NOTICE OF FINAL RULEMAKING

TITLE 18. ENVIRONMENTAL QUALITY

CHAPTER 11. DEPARTMENT OF ENVIRONMENTAL QUALITY

WATER QUALITY STANDARDS

PREAMBLE

1. Articles, Parts, and Sections Affected	**Rulemaking Action**
R18-11-101	Amend
R18-11-107.01	Amend
R18-11-109	Amend
R18-11-114	Amend
R18-11-115	Amend
R18-11-120	Amend
R18-11-122	Amend
Appendix A	Amend
Table 1	Amend
Table 2	Amend
Table 3	Amend
Table 5	Amend
Table 6	Amend
Table 11	Repeal
Table 11	New Table
Table 12	Repeal
Table 12	New Table
Table 13	New Table
Table 14	New Table
Table 15	New Table
Table 16	New Table
Table 17	New Table
Appendix B	Amend
Appendix C	Amend

2. Citations to the agency's statutory rulemaking authority to include the authorizing statute (general) and the implementing statute (specific):

Authorizing statute: A.R.S. §§ 49-202(A), 49-203(A)(1)

Implementing statute: A.R.S. §§ 49-221, 49-222

3. The effective date of the rules:

This rule will become effective sixty days after a certified **original and two copies of the** rule and preamble are filed in the office of the secretary of state and the time and date are affixed as provided in A.R.S. § 41-1031.

4. Citations to all related notices published in the Register as specified in R1-1-409(A) that pertain to the record of the proposed rule:

Notice of Rulemaking Docket Opening: 25 A.A.R. 273, February 1, 2019

Notice Proposed Rulemaking: 25 A.A.R. 177, February 1, 2019

5. The name and address of agency personnel with whom persons may communicate regarding the rulemaking:

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http://www.azdeq.gov/node/3934

6. An agency's justification and reason why a rule should be made, amended, repealed or renumbered, to include an explanation about the rulemaking: General Explanation of this Rulemaking:

The Arizona Department of Environmental Quality (ADEQ) proposes to amend 18 A.A.C. 11, Article 1 in order to adopt and revise water quality standards within the State of Arizona as required under Section 303(c) of the Clean Water Act (CWA). ADEQ last adopted a comprehensive revision to water

quality standards in January, 2009. Minor revisions were adopted in August 2016.

Water Quality Standards Background

A.R.S. § 49-222 authorizes ADEQ to adopt surface water quality standards that: assure attainable water quality; provide for protecting the public health and welfare; enhance the quality of water in Arizona; and take into consideration the use and value of water for public water supplies, the propagation of fish and wildlife, and recreational, agricultural, industrial, and other purposes, including navigation. ADEQ is required to adopt numeric surface water standards that establish numeric limits on the concentrations of each of the 126 toxic pollutants listed by EPA in 40 CFR Part 423, Appendix A under § 307 of the CWA. In adopting numeric water quality standards, ADEQ may consider:

- The effect of local water quality characteristics on the toxicity of pollutants;
- The varying sensitivities of local affected aquatic populations to these pollutants; and
- The extent to which the natural flow of the stream is perennial, intermittent, effluent-dependent, or ephemeral.

While ADEQ may consider site-specific factors in establishing water quality standards for ephemeral waters and effluent-dependent waters, any water quality standard adopted must be consistent with the requirements of the CWA. A.R.S. § 49-221 also prescribes what ADEQ must and may consider to adopt water quality standards. For example, A.R.S. § 49-221(C)(6) directs the Director to consider "[a]ny unique physical, biological, or chemical properties of the waters" when establishing numeric or narrative surface water quality standards.

Section 303(c) of the CWA requires states to, where appropriate, adopt and revise water quality standards at least once every three years. The key elements of the water quality standards program are:

- A water quality standard is defined as consisting of the designated beneficial uses of a water body and the water quality criteria necessary to support the designated uses;
- The criteria shall be specific numeric criteria or narrative criteria based on biological monitoring or assessment methods consistent with the CWA;
- The following minimum beneficial uses must be considered when establishing surface water quality standards under the CWA: 1) public water supply; 2) the propagation of fish, shellfish, and wildlife; 3) recreation; 4) agricultural uses; 5) industrial uses; and 6) other purposes, including navigation;

- The water quality standards must protect public health and welfare, enhance the quality of water, and serve the purposes of the CWA;
- The surface water quality standards rules must be reviewed at least once every three years using a process that includes public participation; and
- EPA must review and approve or disapprove the surface water quality standards adopted by ADEQ.

EPA requires ADEQ to specify appropriate uses to be achieved and protected in Arizona's surface waters. These ADEQ-specified designated uses include:

- domestic water source (DWS),
- fish consumption (FC),
- full body contact recreation (FBC),
- partial body contact recreation (PBC),
- aquatic and wildlife (cold water) (A&Wc) (acute and chronic),
- aquatic and wildlife (warm water) (A&Ww) (acute and chronic),
- aquatic and wildlife (effluent-dependent water) (A&Wedw) (acute and chronic),
- aquatic and wildlife (ephemeral water) (A&We) (acute only),
- agricultural irrigation (AgI), and
- agricultural livestock watering (AgL).

Individual surface waters in Arizona and their respective designated uses are listed in Appendix B of this rulemaking. Other "surface waters" in Arizona are regulated under the tributary rule, which assigns designated uses to unlisted tributaries of surface waters listed in Appendix B.

The surface water quality standards for downstream surface waters must be considered when establishing designated uses for upstream waters. ADEQ must ensure that the water quality standards that are adopted for upstream water bodies also provide for the attainment and maintenance of the water quality standards for downstream waters. *See* 40 C.F.R. § 131.10(b). This concept is also stated in A.A.C. R18-11-104(F).

ADEQ must adopt water quality criteria that are sufficient to protect water quality for the designated uses of Arizona's surface waters and include an antidegradation policy consistent with EPA

requirements in 40 C.F.R. § 131.12. *See* 40 C.F.R. § 131.6. Water quality criteria, numeric criteria, and narrative criteria must be based on a sound scientific rationale and must contain sufficient parameters for constituents to protect each designated use. *See* 40 C.F.R. 131.11(a)

ADEQ has discretionary authority under 40 C.F.R. § 131.13 to include general policies that affect the application and implementation of the surface water quality standards in the rules. ADEQ has used this authority to adopt a mixing zone rule at R18-11-114, a variance rule at R18-11-122, and site specific standards in R18-11-115.

How Surface Water Quality Standards Impact Pollution Control in Arizona

Surface water quality standards are essential elements of several important surface water quality management programs including: Arizona Pollutant Discharge Elimination System (AZPDES) permitting; the § 305(b) water quality assessment and § 303(d) impaired water listing; and total maximum daily load (TMDL) programs.

AZPDES Permit Program

Surface water quality standards are used to regulate point source discharges of pollutants under the AZPDES permit program authorized under § 402 of the Clean Water Act. When technology-based permit limits required by the Clean Water Act are not sufficiently stringent to meet the applicable water quality standards, the Clean Water Act requires the development of more stringent, water quality-based effluent limits (WQBELs) in the AZPDES permit that are designed to ensure that the applicable surface water quality standards are met. *See* C.W.A. § 301(b)(1)(C); *see also* 40 C.F.R. § 125.3(a). The surface water quality standards rules play a critical role in the development of every AZPDES permit and provide the regulatory basis for the development of WQBELs which affect the levels of treatment that a discharger may be required to provide to control the discharge of pollutants to surface waters in Arizona.

Section 305(b) Water Quality Assessment and § 303(d) Impaired Water Listing

Section 305(b) of the CWA establishes an "assessment" process to develop and report information on the quality of Arizona's surface waters. ADEQ developed a program to monitor surface waters within its boundaries, and a biennial report describing the status of water quality in Arizona rivers, streams, lakes, and reservoirs is prepared and submitted to EPA. The § 305(b) water quality assessment process is the primary means by which ADEQ evaluates whether water bodies in Arizona are meeting surface water quality standards, that progress has been made in maintaining and restoring surface water quality, and the extent of remaining water quality problems. The surface water quality standards play a central

role in the § 305(b) water quality assessment process by providing the benchmarks used to assess water quality status. The surface water quality standards also provide the basis for the identification of water quality-limited or impaired waters in Arizona. Under § 303(d) of the CWA, ADEQ identifies and lists impaired waters that do not meet one or more of the surface water quality standards. The CWA requires ADEQ to develop total maximum daily load analyses (TMDLs) to restore water quality in those impaired waters. ADEQ submits the assessment report and impairment water listing in a biennial integrated § 305(b) Assessment and § 303(d) Listing Report. ADEQ's most recent EPA-approved report is the 2016 Clean Water Act Assessment, located here: https://www.azdeq.gov/sites/default/files/2016%20Clean%20Water%20Act%20Assessment.pdf

Total Maximum Daily Load (TMDL) Program

Under § 303(d) of the CWA, ADEQ is required to develop TMDL analyses for impaired water bodies that do not meet one or more surface water quality standards. A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet surface water quality standards. The TMDL allocates that amount among the point and non-point sources in the watershed that discharge the pollutant of concern. A TMDL analysis starts with the identification of the pollutant(s) of concern and the surface water quality standards that must be attained to protect designated uses. A TMDL establishes a pollutant "budget" which is implemented through other Department water quality management programs such as the AZPDES permit program and the § 319 Non-Point Source Program. The ultimate goal of a TMDL is the restoration of water quality so that an impaired water attains applicable surface water quality standards.

Other Department Water Quality Management Programs That Depend on Surface Water Quality Standards

Section 319 of the CWA requires ADEQ to identify surface waters in Arizona that, without additional controls to control non-point sources of pollution, cannot be reasonably expected to attain or maintain applicable water quality standards or the goals and requirements of the CWA. Management measures and best management practices (BMPs) are the primary mechanisms in § 319 of the Act to enable achievement of surface water quality standards. ADEQ administers the Water Quality Improvement Grant program that provides financial assistance to projects that control the discharge of pollutants to surface waters from non-point sources with a goal of achieving applicable water quality standards.

Under § 401 of the CWA, ADEQ may grant, condition, or deny water quality certification for a federally permitted or licensed activity that may result in a discharge to a surface water in Arizona. Congress intended that states use the § 401 water quality certification process to ensure that no federal

license or permit is issued that would violate state-adopted water quality standards. The surface water quality standards that are the subject of this rulemaking are the basis for the § 401 water quality certification process. If ADEQ grants water quality certification for a federal license or permit, it is in effect saying that the regulated activity will not result in a violation of a surface water quality standard. ADEQ also may place conditions on § 401 certification to ensure compliance with the surface water quality standards. ADEQ may deny certification if an applicant for a federal permit or license has not demonstrated that the regulated activity will be protective of applicable water quality standards. If ADEQ denies water quality certification, the federal permitting or licensing agency is prohibited from issuing the permit or license. ADEQ conducts § 401 water quality certifications for a variety of federal programs including the § 404 dredge-and-fill permit program currently administered by the U.S. Army Corps of Engineers, permits for construction of new or expanded airport facilities regulated by the Federal Aviation Administration, and some power plants regulated by the Federal Energy Regulatory Commission (e.g., hydroelectric power plants).

Public Participation

An important element of the surface water quality standards review process is the involvement of those who may be affected by water quality standards decisions. Section 303(c) of the CWA requires that ADEQ hold at least one public hearing during the rulemaking process to consider changes to the standards. A.R.S. § 49-208 requires that ADEQ ensure adequate public participation in the development of new or revised surface water quality standards. Federal requirements also mandate a 45-day notice period and hearing for the review and revision of standards. *See* 40 CFR § 131.20 (referring the reader to 40 C.F.R. §§ 25.5).

ADEQ invites the active involvement of citizens with an interest in surface water quality issues; the regulated community who may be affected by the state's water quality standards decisions; and federal, state, and local agencies and governments, including Indian tribes, who may have a stake in the outcome of the rulemaking process. ADEQ has engaged in a robust public participation process during this rulemaking, holding numerous workshops and stakeholder meetings to discuss water quality standards issues, including the following:

Date	*Event*
June 21, 2017	Stakeholder Meeting: Kick off Meeting for the Triennial Review of Surface Water Quality Standards rulemaking process
November 17, 2017	Outstanding Arizona Waters Workgroup Meeting #1
December 12, 2017	Outstanding Arizona Waters Workgroup Meeting #2
December 21, 2017	Outstanding Arizona Waters Workgroup Meeting #3
January 18, 2018	Outstanding Arizona Waters Workgroup

Date	*Event*
	Meeting #4
January 30, 2018	Outstanding Arizona Waters Workgroup Meeting #5
February 14, 2018	Outstanding Arizona Waters Workgroup Meeting #6
November 17, 2017	Appendix B Workgroup Meeting #1
December 06, 2017	Appendix B Workgroup Meeting #2
December 18, 2017	Appendix B Workgroup Meeting #3
January 10, 2018	Appendix B Workgroup Meeting #4
January 23, 2018	Appendix B Workgroup Meeting #5
November 17, 2017	Antidegradation and Effluent Dependent Waters Workgroup 2017 Triennial Review Kick-off Meeting #1
December 13, 2017	Antidegradation and Effluent Dependent Waters Workgroup 2017 Triennial Review Kick-off Meeting #2
December 21, 2017	Antidegradation and Effluent Dependent Waters Workgroup 2017 Triennial Review Kick-off Meeting #3
January 22, 2018	Antidegradation and Effluent Dependent Waters Workgroup 2017 Triennial Review Kick-off Meeting #4
April 30, 2018	2018 TR Stakeholder meeting in Phoenix: Appendix B; Enforcement; Mixing Zone; Site Specific Standards; Variances
May 1, 2018	2018 TR Stakeholder meeting in Phoenix: Appendix A; Nutrients
May 7, 2018	2018 TR Stakeholder meeting in Phoenix: Outstanding Arizona Waters; Effluent Dependent Waters; Antidegradation
May 10, 2018	2018 TR Stakeholder meeting in Tucson: Appendix B; Enforcement; Mixing Zone; Site Specific Standards; Variances; Appendix A; Nutrients; Outstanding Arizona Waters; Effluent Dependent Waters; Antidegradation
September 12, 2018	Stakeholder Meeting on Draft Notice & Rule in Tucson
September 14, 2018	Stakeholder Meeting on Draft Notice & Rule in Phoenix

EPA Review of Arizona's Surface Water Quality Standards

ADEQ is required to submit new and revised water quality standards to the Region 9 Administrator of the EPA for review. ADEQ must submit final surface water quality standards rules to the Regional Administrator within 30 days of the date of the filing of the final rules with the Office of the Secretary of State. At that time, EPA Region 9 will review the rules to determine whether they are consistent with the requirements of the Clean Water Act and EPA's Water Quality Standards Regulation at 40 C.F.R. Part 131.

