the Act.

9. IS THERE ANY SITUATION WHERE AN EXISTING USE CAN BE REMOVED?

In general, no. Water quality may sometimes be affected, but an existing use, and the level of water quality to protect it must be maintained (§131.12(a)(1) and (2) of the regulation). However, the State may limit or not designate such a use if the reason for such action is non-water quality related. For example, a State may wish to impose a temporary shellfishing ban to prevent overharvesting and ensure an abundant population over the long run, or may wish to restrict swimming from heavily trafficked areas. If the State chooses,

1/ Note: "Fishable/swimmable" is a term of convenience used in the standards program in lieu of constantly repeating the entire text of Section 101(a)(2) goal of the Clean Water Act. As a short-hand expression it is potentially misleading.

for non-water quality reasons, to limit use designations, it must still adopt criteria to protect the use if there is a reasonable likelihood it will actually occur (e.g. swimming in a prohibited water). However, if the State's action is based on a recognition that water quality is likely to be lowered to the point that it no longer is sufficient to protect and maintain an existing use, then such action is inconsistent with the antidegradation policy.

10. HOW DOES THE REQUIREMENT THAT THE LEVEL OF WATER QUALITY NECESSARY TO PROTECT THE EXISTING USE(S) BE MAINTAINED AND PROTECTED, WHICH APPEARS IN §131.12(a)(1),(2), AND (3) OF THE WATER QUALITY STANDARDS REGULATION, ACTUALLY WORK?

Section 131.12(a)(1), as described in the Preamble to the regulation, provides the absolute floor of water quality in all waters of the United States. This paragraph applies a minimum level of protection to all waters. However, it is most pertinent to waters having beneficial uses that are less than the Section 101(a)(2) goals of the Act. If it can be proven, in that situation, that water quality exceeds that necessary to fully protect the existing use(s) and exceeds water quality standards but is not of sufficient quality to cause a better use to be achieved, then that water quality may be lowered to the level required to fully protect the existing use as long as existing water quality standards and downstream water quality standards are not affected. If this does not involve a change in standards, no public hearing would be required under Section 303(c). However, public participation would still be provided in connection with the issuance of a NPDES permit or amendment of a 208 plan. If, however, analysis indicates that the higher water quality does result in a better use, even if not up to the Section 101(a)(2) goals, then the water quality standards must be upgraded to reflect the uses presently being attained (§131.10(i)).

Section 131.12(a)(2) applies to waters whose quality exceeds that necessary to protect the Section 101(a)(2) goals of the Act. In this case, water quality may not be lowered to less than the level necessary to fully protect the "fishable /swimmable" uses and other existing uses and may be lowered even to those levels only after following all the provisions described in §131.12(a)(2). This requirement applies to individual water quality parameters.

Section 131.12(a)(3) applies to so-called outstanding National Resource (ONRW) waters where the ordinary use classifications and supporting criteria are not appropriate. As described in the Preamble to the water quality standards regulation "States may allow some limited activities which result in temporary and short-term changes in water quality," but such changes in water quality should not alter the essential character or special use which makes the water an ONRW. (See also pages 2-14,-15 of the Water Quality Standards Handbook.)

Any one or a combination of several activities may trigger the antidegradation policy analysis as discussed above. Such activities include a scheduled water quality standards review, the establishment of new or revised wasteload allocations NPDES permits, the demonstration of need for advanced treatment or request by private or public agencies or individuals for a special study of the water body.

11. WILL AN ACTIVITY WHICH WILL DEGRADE WATER QUALITY, AND PRECLUDE AN EXISTING USE IN ONLY A PORTION OF A WATER BODY (BUT ALLOW IT TO REMAIN IN OTHER PARTS OF THE WATER BODY) SATISFY THE ANTIDEGRADATION REQUIREMENT THAT EXISTING USES SHALL BE MAINTAINED AND PROTECTED?

