

Ute Mountain Ute Tribe
Water Quality Standards
For Surface Waters
of the
Ute Mountain Ute Indian Reservation



Adopted by
Ute Mountain Ute Tribal Council

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Water Quality Standards

For Surface Waters of the Ute Mountain Ute Indian Reservation

Colorado, New Mexico, Utah

1. Purpose and Authority

The Ute Mountain Ute Tribe (the Tribe), as a sovereign nation and a Federally recognized Indian Tribe, is establishing water quality standards for the protection of its surface water resources. Ute Mountain Ute Tribal Council Resolution No. 99-123, approved August 12, 1999, documents the decision of the Ute Mountain Ute Tribal Council to use their authority, when approved by the U.S. Environmental Protection Agency as described in Section 518 of the Federal Water Pollution Control Act (hereafter referred to as the "Clean Water Act"), to administer a water quality standards program.

Purpose. The purposes for these standards are threefold: assessment, regulatory controls, and protection of all uses including habitat for aquatic and wildlife species.

Assessment. One purpose of these standards is to provide references for the assessment of surface water quality. These standards represent the water quality goals of the Tribe for surface waters, and will be used in assessing potential impacts to that quality.

Regulatory Controls. Both point and nonpoint source regulatory pollution controls to be established by the Tribe or the Federal Government will be developed to ensure a level of water quality that will satisfy these water quality standards. Regulatory pollution controls established for point source discharges shall also be consistent with applicable sections of the federal Clean Water Act. Tribal programs to control nonpoint sources, whether regulatory or voluntary, shall be designed to meet these water quality standards.

Protection of aquatic and wildlife species. It is the intention of the Tribe that the designated uses and criteria assigned to Tribal waters will provide a level of water quality fully protective of aquatic and wildlife species dependent on it, including federally listed threatened or endangered species. Consultation with the U.S. Fish and Wildlife Service during the public review of these standards will ensure, to the extent practicable, adequate protection for listed species.

Authority. Specific waters over which the Ute Mountain Ute Tribe has jurisdiction to administer water quality standards within the exterior boundaries of the Ute Mountain Ute Reservation, are the following:

In Colorado:

San Juan River and all tributaries, Mancos River and all tributaries, McElmo Creek and all tributaries, Navajo Wash and all tributaries, all lakes, reservoirs, and wetlands;

In New Mexico:

All tributaries to the San Juan River, including all lakes, reservoirs, and wetlands;

In Utah:

Recapture Creek and all tributaries, Cottonwood Wash and all tributaries, Allen Canyon Creek and all tributaries, and all lakes, reservoirs, and wetlands.

Also see the related document, %Descriptive Statement of the Ute Mountain Tribe's Authority to Regulate Water Quality.+ (Maynes, Bradford, Shipp and Sheffel, as revised by William Johnson, Associate General Counsel, Ute Mountain Ute Tribe, 2005.)

2. Triennial Review

Water Quality standards shall be reviewed on a triennial basis for the purpose of determining what revisions are necessary to comply with applicable federal regulations and to meet Tribal water quality goals. This process shall meet the requirements of Clean Water Act Section 303(c). For example, any water body segment with water quality standards that do not include the goal uses specified in CWA Section 101(a)(2) shall be reexamined every three years to determine if any new information has become available. If such new information indicates the CWA goal uses are attainable, the Tribe shall revise the standards accordingly. Proposed revisions to the Tribe's water quality standards and the supporting information and analyses will be made available to the public prior to a public hearing. Public hearings will be held in accordance with Tribal laws and EPA requirements. The triennial review process will be ongoing, and public hearings will be held at least every three years following Ute Mountain Ute Tribal Council adoption of these standards.

3. Definitions

- Acute toxicity** The ability of a substance to cause poisonous effects resulting in severe biological harm or death soon after a single exposure or dose. Also, any severe poisonous health effects resulting from a single short-term exposure to a toxic substance.
- Anti-degradation (clause)** A provision of the Tribe's water quality standards that protects existing uses and waters where the existing quality is better than necessary to support Clean Water Act Section 101 (a)(2) goal uses, as required by federal regulations at 40 CFR 131.12.
- Assemblage** An association of aquatic organisms of similar taxonomic classification living in the same area. Examples of assemblages include, but are not limited to, fish, macroinvertebrates, algae, and vascular plants.
- Aquatic Organism** Any plant or animal which lives at least part of its life cycle in water.
- Attainment** To meet the goal or standard. Attainment means that the water body is of sufficient quality chemically, biologically, and physically, to support the uses for which it is designated and to otherwise achieve the applicable water quality standards.

Bioaccumulative	Substances that increase in concentration in living organisms (that are very slowly metabolized or excreted) as they breathe contaminated air, drink contaminated water, or eat contaminated food.
Best Management Practices (BMP)	Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from non-point sources.
Best Available Treatment Economically Achievable (BATEA)	As identified by EPA, the most effective treatment technology that is available to effluent discharge permittees that does not cause widespread and substantial economic harm.
Biological condition	The taxonomic composition, richness, and functional organization of an assemblage of aquatic organisms at a site or within a water body.
Chronic toxicity	The capacity of a substance to cause long-term poisonous health effects.
Conveyance	A route of transfer, for example, a pipe.
Criteria	Elements of State or Tribal 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.
CWA	Clean Water Act, the common name for the Federal Water Pollution Control Act.
Designated Uses	Those water uses identified in the Tribes water quality standards for each water body, whether or not they are being attained.
Ecology	The relationship of living things to one another and their environment, or the study of such relationships
Effluent	Wastewater, treated or untreated, that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters.
Environment	The sum of all external conditions affecting the life, development, and survival of an organism.
Ephemeral Water(s)	A stream or wetland that flows or contains water only in direct response to precipitation in the immediate watershed or in response to the melting of a cover of snow or ice. The stream channel of such a water body is always above the adjacent water table.
Existing Use	A water use attained for a given water body that exists under present conditions, or which existed on or after November 28, 1975. Some existing uses may not be included in these standards at this time.
Food Chain	A sequence of organisms, each of which uses the next, lower member of the sequence as a food source.
Functional Organization	The number of species or abundance of organisms within an assemblage which perform the same or similar ecological functions.
Impaired	A physical, biological or chemical condition, in which a water body is not attaining the applicable water quality standards, including the uses for which it is designated.

Implementation	The act of giving practical effect to and ensuring of actual fulfillment by concrete measures.
Intermittent Water(s)	A stream or wetland that flows or contains water in response to both surface runoff and groundwater discharge with at least part of its channel or wetland bottom below the adjacent water table for some part of the year, which does not have a perennial flow or contain water perennially.
Lentic	A still or slow moving aquatic environment, such as a lake, a reservoir or a wetland.
Lotic	An aquatic environment consisting of moving water, such as a river or stream.
Metric	An expression of biological community composition, richness, or function that displays a predictable, measurable change in value along a gradient of pollution or other anthropogenic disturbance.
Mixing Zone	A designated area or location of a receiving water where waste waters and receiving waters mix and certain ambient water quality criteria do not need to be met.
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint source (pollution)
Nonpoint source pollution	Pollution caused by a source or sources that is not carried by a direct conveyance.
Non-attainment	To not meet the goal or standard assigned to a water body or segment. Non-attainment means that the water body is not of sufficient quality either chemically, biologically, or physically, to support the uses for which it is designated or to otherwise fail to achieve the applicable water quality standards.
Nuisance (species)	Non-indigenous or undesired species that negatively affect an ecosystem. Some introduced species may be non-indigenous, but may be desirable and therefore protected by these standards..
Objectionable	Undesirable, offensive.
Organoleptic	Pertaining to taste and odor, as opposed to health effects.
Outstanding Tribal Resource Water	A tribal water body designated for protection under Tier 3 of the Tribes' antidegradation policy---See Section 4, Antidegradation.
PAH	Polynuclear Aromatic Hydrocarbon
Priority Pollutant	Those toxic pollutants listed by the Administrator of the U.S. Environmental Protection Agency as required in section 307(a) of the Clean Water Act.
Reference site	A site or water body which is determined by the Tribe to be representative of sites or waterbodies of similar type, and are least impaired with respect to habitat, water quality, watershed land use, and riparian and biological condition.
Reference condition	A physical, biological and chemical condition that is determined by the Tribe to be characteristic of minimally impaired conditions with respect to habitat, water quality, watershed land use, and riparian and biological condition in lieu of an unimpaired reference site.