Pursuant to 40 C.F.R. §§ 131.5 & 131.6, EPA review of the surface water quality standards rules generally consists of the following determinations:

1. Whether the designated uses are consistent with the requirements of the CWA;
2. Whether Arizona's surface water quality standards that protect the designated uses are based on sound scientific rationale consistent with 40 C.F.R. § 131.11;

3. Whether Arizona's standards that do not include designated uses specified in § 101(a)(2) of the CWA are based upon appropriate technical and scientific data and analyses;
4. Whether the water quality criterion adequately maintains and protects water quality for the designated uses and whether the state has adopted antidegradation requirements consistent with 40 C.F.R. § 131.12;
5. Whether the state adopted any water quality variances and if so, whether it is consistent with 40 C.F.R. § 131.14;
6. Whether the state adopted provision authorizing the use of schedules of compliance for water quality-based effluent limits in NPDES permits is consistent with 40 C.F.R. § 131.15;
7. Whether the state followed the legal procedures necessary for adopting the surface water quality standards rules; and
8. Whether the surface water quality standards rules submission meets EPA minimum requirements specified in 40 C.F.R. § 131.6.

The EPA Regional Administrator must either approve or disapprove ADEQ's standards within a set amount of time established in the CWA and implementing rules. *See* CWA § 303(c)(3) and 40 C.F.R. §131.21(a). If EPA approves (in whole or in part) ADEQ's submitted standards, the agency must do so by notifying the state within 60 days of receiving a complete submittal of the standards, rules, and supporting documentation. If EPA disapproves (in whole or in part) Arizona's surface water quality standards, it must do so within 90 days of receiving the complete submittal of the surface water quality standards rules.

If the Regional Administrator disapproves a water quality standard, EPA must notify ADEQ specifying (1) why the state standards are not in compliance with the CWA, and (2) the revisions ADEQ must make to its standards to assure compliance with the CWA before EPA could fully approve the standards. *See* 40 C.F.R. § 131.21. Under § 303(c)(4) of the CWA, EPA must federally promulgate water quality standards no later than 90 days after the date of notice of the disapproval described above, if ADEQ does not adopt the necessary revisions as specified by EPA within that time. A state-adopted standard that EPA disapproves remains in effect until either: (1) ADEQ adopts the necessary revisions through the rulemaking process, or (2) EPA promulgates a federal water quality standard to supersede the disapproved water quality standard.

Section by Section Explanation of Changes in this Rulemaking

New or Modified Definitions [R18-11-101]

The following terms are new or modified in A.A.C. R18-11-101, and are described more fully in their most relevant section in the preamble, if applicable, as indicated in the "Rule Number" column below:

New/Modified Term	Action	Rule Subject	Rule Number
Complete Mixing	New Definition	Mixing Zones	R18-11-114
Critical Flow Conditions of the Discharge	New Definition	Mixing Zones	R18-11-114
Critical Flow Conditions of the Receiving Water	New Definition	Mixing Zones	R18-11-114
Pollutant Minimization Program	New Definition	Variances	R18-11-122
Reference Condition	Modify	Biocriteria	See explanation below
Surface Water	Modify	All	See explanation below
Variance	New Definition	Variances	R18-11-122
Zone of Initial Dilution	New Definition	Mixing Zones	R18-11-114
Zone of Passage	Repeal	Mixing Zones	R18-11-114

<u>Clarify "Reference Condition"</u>

ADEQ also proposes to modify the term "reference condition," which is used in A.A.C. R18-11-108.01 (Narrative Biological Criteria for Wadeable, Perennial Streams), to clarify what the Department means by "a set of ecological measurements." The reference condition is a set of physical, chemical, and other site criteria that define least disturbed stream reaches in a statewide monitoring network from which biological assemblages are collected and from which ADEQ's biocriteria standards thresholds are derived. ADEQ, *Implementation Procedures for the Narrative*

Biocriteria Standard 6-7 (April 2015), *available at* http://legacy.azdeq.gov/environ/water/standards/download/draft_bio.pdf.

Modify "Surface Water" Definition to Mean "Navigable Waters" as Defined in Statute

While ADEQ may establish standards for all waters of the state, including surface waters other than navigable waters, based on the rulemaking record over the years, it is clear that Title 18, Chapter 11, Article 1 has historically been designed to align with federal requirements. Further, the surface water quality standards used in that article are used as the foundation of ADEQ's other federal programs. Therefore, ADEQ intends to modify the definition for "surface water" to mean "navigable waters" as defined in A.R.S § 49-201(22), in order to accord with the intent of the surface water regulation applicability. "Navigable Waters" means "the waters of the United States as defined by section 502(7) of the Clean Water Act (33 U.S.C. 1362(7))." A.R.S § 49-201(22). ADEQ will apply the current federal definition of waters of the U.S. exactly as it would have done before this change. In the event that the federal definition of waters of the U.S. changes, application of the standards in Chapter 11, Article 1 will construe the definition of surface water to align with federal law, as ADEQ must do in order to maintain its primacy programs, and to be consistent with parallel federal law and various state authorities rooted in federal requirements (e.g. AZPDES program, TMDL, impaired waters identification). *See* A.R.S. § 49-104(A)(16).

Antidegradation Criteria Rule Modifications [R18-11-107.01]

Federal water quality standards regulations require ADEQ to adopt a statewide antidegradation policy and to identify the methods for implementing the policy. *See* 40 C.F.R. § 131.12. Section R18-11-107.01 satisfies the federal mandate to identify methods for implementing antidegradation.

This rulemaking proposes two minor clarifying adjustments to the antidegradation rule and additional modifications to avoid any legal gaps should the agency issue CWA § 404 permits in the near future.

Clarifying Adjustments

First, ADEQ proposes to adjust the order of required documentation for any person proposing new or expanded regulated discharges that may cause significant degradation under A.A.C. R18-11-107.01(B)(3). Under the current rule the last document required is the baseline data of the water quality upstream of the proposed discharge location. None of the other required analyses can be conducted, however, without first collecting and characterizing the baseline data. Therefore ADEQ proposes to move the baseline data collection and characterization requirement from (B)(3)(c) to (B)(3)(a) and move the other two requirements downward in order as (b) and (c) respectively so that the baseline data is collected and characterized prior to the other required analyses being conducted.

Second, ADEQ proposes to clarify temporary impacts referred to in R18-11-107.01(C)(4) by adding the phrase "and are not regularly occurring." This addition was included in the Antidegradation and Effluent Dependent Waters Workgroup Final Recommendations, located on the ADEQ website at: http://static.azdeq.gov/wqd/tri_rev_antideg_final_recs.pdf. ADEQ believes this phrase provides an additional level of clarity and assurance that impacts will not be recurring.

Legal Gap Modifications

In 2018, the Arizona legislature granted ADEQ the authority to pursue primacy for the CWA § 404 program, which regulates the placement of dredged or fill material into the "waters of the United States," and which is currently administered by the U.S. Army Corps of Engineers. See S.B. 1493 (2nd Reg. Sess. 2018). ADEQ asked several technical stakeholder workgroups to convene and provide ADEQ input regarding the best path forward to assume the CWA § 404 program. In response to an issue already identified by workgroup members, ADEQ is proposing modifications to the antidegradation criteria rule to ensure that, should the agency be granted primacy over the CWA § 404 dredge and fill program, there will be a legal mechanism in place to account for antidegradation review of state-issued, individual § 404 permits. The modifications are not intended to, and do not in any way, impact present day antidegradation standards of review, but clarify how the form of the state's antidegradation review differs depending on whether an individual § 404 permit is issued by the Corps or the state. For state-issued, individual permits, which are not federal actions, CWA § 401 does not apply and CWA § 401 water quality certifications therefore are not required. Under ADEQ's current antidegradation criteria rule, for purposes of individual § 404 permits, antidegradation review is satisfied by conducting a "significant degradation" review of a proposed discharge under the CWA § 404(b)(1) Guidelines, except in cases where a discharge may degrade existing water quality in an OAW or a water listed on the 303(d) List of impaired waters. AAC R18-11-107.01(D); See also, e.g. EPA's Water Quality Standards Handbook Chapter 4, page 7 available at https://www.epa.gov/wqs-tech/water-quality-standards-handbook (Chapter 4 last updated in 2012). In cases where a discharge may degrade existing water quality in an OAW or impaired water, the current standard requires ADEQ to conduct an antidegradation review. ADEQ is not proposing to modify this standard of review at this time, as this standard was approved by EPA under CWA § 303(c), and the consensus of the Antidegradation and Effluent Dependent Waters Workgroup in this most recent triennial review was that the antidegradation standard is consistent with the CWA, and that no changes are necessary. Letter from Alexis Strauss, Director, Water Division, USEPA, to Joan Card, Director, Water Quality Division, ADEQ (Jan. 21, 2009) (on file with ADEQ); Antidegradation and Effluent Dependent Waters Workgroup Final Recommendations, found at:

http://static.azdeq.gov/wqd/tri_rev_antideg_final_recs.pdf. The rule has been changed such that, in the event that ADEQ issues individual § 404 permits, antidegradation review will be satisfied by conducting review of the proposed discharge under CWA § 404(b)(1) Guidelines, as the Corps does currently, unless the discharge will degrade an OAW or impaired water. In those cases, ADEQ will conduct an antidegradation review.

E. Coli Numeric Water Quality Standards Modifications [R18-11-109(A)]

This Section prescribes numeric water quality standards for bacteria, pH, temperature, suspended sediment concentration, dissolved oxygen, and nutrients.

In November 2012, EPA issued revised recreational water quality criteria for *Escherichia coliform* (*E. coli*) *See generally* EPA Office of Water, *Recreational Water Quality Criteria [EPA 820-F-12-058]* (2012), *available at* https://www.epa.gov/wqc/2012-recreational-water-quality-criteria-documents. The criteria protect primary contact recreation by using two bacterial indicators of fecal contamination. ADEQ will continue to use *E. coli* as the primary indicator upon which Arizona surface water quality standards are based. ADEQ proposes to revise the current single sample maximum (SSM) values for Full Body and Partial Body Contact surface water quality standards listed in A.A.C. R18-11-109(A) to the statistical threshold values (STV) of 410 cfu/100ml and 576 cfu/100ml, respectively.

ADEQ proposes to modify the term "single sample maximum" (SSM) to "statistical threshold value" (STV). The term "statistical threshold value" (STV) means single sample maximum (SSM), and the STV language is consistent with EPA's 2012 Criteria Document. The SSM term was often thought of as a "never to exceed value" which lead to confusion as exceedances were allowed prior to a water being considered impaired based on the states' § 305(b) Assessment criteria. The STV term more accurately reflects that the associated value, 410 cfu/100 ml in Arizona's case, is a statistically derived number.

The 410 cfu/100 ml proposed value for Full Body Contact corresponds to the 90th percentile of the water quality distribution used to derive the 2012 EPA criteria. The estimated 90th percentile of the water quality distribution was selected to take into account the expected variability in water quality measurements, while limiting the number of samples allowed to exceed the surface water quality standards, before deciding water quality is impaired.

ADEQ proposes to retain the partial body contact value, 576 cfu/100ml, as it corresponds to the 95th percentile value recommended in the 1986 Beach Act guidance. *See* EPA Office of Water, *Ambient Water Quality Criteria for Bacteria – 1986 [EPA440/5-84-002]* (Jan. 1986), *available at*

https://www.regulations.gov/document?D=EPA-HQ-OW-2007-0808-0001.

The revised criteria still serve as points of reference for entities against which to compare their monitoring results. There are no new sampling or reporting requirements based solely on the proposed change in the standard. Since the STV (previously referred to as SSM) standard is increasing from the 235 to 410 cfu/100ml, the threshold for water quality exceedances will increase as well. Any changes to permit requirements will be made on a case-by-case basis as AZPDES permits are renewed or modified. The number of exceedances required to make CWA § 305(b) assessment determinations will remain the same until an impaired water rule rulemaking addresses any potential changes to the frequency and duration of *E. coli* exceedances for § 305(b) water quality assessment purposes.

Nutrient Criteria Numeric Water Quality Standards Modifications [R18-11-109(F)]

During the 2009 Triennial Review of Surface Water Quality Standards ADEQ revised the automatic applicability of nutrient standards to only apply to those waters listed in -109(F)(1), (2), (3), and (5) and their tributaries (only "perennial" tributaries are specifically listed). Although limiting the automatic applicability of the nutrients standards to listed "perennial" tributaries was the intent of the 2009 revision, the current introductory narrative found in A.A.C. R18-11-109(F) conflicts with -109(F)(1), (2), (3), or (5) in that it still appears to automatically require ADEQ to apply the standards to all tributaries rather than just those listed. However, ADEQ only applies nutrient standards to other tributaries if necessary to protect the water quality of the listed surface water. ADEQ intends to modify the language to reflect that flexibility and to ensure that downstream uses will also be protected, as necessary.

Mixing Zones Rule Modifications [R18-11-114]

A mixing zone is a limited area or volume of water where dilution of a discharge takes place and where numeric water quality criteria may be exceeded in a receiving surface water. The boundary of a mixing zone is the point where the discharged pollutant is completely mixed. The goal of a mixing zone is to ensure that pollutant discharges are mixed so as to prevent acute toxicity and lethality to organisms passing through the mixing zone, and to protect the biological, chemical, and physical integrity of a surface water as a whole (e.g. protection of all designated uses, including DWS). Mixing zones are allowed by Clean Water Act implementing regulations. *See* 40 C.F.R. § 131.13.