No. Existing uses must be maintained in <u>all</u> parts of the water body segment in question other than in restricted mixing zones. For example, an activity which lowers water quality such that a buffer zone must be established within a previous shellfish harvesting area is inconsistent with the antidegradation policy. (However, a slightly different approach is taken for fills in wetlands, as explained in Question 13.)

12. DOES ANTIDEGRADATION APPLY TO POTENTIAL USES?

No. The focus of the antidegradation policy is on protecting existing uses. Of course, insofar as existing uses and water quality are protected and maintained by the policy the eventual improvement of water quality and attainment of new uses may be facilitated. The use attainability requirements of §131.10 also help ensure that attainable potential uses are actually attained. (See also questions 7 and 10.)

13. FILL OPERATIONS IN WETLANDS AUTOMATICALLY ELIMINATE ANY EXISTING USE IN THE FILLED AREA. HOW IS THE ANTIDEGRADATION POLICY APPLIED IN THAT SITUATION?

Since a literal interpretation of the antidegradation policy could result in preventing the issuance of any wetland fill permit under Section 404 of the Clean Water Act, and it is logical to assume that Congress intended some such permits to be granted within the framework of the Act, EPA interprets §131.12 (a)(1) of the antidegradation policy to be satisfied with regard to fills in wetlands if the discharge did not result in "significant degradation" to the aquatic ecosystem as defined under Section 230.10(c) of the Section 404(b)(1) guidelines. If any wetlands were found to have better water quality than "fishable/ swimmable", the State would be allowed to lower water quality to the no significant degradation level as long as the requirements of Section 131.12(a)(2) were followed. As for the ONRW provision of antidegradation (131.(a)(2)(3)), there is no difference in the way it applies to wetlands and other water bodies.

14. IS POLLUTION RESULTING FROM NONPOINT SOURCE ACTIVITIES SUBJECT TO PROVISIONS OF THE ANTIDEGRADATION POLICY?

Nonpoint source activities are not exempt from the provisions of the antidegradation policy. The language of Section 131.12 (a)(2) of the regulation: "Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best mangement practices for nonpoint source control" reflects statutory provisions of the Clean Water Act. While it is true that the Act does not establish a regulatory program for nonpoint sources, it clearly intends that the BMPs developed and approved under sections 205(j), 208 and 303(e) be agressively implemented by the States. As indicated in the introduction, EPA will be developing additional guidance in this area.

15. IN HIGH QUALITY WATERS, ARE NEW DISCHARGERS OR EXPANSION OF EXISTING FACILITIES SUBJECT TO THE PROVISIONS OF ANTIDEGRADATION?

Yes. Since such activities would presumably lower water quality, they would not be permissible unless the State finds that it is necessary to accommodate important economic or social development (Section 131.12(a)(2). In addition the minimum technology based requirements must be met, including new source performance standards. This standard would be implemented through the waste-load and NPDES permit process for such new or expanded sources.

16. A STREAM, DESIGNATED AS A WARM WATER FISHERY, HAS BEEN FOUND TO CONTAIN A SMALL, APPARENTLY NATURALLY OCCURRING POPULATION OF A COLD-WATER GAME FISH. THESE FISH APPEAR TO HAVE ADAPTED TO THE NATURAL WARM WATER TEMPERATURES OF THE STREAM WHICH WOULD NOT NORMALLY ALLOW THEIR GROWTH AND REPRODUCTION. WHAT IS THE EXISTING USE WHICH MUST BE PROTECTED UNDER SECTION 131.12(a)(1)?

Section 131.12(a)(1) states that "Existing instream water uses and level of water quality necessary to protect the existing uses shall be maintained and protected." While sustaining a small cold-water fish population, the stream does not support an existing use of a "cold-water fishery." The existing stream temperatures are unsuitable for a thriving cold-water fishery. The small marginal population is an artifact and should not be employed to mandate a more stringent use (true cold-water fishery) where natural conditions are not suitable for that use.