Richness	The absolute number of taxa in an assemblage at a site or within a water body.
Stream Descriptor	A descriptive identifier for a water body used to distinguish conditions in addition to its designated use. For example-- an ephemeral water body.
Stream Segment	Any part, portion or subsection of a lotic surface water body. Stream segments include the entire width of a stream from one specified point at its upstream end to one specific point at its downstream end, unless specifically defined otherwise.
Surface Water Body	Any river, stream, lake, reservoir, spring, wetland or other natural conveyance that holds a quantity of water at some time.
Taxonomic Composition	The identity and abundance of species or taxonomic groupings within an assemblage of aquatic organisms at a site or within a water body.
Toxic	Harmful to living organisms.
Toxic Pollutant	Those pollutants, or combination of pollutants, including disease-causing agents, which 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, or on the basis of information available to the Administrator of the U.S. Environmental Protection Agency, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring. (See also, %priority pollutant(s),+a subset of %toxic pollutant(s)+)
Tribal Waters (or <i>Water Bodies</i>)	All waters over which the Tribe has jurisdiction and that satisfy the federal definition of %waters of the U.S.+found at 40 CFR 122.2. See Section 1, Purpose and Authority.
Use Attainability Analysis (UAA)	A structured scientific assessment of the factors affecting the attainment of the use, which may include physical, chemical, biological, or economic factors as described in 40 CFR Part 131.10(g).
Violation (of water quality standards)	An action, or negligent lack thereof, by an individual, business or government that causes water pollution of Tribal Waters in excess of the criteria set forth in these standards, including damaging effects on the biological criteria of these standards.
Waterfowl	A swimming bird or a bird that frequents water.
Watershed	The land area that drains into a stream, lake or wetland.
Water Quality Standards (WQS)	Provisions of State, Tribal, or Federal law that primarily consist of a designated use or uses for specific Tribal waters or waters of the United States, and water quality criteria for those waters based upon such uses. Water quality standards also provide policies for the prevention of degradation of quality, mixing zone policies, and site. specific requirements. Ultimately, water quality standards are to protect public health or welfare, enhance the quality of the water and serve the purposes of the Clean Water Act.

- Wetland(s)** An area that is inundated or saturated by surface or ground water at a frequency and duration to support, and that under normal conditions does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands are considered Tribal Waters and generally include swamps, bogs, marshes, and similar areas.
- Wildlife** Living things and especially mammals, birds, and fishes that are neither human nor domesticated.

4. Antidegradation Policy

The Ute Mountain Ute antidegradation policy set forth below is based on the three-tiered Federal policy in 40 CFR 131.12. It applies to all Reservation surface waters.

Tier 1. Existing in-stream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

Tier 2. Where the quality of waters exceed the level 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 Tribe finds, after appropriate intergovernmental coordination and public participation, 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 Tribe shall assure water quality adequate to protect existing uses fully. Further, the Tribe 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.

Tier 3. Where high quality waters constitute such a designation, an Outstanding Tribal Resource Water (OTRW) designation may be adopted. The level of water quality of these waters shall be maintained and protected. These may include, but not be limited to, waters that have outstanding water quality, unique aquatic ecology, or recreational, ceremonial, or aesthetic characteristics that qualify them for such a designation by the Tribe. See definition of *Outstanding Tribal Resource Water* above. See Section 11 and Appendix C for more information regarding OTRW designation.

In those cases where a potential impairment of water quality associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with Section 316 of the Clean Water Act.

See Appendix C, *Anti-degradation Implementation Procedures*, for specific procedures to determine the course of action in the event of a potential for degradation or necessary enforcement action.

5. Narrative Water Quality Criteria

- a. All Reservation surface waters shall be free from substances, from any pollution source, that:
- (1) Settle to form objectionable deposits;
 - (2) Float as debris, scum, oil, or other matter forming nuisances;
 - (3) Produce objectionable color, odor, taste, or turbidity;
 - (4) Cause injury to, or are toxic to, or produce adverse physiological responses in humans, animals, or plants; or
 - (5) Produce undesirable or nuisance aquatic life.
- b. For substances that lack numeric water quality criteria or for which numeric criteria are not protective or representative of clean water goals, these narrative water quality criteria shall be implemented. Implementation of these narrative criteria shall take into consideration appropriate EPA technical guidance concerning the development of water quality based controls. For example, narrative water quality criteria shall be implemented considering any criteria guidance issued by EPA under CWA Section 304(a), and other relevant, technically-defensible criteria for pollutants of concern may also be considered. Any Safe Drinking Water Act provisions and health advisories will be considered for implementation of these criteria for substances that lack numeric criteria for public water supply use. For purposes of point source discharges 5.a.(4) shall be implemented by including appropriate Whole Effluent Toxicity (WET) limitations in the NPDES permit, as specified in the latest edition of the document Region 8 NPDES Whole Effluent Toxicity Program Document.

6. Narrative Biological Criterion

The overall goal of the biological criterion of the Tribe is to maintain and support the structure and function of aquatic communities in conditions similar to reference sites or reference conditions that are determined by the Tribe.

Assessment of biological conditions will include monitoring of the benthic macroinvertebrates, fish, and/or plant communities, as appropriate. Community metrics will be determined by the Tribe, relative to reference sites. A reference condition may be assigned as a goal for the biological community if there is an insufficient number of reference sites or if those sites become impaired. Data for a reference condition will be treated in the same manner as if it were a reference site.

Implementation of narrative biological criterion:

The intent of the Tribe in adopting a narrative biological criterion is primarily to provide an additional assessment method for the identification of impaired waters. The Tribe recognizes an inherent difference between biological criteria and numeric chemical-specific criteria. A major difference is the manner in which the two types of criteria can be applied effectively in determining water quality-based effluent limits for point source discharges. Chemical-specific criteria typically are expressed as a concentration of a given parameter, with provisions that describe an averaging period and an allowable frequency of exceedence. Biological criteria describe a desired biological condition, and are expressed and interpreted using information about aquatic organisms. Biological criteria, therefore, are not ideally suited for directly calculating effluent limits for point source discharges. The Tribe does believe that biological criteria are useful because there can be physical and biological changes in aquatic ecosystems that may impair a water's health that are unrelated to chemical constituents in the water column.

Although the Tribe does not envision that it will always be necessary to establish effluent limits for point source discharges based on biological criteria, the Tribe intends that the biological criteria are to be used as required by Section 301(b)(1)(C) of the Clean Water Act and 40 CFR Section 122.44(d) in determining appropriate effluent limits for point source discharges. For example, where the biological criteria are not satisfied, that information can be used by the permitting authority to reevaluate any NPDES permit(s) for upstream discharges to determine if all appropriate chemical-specific and whole effluent toxicity limits are included in the permits. If any of the biological criteria were exceeded in any water, then the permit(s) for any upstream discharger(s) would need to be revised as needed to include appropriate effluent limits on whatever pollutant or pollutant parameters are or may be discharged that will cause, have the reasonable potential to cause, or contribute to any excursion above the biological criterion. This may involve examining whether the relevant permit(s) contain limits for all substances present in the discharge.

7. Mixing Zones and Dilution Policy

This policy establishes how mixing and dilution of point source discharges with receiving waters will be addressed in developing chemical-specific and whole effluent toxicity discharge limitations. Depending on site-specific mixing patterns and environmental concerns, some pollutants may be allowed a mixing zone for dilution and others may not. In all cases, mixing zone and dilution allowances shall be limited as necessary to protect designated uses and the integrity of the receiving water ecosystem as a whole. This policy shall be implemented consistent with the procedures in the *EPA Region VIII Mixing Zones and Dilution Policy*.

Where dilution is available at critical conditions and the discharge does not completely mix at a near instantaneous rate, an appropriate mixing zone may be designated if:

- a. meeting water quality standards at the end-of-pipe is not practicable;
- b. allowing a mixing zone will not pose unacceptable risks to designated or existing uses in the water body as a whole, considering factors such as:
 - (1) bioaccumulation in fish tissues or wildlife,
 - (2) biologically important areas such as fish spawning or nursery areas,
 - (3) presence of federally-listed or proposed threatened or endangered species,
 - (4) low acute to chronic ratio,
 - (5) potential human exposure to pollutants via drinking water or recreational activities,
 - (6) attraction of aquatic species to effluent plume,
 - (7) toxicity or persistence of the substance discharged,
 - (8) zone of passage for migrating fish or other species (including access to tributaries), and
 - (9) cumulative effects of multiple discharges and mixing zones; and
- c. narrative criteria will be achieved within the mixing zone, provided that the free from toxicity+narrative shall be deemed satisfied where there is an absence of acutely-toxic conditions for swimming, drifting, and sessile organisms.

Mixing zone size shall generally be limited as follows, provided that individual chronic mixing zones may be further limited or denied as needed to protect designated and existing uses based on the factors listed in the preceding paragraph:

- a. No acute mixing zone shall be allowed;
- b. The size of chronic mixing zones for streams and rivers shall not exceed one-half the cross-sectional area or a length 10 times the stream width at critical low flow, whichever is more limiting; and
- c. The size of chronic mixing zones for lakes shall not exceed 5% of lake surface area or 200 feet in radius, whichever is more limiting.

Where the discharge is to a river or stream, dilution is available at critical conditions, and available information is sufficient to reasonably conclude that the discharge exhibits near instantaneous and complete mixing, an appropriate dilution allowance may be provided for the purposes of establishing discharge limitations. The following critical flows may be assumed to dilute the effluent:

a. Stream Flows

Chronic Aquatic Life	4-day, 3-year flow (biologically based)
Acute Aquatic Life	1-day, 3-year flow (biologically based)
Human Health (carcinogens)	harmonic mean flow
Human Health (non- carcinogens)	4-day, 3-year flow (biologically based), Or 1-day, 3-year flow (biologically based)

b. Effluent Flows

Chronic Aquatic Life	Mean daily flow
Acute Aquatic Life	Maximum daily flow
Human Health (all)	Mean daily flow

Where dilution flow is not available at critical conditions, the discharge limits will be based on achieving water quality criteria at the end-of-pipe. In addition, discharge limits for all point source discharges to a wetland will be based on achieving water quality criteria at the end-of-pipe.