To ensure prevention of acute toxicity, the requester of a mixing zone will generally propose a mixing zone boundary based on the following recommended steps according to EPA technical guidance:

1. Identify the critical flow conditions of the receiving water and discharge, in order to predict the worst case mixing scenario of the pollutants within the mixing zone.
2. Identify conservative pollutant concentration inputs (for discharge and receiving water).
3. The requester will then model the mixing of the discharged pollutants based on the critical flow conditions and concentration assumptions.
4. The model run will produce an acceptable mixing zone size (i.e. no part of the mixing zone is acutely toxic). The model will account for whether a mixing zone should or should not be allowed. For example, a model run may show that under critical conditions (worst case scenario) the receiving water will not dilute the discharge far and fast enough to avoid acute toxicity at some point in the mixing zone. In that instance, a mixing zone may not be allowed, or the facility may need to propose installation of diffusers or other methods to ensure rapid and complete mixing. *See generally* EPA, *Technical Support Document for Water Quality-based Toxics Control*, several sections, including Section 4 (1991), *available at* https://www3.epa.gov/npdes/pubs/owm0264.pdf.

Modeling for mixing zone size may be performed, as appropriate, by simple calculation. For example, see the following excerpt from the EPA NPDES permit writers manual:

> "For many pollutants such as most toxic (priority) pollutants, conservative pollutants, and pollutants that can be treated as conservative pollutants when near-field effects are of concern, if there is rapid and complete mixing in a river or stream, the permit writer could use a simple mass-balance equation to model the effluent and receiving water." U.S. EPA, *NPDES Permit Writers' Manual* 6-24 (Sept. 2010).

Ultimately, the factors in determining whether acute toxicity is prevented are (1) duration of exposure, and (2) pollutant concentration. While it is a goal to ensure that mixing zones are not larger than necessary, the size of the mixing zone is not as important as toxicity. *See generally* EPA, *Technical Support Document for Water Quality-based Toxics Control*, several sections, including Section 4 (1991), *available at* https://www3.epa.gov/npdes/pubs/owm0264.pdf.

Mixing zone standards and requirements should ensure protection of all water quality standards and should also be flexible enough for practicable and scientifically defensible implementation. Currently, ADEQ mixing zone requirements have limited flexibility and practicability. ADEQ contracted PG Environmental to provide ADEQ technical expertise and advice regarding ADEQ's current mixing

zone rule. PG Environmental provided ADEQ with a technical memorandum in which it identified and recommended two main areas of change to current mixing zone standards:

- Redefine critical flow conditions for discharges and receiving waters for purposes of authorizing mixing zones
- Modify the mixing zone size requirements from fixed numeric requirements to narrative functional performance standards

ADEQ proposes to establish definitions for critical flow conditions for discharges and receiving waters and modify its mixing zone requirements based on recommendations from PG Environmental's memorandum, *Arizona Mixing Zone Water Quality Standards* (Jun. 2018) (on file with ADEQ and available at: http://static.azdeq.gov/wqd/tri_rev_mixing_memo.pdf), conversations with PG Environmental staff, *EPA's Water Quality Standards Handbook*, Chapter 5 (Sept. 2014), *EPA's Technical Support Document for Water Quality-based Toxics Control* (1991), *EPA's Water Quality Standards Handbook, Chapter 5* (Sept. 2014), *EPA's NPDES Permit Writers' Manual* (Sept. 2010), *Mixing Zone Guidance for Chronic Toxicity and Zones of Initial Dilution* (2nd Rev., May 1992), as well as ADEQ's expertise and training.

Redefine Critical Flow Conditions

ADEQ defined critical flow conditions of the discharge and the receiving water based on review of the above cited documentation and experience.

Mixing zone size and boundaries are based on calculations and modeling to account for critical flow conditions. Assigning critical conditions for discharge and receiving water flows will allow for sizing of mixing zones based on exposure risk and exceedance frequencies and the particular designated use and criteria.

Typically, critical flow conditions allow the mixing zone to be established based on the maximum average potential of pollution concentration in a mixing zone. This is estimated by taking into account discharge flow conditions, receiving water flow conditions, the pollutant at issue, and the designated use that the mixing zone is intended to protect. Hence, for acute and chronic aquatic health standard protection at critical flow conditions, discharge flows are inputted into the model calculation at their maximum average representative flow levels, and receiving waters are inputted at their lowest average representative flow conditions. The resultant calculation of mixing zone requirements approximates the lowest representative dilution rate that will allow the water body to meet water quality standards downstream and protect aquatic wildlife in the mixing zone itself. Aquatic and wildlife standards are typically much lower than human health standards to account for aquatic life's

greater sensitivity to pollutants in waterbodies. Therefore, human health standards are generally calculated using operation-representative averages over a long periods of time to approximate a longer exposure rate.

Modify Mixing Zone Size from Fixed Numeric Size to Functional Narrative Standards

Currently, ADEQ has fixed numeric size limits in its mixing zone standards:

- "The length of the mixing zone shall not exceed 500 meters in a stream." A.A.C. R18-11-114(H)(1)
- "A mixing zone shall provide for a zone of passage of not less than 50% of the cross-sectional area of a river or stream." A.A.C. R18-11-114(H)(4)

In some cases, these numeric standards may limit the practicability of the mixing zone rule. For example, a mixing zone may need to be 550 meters to reach allowable and appropriate dilution levels. This distance is only 10% greater than the now required 500 meters, but the rule as currently written does not allow for such flexibility. Also, the 50% cross-sectional zone of passage requirement may not be adequate to prevent acute toxicity to aquatic life. This is because while 50% of the channel, split lengthwise, may be nontoxic, the other 50% of the length of the channel may be acutely toxic. A visual analogy of this phenomenon may be a confluence of two rivers coming together to flow side by side for a river segment, where one side is relatively clear and the other side muddy with sediment.

An approach, which ADEQ intends to implement, that furthers the practicability of a mixing zone and ensures that there are no acutely toxic areas of a mixing zone is to remove the fixed numeric mixing zone size requirements and instead:

- Ensure that the mixing zone must still prevent acute toxicity and lethality to organisms passing through it.
- Clarify that the mixing zone ends at the point that complete mixing occurs.
- Require the mixing zone to be as small as practicable, ensuring the mixing zone is no larger than necessary.
- Disallow a mixing zone size to exceed the zone of initial dilution under critical conditions, nor extend beyond the point in a waterbody wherein complete mixing occurs, clarifying that mixing zones may only be applied in portions of a waterbody where mixing occurs at appreciable levels.
- Limit mixing zones to be issued on a pollutant-by-pollutant basis, as not all pollutants will

mix and dilute in the same manner. Also, some pollutants may be more toxic in lower concentrations than others, so that appropriate mixing is ultimately important to analyze on a pollutant basis to protect designated uses.

In making these modifications, ADEQ will remove the definition for "zone of passage" as this term is no longer used and will instead add a definition for "zone of initial dilution." ADEQ is also adding definitions for "critical flow condition of the discharge" and "critical flow of the receiving water" to ensure that the regulated public understands what data is required in their analyses. ADEQ will also add a definition for "complete mixing" to ensure that it is clear where the boundary of the mixing zone is required to be.

Other Changes to Mixing Zone Rule

ADEQ intends to repeal two statements in subsections (C) and (D), which are already required in accordance with licensing timeframe statutes and rules. If someone is applying for a mixing zone, it is a part of a permit application, revision, or renewal. If a submittal is incomplete, the Department must gather missing information from the applicant. Also, the Director's determination regarding the mixing zone is a part of the permit decision. As a part of an issuance or denial of a permit, anything regarding that issuance or denial is an appealable agency action. For example, if a permit is issued without a requested mixing zone, the permit is appealable on the basis that the Director did not include a mixing zone.

Site Specific Standards Rule Modifications [R18-11-115(B)(5)]

State and federal laws authorize the adoption of site-specific standards that reflect local environmental conditions. The federal water quality standards at 40 C.F.R. § 131.11(b)(1)(ii) allow ADEQ to adopt water quality criteria that are "modified to reflect site-specific conditions." Similarly, A.R.S. § 49-221(C)(6) directs the Director to consider "[a]ny unique physical, biological, or chemical properties of the waters" when establishing surface water quality standards. Under A.R.S. § 49-222(C), ADEQ may consider the effect of local water quality characteristics on the toxicity of specific pollutants and the varying sensitivities of local, affected aquatic populations to pollutants when setting numeric water quality standards. This rule section prescribes specific and technically defensible methods acceptable to both ADEQ and EPA for developing site specific standards. Site specific standards, like all surface water quality standards, must be based on a sound scientific rationale to protect the designated use.

In 2016, ADEQ proposed and finalized "natural adaptive" language in its site specific standards rule at R18-11-115(B)(5). ADEQ then submitted this language to EPA for approval as a part of its Water

Quality Standards Triennial Review. This "natural adaptive" language essentially allows for a site specific standards if it is shown that some number of species at a site have adapted to higher levels of pollutants in an area.

In its action letter, however, EPA disapproved this "natural adaptive" language, stating that the language "is not scientifically defensible nor consistent with 40 C.F.R. § 131 and the CWA." Torres, Tomás, EPA Director, Water Division, Letter to Trevor Baggiore, ADEQ Director, *Water Quality Division Letter of Approval and Disapproval of ADEQ's 2016 Water Quality Standards* (Dec. 23, 2016). As such, ADEQ has not implemented the subsection and now proposes to repeal it.

Enforcement Rule Modifications [R18-11-120]

As far back as 1984, ADEQ has consistently had this enforcement rule in place as a tool to compel the regulated community to comply with the law by prescribing measures to address violations of surface water quality standards.

Currently, this rule compels compliance with A.R.S. § 49-263(a), which states:

> "A. It is unlawful to:
>
> 1. *Discharge without a permit or appropriate authority under this chapter*.
>
> 2. Fail to monitor, sample or report discharges as required by a permit issued under this chapter.
>
> 3. Violate a discharge limitation specified in a permit issued under this chapter.
>
> 4. *Violate a water quality standard*…." (emphasis added)

<u>Enforcement Rule Should Only Apply to Non-permitted Discharges</u>

The rule prescribes the minimum data collection requirements for identifying a violation of a standard for enforcement purposes. This requirement is likely confusing to permittees because water quality standard violations for permitted discharges are identified using the permit conditions as established in accordance with federal law. The current rule does not appear to contemplate AZPDES regulation at all, as it was adopted long before ADEQ obtained primacy over the National Pollutant Discharge Program (NPDES/AZPDES). The last time this rule was amended was in 2002, in ADEQ's triennial review rulemaking, just before ADEQ adopted AZPDES rules and obtained federal approval for its AZPDES program.

The fact that the rule does not contemplate a permitting program is evident in ADEQ's responses to comments in the 2002 triennial review rulemaking. EPA commented that it assumed that the rule indicated how to comply with criteria in terms of state law alone and asked for assurances that the rule would not be misinterpreted as "describing how compliance with the criteria will be determined

in the Clean Water Act context." *NFRM*, 8 A.A.R. 1264, 1392 (Mar. 29, 2002). ADEQ responded in part:

> "The rule does not regulate how EPA establishes water quality-based discharge limitations in NPDES permits or how EPA enforces those permit conditions. Presumably, EPA's establishment of permit conditions and their enforcement are addressed in the federal NPDES permit program regulations." *Id*. at 1393.

AZPDES permits are conditioned according to federal law, which typically means that the permit identifies a daily maximum pollutant discharge limit and a monthly average pollutant discharge limitation. Each of these limits are calculated to ensure that the permittee does not cause or contribute to water quality violations in any water body. *See* 40 C.F.R. § 122.44(d)(1). Hence, ADEQ may take an enforcement action for violations of permit conditions and limits, because exceedance of those limits and noncompliance with conditions may indicate that a facility could be causing a violation of a water quality standard. Additionally, in order to clarify that the enforcement rule does not apply to exceedances of a permit, ADEQ added the following language to the rule:

> For the purposes of this section, a "non-permitted discharge violation" does not include a discharge regulated under an AZPDES permit.

Therefore, this enforcement rule should not be applied to permitted discharges.

However, this rule does provide a mechanism to determine the need for enforcement of suspected unpermitted discharges and ensuing violations of water quality standards. ADEQ proposes adjustments to this rule so that it only applies to non-permitted discharge violations.

ADEQ proposes to modify subsection (B) (previously subsection (C)) to clarify that enforcement for all numeric standards, except for A&W chronic standards, would be determined by analysis of a single sample, unless additional samples are required under Title 18, Chapter 11, Article 1. The current version of the rule only discusses how the agency would determine compliance with A&W acute and chronic uses, but does not address any of the other designated uses. ADEQ further proposes to clarify the sampling terminology in subsection (B) by modifying the term "grab sample" to "single sample." "Grab sample" refers to a descriptive sample type (grab, composite, EWI, first flush, etc.), not the number of samples. "Single sample" is a more accurate term because it references the number of samples needed to utilize acute and chronic criteria for compliance determinations. Additionally, to resolve an oversight in the language of the NPRM, ADEQ has clarified the rule to allow for additional sampling where it is required under Title 18, Chapter 11, Article 1 (e.g. AAC R18-11-109(D); R18-11-109(F)).

ADEQ intends to strike subsection (A) of this rule because it consists of ADEQ authority that is inherent in statute and is unnecessary to be repeated here. The statutes in A.R.S. Title 49, Chapter 2, Article 4 apply more directly and cleanly without repeating them in rule.

ADEQ further intends to strike subsection (D) because it is not applicable in practice. There is no instance in which a non-permitted discharger will have an assigned compliance schedule without the schedule being included in a permit. If a non-permitted discharger violates a standard and intends to or continues to discharge, part of ADEQ's enforcement action would be to require the discharger to obtain an AZPDES permit.