A use attainability analysis or other scientific assessment should be used to determine whether the aquatic life population is in fact an artifact or is a stable population requiring water quality protection. Where species appear in areas not normally expected, some adaptation may have occurred and site-specific criteria may be appropriately developed. Should the cold-water fish population consist of a threatened or endangered species, it may require protection under the Endangered Species Act. Otherwise the stream need only be protected as a warm water fishery.

17. HOW DOES EPA'S ANTIDEGRADATION POLICY APPLY TO A WATERBODY WHERE A CHANGE IN MAN'S ACTIVITIES IN OR AROUND THAT WATERBODY WILL PRECLUDE AN EXISTING USE FROM BEING FULLY MAINTAINED?

If a planned activity will forseeably lower water quality to the extent that it no longer is sufficient to protect and maintain the existing uses in that waterbody, such an activity is inconsistent with EPA's antidegradation policy which requires that existing uses are to be maintained. In such a circumstance the planned activity must be avoided or adequate mitigation or preventive measures must be taken to ensure that the existing uses and the water quality to protect them will be maintained.

In addition, in "high quality waters", under §131.12(a)(2), before any lowering of water quality occurs, there must be: 1) a finding that it is necessary in order to accommodate important economical or social development in the area in which the waters are located, (2) full satisfaction of all intergovernmental coordination and public participation provisions and (3) assurance that the highest statutory and regulatory requirements and best management practices for pollutant controls are achieved. This provision can normally be satisfied by the completion of Water Quality Management Plan updates or by a similar process that allows for public participation and intergovernmental coordination. This provision is intended to provide relief only in a few extra-ordinary circumstances where the economic and social need for the activity clearly outweighs the benefit of maintaining water quality above that required for "fishable/swimmable" water, and the two cannot both be achieved. The burden of demonstration on the individual proposing such activity will be very high. In any case, moreover, the existing use must be maintained and the activity shall not preclude the maintenance of a "fishable/swimmable" level of water quality protection.

18. WHAT DOES EPA MEAN BY "...THE STATE SHALL ENSURE THAT THERE SHALL BE ACHIEVED THE HIGHEST STATUTORY AND REGULATORY REQUIREMENTS FOR ALL NEW AND EXISTING POINT SOURCES AND ALL COST EFFECTIVE AND REASONABLE BEST MANAGEMENT PRACTICES FOR NON-POINT SOURCE CONTROL" (§131.12(a)(2)?

This requirement ensures that the limited provision for lowering water quality of high quality waters down to "fish-able /swimmable" levels will not be used to undercut the Clean Water Act requirements for point source and non-point source pollution control. Furthermore, by ensuring compliance with such statutory and regulatory controls, there is less chance that a lowering of water quality will be sought in order to accommodate new economic and social development.

19. WHAT DOES EPA MEAN BY "...IMPORTANT ECONOMIC OR SOCIAL DEVELOPMENT IN THE AREA IN WHICH THE WATERS ARE LOCATED" IN 131.1 2(a)(2)?

This phrase is simply intended to convey a general concept regarding what level of social and economic development could be used to justify a change in high quality waters. Any more exact meaning will evolve through case-by-case application under the State's continuing planning process. Although EPA has issued suggestions on what might be considered in determining economic or social impacts, the Agency has no predetermined level of activity that is defined as "important".

20. IF A WATER BODY WITH A PUBLIC WATER SUPPLY DESIGNATED USE IS, FOR NON-WATER QUALITY REASONS, NO LONGER USED FOR DRINKING WATER MUST THE STATE RETAIN THE PUBLIC WATER SUPPLY USE AND CRITERIA IN ITS STANDARDS?

Under 40 CFR 131.10(h)(1), the State may delete the public water supply use designation and criteria if the State adds or retains other use designations for the waterbodies which have more stringent criteria. The State may also delete the use and criteria if the public water supply is not an "existing use" as defined in 131.3 (i.e., achieved on or after November 1975), as long as one of the §131.10(g) justifications for removal is met.

Otherwise, the State must maintain the criteria even if it restricts the actual use on non-water quality grounds, as long as there is any possibility the water could actually be used for drinking. (This is analogous to the swimming example in the preamble.)