All mixing zone-dilution assumptions are subject to review and revision as information on the nature and impacts of the discharge becomes available. At a minimum, mixing zone and dilution decisions are subject to review and revision along with all other aspects of the discharge permit upon expiration of the permit.

8. Water Quality Standards for Wetlands

The Tribe recognizes that the natural water quality of wetlands may differ from that of associated streams. Existing water quality, uses and functions of wetlands will be protected.

- a. For wetlands specifically listed in **Section 11. Use Designations**, designated uses cited in that section and numeric criteria assigned to those uses will apply. Those wetlands will also be subject to narrative criteria, antidegradation provisions, and the narrative biological criteria of the Tribe.
- b. Wetlands not specifically listed in **Section 11** are considered to be Tribal waters, and will be subject to narrative criteria, applicable antidegradation provisions, and the narrative biological criteria of the Tribe. It shall also be a goal of the Tribe to maintain the water quality of wetlands at naturally occurring levels, within the natural range of variability for the individual wetland.
- c. Wetlands that are seasonally dry shall be considered to be ephemeral waters, intermittent waters, or both.
- d. Wetlands shall not be considered as repositories or treatment systems for wastes from human sources.
- e. Constructed wetlands are those that are specifically designed for the purpose of wastewater or storm water treatment, and those are not considered Tribal waters.

9. Ephemeral Waters and Intermittent Waters

- a. *Ephemeral* waters shall be required to meet the criteria established to support existing and designated uses when there is an existing surface stream flow from any source, however minimal. All stream segments of *intermittent* waters shall meet the criteria established for segments of that water body that have a stream flow, however minimal.

- b. Ephemeral waters that receive a continuous discharge that enhances habitat by causing a perennial flow shall be protected in the same manner as other perennial waters. In these cases, designated uses and criteria shall be evaluated for revision to a more stringent standard, unless a Use Attainability Analysis has been performed and approved by the Tribe and the U.S. Environmental Protection Agency, Region VIII.

10. Variances from Water Quality Criteria

Tribal waters where it is not feasible to achieve these water quality standards may be granted a temporary variance from specific criteria in these standards. Such a variance temporarily modifies the water quality standard for a stream or stream segment and includes an expiration date, a water quality goal, and an interim standard that is effective for the duration of the variance. All other standards, including designated uses, other criteria applicable to those designations, and other requirements not modified by the variance shall remain in effect. Variances are noted in the tables in **Section 12. Designated Uses, Criteria, and Variances for Stream Segments**, and are described in detail in **Table 12.1**.

a. Types of Variances

- (1) *Discharger-specific variances* may be adopted where the conditions precluding the attainment of designated uses are shown to be applicable to specific discharges.
 - (2) *Temporary Standards*, applicable to all pollution sources located on a stream, stream segment, or a portion thereof, may be adopted where the conditions precluding attainment of designated uses are characteristic of the entire stream or stream segment.
- b. All variances must be supported by a use attainment demonstration (showing attainment of the use is not feasible); must provide for protection of the highest attainable use that can be met and criteria necessary to protect that use; and must be approved by the Tribe and EPA. A variance may be authorized where existing uses are protected and one or more of the following causes for non-attainment of a designated use are justified:
- (1) naturally-occurring pollutant concentrations prevent the attainment of the use;
 - (2) ephemeral, intermittent, or low-flow conditions or water levels prevent attainment of the use unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges to enable uses to be met;

- (3) human-caused conditions or sources of pollutants prevent attainment of a designated use and cannot be corrected or correction would cause more environmental damage than to leave uncorrected;
 - (4) dams, diversions or other structures prevent the attainment of a use, and it is not feasible to restore the water body to its original condition or to operate the structure in a way that would result in attainment of that use;
 - (5) natural physical conditions such as substrate, cover, flow, etc. unrelated to water quality, prevent the attainment of an aquatic life use;
 - (6) more stringent controls than those required by sections 301(b) and 306 of the Clean Water Act would result in substantial and wide spread economic and social impact.
- c. The written justification for a variance, in addition to explaining why one or a combination of the factors in paragraph (b) preclude the attainment of designated uses, must include documentation that controls have been evaluated and there is no reasonable control available that can be employed to attain the designated uses in the short term. Also, the justification must include a plan to gather additional information and/or conduct projects to remedy the conditions that preclude the attainment of designated uses, including a TMDL analysis where one is required. For temporary standards, the justification must also show that the conditions precluding the attainment of designated uses are representative of the water body segment, rather than one or more individual discharges.
 - d. All variances shall have a specific expiration date. The date shall be based upon the amount of time it is reasonably expected will be needed to remedy the water quality problem precluding the attainment of designated uses. Variances shall be reviewed every 3 years, and a variance may be extended only if the conditions for granting the variance still apply. Upon expiration, the general numeric water quality standards apply.
 - e. All variances shall identify interim water quality standards. Variances that are pollutant-specific shall have pollutant-specific interim standards. In no case shall interim standards be set at levels that would impair or otherwise have a negative impact on existing water quality.
 - f. For variances applicable to facilities with NPDES permits, such permits must include two sets of permit limits. One set shall be at a level sufficient to achieve the interim standards, and one set shall be at a level to achieve the underlying standards upon expiration of the variance. Permit limits for facilities for which a variance has been obtained must also be set to achieve all applicable technology-based controls.

11. Use Designations

a. Use Designation Codes:

AG	Agriculture, irrigation and/or livestock watering
CWAL	Cold Water Aquatic Life

DW	Drinking Water Source
FSH	Fish Consumption
IND	Industrial Use
REC1	Recreation, primary contact
REC2	Recreation, secondary contact
T	Tribal Cultural Use
WWAL	Warm Water Aquatic Life

Definitions of designated use codes:

AG Waters that are used for agricultural purposes such as irrigation and livestock watering.

CWAL Waters that support salmonid fish species or other cold water species of aquatic life, including associated benthic macroinvertebrate communities. Waters supporting such an aquatic ecosystem have a natural temperature regime that does not routinely exceed 20 degrees C.

DW Waters that are used, or have the potential to be used, as a public or private human drinking water source.

FSH Waters from which fish are, or may be, extracted and consumed by humans.

IND Waters that are used for industrial purposes, including construction activities.

T Waters that are used for Tribal ceremonial purposes and traditional activities. Examples of water contact that may be associated with Tribal use include ingestion and body contact. The preservation of the quality of these waters is important in the preservation of Ute Culture.

REC1 Waters that are, or may be, used for recreation such as swimming and boating, during which it is expected that small quantities of water may be ingested.

REC2 Waters that are, or may be, used for recreation such as wading and fishing, during which it is unreasonable to expect the ingestion of small quantities of water, but during which it is expected that skin contact with water may occur.

WWAL Waters that support warm water species of aquatic life, including associated benthic macroinvertebrate communities, that can survive temperatures greater than 20 degrees C for extended periods of time.

Designated uses for Tribal waters are determined by the Tribe, in accordance with Sections 101(a)(2) and 303 of the Clean Water Act and the implementing federal regulation at 40 CFR Part 131.10. Existing uses are uses that were in existence on a specific stream, lake, or wetland on November 28, 1975, or that have been attained thereafter. Some uses may be designated that are not currently attained, but for which there is a reasonable expectation that those uses can be attained using point and nonpoint source controls of limiting pollutants. Section 101(a)(2) of the Clean Water Act requires that waters be designated as fishable and swimmable+(supporting protection and propagation of fish, shellfish, and wildlife, and providing for recreation in and on the water) unless a use attainability analysis has been approved supporting a less stringent use designation. Those waters that do not support a REC1 use designation have

been identified in **Section 14. Tribal Waters with Use Attainability Analyses**, and are identified in **Section 12**; in the center column of Tables 12.1 and 12.2.

b. Outstanding Tribal Resource Water Designation

Any Tribal Water or segment thereof can be designated an Outstanding Tribal Resource Water+(OTRW), following an informal recommendation by a member of the public at large, appropriate consideration and documentation of the reasons for the recommendation by Tribal staff and Tribal Council, and official designation as part of a triennial revision of these standards.