<u>Enforcement Rule is Not Intended for CWA Assessment Purposes</u>

Although the rule does prescribe the minimum data collection requirements, these requirements are for enforcement purposes only. However, because this rule is located in the standards rules, it may be unclear that this rule is not intended to be used for "assessment" purposes. An "assessment" is a CWA required action whereby, every two years, ADEQ assesses whether each water or segment of a water of the United States in Arizona is attaining designated uses or not. *See* C.W.A. § 305(b). Typically combined with and integrated into that assessment report is the impaired waters list. The impaired waters list consists of the waters that ADEQ has identified where effluent limitations are not stringent enough to implement any water quality standard applicable to such waters. The list prioritizes these waters for calculation of total maximum daily load for each pollutant impairing the nonattaining water segment. *See* C.W.A. § 303(d).

For assessment and impaired water identification purposes, ADEQ must use the relevant standard rule and associated calculation method pursuant to A.A.C. Chapter 11, Article 1 for each pollutant/use, and use the credible data and data interpretation requirements and methodologies in the Impaired Waters Identification rules in A.A.C. Chapter 11, Article 6 to determine whether each water is attaining applicable standards or not. The impaired water identification rules applicable to identifying aquatic and wildlife acute and chronic impaired waters align with EPA guidance. This guidance differs from the data gathering required for non-permitted dischargers under this standards enforcement rule. Rather, under the impaired waters identification rules, if a minimum of two water samples collected show that there were "two or more exceedances" of the water quality standards for aquatic and wildlife acute or chronic, then the agency must list the stream as impaired. *See* A.A.C. R18-11-605(D)(2)(b); *see also Prepared Statement by Joan Card, Deputy Administrative Council at ADEQ, 2004 Meeting of the Governor's Regulatory Review Council Minutes* (Dec. 7, 2004). As ADEQ stated in 2002, the "impaired water rule prescribes requirements for § 303(d) listing and the minimum requirements for data that is used for water quality assessment purposes" and "ADEQ may

adopt different criteria for purposes of determining compliance with water quality standards." *NFRM*, 8 A.A.R. 1264, 1391 (Mar. 29, 2002). The agency has repeatedly stated and maintains that the impaired waters identification rules are separate and distinct from this enforcement rule. Therefore, this enforcement rule does not relate to whether a water is attaining or not for purposes of assessment or the impaired waters list.

Variances Rule Modifications [R18-11-122]

A water quality variance is temporary water quality criteria that diverges from the designated use criteria of the receiving water, but which still maintains the highest attainable condition of that water. The highest attainable condition of the water essentially means that the receiving water quality aligns as much as possible with a designated use and is the best quality that can be achieved during the term of a variance.

A variance is time-limited, discharger or water body-specific, and pollutant-specific. A variance does not result in any change to the underlying designated use and criteria of the receiving water. This means that any discharger to which a variance does not apply must still comply with the applicable designated use and criteria of the water.

For years, EPA has allowed states to adopt water quality standard variances under 40 CFR § 131.13. Because variances are a vital tool to improving water quality in partnership with facilities, ADEQ has had some form of a rule allowing for variances since 1996. ADEQ's current variances rule is based on EPA guidance as no EPA rule previously existed to prescribe and define variance requirements. However, in 2015, ADEQ's current rule became unimplementable when EPA promulgated new and revised rules, including a new variance rule at 40 CFR § 131.14. The new federal rule specifically prescribes what variances are and how they may be implemented. State variances are now subject to the provisions of 40 CFR §131.14, the public participation requirements at 40 CFR §131.20(b), and EPA review for approval or disapproval. ADEQ's current rule does not align with EPA's current requirements and allowances for variances. Therefore, this rule revision of A.A.C. R18-11-122 seeks to align with federal law.

<u>Variances Rule Differences from Current Version</u>

Some of the main differences between the current rule and the proposed version, which aligns with current law, include the following:

- Pursuant to federal law, variances are now a water quality standard. *See* 40 C.F.R. § 131.14. In Arizona, water quality standards must be established by rule. *See* A.R.S. § 49-221(A).

Therefore, variances must be established in rule as a water quality standard, and shall be implemented as such.

Previously, variances were granted or denied *pursuant to rule*, but did not have to be established specifically in rule. Rather they were approved or disapproved in a permit. However, under the proposed rule, variances shall no longer be tied to a specific permit, only to a specific discharger/facility or water body segment. For example, if a discharger is granted a variance, the variance will be adopted as a rule, and that rule will be referred to as a basis for a permit condition in that discharger's permit in the next permit renewal or modification. Note that if a variance is repealed, which may occur for some reason that necessitates immediate action, ADEQ would have the authority under the standard reopener clause to modify the permit condition. *See* 40 C.F.R. §§ 123.25(c) and 123.25.

- Variances may now be discharger-specific or water body or waterbody segment-specific. See 40 C.F.R § 131.14(a)(1). This differs from ADEQ's current rule, which has only allowed for discharger-specific variances. While water body or waterbody segment-specific variances may be allowed, the amount of data required for such a showing will likely be significant. Water body/segment specific variances would require an evaluation of all pollutant sources on the waterbody/segment. Therefore, each time a discharger applied for an already issued waterbody/segment-specific variance, a showing would have to be made, considering all pollutant sources to the water, that the water body would still meet the highest attainable condition. *See, Final Rule, Water Quality Standards Regulatory Revisions*, 80 Fed. Reg. 51020, 51037 (Aug. 21, 2015). Alternatively, a variance may need to be amended to account for the additional discharger because all pollutant sources must be considered.
- Under EPA's new rule, each variance and its requirements must represent the "highest attainable condition" of the water body to which a variance applies. *See* 40 CFR § 131.14(a)(1)(ii). "Highest attainable condition" is a new term that is not specifically defined in federal law, but represents a number of factors that have been generally considered in previous EPA guidance and the current variance rule. Pursuant to EPA guidance in its 2015 rulemaking, "highest attainable condition" differs from EPA's term "highest attainable use" in that:
    - The condition does not have to be expressed as a use, but rather as a quantifiable expression of the condition;
    - The condition applies to variances from either CWA § 101(a)(2) uses or non-CWA § 101(a)(2) uses;

- The condition cannot lower currently attaining water quality in that the condition does not change the use underlying a variance. *See Final Rule*, 80 Fed. Reg. at 51035-38.

Thus, the highest attainable use is a modified aquatic life, wildlife, or recreational use, while the highest attainable condition is an expression of pollutant reduction. For example, the preamble to the EPA final rule explained that the "rule provides states and authorized tribes the flexibility to express the highest attainable condition as numeric pollutant concentrations in ambient water, numeric effluent conditions, or other quantitative expressions of pollutant reduction, such as the maximum number of combined sewer overflows that is achievable after implementation of a long-term control plan or a percent reduction in pollutant loads." Final Rule, 80 Fed. Reg. at 51037.

- Because the "highest attainable condition" must be met at any time throughout a variance term, variance requirements may need to be expressed as a range, and dependent on particular parameters, to account for change over time, or multiple variances may be adopted to allow for incremental change. *See* 80 Fed. Reg. at 51035, 51037. According to the new federal requirements, the variance requirements applicable at initial adoption must be the least stringent applicable requirements during the term of the variance (i.e. variance requirements can only be more stringent as time goes on). See 40 CFR § 131.14(b)(1)(iii). This allows variances to be a mechanism for incremental progress toward improving water quality. See Final Rule, 80 Fed. Reg. at 51035.

- Under ADEQ's current rule, all variances could be issued for only up to five years. Under EPA's new rule, variances may be issued for longer than five years, but for no longer than is necessary to achieve the highest attainable condition. See 40 CFR § 131.14(b)(1)(iv). However, variances issued for longer than five years must be periodically reviewed with notice and comment. Id. Although EPA will not review the reevaluation for approval or disapproval, EPA has stated that the reevaluation may inform the EPA regarding whether new or revised water quality standards are necessary. See Final Rule, 80 Fed. Reg. at 51038 (Aug. 21, 2015). EPA also states the variances are water quality standards. Since water quality standards are required to be reviewed in Triennial Reviews, ADEQ intends, at a minimum, to establish and reevaluate variances during its Triennial Review. ADEQ also notes that it may establish variances, or any water quality standard, outside of the regular Triennial Review.

- EPA's 2015 rule requires additional documentation beyond that in ADEQ's current rule to approve a variance, and ADEQ's proposed rule requires this additional documentation.

Definitions to Implement the New Variance Rule

ADEQ also plans to add definitions for:

- "Pollutant Minimization Program," and
- "Variance."

These are new EPA defined terms used in EPA's standards rules, terms which ADEQ proposes to define for clarity in alignment with EPA-defined terms in 40 C.F.R. § 131.3.

Modifications to Numeric Water Quality Standards [Appendix A]

Appendix A lists most of the numeric water quality standards applicable to surface waters, as discussed in the introductory section of this rulemaking, "Water Quality Standards Background." The numeric water quality criteria have been revised to reflect changes in criteria derivation methodologies, revised exposure assumptions, new information, and data on human health effects or new toxicity data that support a revision of aquatic life criteria. Generally, these standards will be implemented upon a permit renewal, but if needed ADEQ would have the authority under the reopener clause to modify the permit conditions. *See* 40 C.F.R. §§ 122.44(c) and 123.25(a)(15).

In this rulemaking, ADEQ proposes the following amendments to Appendix A: Table 1 is being amended for designated uses; Tables 2-6 are being amended for hardness dependent metals; No amendments are being made to Tables 7-10; New Tables 11 through 17 are being created to address new aquatic and wildlife criteria for ammonia.

Specific revisions and the reasons for making the changes are included in the subsequent explanations and tables. Each table is organized by designated use, existing criteria, and adopted criteria for each parameter.

ADEQ notes that it considered but did not take action on new selenium (Se) criteria. As recently as 2016, EPA updated its selenium standards from a water column concentration number to a three-pronged hierarchical standard where three standards apply at once for the same pollutant (the new water column is superseded by fish tissue sample concentrations which is superseded by fish egg and ovary sample concentrations). *See generally* EPA Office of Water, *Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater, [EPA 822-R-16-006]* (2016). The new standard is extremely complex and its implementation is not yet settled. In fact, EPA's implementation guidance is in draft form and in the process of finalization. ADEQ will need to understand the impact of the standard before it may be implemented. In the interim, ADEQ's water column standards are still

protective of the aquatic and wildlife uses. (The current standard A&W is 2 µg/L; the new standard for streams would be 3.5 µg/L and for lakes would be 1.5 µg/L.)

Specific Designated Uses and Modification to Table 1

Human Health-Based Designated Uses Generally

When calculating water quality standards for human health, the State uses base equation factors found in EPA human health criteria methodology documentation, and then arranges the formulas to reflect the different uses assigned to Arizona waters. See generally *EPA Human Health Criteria* (2000), available at https://www.nj.gov/drbc/library/documents/EPA_human-health-criteria2000.pdf. Arizona's human health standards are broken down into domestic water source (DWS), fish consumption (FC), full body contact (FBC) and partial body contact (PBC). The first three standards (DWS, FC, FBC) are further divided and calculated using carcinogenic and non-carcinogenic endpoints. Where the FBC use assumes acute exposure to carcinogens through water consumption, the PBC standard, due to the infrequent, short, and episodic nature of the exposure, assumes an acute dose and uses only the non-carcinogenic endpoint.

Aquatic and wildlife standards are derived using empirical toxicity data, so acute and chronic endpoints can be directly measured. For human health standards, data are mainly gathered from accidental exposures or extrapolated from animal studies. Because of this, the reference dose (RfD) used to calculate a standard incorporates safety factors addressing aspects such as extrapolation of animal data and human weight, age, and sex differences. Also, because humans don't have constant and direct exposure to waterborne toxins, for non-carcinogenic pollutants, ADEQ uses relative source contribution factors (RSC) to account for exposures from other sources, such as food and occupational exposures. For fish consumption, ADEQ also considers the average bioaccumulation potential of a chemical in edible tissues of aquatic organisms that are commonly consumed by humans. *EPA Human Health Criteria* 5-3 (2000).

Carcinogenic standards are functionally statistical risk equations that take the potency of a carcinogen and calculate the concentration that would cause one additional cancer case per 1,000,000 people. One in a million is considered an "acceptable" risk when calculating standards. *EPA Human Health Criteria* 1-8 (2000). Every exposure carries exactly the same risk for developing cancer.

Unlike aquatic and wildlife standards, human health standards are not broken down into chronic and acute concentrations. A more conservative approach is employed, which assumes acute but incremental lifetime exposure due to: a) the unknowns due to lack of empirical data, b) other uncontrolled exposures to toxins, c) the statistical nature of carcinogenic standards and d) the fact that

standards are set for the human population as a whole. *EPA Human Health Criteria* 4-3 to 4-5 (2000).

Aquatic and Wildlife Uses Generally

For all of the aquatic and wildlife uses (A&W) the State uses data contained in the US EPA CWA § 304(a) Aquatic Life criteria document for the individual toxicant in question. To tailor the standard to the individual A&W use, the State uses the EPA site-specific recalculation procedure where species that do not occur in that in a particular use type are deleted from the data pool. *See generally* EPA, *Revised Deletion Process for the Site-Specific Recalculation Procedure for Aquatic Life Criteria* (2013), available at https://www.epa.gov/sites/production/files/2015-08/documents/revised_deletion_process_for_the_site-specific_recalculation_procedure_for_aquatic_life_criteria.pdf. For standards for the Aquatic and Wildlife Coldwater use, ADEQ uses salmonids and other coldwater species. For Aquatic and Wildlife Warmwater, data from coldwater species are usually not considered. For Aquatic and Wildlife Effluent Dependent, ADEQ uses warmwater species that generally occur in nutrient rich, lower oxygen environments. For Aquatic and Wildlife Ephemeral, ADEQ uses data from organisms with short lifecycles such as insects, which can take advantage of short pulses of water from flash floods.