21. WHAT IS THE RELATIONSHIP BETWEEN WASTELOAD ALLOCATIONS, TOTAL MAXIMUM DAILY LOADS, AND THE ANTIDEGRADATION POLICY?

Wasteload allocations distribute the allowable pollutant loadings to a stream between dischargers. Such allocations also consider the contribution to pollutant loadings from non-point sources. Wasteload allocations must reflect applicable State water quality standards including the antidegradation policy. No wasteload allocation can be develped or NPDES permit issued that would result in standard being violated, or, in the case of waters whose quality exceeds that necessary for the Section 101(a)(2) goals of the Act, can result a lowering of water quality unless the applicable public participation, intergovernmental review and baseline control requirements of the antidegradation policy have been met.

22. DO THE INTERGOVERNMENTAL COORDINATION AND PUBLIC PARTICIPATION REQUIREMENTS WHICH ESTABLISH THE PROCEDURES FOR DETERMINING THAT WATER QUALITY WHICH EXCEEDS THAT NECESSARY TO SUPPORT THE SECTION 101(a)(2) GOAL OF THE ACT MAY BE LOWERED APPLY TO CONSIDERING ADJUSTMENTS TO THE WASTELOAD ALLOCATIONS DEVELOPED FOR THE DISCHARGERS IN THE AREA?

Yes. Section 131.12(a)(2) of the water quality standards regulation is directed towards changes in water quality per se, not just towards changes in standards. The intent is to ensure that no activity which will cause water quality to decline in existing high quality waters is undertaken without adequate public review. Therefore, if a change in wasteload allocation could alter water quality in high quality waters, the public participation and coordination requirements apply.

23. IS THE ANSWER TO THE ABOVE QUESTION DIFFERENT IF THE WATER QUALITY IS LESS THAN THAT NEEDED TO SUPPORT "FISHABLE/SWIMMABLE" USES?

Yes. Nothing in either the water quality standards or the wasteload allocation regulations requires the same degree of public participation or intergovernmental coordination for such waters as is required for high quality waters. However, as discussed in question 10, public participation would still be provided in connection with the issuance of a NPDES permit or amendment of a 208 plan. Also, if the action which causes reconsideration of the existing wasteloads (such as dischargers withdrawing from the area) will result in an improvement in water quality which makes a better use attainable, even if not up to the "fishable/swimmable" goal, then the water quality standards must be upgraded and full public review is required for any action affecting changes in standards. Although not specifically required by the standards regulation between the triennial reviews, we recommend that the State conduct a use attainability analysis to determine if water quality improvement will result in attaining higher uses than currently designated in situations where significant changes in wasteloads are expected (see question 10).

24. SEVERAL FACILITIES ON A STREAM SEGMENT DISCHARGE PHOSPHORUS-CONTAINING WASTES. AMBIENT PHOSPHORUS CONCENTRATIONS MEET CLASS B STANDARDS, BUT BARELY. THREE DISCHARGERS ACHIEVE ELIMINATION OF DISCHARGE BY DEVELOPING A LAND TREATMENT SYSTEM. AS A RESULT, ACTUAL WATER QUALITY IMPROVES (I.E., PHOSPHORUS LEVELS DECLINE) BUT NOT QUITE TO THE LEVEL NEEDED TO MEET CLASS A (FISHABLE/SWIMMABLE) STANDARDS. CAN THE THREE REMAINING DISCHARGERS NOW INCREASE THEIR PHOSPHORUS DISCHARGE WITH THE RESULT THAT WATER QUALITY DECLINES (PHOSPHORUS LEVELS INCREASE) TO PREVIOUS LEVELS?

Nothing in the water quality standards regulation explicitly prohibits this (see answer to questions 10 and 23). Of course, changes in their NPDES permit limits may be subject to non-water quality constraints, such as BPT or BAT, which may restrict this.