(2010 Proposed) Designations:

Two OTRW designations are being recommended in these standards, nominated by the Tribe's Water Quality Specialist:

1. Ute Spring and unnamed creek from Ute Spring downstream within Section 12, TWP35N R18W (Colorado).
2. Allen Canyon Creek, Sections 17, 20, 29, 30, 31, TWP 35S, R21E (Utah)
3. Lopez+Spring and unnamed creek tributary to and downstream from the spring, within Section 35, TWP 34N, R18W

12. Designated Uses, Criteria, and Variances for Stream Segments

The following tables summarize designated uses, types of narrative and numeric water quality criteria, and any temporary variances for water bodies determined to be Tribal waters+in **Section 1.** of this document:

Table 12.1 Designated Uses for Tribal Waters, Colorado and New Mexico

Stream Segment	Type of Criteria, Variances, applicable UAA	Designated Use
Mancos River, segments and tributaries: (USGS HUC 14080107)		
Mancos above Weber Creek	Narrative and Numeric	WWAL, AG, REC1
Weber Creek	Narrative and Numeric	WWAL, AG, REC1
Mancos below Weber Cr. to Farm's diversion dam:	Narrative and Numeric	WWAL, AG, REC1
Tributaries to Mancos on segment above: Soda, Grass, Johnson, Ute and Moqui Canyons, and all other tributaries	Narrative and Numeric, UAA, Ute Canyon: site-specific, E. Coli = 126 cfu/ 100ml	WWAL, AG, REC2
Mancos below diversion dam to Navajo Wash confluence	Narrative and Numeric	WWAL, AG, REC1
Navajo Wash (primary tributary to the Mancos River on Reservation)	Narrative and Numeric,	WWAL, AG, REC1, IND

Cottonwood Wash, CO (tributary to Navajo Wash)	Numeric	WWAL, AG, REC1, FSH
Unnamed tributaries to Cottonwood Wash, Lopez Spring, unnamed springs	Numeric	WWAL, AG, T
Aztec Wash	Numeric, UAA	WWAL, AG, REC2
Mancos River downstream of Navajo Wash to the CO/NM, Ute/Navajo Border	Numeric	WWAL, AG, REC1
Lower San Juan River, segments and tributaries:		
McElmo Creek	Numeric	WWAL, AG, REC1
Tributaries to McElmo Creek on Ute Mountain Indian Reservation (Mud Creek, Ute Creek, Pine Creek, Berry Creek, Finley Creek, Echo Canyon Creek, Hamilton Canyon Creek, Littlewater Creek, and unnamed tributaries)	Numeric, UAA	WWAL, AG, REC2
Ute Spring, Hanna Spring, unnamed springs	Numeric	AG, T, WWAL
Cowboy Wash, Marble Wash, Mariano Wash, Coyote Wash, East McElmo Creek and other, and unnamed tributaries to lower San Juan River	Numeric, UAA	WWAL, AG, REC2
Lower San Juan River (USGS HUC 14080201)	Numeric	DW, WWAL, AG, REC1, FSH
Tributaries to Middle San Juan River (USGS HUC 14080105): (surface waters of Ute Canyon, Pickett Canyon, Navajo Canyon, Cholla Canyon, Purgatory Canyon, Barker Canyon, Thomas Canyon, Jones Canyon, Buzan Canyon, Oak Springs Canyon, Trail Canyon, Pump Canyon, Craig Canyon, and all other tributaries to the La Plata River and middle San Juan River) in New Mexico	Numeric, UAA	WWAL, REC2, AG
East Lake, Jones Lake, Blue Lake, and all other lakes, reservoirs and wetlands in Middle San Juan watershed	Numeric	WWAL, AG, REC1
Lakes, Reservoirs, and Wetlands in Mancos and McElmo watersheds:		
1 st Lake (Cottonwood Wash watershed)	Numeric	CWAL, REC1, AG, FSH
2 nd Lake (Pine Creek watershed)	Numeric	CWAL, REC1, AG, FSH
Horseshoe Reservoir, East Lake+(McElmo watershed)	Numeric	CWAL, REC1, AG, FSH
Hayfield Reservoir (Navajo Wash watershed)	Numeric	CWAL, REC1, AG, FSH
Ute Canal	Numeric, UAA	AG

Table 12.2. Designated Uses for Tribal Waters, Utah

Stream Segment	Type of Criteria, Variances	Designated Use
Right Hand Fork and tributaries (tributary to Cottonwood Wash)	Narrative and Numeric	WWAL, AG, REC1, T
Westwater Creek and all tributaries,	Numeric	WWAL, AG, REC1
Cottonwood Wash and all tributaries	Numeric	WWAL, AG, REC1, T
Allen Canyon Creek and all tributaries	Numeric	WWAL, AG, REC1, T
Whiskers Spring, Hammond Spring, unnamed springs	Numeric	AG, T, WWAL
Recapture Creek and Tributaries	Numeric	WWAL, AG, REC1, T

Criteria:

The following numeric criteria shall not be exceeded for any Tribal water, beyond the limits of averaging periods and allowable frequencies of exceedance. Two types of criteria are presented here, general numeric criteria and site specific numeric criteria.

Numeric criteria are levels of pollutants beyond which impairment of a water body, resulting in non-attainment of a designated use, may be expected. These are also referred to as use-protected standards. Therefore, these criteria are specific to the designated uses that are to be protected. These numeric criteria are summarized in Tables 12.3 to 12.7, below. **For a water body with multiple use designations, the most stringent criteria will be the goal of its water quality standard.**

Site specific criteria are set for individual waters or segments thereof for which the numeric criteria are not appropriate due to natural background conditions, historical pollution impairment, or conditions that may otherwise prevent the attainment of specific designated uses.

Note: Capital letters refer to references in Section 15. Numbers refer to footnotes in this section.

Table 12.3. Physical Parameters

Parameter:	pH (1) (K)	Temperature (2) (K)	Salinity (3), (4) (W,JJ)
Uses Protected:			
WWAL, CWAL	6.5-9.0 s.u. (range)	WWAL: <30C with maximum 3 degree C increase, CWAL: <20C with maximum 3 degree C increase	
REC1, REC2	6.5-9.0 s.u. (range)	<50 C	
AG	6.5-9.0 s.u. (range)	<50 C	Livestock consumption: TDS<or= 5,000 mg/L; Irrigation: <2250 mg/L when SAR is <or= 4.00, <1500 when SAR is 4.01-10.00; 750 mg/L if SAR> 10.00
DW & T	6.6-8.5 s.u. (range)		TDS <or= 500 mg/L
IND (5)	Boilers: 8.0-8.5 at 150-250 psi		Construction Watering: TDS<8,510 mg/L Boilers: TDS < 2500 at 150-250 psi pressure

Footnotes for Table 12.3:

(1) pH criteria are instantaneous measurements for the purpose of regulating effluent limits.

(2) Temperature shall maintain a natural pattern of seasonal fluctuation with no abrupt changes, and shall have no increase of a magnitude, rate or duration that negatively impacts aquatic life. Generally a maximum increase of less than 3 degrees C over a minimum of 4 hours, and lasting for no more than 12 hours is deemed acceptable for discharges that fluctuate in volume and/or temperature. Where temperature increases cannot be maintained within this limit by Best Management Practices and Best Available Treatment Economically Achievable, the Tribe will determine whether temperature increases impact the attainment of an aquatic life use.

(3) Waters in the 7,000-10,000 mg/L range of total soluble salts are unfit for poultry and swine, and present a significant risk for pregnant and lactating cows, horses, sheep, and the young of these species. Consumption of waters at this level of salinity also presents a risk for livestock subjected to heavy heat stress or water loss. 5,000 mg/L is therefore a threshold value to prevent adverse effects on livestock.

(4) SAR, or Sodium Adsorption Ratio: $Na/(1/2(Ca+Mg))^{1/2}$ The combination of sodium adsorption ratio (SAR) and total dissolved solids is used to assess the risk of sodium hazard in the application of water to crops of different sensitivities to sodium. These standards are not to be exceeded by more than 3 consecutive samples in a 30-day period or 20% of the samples in a growing season, for protection of long-term soil productivity.

(5) Use of untreated surface waters from local geology in boilers is most likely limited by hardness, which is not a specifically regulated water quality parameter, and industrial use of this type should be considered carefully with correspondence with Water Pollution Prevention Program staff and site-specific sampling for a suite of water quality parameters.

Table 12.3.a Dissolved Oxygen Criteria (mg/L) ^{(1) (A)}

	CWAL, Early Life Stages ^{(2) (3)}	CWAL, Other Life Stages	WWAL, Early Life Stages ⁽³⁾	WWAL, Other Life Stages
30 Day mean	NA ⁽⁴⁾	6.5	NA	5.5
7 Day mean	9.5 (6.5)	NA	6	NA
7 Day mean minimum ⁽⁷⁾	NA	5.0	NA	4.0
1 Day mean minimum ^{(5), (6)}	8.0 (5.0)	4.0	5.0	3.0

Footnotes for Table 12.3.a:

(1) The dissolved oxygen criteria apply to all non-thermally stratified lentic waters, and to all lotic waters. Dissolved oxygen levels may be lowered by natural causes in the hypolimnion (bottom layer) of a thermally-stratified lentic water body. Dissolved oxygen criteria apply to the epilimnion (upper layer) and metalimnion (middle layer or thermocline) of any thermally-stratified lentic water. This hypolimnion exclusion of the dissolved oxygen criteria may occur only where the Tribe determines that: 1) the lentic water body is thermally stratified and 2) dissolved oxygen levels are responding to natural cycles and are not significantly influenced by anthropogenic activities. Alternatively, the Tribe may set site-specific dissolved oxygen criteria in accordance with Section 12. Designated Uses, Criteria and Variances for Stream Segments.

(2) These are water column concentrations required to achieve the intergravel concentrations shown in parentheses. For species that have early life stages directly exposed to the water column, the concentrations in parentheses apply.

(3) "Early life stages" includes all embryonic and larval stages and all juvenile forms to 30-days following hatching.

(4) "NA" means not applicable

(5) Discharges that are easily manipulated may have further restrictions requiring higher one-day mean minimum concentrations, to be determined on a site-specific basis.