Methodologies for Deriving Criteria for the Domestic Water Source Designated Use

Numeric criteria to maintain and protect water quality for the Domestic Water Source (DWS) designated use are either Maximum Contaminant Levels (MCLs) established by EPA under the National Primary Drinking Water Regulations or values derived using EPA methods to protect human health. Where an MCL has been established for a pollutant, the MCL has been adopted as a criterion to protect water quality for the DWS designated use. Where MCLs were not available, the criteria were derived for the DWS designated use using the following equations:

For carcinogens:

$$\frac{70 \text{ kg} * 10^{-6}}{\text{OCSF} * 2 \text{ L/day}}$$

For non-carcinogens:

$$\frac{\text{RfD} * \text{RSC} * 70 \text{ kg}}{2 \text{ L/day}}$$

In the carcinogen equation, 70 kg is the average weight of a human male in kilograms; 10^{-6} is the excess cancer risk level; OCSF is the oral cancer slope factor; and 2 L/day is the national average water consumption rate in liters per day.

In the non-carcinogen equation, RfD is the reference dose; RSC is the relative source contribution

factor, 70 kg is the average weight of a human male in kilograms and 2 L/day is the national average water consumption rate in liters per day. The relative source contribution factor is a way to account for other exposure pathways to a pollutant (e.g., food, inhalation, work exposure, etc.). There is little reliable information to assess the amount of exposure to a pollutant attributable to multiple exposure pathways. EPA uses a default RSC factor of 20 percent when developing MCLs. This assumes that 20 percent of a person's exposure to a pollutant is estimated to be through the ingestion of water. The Department used the same default RSC factor in deriving criteria for the DWS designated use.

Numeric criteria for the DWS designated use has been adopted using the following decision criteria:

1. MCLs, where available;
2. Where MCLs were not available, the DWS criterion was calculated using the appropriate procedure for carcinogens or non-carcinogens;
3. For carcinogens where an OCSF was not available but an RfD was available, the non-carcinogen procedure and the RfD were used to calculate a criterion;
4. For non-carcinogens, a criterion using available RfDs was used. If an RfD was not available in the Integrated Risk Information System (IRIS) but a surrogate RfD was available, such as a Minimum Risk Level (MRL) from the Agency for Toxic Substances Disease Registry (ATSDR), a criterion using the MRL as an RfD was calculated;
5. Where an MCL, OCSF, RfD or MRL was not available, a criterion for the DWS designated use was not derived.

The following table summarizes those pollutants where a change or repeal has been made to the numeric criteria for the DWS designated use.

Domestic Water Source (DWS) Modifications

Parameter	CAS NUM	Current DWS standard (µg/L)	Proposed DWS standard (µg/L)	Higher/ Lower/ New	Modified Data to Calculate Standard	Data Source
Acenaphthylene	208968	NA	420	New	RfD = 0.06	ADEQ used the surrogate PAH RfD for acenaphthene: https://rais.ornl.gov/tox/profiles/acenaphthene_f_V1.html
Acrylonitrile	107131	0.06	0.006	Lower	MRL = 0.04 mg/Kg/day	ATSDR MRL https://www.atsdr.cdc.gov/toxprofiles/tp125.pdf

Parameter	CAS NUM	Current DWS standard (µg/L)	Proposed DWS standard (µg/L)	Higher/ Lower/ New	Modified Data to Calculate Standard	Data Source
Bis(2-chloroethoxy) methane	111911	NA	21	New	RfD = 0.003mg/Kg/day	https://cfpub.epa.gov/ncea/pprtv/documents/Bis2chloroethoxymethane.pdf
Bis(chloromethyl) ether	542881	NA	0.00015	New	OCSF = 220 $(mg/Kg\text{-}d)^{-1}$	https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0375_summary.pdf
Chloroethane	75003	NA	280	New	Based on the State of Michigan's interpretation of subchronic RfD of 0.1 mg/kg-day	https://cfpub.epa.gov/ncea/pprtv/documents/Chloroethane.pdf
beta-Chloronaphthalene	91587	560	2,240	Higher	RfD = 0.08 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=463
Chromium III	16065831	NA	10,500	New	RfD = 1.5 mg/Kg/day	https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0028_summary.pdf
Dibenz (ah) anthracene	53703	0.005	0.350	Higher	Used PAH RfD surrogate (pyrene)	IRIS OCSF/RfD : benzo(a)pyrene PAH surrogate See:https://www.michigan.gov/documents/deq/deq-rrd-chem-DibenzoAHAnthraceneDatasheet_527910_7.pdf
1, 2-Dibromoethane	106934	0.05	0.02	Lower	OCSF = 2 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=361
4,6- Dinitro-o-cresol,	534521	28.0	0.6	Lower	RfD = 0.00008 mg/kg-day	https://cfpub.epa.gov/ncea/pprtv/documents/Dinitroocresol46.pdf
Di-n-octyl phthalate	117840	2,800	70	Lower	RfD = 0.01 mg/Kg/day	https://cfpub.epa.gov/ncea/pprtv/documents/OctylPhthalatediN.pdf

Parameter	CAS NUM	Current DWS standard (µg/L)	Proposed DWS standard (µg/L)	Higher/ Lower/ New	Modified Data to Calculate Standard	Data Source
Endrin Aldehyde	7421933	NA	2	New	Used Endrin MRL = 0.0003 mg/Kg/day	Used MRL for Endrin as surrogate https://www.atsdr.cdc.gov/toxprofiles/tp89.pdf
Guthion	86500	NA	21	New	MRL = 0.003 mg/Kg/day	MRL 0.003 ATSDR https://www.atsdr.cdc.gov/toxprofiles/tp188.pdf
Hexachloroethane	67721	2.5	0.9	Lower	OCSF = 0.04 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=167
Indeno (1,2,3 cd) pyrene	193395	0.05	0.4	Higher	OCSF 0.1 mg/Kg/day	Used older IRIS OCSF
Nickel	7440020	140 T	210 T	Higher	RfD = 0.02 mg/Kg/day	https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0271_summary.pdf
Nitrobenzene	98953	3.5	14	Higher	RfD = 0.002 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=79
Nitrosodibutylamine	924163	NA	0.006	New	OCSF = 5.4 mg/kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=37
Nitrosodiethylamine	55185	NA	0.0002	New	OCSF = 150 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=42
N-nitrosopyrrolidine	930552	NA	0.02	New	OCSF = 2.13 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=81
Parathion	56382	NA	42	New	RfD = 0.006 mg/Kg/day	https://www.epa.gov/sites/production/files/2016-09/documents/parathion.pdf
Pentachlorobenzene	608935	NA	6	New	RfD = 0.0008 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=85
1,2,4,5-Tetrachlorobenzene	95943	NA	2.1	New	RfD = 0.0003 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=107

Parameter	CAS NUM	Current DWS standard (µg/L)	Proposed DWS standard (µg/L)	Higher/ Lower/ New	Modified Data to Calculate Standard	Data Source
2,4,5-Trichlorophenol	95954	NA	700	New	RfD = 0.1 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=121

RfD = Reference Dose - An estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

MRL = Minimal Risk Level - An Agency for Toxic Substances and Disease Registry (ATSDR) estimate of daily human exposure to a hazardous substance at or below which that substance is unlikely to pose a measurable risk of adverse, noncancerous effects.

304 (a) criteria - U.S. EPA - Human health ambient water quality criteria represent specific levels of chemicals or conditions in a water body that are not expected to cause adverse effects to human health.

PAH = Polycyclic Aromatic Hydrocarbon - Organic compounds containing only carbon and hydrogen—that are composed of multiple aromatic rings.

OCSF = Oral Cancer Slope Factor - An estimate of the risk of cancer associated with exposure to a carcinogenic or potentially carcinogenic substance. A slope factor is an upper bound, approximating a 95% confidence limit, on the increased cancer risk from a lifetime exposure to an agent by ingestion or inhalation.

Methodologies for Deriving Criteria for the Fish Consumption (FC) Designated Use

Numeric water quality criteria for the fish consumption (FC) designated use were derived using the following equations:

For carcinogens:

$$\frac{70 \text{ kg} * 10^{-6}}{\text{OCSF} * 17.5 \text{ grams/day} * \text{BCF}}$$

For non-carcinogens:

$$\frac{\text{RfD} * \text{RSC} * 70 \text{ kg}}{17.5 \text{ grams/day} * \text{BCF}}$$

In the carcinogen equation, 70 kg is the average weight of a human male in kilograms; 10^{-6} is the excess cancer risk level; OCSF is the oral cancer slope factor, 17.5 grams /day is the national average fish consumption rate, and BCF is a bioconcentration factor.

In the non-carcinogen equation, RfD is the reference dose, RSC is the relative source contribution factor, 70 kg is the average weight of a human male in kilograms, 17.5 grams/day is the national average fish consumption

rate, and BCF is the bioconcentration factor.

The following decision criterion is used to determine the numeric criteria for fish consumption designated use:

1. For carcinogens where an OCSF was available, a criterion was calculated using the procedure for carcinogens;
2. For carcinogens where an OCSF was not available but an RfD was available, the non-carcinogen procedure was used and a criterion was calculated for the carcinogen using the RfD or an RfD surrogate;
3. For non-carcinogens, a criterion was calculated using available RfD. If an RfD was not available in the Integrated Risk Information System (IRIS) but a surrogate RfD was available, such as a Minimum Risk Level (MRL) from the Agency for Toxic Substances Disease Registry (ATSDR), a criterion was calculated for the non-carcinogen using the MRL;
4. Where an OCSF, RfD, or MRL was not available, a criterion was not derived for the fish consumption designated use. If the Department did not have a bioconcentration factor for a pollutant, a FC criterion was not calculated.
5. Because ADEQ separates the fish and water consumption uses in the Surface Water Quality Standards, water quality standards for our Fish Consumption use are calculated using bioconcentration factors (BCF) from USEPA documents or from the technical literature. BCFs are a measure of how much a pollutant in the water column will concentrate in the tissue over time. It is important to address bioconcentration for the fish consumption use because the standard, as calculated, is functionally a translator that guards against the buildup of the pollutant in question to concentrations that may pose a threat to those that may consume wild caught fish. Arizona has more than 27 different species of sport fish that can be taken and consumed by Arizona anglers. Each of those species occupies a different locus in the aquatic food web, depending on the community composition of each individual waterbody. Because of this variability in species, community composition and food web structure, the BCF value is, by necessity, a broad estimate.

   If USEPA data are not available, data is gathered from peer-reviewed journals, the Extension Toxicology Network (EXTOXNET) and the U.S. National Library of Medicine among other sources. If multiple studies are available or a range given, a rounded mean is calculated for use in deriving standards.

Fish Consumption (FC) Modifications

Parameter	CAS Num	Current FC standard (µg/L)	Proposed FC standard (µg/L)	Higher/ Lower/ New	Modified Data used to Calculate Standard	Change data
Benzene	71432	140	114	Lower	OCSF = 0.035 mg/Kg/day	https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0276_summary.pdf
Benzo (a) pyrene	50328	0.02	0.1	Higher	OCSF = 7.3 mg/Kg/day	IRIS OCSF/RfD : benzo(a)pyrene PAH surrogate
Cadmium	7440439	84 T	6 T	Lower	RfD = 0.0005 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=141
Carbon tetrachloride	56235	2	3	Higher	OCSF = 0.07 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=20
Chloroform	67663	470	2,133	Higher	RfD/OCSF = 0.01 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=25
beta-Chloronaphthalene	91587	317	1,267	Higher	RfD = 0.08 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=463
Chlorpyrifos	2921882	NA	1.0	New	BCF = 2500	http://pmep.cce.cornell.edu/profiles/extoxnet/carbaryl-dicrotophos/chlorpyrifos-ext.html
Cyanide (as free cyanide)	57125	16,000 T	504 T	Lower	RfD = 0.00063 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=31
DDT and break down products	50293	0.0002	0.0003	Higher	OCSF = 0.34 mg/Kg/day	OCSF/RfD from DDT
Dichloromethane	75092	593	2,222	Higher	OCSF = 0.002 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=70
4,6 Dinitro-o-cresol	534521	582	12	Lower	RfD = 0.00008 mg/kg-day	https://cfpub.epa.gov/ncea/pprtv/documents/Dinitroocresol46.pdf
Dinoseb	88857	NA	12	New	BCF = 68	https://books.google.com/books?id=0yPaA9yiKYwC&pg=PA299&lpg=PA299&dq=Dinoseb+BCF&source=bl&ots=b7VQM1gHrU&sig=bfdC4RXvAF7m9G0NEy9I_KsVuBs&hl=en&sa=X&ved=0ahUKEwjP76jQrezZAhVozFQKHYn5CekQ6AEIRjAC#v=onepage&q=Dinoseb%20BCF&f=false

Parameter	CAS Num	Current FC standard (µg/L)	Proposed FC standard (µg/L)	Higher/ Lower/ New	Modified Data used to Calculate Standard	Change data
Diquat	85007	NA	176	New	BCF = 10	https://pubchem.ncbi.nlm.nih.gov/compound/diquat#section=Top
Endothall	145733	NA	16,000	New	BCF = 10	https://pubchem.ncbi.nlm.nih.gov/compound/endothall
Endrin Aldehyde	7421933	NA	0.06	New	Used Endrin MRL = 0.0003 mg/Kg/day	Used values for Endrin
Guthion	86500	NA	92	New	MRL = 0.003 mg/Kg/day	MRL 0.003 ATSDR https://www.atsdr.cdc.gov/toxprofiles/tp188.pdf
Hexochlorocyclohexane gamma	58899	1.8	5	Higher	RfD = 0.0003 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=65
Hexachlorocyclopentadiene	77474	580	74	Lower	RfD = 0.006 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=59
Hexachloroethane	67721	3.3	1	Lower	OCSF = 0.04 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=167
Indeno (1,2,3cd) pyrene	193395	0.49	1	Higher	OCSF 0.1 mg/Kg/day	Used older IRIS OCSF
Malathion	121755	NA	1,455	New	BCF = 11	https://www.aphis.usda.gov/plant_health/ea/downloads/2018/fruit-fly-draft-malathion-hhera.pdf
Mirex	2385855	NA	0.0002	New	BCF = 1200, OCSF = 18 mg/Kg/day	https://oehha.ca.gov/chemicals/mirex Changed OCSF and BCFhttps://books.google.com/books?id=ibJKf8Gqi5gC&pg=PA208&lpg=PA208&dq=Mirex+bcf&source=bl&ots=j-SHf82Xs3&sig=JCFi4W60MBVk03KeQgiMdxWvFig&hl=en&sa=X&ved=0ahUKEwjSrKe8tOzZAhUEzWMKHXPWC2EQ6AEIPzAC#v=onepage&q=Mirex%20bcf&f=false