25. SUPPOSE IN THE ABOVE SITUATION WATER QUALITY IMPROVES TO THE POINT THAT ACTUAL WATER QUALITY NOW MEETS CLASS A REQUIREMENTS. IS THE ANSWER DIFFERENT?

Yes. The standards must be upgraded (see answer to question 10).

26. AS AN ALTERNATIVE CASE, SUPPOSE PHOSPHORUS LOADINGS GO DOWN AND WATER QUALITY IMPROVES BECAUSE OF A CHANGE IN FARMING PRACTICES, E.G., INITIATION OF A SUCCESSFUL NON-POINT PROGRAM. ARE THE ABOVE ANSWERS THE SAME?

Yes. Whether the improvement results from a change in point or nonpoint source activity is immaterial to how any aspect of the standards regulation operates. Section 131.10(d) clearly indicates that uses are deemed attainable if they can be achieved by "... cost-effective and reasonable best management practices for nonpoint source control". Section 131.12(a)(2) of the anti-degradation policy contains essentially the same wording.

27. WHEN A POLLUTANT DISCHARGE CEASES FOR ANY REASON, MAY THE WASTELOAD ALLOCATIONS FOR THE OTHER DISCHARGES IN THE AREA BE ADJUSTED TO REFLECT THE ADDITIONAL LOADING AVAILABLE?

This may be done consistent with the antidegradation policy only under two circumstances: (1) In "high quality waters" where after the full satisfaction of all public participation and intergovernmental review requirements, such adjustments are considered necessary to accomodate important economic or social development, and the "threshold" level requirements are met; or (2) in less than "high quality waters", when the expected improvement in water quality will not cause a better use to be achieved, the adjusted loads still meet water quality standards, and the new wasteload allocations are at least as stringent as technology-based limitations. Of course, all applicable requirements of the Section 402 permit regulations would have to be satisfied before a permittee could increase its discharge.

28. HOW MAY THE PUBLIC PARTICIPATION REQUIREMENTS BE SATISFIED?

This requirement may be satisfied in several ways. The State may obviously hold a public hearing or hearings. The State may also satisfy the requirement by providing the opportunity for the public to request a hearing. Activities which may affect several water bodies in a river basin or sub-basin may be considered in a single hearing. To ease the resource burden on both the State and public, standards issues may be combined with hearings on environmental impact statements, water management plans, or permits. However, if this is done, the public must be clearly informed that possible changes in water quality standards are being considered along with other activities. In other words, it is inconsistent with the water quality standards regulation to "back-door" changes in standards through actions on EIS's, wasteload allocations, plans, or permits.

29. WHAT IS MEANT BY THE REQUIREMENT THAT, WHERE A THERMAL DISCHARGE IS INCLUDED, THE ANTIDEGRADATION POLICY SHALL BE CONSISTENT WITH SECTION 316 OF THE ACT?

This requirement is contained in Section 131.12 (a)(4) of the regulation and is intended to coordinate the requirements and procedures of the antidegadation policy with those established in the Act for setting thermal discharge limitations. Regulations implementing Section 316 may be found at 40 CFR 124.66. The statutory scheme and legislative history indicate that limitations developed under Section 316 take precedence over other requirements of the Act.