(6) All minima should be considered to be instantaneous concentrations to be achieved at all times.

(7) The 7-day mean minimum is the mean value of the daily minimums.

Table 12.4 Bacteriological Criteria (# of colonies/100ml) ^{(1), (2) (D, N, PP)}

Parameter	E. Coli geometric mean (g.m.); single sample maximum (s.m.) ⁽²⁾
Uses Protected:	
REC 1	126/100mL (g.m.); 235/100mL (s.m.)
REC 2	1152/100mL (s.m.)
T (human health)	0 (absent)

Footnotes for Table 12.4

(1) Fecal Coliform has been removed from the standards as an indicator of potential human pathogen pollution. With EPA's approval of modern E.Coli analytical procedures and only a limited amount of historical Tribal fecal coliform data, it is now more practical to use E.Coli as an indicator exclusively, unless a pathogen-specific procedure is required to determine illness rates as part of a more in-depth epidemiological study.

(2) The Tribal Ceremonial Use criterion of total absence of E.Coli bacteria is meant to be protective of those small stream segments directly downstream of springs and seeps of traditional Tribal use. It is a goal that has been documented to be achievable on such stream segments where protective best management practices have been implemented. Where flowing surface waters have a Tribal Ceremonial Use ("T") designation, this criterion should be perceived as an interim value where a site-specific value will be calculated in the future, and also a goal for the minimization of fecal pollution.

12.5. Inorganic Chemical Parameters, Cyanide and Asbestos (mg/L, unless noted otherwise)
(6), (7)

Parameter	Ammonia, NH ₃ ^{(1), (2) (V, II, NN)}	
Acute/Chronic Descriptor	acute (1-hour)	chronic (30-day)
Uses Protected:		
WWAL/CWAL	$\frac{0.411}{(1+10^{7.204-pH})} + \frac{58.4}{(1+10^{pH-7.204})}$	$\frac{0.0577}{(1+10^{7.688-pH})} + \frac{2.487}{1+10^{pH-7.688}} \cdot (1.45 \cdot 10^{0.028 \cdot \text{MAX}(25-T, 7)})$
WWAL/CWAL with salmonid fish for acute criteria, with early life stages for chronic criteria	$\frac{0.275}{(1+10^{7.204-pH})} + \frac{39.0}{(1+10^{pH-7.204})}$	$\frac{0.0577}{(1+10^{7.688-pH})} + \frac{2.487}{1+10^{pH-7.688}} \cdot \text{MIN}(2.85, 1.45 \cdot 10^{0.028 \cdot (25-\text{MAX}(T, 7))})$
T&DW (human health)		0.5 (30-day)
Acute/Chronic Descriptor	acute (1-day)	chronic (30-day)
Parameter	Chlorine, Cl ₂ ^(Y)	
WWAL	19 ug/L	11 ug/L
CWAL	same as WWAL	same as WWAL
T&DW (human health)	4,000 (1-Day) ⁽⁴⁾	
Parameter	Nitrite/Nitrate - Nitrogen NO ₂ / NO ₃ -N ^(V, W, CC)	
WWAL (CC)	0.20(2.00[Cl ⁻]+0.73) mg/L NO ₂ -N	0.10(2.00[Cl ⁻]+0.73) mg/L NO ₂ -N
	[Cl ⁻] = chloride ion concentration, upper Cl ⁻ limit = 22 mg/L	
CWAL (8) (CC)	0.10(0.59[Cl ⁻]+3.90) mg/L NO ₂ -N	0.10(0.29[Cl ⁻]+0.53) mg/L NO ₂ -N
	[Cl ⁻] = chloride ion concentration, upper Cl ⁻ limit = 22 mg/L	
AG	10 mg/L (1-Day) (as NO ₂ -N only)	100 mg/L (30-Day) (as NO ₃ -N + NO ₂ -N)
T&DW (human health)	1.0 mg/L (1-Day) (as NO ₂ -N only)	10 mg/L (1-Day) (as NO ₃ -N + NO ₂ -N)
Parameter	Cyanide, CN ^{(3) (I, M, T, W)}	
WWAL	22 ug/L	5.2 ug/L
CWAL	Same as WWAL	Same as WWAL
AG	200 ug/L (1-Day)	
T&DW (human health)	200 ug/L (1-Day)	
Parameter	Boron, B ^(EE, JJ)	Sulfide, as undissociated H ₂ S ^{(4) (U)}
WWAL	NA	2 ug/L (30-Day)
CWAL	NA	2 ug/L (30-Day)
AG	750 ug/L (sensitive crops, long-term) (30-Day)	NA
T&DW (human health)	NA	50 ug/L (30-Day)
Parameter	Asbestos ^{(5) (T)}	
WWAL		NA

CWAL		NA
AG		NA
T&DW (human health)		7,000,000 fiber/L

Footnotes for Table 12.5:

- (1) These criteria apply to unionized ammonia. The applicable criteria shall not be exceeded more than one time every three years on the average.
- (2) The highest four-day average within the 30-day chronic criteria averaging period should not exceed 2.5 times the chronic criterion.
- (3) This water quality criterion is expressed as ug free cyanide (as mg CN)/L.
- (4) Organoleptic criterion for taste and odor.
- (5) Asbestos criterion applies to fibers equal to or longer than 10 micrometers. There is no averaging period for this criterion. Any detection of asbestos at this level will warrant immediate remedial action.
- (6) "NA" means "not applicable".
- (7) Averaging periods are in parentheses following descriptors or criteria. No concentration shall exceed criteria more than once every three years.

12.6 Standards for Metallic Inorganics and Selenium (ug/L) ^{(2), (3), (11)}

Parameter	Ag, Silver ^{(1) (T)}
WWAL acute criteria	$e^{(1.72[\ln(\text{hardness})]-6.52)(0.85)}$
WWAL chronic criteria	$e^{(1.72[\ln(\text{hardness})]-9.06)(0.85)}$
CWAL acute criteria	same as WWAL acute
CWAL chronic criteria	$e^{(1.72[(\ln(\text{hardness})]-10.51)(0.8)}$
Agriculture (total recoverable)	na
T & DW, Water+Organisms (ug/L) ⁽³⁾	100 (1-Day)
FSH, Organisms Only (ug/L)	110,000
Parameter	Al, Aluminum ^(U, 12)
WWAL acute criteria	750
WWAL chronic criteria	87
CWAL acute criteria	same as WWAL
CWAL chronic criteria	same as WWAL
Agriculture (total recoverable)	na
T & DW, Water+Organisms (ug/L) ⁽³⁾	200 ⁽¹⁰⁾
FSH, Organisms Only (ug/L)	na
Parameter	As, Arsenic ^(C, T, W, JJ)
WWAL acute criteria	340
WWAL chronic criteria	150

CWAL acute criteria	same as WWAL
CWAL chronic criteria	same as WWAL
Agriculture (total recoverable)	100 (30-Day)
T & DW, Water+Organisms (ug/L) ⁽³⁾	0.018 (1-Day)
FSH, Organisms Only (ug/L)	0.014
Parameter	Ba, Barium ^(U)
WWAL acute criteria	na
WWAL chronic criteria	na
CWAL acute criteria	na
CWAL chronic criteria	na
Agriculture (total recoverable)	na
T & DW, Water+Organisms (ug/L) ⁽³⁾	1,000 (1-Day)
FSH, Organisms Only (ug/L)	na
Parameter	Cd, Cadmium ^{(1) (E, T, W, JJ)}
WWAL acute criteria	$e^{(1.0166[\ln(\text{hardness})]-3.924)*(1.136672)[(\ln \text{hardness}).041838]}}$
WWAL chronic criteria	$e^{(0.7409[\ln(\text{hardness})]-4.719)*(1.101672-[(\ln \text{harness}).041838]}}$
CWAL acute criteria	same as WWAL
CWAL chronic criteria	
Agriculture (total recoverable)	10 (30-Day)
T & DW, Water+Organisms (ug/L) ⁽³⁾	5 (1-Day) (4)
FSH, Organisms Only (ug/L)	84
Parameter	Cr (III), Chromium ^{(1), (5) (F, T, W, JJ)}
WWAL acute criteria	$e^{(0.819*\ln(\text{hardness})+3.7256)(0.316)}$
WWAL chronic criteria	$e^{(0.819*\ln(\text{hardness})+0.6848)(0.860)}$
CWAL acute criteria	same as WWAL
CWAL chronic criteria	
Agriculture (total recoverable)	100 (30-Day)
T & DW, Water+Organisms (ug/L) ⁽³⁾	160 (1-Day)
FSH, Organisms Only (ug/L)	670,000
Parameter	Cr (VI), Chromium ^(F, T, W, JJ)
WWAL acute criteria	16
WWAL chronic criteria	11
CWAL acute criteria	same as WWAL
CWAL chronic criteria	
Agriculture (total recoverable)	100 (30-Day)
T & DW, Water+Organisms (ug/L) ⁽³⁾	50 (1-Day)
FSH, Organisms Only (ug/L)	3,400