Parameter	CAS Num	Current FC standard (µg/L)	Proposed FC standard (µg/L)	Higher/ Lower/ New	Modified Data used to Calculate Standard	Change data
Nickel	7440020	4,600 T	511 T	Lower	RfD = 0.02 mg/Kg/day	Kept Older RfD
Nitrobenzene	98953	138	554	Higher	RfD = 0.002 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=79
Nitrosodibutylamine	924163	NA	0.2	New	OCSF = 5.4 mg/kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=37
Nitrosodiethylamine	55185	NA	0.1	New	OCSF = 150 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=42
Nitrosopyrrolidine	930552	NA	34	New	OCSF = 2.13 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=81
Oxamyl	23135220	NA	6452	New	BCF = 3.1	https://pubchem.ncbi.nlm.nih.gov/compound/oxamyl
Paraquat	1910425	NA	12,000	New	BCF = 0.3	http://pmep.cce.cornell.edu/profiles/extoxnet/metiram-propoxur/paraquat-ext.html
Parathion	56382	NA	16	New	RfD = 0.006 mg/Kg/day	https://www.epa.gov/sites/production/files/2016-09/documents/parathion.pdf
Pentachlorophenol	87865	1,000	111	Lower	OCSF = 0.4 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=86
Permethrin	52645531	NA	77	New	BCF = 520	New BCF https://pubchem.ncbi.nlm.nih.gov/compound/Permethrin#section=Environmental-Fate
Picloram	1918021	2,710	1806	Lower	RfD = 0.07	https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0256_summary.pdf
2,3,7,8 Tetrachlorodibenzopdioxin	1746016	5.00E-09	0.0000001	Higher	RfD = 0.0000000007 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=1024
1,1,2,2 Tetrachloroethane	79345	4	32,000	Higher	OCSF = 0.2 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=193
Tetrachloroethylene	127184	261	62	Lower	OCSF = 0.0021 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=106

Parameter	CAS Num	Current FC standard (µg/L)	Proposed FC standard (µg/L)	Higher/ Lower/ New	Modified Data used to Calculate Standard	Change data
Thallium	7440280	7.2 T	0.07 T	Lower	RfD = 0.00001 mg/Kg/day	https://cfpub.epa.gov/ncea/pprtv/documents/ThalliumCarbonate.pdf
Toluene	108883	201,000	11,963	Lower	RfD = 0.08 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=118
Tributyltin	688733	NA	0.08	New	RfD = 0.0003 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=349
1,1,1 Trichloroethane	71556	428,571	285,714	Lower	RfD = 2	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=197
Trichloroethylene	79016	29	8	Lower	OCSF = 0.046 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=199

RfD = Reference Dose - An estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

MRL = Minimal Risk Level - An Agency for Toxic Substances and Disease Registry (ATSDR) estimate of daily human exposure to a hazardous substance at or below which that substance is unlikely to pose a measurable risk of adverse, noncancerous effects.

§ 304 (a) criteria - U.S. EPA - Human health ambient water quality criteria represent specific levels of chemicals or conditions in a water body that are not expected to cause adverse effects to human health.

PAH = Polycyclic Aromatic Hydrocarbon - Organic compounds containing only carbon and hydrogen—that are composed of multiple aromatic rings.

OCSF = Oral Cancer Slope Factor - An estimate of the risk of cancer associated with exposure to a carcinogenic or potentially carcinogenic substance. A slope factor is an upper bound, approximating a 95% confidence limit, on the increased cancer risk from a lifetime exposure to an agent by ingestion or inhalation.

Cancelled/banned pesticide - Registration cancelled by EPA. Essentially banned.

Limited/controlled use chemical. Low reasonable potential for discharge - Chemicals of limited use that are usually employed in restricted to controlled industrial settings and are not likely to enter the waste stream.

Methodologies for Deriving Criteria for the Full Body Contact Designated Use

The numeric water quality criteria for the full body contact (FBC) designated use was derived using the

following equations:

For carcinogens:

$$\frac{70\ kg * 10^{-6}}{OCSF * 15\ ml/day}$$

For non-carcinogens:

$$\frac{RfD * RSC * 70\ kg}{15\ ml/day}$$

In the carcinogen equation, 70 kg is the average weight of a human male in kilograms; 10^{-6} is the excess cancer risk level; OCSF is the oral cancer slope factor, and 15 ml/day is the incidental water ingestion rate in milliliters per day.

In the non-carcinogen equation, RfD is the reference dose, RSC is the relative source contribution factor, 70 kg is the average weight of a human male in kilograms, and 15 ml/day is the incidental water ingestion rate in milliliters per day.

This rulemaking adopts numeric criteria for the full body contact designated use using the following decision criteria:

1. A criterion was calculated using the appropriate procedure for carcinogens or non-carcinogens;
2. For carcinogens where an OCSF was not available but an RfD was available, the non-carcinogen procedure was used and a criterion was calculated for the carcinogen using the RfD or a surrogate RfD;
3. For non-carcinogens, a criterion was calculated using available RfDs. If an RfD was not available in the Integrated Risk Information System (IRIS) but a surrogate RfD was available, such as a Minimum Risk Level (MRL) from the Agency for Toxic Substances Disease Registry (ATSDR), a criterion for the non-carcinogen was calculated using the MRL;
4. Where an OCSF, RfD or MRL was unavailable, a criterion was not derived for the full body contact designated use.
5. Where the calculated full body contact standard was more stringent than the Domestic Water Source standard for the same pollutant, the DWS value was used in place of the calculated PBC value. It is unlikely that an individual will be more at risk from incidental ingestion during recreational activities than through direct consumption.

Full Body Contact (FBC) Modifications

Parameter	CAS NUM	Current FBC standard (µg/L)	Proposed FBC standard (µg/L)	Higher/ Lower/ New	Modified Data used to Calculate Standard	Data Source
Acenaphthylene	208968	NA	56,000	New	RfD = 0.06 mg/Kg/day	https://rais.ornl.gov/tox/profiles/acenaphthene_f_V1.html
Acrylonitrile	107131	3	9	Higher	MRL = 0.04 mg/Kg/day	ATSDR MRL https://www.atsdr.cdc.gov/toxprofiles/tp125.pdf
Aldrin	309002	0.08	0.27	Higher	OCSF = 17 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=130
Barium	7440393	98,000 T	186,667 T	Higher	RSC changed to 20%	RSC = .2
Benz (a) anthracene	56553	0.2	47.0	Higher	OCSF = 7.3 mg/Kg/day	IRIS OCSF/RfD : benzo(a)pyrene PAH surrogate
Benzene	71432	93	133	Higher	OCSF = 0.035 mg/Kg/day	https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0276_summary.pdf
Benzo[b]fluoranthene	205992	1.9	47.0	Higher	OCSF = 7.3 mg/Kg/day	IRIS OCSF/RfD : benzo(a)pyrene PAH surrogate
Benzidine	92875	0.01	0.02	Higher	OCSF = 230 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=135
Benzo (a) pyrene	50328	0.2	47.0	Higher	OCSF = 7.3 mg/Kg/day	IRIS OCSF/RfD : benzo(a)pyrene PAH surrogate
Benzo (k) fluoranthene	207089	1.9	47.0	Higher	OCSF = 7.3 mg/Kg/day	IRIS OCSF/RfD : benzo(a)pyrene PAH surrogate
Bis(2-chloroethoxy) methane	111911	NA	2,800	New	RfD = 0.003mg/Kg/day	https://cfpub.epa.gov/ncea/pprtv/documents/Bis2chloroethoxymethane.pdf
Bis(chloroethyl) ether	111444	1	4.0	Higher	OCSF = 1.1 mg/Kg/Day	https://www.epa.gov/sites/production/files/2016-09/documents/dichloroethyl-ether.pdf

Parameter	CAS NUM	Current FBC standard (µg/L)	Proposed FBC standard (µg/L)	Higher/ Lower/ New	Modified Data used to Calculate Standard	Data Source
Bis(Chloromethyl) ether	542881	NA	0.02	New	OCSF = 220 $(mg/Kg\text{-}d)^{-1}$	https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0375_summary.pdf
Bromoform	75252	180	591	Higher	OCSF = 0.0079 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=214
Cadmium	7440439	700 T	467 T	L	RfD = 0.0005 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=141
Carbon tetrachloride	56235	11	67	Higher	OCSF = 0.07 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=20
Chlordane	57749	4	13	Higher	OCSF = 0.35 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=142
Chlorine (total residual)	7782505	4,000	93,333	Higher	RfD = 0.1 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=405
Chloroethane	75003	NA	93,333	New	Based on the State of Michigan's interpretation of subchronic RfD of 0.1 mg/kg-day	https://cfpub.epa.gov/ncea/pprtv/documents/Chloroethane.pdf
Chloroform	67663	230	9,333	Higher	RfD/OCSF = 0.01 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=25
beta-Chloronaphthalene	91587	74,667	298,667	Higher	RfD = 0.08 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=463
Chromium (Total)	7440473	NA	100 T	New	Reverted to old standards despite lack of EPA data	Added FBC/PBC

Parameter	CAS NUM	Current FBC standard (µg/L)	Proposed FBC standard (µg/L)	Higher/ Lower/ New	Modified Data used to Calculate Standard	Data Source
Chrysene	218019	19	0.6	Lower	OCSF = 7.3 mg/Kg/day	IRIS OCSF/RfD : benzo(a)pyrene PAH surrogate
Cyanide (as free cyanide)	57125	18,667 T	588 T	Lower	RfD = 0.00063 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=31
DDT and break down products	50293	4	14	Higher	OCSF = 0.34 mg/Kg/day	OCSF/RfD from DDT
Di (2-ethylhexyl) adipate	103231	560,000	3,889	Lower	OCSF = 0.0012 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=420
Di(2ethylhexyl) phthalate	117817	100	333	Higher	RfD = 0.01 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=14
Dibenz (ah) anthracene	53703	1.9	47.0	Higher	Used PAH RfD surrogate (pyrene)	IRIS OCSF/RfD : benzo(a)pyrene PAH surrogate See:https://www.michigan.gov/documents/deq/deq-rrd-chem-DibenzoAHAnthraceneDatasheet_527910_7.pdf
1,2 Dibromoethane	106934	8,400	2	Lower	OCSF = 2 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=361
3,3' Dichlorobenzidine	91941	3	10	Higher	OCSF = 0.45 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=504
1,2 Dichloroethylene cis	156592	70	1,867	Higher	RfD = 0.002 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=418
Dichloromethane	75092	190	2,333	Higher	OCSF = 0.002 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=70

Parameter	CAS NUM	Current FBC standard (µg/L)	Proposed FBC standard (µg/L)	Higher/ Lower/ New	Modified Data used to Calculate Standard	Data Source
1,3 Dichloropropene	542756	420	93	Lower	OCSF = 0.05 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=224
Dieldrin	60571	0.09	0.3	Higher	OCSF = 16 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=225
4,6 Dinitro o cresol	534521	3,733	75	Lower	RfD = 0.00008 mg/kg-day	https://cfpub.epa.gov/ncea/pprtv/documents/Dinitroocresol46.pdf
2,6-Dinitrotoluene	606202	2	7	Higher	OCSF = 0.68 mg/Kg/day	https://cfpub.epa.gov/ncea/pprtv/documents/Dinitrotoluene26.pdf
Di-n-octyl phthalate	117840	373,333	9,333	Lower	RfD = 0.01 mg/Kg/day	https://cfpub.epa.gov/ncea/pprtv/documents/OctylPhthalatediN.pdf
1,2 Diphenylhydrazine	122667	1.8	6	Higher	OCSF = 0.8 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=49
Endrin	72208	280	1,120	Higher	Used EPA RSC of 80%	https://www.epa.gov/sites/production/files/2016-03/documents/summary_of_inputs_final_revised_3.24.16.pdf
Endrin Aldehyde	7421933	NA	1,120	New	Used Endrin MRL = 0.0003 mg/Kg/day	Used values for Endrin
Guthion	86500	NA	2,800	New	MRL = 0.003 mg/Kg/day	MRL 0.003 ATSDR https://www.atsdr.cdc.gov/toxprofiles/tp188.pdf
Heptachlor	76448	0.4	1	Higher	OCSF = 4.5 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=243
Heptachlor epoxide	1024573	0.2	0.5	Higher	OCSF = 9.1 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=160

Parameter	CAS NUM	Current FBC standard (µg/L)	Proposed FBC standard (µg/L)	Higher/ Lower/ New	Modified Data used to Calculate Standard	Data Source
Hexachlorobenzene	118741	1	3	Higher	OCSF = 1.6 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=374
Hexachlorobutadiene	87683	18	60	Higher	OCSF = 0.078 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=58
Hexachlorocyclohexane alpha	319846	0.22	0.7	Higher	OCSF = 6.3 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=162
Hexachlorocyclohexane beta	319857	0.78	3	Higher	OCSF = 1.8 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=244
Hexachlorocyclopentadiene	77474	9,800	11,200	Higher	RfD = 0.006 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=59
Hexachloroethane	67721	100	117	Higher	OCSF = 0.04 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=167
Hexochlorocyclohexane gamma	58999	280	700	Higher	RfD = 0.0003 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=65
Indeno (1,2,3cd) pyrene	193395	1.9	47	Higher	OCSF 0.1 mg/Kg/day	Used older IRIS OCSF
Isophorone	78591	1500.0	4,912	Higher	OCSF = 0.00095 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=63
Methoxychlor	72435	4,667	18,667	Higher	Used EPA RSC of 80%	https://www.epa.gov/sites/production/files/2016-03/documents/summary_of_inputs_final_revised_3.24.16.pdf
Mirex	2385855	187	0.26	Lower	OCSF = 18 mg/Kg/day	https://oehha.ca.gov/chemicals/mirex