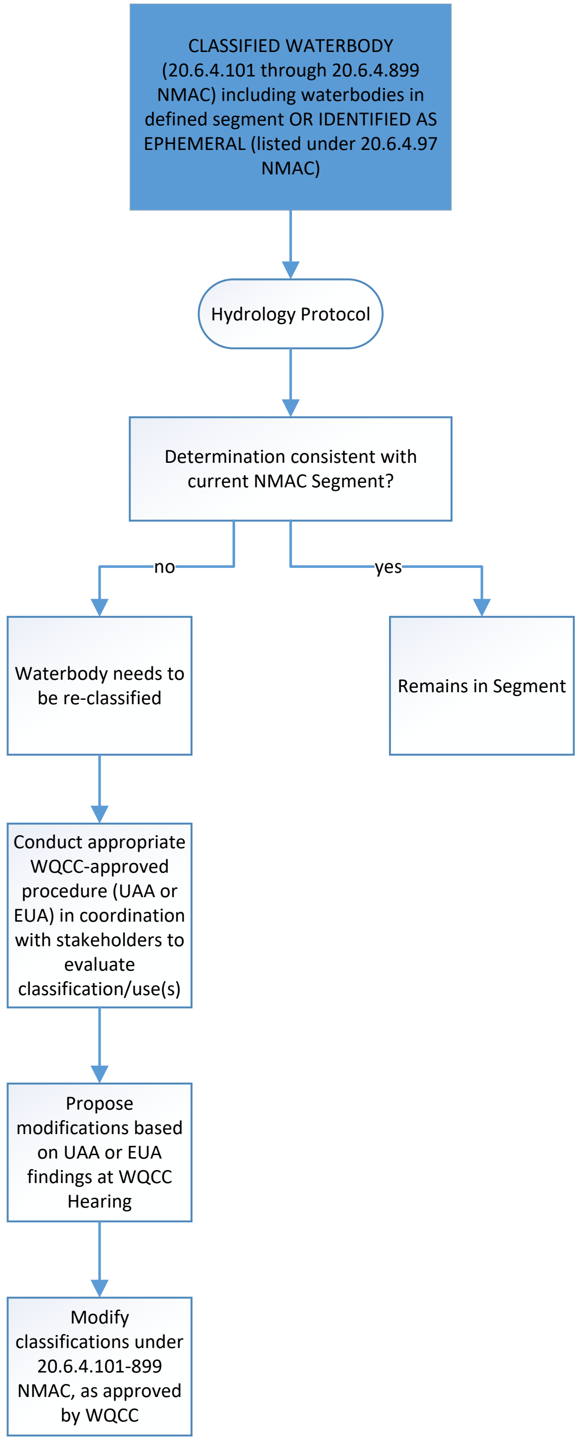
30. WHAT IS THE RELATIONSHIP BETWEEN THE ANTIDEGRADATION POLICY, STATE WATER RIGHTS USE LAWS AND SECTION 101(g) OF THE CLEAN WATER ACT WHICH DEALS WITH STATE AUTHORITY TO ALLOCATE WATER QUANTITIES?

The exact limitations imposed by section 101(g) are unclear; however, the legislative history and the courts interpreting it do indicate that it does not nullify water quality measures authorized by CWA (such as water quality standards and their upgrading, and NPDES and 402 permits) even if such measures incidentally affect individual water rights; those authorities also indicate that if there is a way to reconcile water quality needs and water quantity allocations, such accomodation should be be pursued. In other words, where there are alternate ways to meet the water quality requirements of the Act, the one with least disruption to water quantity allocations should be chosen. Where a planned diversion would lead to a violation of water quality standards (either the antidegradation policy or a criterion), a 404 permit associated with the diversion should be suitably conditioned if possible and/or additional nonpoint and/or point source controls should be imposed to compensate.

31. AFTER READING THE REGULATION, THE PREAMBLE, AND ALL THESE QUESTIONS AND ANSWERS, I STILL DON'T UNDERSTAND ANTIDEGRADATION. WHOM CAN I TALK TO?

Call the Standards Branch at: (202) 245-3042. You can also call the water quality standards coordinators in each of our EPA Regional offices.

Exhibit 78


CLASSIFIED WATERBODY (20.6.4.101 through 20.6.4.899 NMAC) including waterbodies in defined segment OR IDENTIFIED AS EPHEMERAL (listed under 20.6.4.97 NMAC)
Hydrology Protocol
Determination consistent with current NMAC Segment?
no
yes
Waterbody needs to be re-classified
Remains in Segment
Conduct appropriate WQCC-approved procedure (UAA or EUA) in coordination with stakeholders to evaluate classification/use(s)
Propose modifications based on UAA or EUA findings at WQCC Hearing
Modify classifications under 20.6.4.101-899 NMAC, as approved by WQCC