Parameter	Cu, Copper ^{(1) (T, W, JJ)}
WWAL acute criteria	$e^{(0.9422[\ln(\text{hardness})]-1.700)}(.960)$
WWAL chronic criteria	$e^{(0.8545[\ln(\text{hardness})]-1.702)}(.960)$
CWAL acute criteria	same as WWAL
CWAL chronic criteria	
Agriculture (total recoverable)	200 (30-Day)
T & DW, Water+Organisms (ug/L) ⁽³⁾	1000 (30-Day)
FSH, Organisms Only (ug/L)	na
Parameter	Hg, Mercury ^{(6)(S,T,W,DD,JJ)}
WWAL acute criteria	1.4
WWAL chronic criteria	0.012
CWAL acute criteria	same as WWAL
CWAL chronic criteria	same as WWAL
Agriculture (total recoverable)	10 (30-day)
T & DW, Water+Organisms (ug/L) ⁽³⁾	0.05 (1-day)
FSH, Organisms Only (ug/L)	0.051
Parameter	MeHg, Methylmercury ^(13,QQ)
FSH, Organisms Only	0.3 mg MeHg/kg fish
Parameter	Ni, Nickel ^{(1) (T, W, JJ)}
WWAL acute criteria	$e^{(0.8460[\ln(\text{hardness})]+2.255)}(.998)$
WWAL chronic criteria	$e^{(0.8460[\ln(\text{hardness})]+0.0584)}(.997)$
CWAL acute criteria	same as WWAL
CWAL chronic criteria	
Agriculture (total recoverable)	200 (30-Day)
T & DW, Water+Organisms (ug/L) ⁽³⁾	100 (30-Day)
FSH, Organisms Only (ug/L)	4,600
Parameter	Pb, Lead ^{(1) (P, T, W, JJ)}
WWAL acute criteria	$e^{(1.273[\ln(\text{hardness})]-1.460)}*(1.46203-[\ln(\text{hardness})](0.145712))$
WWAL chronic criteria	$e^{(1.273[\ln(\text{hardness})]-4.705)}*(1.46203-[\ln(\text{hardness})](0.145712))$
CWAL acute criteria	same as WWAL
CWAL chronic criteria	
Agriculture (total recoverable)	100 (30-Day)
T & DW, Water+Organisms (ug/L) ⁽³⁾	50 (1-Day)

FSH, Organisms Only (ug/L)	na
Parameter	Se, Selenium ⁽⁷⁾ (T, W, DD, EE, GG, HH, JJ)
WWAL acute criteria	20
WWAL chronic criteria	5
CWAL acute criteria	same as WWAL
CWAL chronic criteria	
Agriculture (total recoverable)	20 (30-Day)
T & DW, Water+Organisms (ug/L) ⁽³⁾	50 (30-Day) ⁽⁹⁾
FSH, Organisms Only (ug/L)	4200
Parameter	Sb, Antimony ^(T)
WWAL acute criteria	na
WWAL chronic criteria	na
CWAL acute criteria	na
CWAL chronic criteria	na
Agriculture (total recoverable)	na
T & DW, Water+Organisms (ug/L) ⁽³⁾	5.6 (30-Day)
FSH, Organisms Only (ug/L)	640
Parameter	Zn, Zinc ⁽¹⁾ (T, NN, DD, W, JJ)
WWAL acute criteria	$e^{0.8473[\ln(\text{hardness})]+0.884}(.978)$
WWAL chronic criteria	$e^{0.8473[\ln(\text{hardness})]+0.884}(.986)$
CWAL acute criteria	same as WWAL
CWAL chronic criteria	
Agriculture (total recoverable)	2,000 (30-Day)
T & DW, Water+Organisms (ug/L) ⁽³⁾	5,000 (30-Day) ⁽¹⁰⁾
FSH, Organisms Only (ug/L)	26,000
Parameter	U, Uranium (elemental) ⁽¹²⁾
WWAL acute criteria	na
WWAL chronic criteria	na
CWAL acute criteria	na
CWAL chronic criteria	na
Agriculture (total recoverable)	na
T & DW, Water+Organisms (ug/L) ⁽³⁾	30 ug/L ⁽⁸⁾
FSH, Organisms Only (ug/L)	na

Footnotes for Table 12.6

(1) Hardness dependent criteria are based on hardness expressed as mg/L CaCO₃. For waters with a hardness value greater than 400 mg/L as CaCO₃, the criterion should be calculated using a hardness value of 400 mg/L, unless a water effects ration calculation is to be used.

(2) Both acute and chronic numeric aquatic life and fish consumption metals criteria are not be exceeded more than once every three years on the average. The acute criteria have a 1-hour averaging period, and the chronic criteria have an averaging period of 4 days. Agricultural and domestic water supply criteria differ in the length of an averaging period for allowable exceeding. These averaging periods are included in Table 12.6 in parentheses directly after criteria.

(3) Aquatic life criteria for metals are expressed as *dissolved* metals, except for aluminum, arsenic, selenium and mercury. Agriculture, Drinking Water, and Fish Consumption numeric criteria are expressed as total recoverable metals. Metals criteria in Table 12.6 can be converted to total recoverable metals for assessment purposes. Conversion factors for each parameter in Table 12.6 are included as Appendix A of this document.

(4) Drinking Water MCL

(5) Cr (III) criteria are applicable to the total of all valance states if specific valance state data are unavailable.

(6) Mercury criteria are ug/L of **total** mercury. EPA's current recommended CWA section 304(a) water quality criterion for methylmercury is expressed as a fish tissue concentration value (0.3 milligram methylmercury per kilogram of wet-weight fish tissue, or 0.3 mg/kg). With the publication of the fish tissue criterion, EPA withdrew the previous human health water quality criterion for mercury as the recommended section 304(a) water quality criterion for states and authorized tribes to use as guidance in adopting water quality standards (USEPA 2001). These water column criteria will be temporarily part of revised mercury criteria until the triennial review that follows the criterion adoption to help the transition in implementing the fish tissue criterion.

(7) Nationally recommended numeric aquatic life criteria for selenium are currently undergoing revision by EPA. Until further research indicates it is insufficient, the acute aquatic life criterion for selenium is 20 ug/L total recoverable selenium; chronic aquatic life criterion for selenium is 5 ug/L total recoverable selenium.

(8) EPA drinking water standard for Uranium designated for potential Tribal use.

(9) 50 ug/L Se is a drinking water MCL

(10) Organoleptic criteria for taste

(11) "na" means that insufficient research has been performed to develop numeric criteria for this parameter and designated use. Narrative criteria of Section 5, page 7 of these standards apply.

(12) The aluminum criteria are expressed as total recoverable metal in the water column. The 87 ug/l chronic criterion for aluminum is based on information showing chronic effects on brook trout and striped bass. The studies underlying the 87 ug/l chronic value, however, were conducted at low pH (6.5 - 6.6) and low hardness (< 10 ppm CaCO₃), conditions uncommon in Reservation surface waters. A water effect ratio toxicity study in West Virginia indicated that aluminum is substantially less toxic at higher pH and hardness (although this relationship is not well quantified at this time). Further, EPA is aware of field data indicating that many high quality waters in the U.S. contain more than 87 ug/l aluminum when either the total recoverable or dissolved aluminum is measured. Based on this information and considering the available toxicological information in Tables 1 and 2 of EPA's Aluminum Criteria Document (EPA 440/5-86-008), the Tribe will implement the 87 ug/l chronic criteria for aluminum as follows: where the pH is equal to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as CaCO₃ in the receiving water after mixing, the 87 ug/l chronic criterion will not apply, and aluminum will be regulated based on compliance with the 750 ug/l acute aluminum criterion. In situations where the 87 ug/l chronic criterion applies, a discharger may request development of a site specific chronic criterion based on a water effect ratio. Or, a discharger may request development of a permitting procedure (a translator) that would take into account less toxic forms of particulate aluminum. In either case, the Tribe may require that the discharger requesting the change provide the technical information and data needed to support such a change.

(13) Methylmercury water quality criteria have been adopted in the form of a fish tissue methylmercury concentration. This is the preferred form for the following reasons:

A criterion expressed as a fish tissue concentration is closely tied to the fishable+designated use goal applied to nearly all waterbodies in the United States.

A fish tissue concentration value is expressed in the same form (fish tissue) through which humans are exposed to methylmercury.

A fish tissue concentration value is more consistent with how fish advisories are issued

- At environmentally relevant concentrations, methylmercury is currently easier to detect in fish tissue than in water samples.

Table 12.7 Organic Compounds; ug/L unless stated otherwise (1),(2) (T)

Criteria labeled as "N" defer to narrative criteria only.