Parameter	CAS NUM	Current FBC standard (µg/L)	Proposed FBC standard (µg/L)	Higher/ Lower/ New	Modified Data used to Calculate Standard	Data Source
N nitrosodi n propylamine	621647	0.2	0.7	Lower	OCSF = 7.0 mg/kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=177
Nitrobenzene	98953	467	1,867	Higher	RfD = 0.002 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=79
Nitrosodibutylamine	924163	NA	0.9	New	OCSF = 5.4 mg/kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=37
Nitrosodiethylamine	55185	NA	0.03	New	OCSF = 150 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=42
Nitrosopyrrolidine	930552	NA	2	New	OCSF = 2.13 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=81
Nnitrosodimethylamine	62759	0.03	0.09	Higher	OCSF = 51 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=45
N-Nitrosodiphenylamine	86306	290	952	Higher	OCSF = 0.0049 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=178
Parathion	56382	NA	5,600	New	RfD = 0.006 mg/Kg/day	https://www.epa.gov/sites/production/files/2016-09/documents/parathion.pdf
Pentachlorobenzene	608935	NA	747	New	RfD = 0.0008 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=85
Polychlorinatedbiphenyls	1336363	19	2	Lower	OCSF = 2 mg/Kg/day	https://www.atsdr.cdc.gov/toxprofiles/tp17.pdf
1,2,4,5-Tetrachlorobenzene,	95943	NA	280	New	RfD = 0.0003 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=107
2,3,7,8 Tetrachlorodibenzopdioxin	1746016	0.00003	0.0007	Higher	RfD = 0.0000000007 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=1024

Parameter	CAS NUM	Current FBC standard (µg/L)	Proposed FBC standard (µg/L)	Higher/ Lower/ New	Modified Data used to Calculate Standard	Data Source
1,1,2,2 Tetrachloroethane	79345	7	23	Higher	OCSF = 0.2 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=193
Tetrachloroethylene	127184	9,333	2,222	Lower	OCSF = 0.0021 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=106
Thallium	7440280	75 T	9 T	Lower	RfD = 0.00001 mg/Kg/day	https://cfpub.epa.gov/ncea/pprtv/documents/ThalliumCarbonate.pdf
Toluene	108883	280,000	149,333	Lower	RfD = 0.08 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=118
Toxaphene	8001352	1.3	4	Higher	OCSF = 1.1 mg/Kg/Day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=346 https://www.atsdr.cdc.gov/toxprofiles/tp94.pdf
Tributyltin	688733	NA	280	New	RfD = 0.0003 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=349
1,1,2-Trichloroethane	79005	25	82	Higher	OCSF = 0.057 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=198
Trichloroethylene	79016	280,000	101	Lower	OCSF = 0.046 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=199
2,4,6-Trichlorophenol	88062	130	424	Higher	OCSF = 0.011 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=122
2,4,5-Trichlorophenol	95954	NA	93,333	Higher	RfD = 0.1 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=121

Parameter	CAS NUM	Current FBC standard (µg/L)	Proposed FBC standard (µg/L)	Higher/ Lower/ New	Modified Data used to Calculate Standard	Data Source
Trichlorophenoxy proprionic acid (2,4,5-TP)	93721	7,467	29,867	Higher	OCSF = 0.008 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=323 https://oehha.ca.gov/media/downloads/water/public-health-goal/silvexposting53002.pdf
Vinyl chloride	75014	2	6	Higher	OCSF = 0.72 mg/Kg/day	Calculated FBC higher than MCL https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=1001

Methodologies for Deriving Criteria for the Partial Body Contact (PBC) Designated Use

The Department derived numeric water quality criteria for the partial body contact (PBC) designated use using the following equation:

$$\frac{\text{RfD} * \text{RSC} * 70\text{ kg}}{15\text{ ml/day}}$$

In this equation, RfD is the reference dose, RSC is the relative source contribution factor, 70 kg is the average weight of a human male in kilograms, and 15 ml/day is the incidental water ingestion rate in milliliters per day. The equation is the same equation used to derive numeric criteria for non-carcinogens for the full body contact designated use.

The rulemaking adopts numeric criteria for the partial body contact designated use using the following decision criteria:

1. Calculate a criterion using the PBC equation using available RfDs. If an RfD is not available in the Integrated Risk Information System (IRIS) but a surrogate RfD is available, such as a Minimum Risk Level (MRL) from the Agency for Toxic Substances and Disease Registry (ATSDR), a PBC criterion is calculated using the MRL; and
2. A criterion for the partial body contact designated use was not derived if there was no RfD or MRL.
3. In cases where the carcinogenicity of a toxicant is classified as a B2 or higher, the State may use the OCSF to calculate a PBC standard where no RfD or MRL is available rather than publish no standard for the PBC use.

Partial Body Contact (PBC) Modifications

Parameters	CAS NUM	Current PBC standard (µg/L)	Proposed PBC standard (µg/L)	Higher/ Lower/ New	Modified Data used to Calculate Standard	Change data
Acenaphthylene	208968	NA	56,000	New	RfD = 0.06 mg/Kg/day	https://rais.ornl.gov/tox/profiles/acenaphthene_f_V1.html
Barium	7440393	98,000 T	186,667 T	Higher	RSC changed to 20%	RSC = .2
Benz~~o~~ (a) anthracene	56553	0.2	280	Higher	RfD = 0.0003 mg/Kg/day	IRIS OCSF/RfD : benzo(a)pyrene PAH surrogate
Benzo[b]fluoranthene	205992	1.9	280	Higher	RfD = 0.0003 mg/Kg/day	IRIS OCSF/RfD : benzo(a)pyrene PAH surrogate
Benzo (a) pyrene	50328	0.2	280	Higher	RfD = 0.0003 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=136
Benzo (k) fluoranthene	207089	1.9	280	Higher	RfD = 0.0003 mg/Kg/day	IRIS OCSF/RfD : benzo(a)pyrene PAH surrogate
Bis(2-chloroethoxy) methane	111911	NA	2,800	New	RfD = 0.003mg/Kg/day	https://cfpub.epa.gov/ncea/pprtv/documents/Bis2chloroethoxymethane.pdf
Bis(chloroethyl) ether	111444	1	4	Higher	OCSF = 1.1 mg/Kg/Day	https://www.epa.gov/sites/production/files/2016-09/documents/dichloroethyl-ether.pdf
Cadmium	7440439	700 T	467 T	Lower	RfD = 0.0005 mg/Kg/day	IRIS RfD, 304 criteria
Carbon tetrachloride	56235	980	3,733	Higher	RfD = 0.004 mg/Kg/day	IRIS OCSF/RfD
Chlorine (total residual)	7782505	4,000	93,333	Higher	RfD = 0.1 mg/Kg/day	RfD less stringent than MCL
Chloroethane	75003	NA	93,333	New	Based on the State of Michigan's interpretation of subchronic RfD of 0.1 mg/kg-day	https://cfpub.epa.gov/ncea/pprtv/documents/Chloroethane.pdf

Parameters	CAS NUM	Current PBC standard (µg/L)	Proposed PBC standard (µg/L)	Higher/ Lower/ New	Modified Data used to Calculate Standard	Change data
beta-Chloronaphthalene	91587	74,667	298,667	Higher	RfD = 0.08 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=463
Chromium (Total)	7440473	NA	100 T	New	Reverted to old standards despite lack of EPA data	Added FBC/PBC
Chrysene	218019	19	0.6	Higher	RfD = 0.0003 mg/Kg/day	IRIS OCSF/RfD : benzo(a)pyrene PAH surrogate
Cyanide	57125	18,667 T	588 T	Higher	RfD = 0.00063 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=31
Dibenz (ah) anthracene	53703	1.9	280	Higher	Used PAH RfD surrogate (pyrene)	IRIS OCSF/RfD : benzo(a)pyrene PAH surrogate See:https://www.michigan.gov/documents/deq/deq-rrd-chem-DibenzoAHAnthraceneDatasheet_527910_7.pdf
1,4-Dichlorobenzene	106467	373.333	373,333	Higher	Corrected mistake	Mistake in previous standards
3,3' Dichlorobenzidine	91941	3	10	Higher	OCSF = 0.45 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=504
1,2 Dichloroethylene cis	156592	70	1,867	Higher	RfD = 0.002 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=418
Dichloromethane	75092	56,000	5,600	Lower	RfD = 0.006 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=70
4,6 Dinitro o cresol	534521	3.733	75	Higher	RfD = 0.00008 mg/kg-day	https://cfpub.epa.gov/ncea/pprtv/documents/Dinitroocresol46.pdf

Parameters	CAS NUM	Current PBC standard (µg/L)	Proposed PBC standard (µg/L)	Higher/ Lower/ New	Modified Data used to Calculate Standard	Change data
2,6-Dinitrotoluene	606202	3733	280	Lower	RfD = 0.0003 mg/Kg/day	https://cfpub.epa.gov/ncea/pprtv/documents/Dinitrotoluene26.pdf
Di-n-octyl phthalate	117840	373,333	9,333	Lower	RfD = 0.01 mg/Kg/day	https://cfpub.epa.gov/ncea/pprtv/documents/OctylPhthalatediN.pdf
1,2 Diphenylhydrazine	122667	1.8	6	Higher	OCSF = 0.8 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=49
Endrin	72208	280	1,120	Higher	Used EPA RSC of 80%	https://www.epa.gov/sites/production/files/2016-03/documents/summary_of_inputs_final_revised_3.24.16.pdf
Endrin Aldehyde	7421933	NA	1,120	New	Used Endrin MRL = 0.0003 mg/Kg/day	Used values for Endrin
Guthion	86500	NA	2,800	New	MRL = 0.003 mg/Kg/day	MRL 0.003 ATSDR https://www.atsdr.cdc.gov/toxprofiles/tp188.pdf
Hexochlorocyclohexane gamma	58999	280	700	Higher	RfD = 0.0003 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=65
Hexachlorocyclopentadiene	77474	9,800	11,200	Higher	RfD = 0.006 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=59
Hexachloroethane	67721	933	653	Lower	RfD = 0.0007 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=167
Indeno (1,2,3cd) pyrene	193395	1.9	47	Higher	OCSF 0.1 mg/Kg/day	Used older IRIS OCSF
Methoxychlor	72435	4,667	18,667	Higher	Used EPA RSC of 80%	https://www.epa.gov/sites/production/files/2016-03/documents/summary_of_inputs_final_revised_3.24.16.pdf

Parameters	CAS NUM	Current PBC standard (µg/L)	Proposed PBC standard (µg/L)	Higher/ Lower/ New	Modified Data used to Calculate Standard	Change data
Mirex	2385855	187	0.26	Lower	RfD = 0.0002 mg/Kg/day	https://oehha.ca.gov/chemicals/mirex
Nitrobenzene	98953	467	1,867	Higher	RfD = 0.002 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=79
Nnitrosodimethylamine	62759	0.03	0.09	Higher	OCSF = 51 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=45
N-nitrosodi-n-propylamine	621647	88,667	0.7	Lower	OCSF = 7.0 mg/kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=177
Nnitrosodiphenylamine	86306	88,667	952	Lower	OCSF = 0.0049 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=178
Parathion	56382	NA	5,600	New	RfD = 0.006 mg/Kg/day	https://www.epa.gov/sites/production/files/2016-09/documents/parathion.pdf
Pentachlorobenzene	608935	NA	747	New	RfD = 0.0008 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=85
Pentachlorophenol	87865	28,000	4,667	Lower	RfD = 0.005 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=86
1,2,4,5-Tetrachlorobenzene	95943	NA	280	New	RfD = 0.0003 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=107
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746016	0.00003	0.0007	Higher	RfD = 0.0000000007 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=1024
1,1,2,2 Tetrachloroethane	79345	56,000	186,667	Higher	RfD = 0.05 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=193
Tetrachloroethylene	127184	9,333	5,600	Lower	RfD = 0.006 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=106

Parameters	CAS NUM	Current PBC standard (µg/L)	Proposed PBC standard (µg/L)	Higher/ Lower/ New	Modified Data used to Calculate Standard	Change data
Thallium	7440280	75 T	9 T	Lower	RfD = 0.00001 mg/Kg/day	https://cfpub.epa.gov/ncea/pprtv/documents/ThalliumCarbonate.pdf
Toluene	108883	280,000	149,333	Lower	RfD = 0.08 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=118
Toxaphene	8001352	933	1,867	Higher	MRL = 0.002 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=346 https://www.atsdr.cdc.gov/toxprofiles/tp94.pdf
Tributyltin	688733	NA	280	New	RfD = 0.0003 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=349
Trichloroethylene	79016	280	467	Higher	RfD = 0.0005 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=199
2,4,5-Trichlorophenol	95954	NA	93,333	New	RfD = 0.1 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=121
2,4,6-Trichlorophenol	88062	130	424	Higher	OCSF = 0.011 mg/Kg/day	https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=122
2(2,4,5-Trichlorophenoxy) propionic acid (2,4,5-TP)	93721	7,467	29,867	Higher	RSC changed to 80%	US EPA RSC = 0.8

RfD = Reference Dose - An estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

MRL = Minimal Risk Level - An Agency for Toxic Substances and Disease Registry (ATSDR) estimate of daily human exposure to a hazardous substance at or below which that substance is unlikely to pose a measurable risk of adverse, noncancerous effects.

§ 304 (a) criteria - U.S. EPA - Human health ambient water quality criteria represent specific levels of chemicals or conditions in a water body that are not expected to cause adverse effects to human health.

PAH = Polycyclic Aromatic Hydrocarbon - Organic compounds containing only carbon and hydrogen—that are composed of multiple aromatic rings.

OCSF = Oral Cancer Slope Factor - An estimate of the risk of cancer associated with exposure to a carcinogenic or potentially carcinogenic substance. A slope factor is an upper bound, approximating a 95% confidence limit, on the increased cancer risk from a lifetime exposure to an agent by ingestion or inhalation.

Cancelled/banned pesticide - Registration cancelled by EPA. Essentially banned.