Compound	Chemical Abstract Number (CAS)	Freshwater Criteria	Human Health for the Consumption of:	
		WWAL & CWAL Criteria	DW (3) Water + Organisms	Organisms Only
Acenaphthene	83-32-9	N	670	990
Acenaphthylene (PAH)	208-96-8	N	1,200	2,700
Acrolein	107-02-8	3	6	9
Acrylonitrile	107-13-1	N	0.051	0.25
Alachlor	15972-60-8	N	2	N
Aldrin	309002	3	0.000049	0.000050
Anthracene (PAH)	120-12-7	N	8,300	40,000
Atrazine	1912-24-9	N	3	N
Benzene	71-43-2	N	2.2	51
Benzidine	92-87-5	N	0.000086	0.00020
Benzo(a)anthracene (PAH)	56-55-3	N	0.0038	0.018
Benzo(b)fluoranthene (PAH)	205-99-2	N	0.0038	0.018
Benzo(k)fluoranthene (PAH)	207-08-9	N	0.0038	0.018
Benzo(a)pyrene (PAH)	50-32-8	N	0.0038	0.018
Bis(2-chloroethyl) ether	111-44-4	N	0.030	0.53
Bis(2-chloroethoxy) methane	111-91-1	N	N	N
Bis(2-chloroisopropyl) ether	108-60-1	N	1,400	65,000
Bis(2-ethylhexyl) phthalate	117-81-7	N	1.2	2.2
Bromoform (HM)	75-25-2	N	4.3	140
4-Bromophenyl phenyl ether	101-55-3	N	N	N
Butyl benzyl phthalate	85-68-7	N	1,500	1,900
Carbon tetrachloride	56-23-5	N	0.23	1.6
Chlordane	57749	Acute: 2.4 Chronic: 0.0043	0.0008	0.00081
Chlorobenzene	108-90-7	N	130	1,600
Chlorodibromomethane (HM)	124-48-1	N	0.40	13
Chloroform (HM)	67-66-3	N	5.70	470
4-Chlorophenyl phenyl ether	7005-72-3	N	N	N
Chrysene (PAH)	218-01-9	N	0.0038	0.018
Cyanozine	21725-46-2	N	1.0 (4)	N
2-Chloroethyl vinyl ether	110-75-8	N	N	N
2-Chloronaphthalene	91-58-7	N	1,000	1,600
2-Chlorophenol	95-57-8	N	81	150
DBCP (dibromo-chloropropane)	96-12-8	N	0.2	N
DDT and metabolites	4,4 DDT: 50293 4,4 DDE: 72559	Acute: 1.1 Chronic: 0.001	0.00022	

	4,4 DDD: 72548		0.00031	
Demeton	8065-48-3	Chronic: 0.1	N	N
Dibenzo(a,h)anthracene (PAH)	53-70-3	N	0.0038	0.018
1,2-Dichlorobenzene	95-50-1	N	420	1,300
1,3-Dichlorobenzene	541-73-1	N	320	960
1,4-Dichlorobenzene	106-46-7	N	63	190
3,3-Dichlorobenzidine	91-94-1	N	0.021	0.028
Dichlorobromomethane (HM)	75-27-4	N	0.55	17
1,1-Dichloroethane	75-34-3	N	330	7,100
1,2-Dichloroethane	107-06-2	N	0.38	37
1,1-Dichloroethylene	75-35-4	N	0.057	3.2
1,2-Dichloropropane	78-87-5	N	0.34	15
1,2-Trans-dichloroethylene	156-60-5	N	140	10,000
1,3-Dichloropropene	542-75-6	N	0.34	21
2,4-D	94-75-7	100	70	N
2,4-Dichlorophenol	120-83-2	N	77	290
2,4-Dimethylphenol	105-67-9	N	380	850
2,4-Dinitrotoluene	121-14-2	N	0.11	3.4
2,6-Dinitrotoluene	606-20-2	N	N	N
1,2-Diphenylhydrazine	122-66-7	N	0.036	0.20
Dieldrin	60571	Acute: 0.24	0.000052	0.000054
		Chronic:0.056		
Diethyl phthalate	84662	N	17,000	44,000
2,4-Dinitrophenol	51-28-5	N	69	5,300
2-Methyl-4,6-Dinitrophenol	534-52-1	N	13	280
Di-n-butyl phthalate	84-74-2	N	2,000	4,500
Di-n-octyl phthalate	117-84-0	N	N	N
Dioxin (2,3,7,8-TCDD)	1746-01-6	Acute: 0.01	5.0E-9	5.1E-9
		Chronic: 0.00001		
Endosulfan (alpha)(8)	alpha:959988	Acute: 0.22 Chronic: 0.056	62	89
Endosulfan (beta)(8)	beta:33213659	Acute: 0.22 Chronic: 0.056	62	89
Endosulfan sulfate	sulfate form:1031078	N	62	89
EDB (Ethylene Dibromide)	106-93-4	N	0.05	N
Endrin	72208	Acute: 0.086	0.059	0.060
		Chronic: 0.036	N	N
Endrin Aldehyde	7421934	Acute: 0.086	0.059	0.060
		Chronic: 0.036	0.29	0.30
Ethylbenzene	100-41-4	N	530	2,100
Fluorene	86737	N	1,100	5,300
Fluoranthene	206-44-0	N	130	140
Heptachlor	76448	Acute: 0.52	0.000079	0.000079
Heptachlor Epoxide	1024573	Chronic: 0.0038	Epoxide only: 0.000039	Epoxide only: 0.000039
Hexachlorobenzene	118-74-1	N	0.00028	0.00029

Hexachlorobutadiene (c)	87-68-3	N	0.44	18
Hexachlorocyclopentadiene	77-47-4	N	40	1,100
Hexachloroethane	67-72-1	N	1.4	3.3
Indeno(1,2,3,-cd)pyrene (PAH)	193-39-5	N	0.0038	0.018
Isophorone	78-59-1	N	35	960
alpha-BHC	319846	N	0.0026	0.0049
beta-BHC	319857	N	0.0091	0.017
Lindane (gamma BHC)	58899	0.95	0.091	1.8
Malathion	121-75-5	0.1	N	N
Methalochlor	51218-45-2	N	N	N
Methoxychlor	72-43-5	0.03	100	N
Methyl bromide (Hm)	74-83-9	N	47	1,500
Methyl chloride (HM)	74-87-3	N	N	N
Methylene Chloride (HM)	75-09-2	N	4.6	590
Mirex	2385-85-5	0.001	N	N
Napthalene	91-20-3	N	N	N
Nitrobenzene	98-95-3	N	17	690
2-Nitrophenol	88-75-5	N	N	N
4-Nitrophenol	100-02-7	N	N	N
N-Nitrosodimethylamine	62-75-9	N	0.00069	3.0
N-Nitrosodiphenylamine	86-30-6	N	3.3	6.0
p-Chloro-m-cresol	59-50-7	N	N	N
Pentachlorophenol (5)	87865	Acute: =exp(1.005(pH)-4.869)	0.27	3.0
		Chronic: =exp(1.005(pH)-5.134)		
Phenol	108952	Acute: 10.2 mg/L	10 mg/L	0.86 g/L
		Chronic: 2.56 mg/L	(EPA organoleptic = 300 ug/L)	
polychlorinated biphenyls (6,7)	1336363 for all PCB's	(Chronic, 24-hr. average): 0.014 ug/L	0.000064	0.000064
Pyrene (PAH)	129-00-0	N	830	4,000
Simazine	122-34-9	N	4	N
1,1,2,2-Tetrachloroethane	79-34-5	N	0.17	4.0
Tetrachloroethylene	127-18-4	N	0.69	3.3
1,2,4-Trichlorobenzene	120-82-1	N	35	70
1,1,1-Trichloroethane	71-55-6	N	200	N
1,1,2-Trichloroethane	79-00-5	N	0.59	16
2,4,6-Trichlorophenol	88-06-2	N	1.4	2.4
Toluene	108-88-3	N	1,300	15,000
Toxaphene	8001352	Acute: 0.73	0.00028	0.00028
		Chronic: 0.0002		
Trichloroethylene	79-01-6	N	2.5	30
2,4,5-TP	93-72-1	N	10	N
Vinyl Chloride	75-01-4	N	0.025	2.4

Footnotes for Table12.7:

- (1) Aquatic life organics criteria are applicable to all stream segments designated as WWAL or CWAL. Fish consumption human health criteria apply only to waters that have a FSH (fish consumption) designation.

- (2) Criteria listed in Table 12.7 as **N** are those for which insufficient research information has been collected to recommend criteria. For these circumstances, the narrative criteria of Section 5, of these standards apply.
- (3) DW + organisms Human Health criteria values are 30-day average or chronic values. These are based on EPA's nationally recommended criteria or lifetime health advisories using a 10⁻⁶ incremental risk factor. These criteria apply only to waters designated as DW (drinking water source).
- (4) Human Health criterion for cyanazine is based on EPA's lifetime Health Advisory.
- (5) Pentachlorophenol has pH-dependent numeric aquatic life criteria.
- (6) Specific PCBs CAS #: Arochlor 1242: 53469219; Arochlor 1254: 11097691; Arochlor 1221: 11104282; Arochlor 1232: 11141165; Arochlor 1248: 12672296; Arochlor 1260: 11096825; Arochlor 1016: 12674112
- (7) PCBs criteria is for the sum of all Arochlors.
- (8) Aquatic life criteria for alpha and beta forms of endosulfan apply to the sum of these forms at any one time.

13. Description of Variances and Site-Specific Criteria:

a. Site-Specific Criteria:

These waters are identified in the tables above, and the general numeric criteria that correspond to them also apply, except for the specific criteria described for each below, where a different standard is deemed necessary.

Waters	Site-Specific Criteria
1. Ute Canyon (in Mancos River Watershed)	Fecal coliform = 200 colonies/ 100 mL, E. Coli = 126 colonies / 100ml

Explanation of Site Specific Criteria:

- 1. Ute Canyon has a spring that maintains flow for most of the year. Although it is not entirely perennial and would be identified as intermittent by the definition in Section 9 of these standards, there is a reasonable potential for REC1 activities due to its location.

14. Tribal Waters with Use Attainability Analyses

The following Tribal Waters do not meet the requirements of fishable and swimmable, as described in Clean Water Act, Section 101(a)(2).

In Colorado:

Soda Canyon, Grass Canyon, Johnson Canyon, Moqui Canyon;
unnamed tributaries to the Mancos River, Aztec Wash and Ute Reservoir;

Mud Creek, Ute Creek, Pine Creek, Berry Creek, Finley Creek, Echo Canyon Creek,
Hamilton Canyon Creek, Littlewater Creek, and unnamed tributaries to McElmo Creek;

Ute Canal, Cowboy Wash, Marble Wash, Mariano Wash, Coyote Wash, East McElmo
Creek and other unnamed tributaries to lower San Juan River;

In New Mexico:

Ute Canyon, Pickett Canyon, Navajo Canyon, Cholla Canyon, Purgatory Canyon,
Barker Canyon, Thomas Canyon, Jones Canyon, Buzan Canyon, Oak Springs Canyon,
Trail Canyon, Pump Canyon, Craig Canyon, and all other tributaries to the La Plata
River and middle San Juan River;

Use Attainability Analyses are on file with the Ute Mountain Ute Water Pollution
Prevention Program, and are included as Appendix B of the *Ute Mountain Ute Water
Quality Standards Rationale Document*.

15. References

Note: For pollutant-specific criteria references, use footnote reference letters.

- A. Ambient Water Quality Criteria for Dissolved Oxygen, April 1986, U.S. Environmental Protection Agency, Document EPA 440/5-86/003.
- B. Ambient Aquatic Life Water Quality Criteria for Atrazine- Draft, August 2001, U.S. Environmental Protection Agency, Document EPA 822-D-01-002.
- C. Arsenic Water Quality Standards criteria Summaries: A Compilation of State/Federal Criteria, September 1988, U.S. Environmental Protection Agency, Document EPA 440/5-88/018.
- D. Bacteriological Ambient Water Quality Criteria for Marine and Fresh Recreational Waters, Luey et al. January 1986, U.S. Environmental Protection Agency, Document EPA 440/5-84/002.
- E. Cadmium Water Quality Standards criteria Summaries: A Compilation of State/Federal Criteria, September 1988, U.S. Environmental Protection Agency, Document EPA 440/5-88/014.
- F. Chromium Water Quality Standards criteria Summaries: A Compilation of State/Federal Criteria, September 1988, U.S. Environmental Protection Agency, Document EPA 440/5-88/026.
- G. Federal Register, Title 40, Chapter I, Subchapter D, Part 131.
- H. Copper Water Quality Standards criteria Summaries: A Compilation of State/Federal Criteria, September 1988, U.S. Environmental Protection Agency, Document EPA 440/5-88/027.
- I. Cyanide Water Quality Standards criteria Summaries: A Compilation of State/Federal Criteria, September 1988, U.S. Environmental Protection Agency, Document EPA 440/5-88/016.
- J. Federal Water Pollution Control Act, As Amended by the Clean Water Act of 1977. Public Law 92-500, as amended. 33 U.S.C. 1251 et seq.
- K. General Provisions Water Quality Standards criteria Summaries: A Compilation of State/Federal Criteria, September 1988, U.S. Environmental Protection Agency, Document EPA 440/5-88/010.
- L. Glossary of Environmental Terms And Acronym List, December 1989, U.S. Environmental Protection Agency, Document 19K-1002.
- M. Handbook of Handbook of Toxic and Hazardous Chemicals and Carcinogens, Second Edition, 1985, Sittig, Marshall, Noyes Publications, Park Ridge, NJ.
- N. Health Effects Criteria for Fresh Recreational Waters, Dufour, Alfred P. August 1984, U.S. Environmental Protection Agency, Document EPA 600/1-84/004.
- O. Iron Water Quality Standards criteria Summaries: A Compilation of State/Federal Criteria, September 1988, U.S. Environmental Protection Agency, Document EPA 440/5-88/022.
- P. Lead Water Quality Standards criteria Summaries: A Compilation of State/Federal Criteria, September 1988, U.S. Environmental Protection Agency, Document EPA 440/5-88/030.
- Q. Limnology, 1983, Goldman, Horne, McGraw-Hill Publishing Company, USA.

- R. Mixing Zones Water Quality Standards criteria Summaries: A Compilation of State/Federal Criteria, September 1988, U.S. Environmental Protection Agency, Document EPA 440/5-88/015.
- S. Mercury Water Quality Standards criteria Summaries: A Compilation of State/Federal Criteria, September 1988, U.S. Environmental Protection Agency, Document EPA 440/5-88/005.
- T. National Recommended Water Quality Criteria for Priority Toxic Pollutants, February 23, 2010 U.S. Environmental Protection Agency, Document EPA-Z-99-01.
- U. National Recommended Water Quality Criteria for Non-Priority Toxic Pollutants, February 23, 2010, U.S. Environmental Protection Agency, Document EPA-Z-99-01.
- V. Nitrogen-Ammonia/Nitrate/Nitrite Water Quality Standards criteria Summaries: A Compilation of State/Federal Criteria, September 1988, U.S. Environmental Protection Agency, Document EPA 440/5-88/029.
- W. Nutrients and Toxic Substances in Water for Livestock and Poultry, 1974, National Academy of Sciences, Washington, D.C.
- X. Organics Water Quality Standards criteria Summaries: A Compilation of State/Federal Criteria, September 1988, U.S. Environmental Protection Agency, Document EPA 440/5-88/006.
- Y. Other Elements Water Quality Standards criteria Summaries: A Compilation of State/Federal Criteria, September 1988, U.S. Environmental Protection Agency, Document EPA 440/5-88/011.
- Z. Questions and Answers on: Antidegradation, August 1985, U.S. Environmental Protection Agency.
- AA. Reconnaissance Investigation of Water Quality, Bottom Sediment, and Biota Associated with Irrigation Drainage in the Dolores Project Area, Southwestern Colorado and Southeastern Utah, 1990, 1993, Butler, Krueger, Osmundson, and Jensen, U.S. Geologic Survey Water-Resources Investigations Report 93-XXXX, Denver, CO.
- BB. Reconnaissance Investigation of Water Quality, Bottom Sediment, and Biota Associated with Irrigation Drainage in the San Juan River Area, San Juan County, Northwestern New Mexico, 1990-91, 1993, Blanchard, Roy, and O'Brien, U.S. Geologic Survey Water-Resources Investigations report 93-4065, Albuquerque, NM.
- CC. Regulation NO. 31, The Basic Standards and Methodologies for Surface Water, July, 23, 1997, (Effective August 30, 1997). Colorado Department of Public Health and Environment, Water Quality Control Commission.
- DD. Regulation NO. 34, Classifications and Numeric Standards for San Juan River And Dolores River Basins, July, 23, 1997, (Effective August 30, 1997). Colorado Department of Public Health and Environment, Water Quality Control Commission.
- EE. San Juan River Basin Water Quality And Contaminants Review, Volume I, April 1994, Abell, Robin. Museum of Southwestern Biology, Department of Biology, University of New Mexico, Albuquerque, NM.

- FF. Standard Methods For the Examination of Water and Wastewater, 17th Edition, 1989, Clesceri, Greenberg, Trussel. Port City Press, Baltimore, MD, 1989.
- GG. Standards Of Quality For Waters Of The State, R317-2, Utah Administrative Code, December 19, 1997 Revision, Utah Department of Environmental Quality, Division of Water Quality.
- HH. Title 20, Chapter 6, Part 1, Standards For Interstate And Intrastate Surface Waters (NMED Public Discussion Draft), April 14, 1998. Water Quality Control Commision.
- II. Understanding Colorado's ammonia standards and the Colorado Ammonia Model, Part I+Footnotes¹, A Bulletin from Rothberg, Tamburini & Winsor, Morgan, Bill, P.E. Winter 1997.
- JJ. Water Quality for Agriculture, 1976, Food and Agriculture Organization of the United Nations.
- KK. Water Quality Standards Academy Basic Course Participant Manual 1997 Edition, March 1997, U.S. Environmental Protection Agency, Document EPA-823-B-97-004.
- LL. Water Quality Standards for the Southern Ute Indian Reservation, October 1997, Southern Ute Indian Tribe Water Quality Department, Ignacio, CO.
- MM. Water Quality Standards Handbook, Second Edition, August 1994, U.S. Environmental Protection Agency, Document EPA-823-B-94-005b.
- NN. Zinc Water Quality Standards criteria Summaries: A Compilation of State/Federal Criteria, September 1988, U.S. Environmental Protection Agency, Document EPA 440/5-88/019.
- OO. 1999 Update of Ambient Water Quality for Ammonia, December 1999, U.S. Environmental Protection Agency, Document EPA . 822-R-99-014.
- PP. Implementation Guidance for Ambient Water Quality for Bacteria, May 2002 Draft, U.S. Environmental Protection Agency, Document EPA . 823-B-02-003.
- QQ. Guidance for Implementing the January 2001 Methylmercury Water Quality Criterion, April 2010