Numeric Water Quality Standards for Aquatic and Wildlife Designated Uses in Table 1

Currently, there are numeric criteria for 98 pollutants to maintain and protect water quality for the aquatic life and wildlife (A&W) designated uses. In this rulemaking ADEQ proposes new and revised criteria for existing numeric A&W criteria for four parameters. In most cases, CWA § 304(a) national criteria recommendations to protect freshwater aquatic life have been adopted. New numeric water quality standards for previously unregulated pollutants include Carbaryl, Dementon, Diazinon, and Nonylphenol.

Under the CWA § 304(a) criteria for the Aquatic Life use is derived using what data is available for all aquatic species. As such, data from cold water species like salmonids (trout), that tend to be more sensitive to toxins, serve to make criteria more stringent. Because Arizona has an incredibly diverse landscape, from lowland deserts to alpine peaks over 12,000 ft. in altitude, one set of standards covering the entire state makes little sense. To address this issue, the state has broken down the Aquatic Life use into four sub uses that more accurately characterize our varied aquatic ecosystems (cold, warm, effluent dependent, and ephemeral).

Generally, the state starts with data contained in the US EPA CWA § 304(a) Aquatic Life criteria document and then uses the site specific species deletion procedure to recalculate the standards for our different uses. For standards for the Aquatic and Wildlife Coldwater use, the State employs salmonids and other cold water species. For Aquatic and Wildlife Warmwater, data from coldwater species are usually not considered. For Aquatic and Wildlife Effluent Dependent, the State uses warmwater species that generally occur in nutrient rich, lower oxygen environments. For Aquatic and Wildlife Ephemeral, we use data from organisms with short lifecycles such as insects, which can take advantage of short pulses of water from flash floods.

Aquatic & Wildlife Uses Modifications in Table 1

Cadmium ***CAS# 7440439***		***Ammonia (Mussels Absent)*** ***CAS # 7664417***		***Ammonia (Mussels Present)*** ***CAS # 7664417***		***Acrolein*** ***CAS# 107028***		POLLUTANT IN TABLE 1	PARAMETER
Standard Level	*Change in Standard*	*Standard Level*	*Change in Standard*	*Standard Level*	*Change in Standard*	*Standard Level*	*Change in Standard*	Standard Change	
See Table 2		See Table		See Table		34		Current **A&Wc Acute** (µg/L)	
See Table 2	Lower	See Table	Similar	See Table	Lower	3	Lower	Proposed A&Wc Acute (µg/L)	
See Table 3		See Table		See Table		30		Current **A&Wc Chronic** (µg/L)	
See Table 3	Higher	See Table	Higher	See Table	Lower	3	Lower	Proposed A&Wc Chronic (µg/L)	
See Table 2		See Table		See Table		34		Current **A&Ww Acute** (µg/L)	
See Table 2	Higher	See Table	Higher	See Table	Lower	3	Lower	Proposed A&Ww Acute (µg/L)	
See Table 3		See Table		See Table		30		Current **A&Ww Chronic** (µg/L)	
See Table 3	Higher	See Table	Higher	See Table	Lower	3	Lower	Proposed A&Ww Chronic (µg/L)	
See Table 2		See Table		See Table		34		Current **A&Wedw Acute|** (µg/L)	
See Table 2	Higher	See Table	Higher	None	--	3	Lower	Proposed A&Wedw Acute| (µg/L)	
See Table 3		See Table		See Table		30		Current **A&Wedw Chronic** (µg/L)	
See Table 3	Higher	See Table	Higher	None	--	3	Lower	Proposed A&Wedw Chronic (µg/L)	
See Table 2		None		None		None		Current **A&We Acute** (µg/L)	
See Table 2	Lower	None	--	None	--	3	New	Proposed A&We Acute (µg/L)	
CWA §304 criteria (2016)		CWA §304 criteria (2013)		CWA §304 criteria (2013)		CWA §304 criteria (2009)		Change data	

Nonylphenol ***CAS# 104405***		***Diazinon*** ***CAS# 333415***		***Demeton*** ***CAS# 8065483***		***Carbaryl*** ***CAS# 63252***		POLLUTANT IN TABLE 1	
Standard Level	*Change in Standard*	*Standard Level*	*Change in Standard*	*Standard Level*	*Change in Standard*	*Standard Level*	*Change in Standard*	Standard Change	PARAMETER
None		None		None		None		Current **A&Wc Acute** (µg/L)	
28	New	0.17	New	None	--	2.1	New	Proposed A&Wc Acute (µg/L)	
None		None		None		None		Current **A&Wc Chronic** (µg/L)	
6.6	New	0.17	New	0.01	New	2.1	New	Proposed A&Wc Chronic (µg/L)	
None		None		None		None		Current **A&Ww Acute** (µg/L)	
28	New	0.17	New	None	--	2.1	New	Proposed A&Ww Acute (µg/L)	
None		None		N/A		None		Current **A&Ww Chronic** (µg/L)	
6.6	New	0.17	New	0.01	New	2.1	New	Proposed A&Ww Chronic (µg/L)	
None		None		None		None		Current **A&Wedw Acute|** (µg/L)	
28	New	0.17	New	None	--	2.1	New	Proposed A&Wedw Acute| (µg/L)	
None		None		None		None		Current **A&Wedw Chronic** (µg/L)	
6.6	New	0.17	New	0.01	New	2.1	New	Proposed A&Wedw Chronic (µg/L)	
None		None		None		None		Current **A&We Acute** (µg/L)	
28	New	0.17	New	None	--	2.1	New	Proposed A&We Acute (µg/L)	
CWA §304 criteria (2005)		CWA §304 criteria (2005)		CWA §304 criteria (1985)		CWA §304 criteria (2012)		Change data	

Modifications to Hardness Dependent Tables for Aquatic and Wildlife Uses *[Tables 2 through 6]*

The numeric water quality standards for certain metals are expressed as a function of hardness because hardness can affect the toxicities of the metals to aquatic life. These "hardness-dependent" pollutants include cadmium, chromium III, copper, lead, nickel, silver, and zinc. Increasing hardness has the effect of decreasing the toxicity of the metals.

In this Triennial Review, ADEQ intends to make modifications to the standards for copper, lead, and cadmium. Copper, and lead are being updated due to rounding errors from the last rulemaking in 2016. In 2016, EPA issued a new § 304(a) criteria document for cadmium. ADEQ is updating its aquatic and wildlife standards for cadmium to align with this EPA criteria. For A&Wc, the acute standard is slightly more stringent while the chronic standard is less stringent. For A&Ww, and A&Wedw, the acute standards are less stringent and the chronic standards are more stringent. For A&We, the acute standard is more stringent. See explanatory table below:

Cadmium – Change in Level (Higher/Lower)						
A&Wc		A&Ww		A&Wedw		A&Weph
Acute	*Chronic*	*Acute*	*Chronic*	*Acute*	*Chronic*	*Acute*
Lower	Higher	Higher	Lower	Higher	Lower	Lower

Ammonia *[New Tables 11 through 17]*

In 2013, the U.S. EPA issued a new aquatic and wildlife criteria document for ammonia. EPA Office of Water, *Aquatic Life Ambient Water quality Criteria for Ammonia – Freshwater* (2013), *available at* https://www.epa.gov/sites/production/files/2015-08/documents/aquatic-life-ambient-water-quality-criteria-for-ammonia-freshwater-2013.pdf. The new criteria considered toxicological data for unionids, a family of fresh water mussels that were not included in previous criteria documents. As unionids are particularly sensitive to ammonia toxicity, this will have the effect of making the standard more stringent for waters where unionids are present.

A 2009 study by Dr. Terry Myers, funded by an Arizona Game and Fish Heritage Grant, found that there was evidence of wide spread pre-Columbian occurrence for unionids in Arizona, including the Colorado and Santa Cruz rivers, and more recent occurrences in the Little Colorado and San Pedro rivers and Chevelon Creek. Additionally, the study found that there are extant populations in the watershed of the Black River and in the White Mountains. Myers, T. L., *Pre-historical, Historical, and Recent Distribution of Freshwater Mussels (Unionidae: Anodonta) in*

the Colorado River and Río Yaqui Basins (with notes on Guzmán Basin, Río Sonoyta, Río Asunción/Magdalena, and Rio Grande). Arizona Game and Fish Department Heritage Grant Project # I07011 (2009) (on file with the Department).

Given the CWA goals to restore and maintain the integrity of the Nations waters, the widespread historic range of unionids, both in spatial extent and altitude, and the extant population in the White Mountains, it is important that ADEQ addresses ammonia toxicity to unionids, where they occur or where they could be reestablished.

For the aquatic and wildlife cold and warm water uses, unionids will be assumed to be present unless a study is performed demonstrating that they are absent and there is no historic evidence of their presence, or hydrologic modification has altered the flow regime in a way that would prevent their reestablishment. The aquatic and wildlife effluent dependent water use will apply standards that do not address unionid toxicity because effluent dependent waters (EDWs) are situated in channels that were dry prior to permitted discharge. Therefore, ADEQ proposes ammonia standards for EDWs only for the absence of unionid mussels. No ammonia standards are currently established for ephemeral waters. Because ephemeral waters are dry most of the year and unionid mussels cannot be present, ADEQ is not proposing ammonia standards for ephemeral waters.

The new ammonia standards are applicable by table in Appendix A as follows:

	A&Wc	*A&Ww*	*A&Wedw*	*A&We*
Acute & Mussels Present	New Table 11	New Table 12	None.	None.
Chronic & Mussels Present	New Table 13	New Table 13	None.	None.
Acute & Mussels Absent	New Table 14	New Table 15	New Table 15	None.
Chronic & Mussels Absent	New Table 17	New Table 16	New Table 16	None.

Modifications to Listed Surface Waters and Designated Uses [Appendix B]

Appendix B lists surface waters and their designated uses. ADEQ proposes non-substantive updates to Appendix B including name corrections, description updates, and removal of one waterbody listed in error. These updates are needed to be consistent with waterbody names in the National Hydrography Dataset, to make stream reach descriptions and lake locations more accurate, and to

remove errors to make Appendix B more accurate. One such error is the inclusion of Williams Ranch Tanks. Williams Ranch Tanks are two hydrologically isolated water tanks and not subject to Arizona's CWA jurisdictional authority. Also, one water body segment that was mistakenly omitted in the last triennial review process was re-inserted. This water body is in the Salt River watershed, a reach currently described as the "White Mountain Apache Reservation Boundary at 33°48'52"/110°31'33" to Roosevelt Lake," but which was previously called "Confluence of White River and Black River to Roosevelt Lake." *Triennial Review NFRM*, 14 A.A.R. 4708, 4921 (Dec. 26 2008); *but see* Triennial Review *NFRM*, 22 A.A.R. 2328, 2394 (Sept. 2, 2016). ADEQ is not removing Pretty Water Lake or its designated uses from Appendix B as originally proposed in the NPRM. ADEQ proposed to remove this waterbody because erroneous GIS data indicated that the lake was located in California and, therefore, outside of Arizona's CWA jurisdictional authority. The intended effect of this change was improve the accuracy of Appendix B without affecting waterbodies or corresponding interests within State boundaries. New information now indicates that the GIS location within California was incorrect, and that additional information will be needed before further changes can be made. Therefore, ADEQ is not removing or changing the listing for Pretty Water Lake at this time. This is consistent with the intended effects of the NPRM in that it does not remove protections from any waterbody, or affect corresponding interests, within the State.

ADEQ is proposing to change the names of the following waterbodies for clarification:

Watershed	Current Name	Proposed Name	Reason for Name Change
LC	Blue Ridge Reservoir	Cragin Reservoir	As part of the Arizona Water Settlement Act of 2004, the name of the reservoir was changed to honor C. C. Cragin
MG	Mountain Valley Park Ponds (EDW)	Yavapai Lake (EDW)	Correction; it was incorrectly modified during Mountain Valley Park construction
SP	Golf Course Pond	Mountain View Golf Course Pond	Correction; to indicate which golf course to which this pond belongs
VR	Stone Dam Lake	Masonry Number 2 Reservoir	Correction; Stone Dam Lake was an informal name, now corrected. Stone Dam is the name of the area where this lake located.

In the NPRM preamble, ADEQ indicated an intent to change the name of Pierce Seep and Unnamed Wash (EDW) to further differentiate between Pierce Wash and its tributary. However, ADEQ elected not to change these names, and these changes were not included in the full text of

the rules in the NPRM. ADEQ clarifies here that it is not changing the names of Pierce Seep and Unnamed Wash (EDW).

ADEQ is not proposing substantive changes to Appendix B because the underlying definition of Waters of the United States is so unsettled at this time. Understanding what the definition of "Waters of the United States" (WOTUS) is and what it means has been in flux since the 1972 CWA Amendments. The definition has been highly litigated over the years. The most influential recent Supreme Court case was *Rapanos v. United States*, 547 U.S. 715 (2006), which was a split decision that did not alleviate the confusion surrounding WOTUS interpretations. Since that case was decided, EPA issued the Clean Water Rule in 2015 to attempt to clarify WOTUS.

This 2015 rule was immediately challenged in court, and its implementation has been delayed by various legal mechanisms over the years. *See North Dakota v. United States EPA*, 127 F. Supp. 3d 1047 (D.N.D. 2015) (North Dakota District Court issued a stay of the rule, which is currently still applicable in 13 states, including Arizona, precluding applicability of rule until the court decides the challenge to the rule); *Murray Energy Corp. v. United States DOD* (In re United States DOD), 817 F.3d 261 (6th Cir. 2016) (6th Circuit Court of Appeals issued a nationally applicable preliminary injunction); *but see Nat'l Ass'n of Mfrs. v. DOD*, 138 S. Ct. 617, 199 L.Ed.2d 501 (2018) (Supreme Court reversed the lower circuit court's nationally applicable preliminary injunction decision); *see also Addition of an Applicability Date to 2015 Clean Water Rule*, 83 Fed. Reg. 5200 (Feb. 6, 2018) (final rule immediately delayed applicability of 2015 Clean Water Rule to Feb. 6, 2020); but *See generally Puget Soundkeeper All. v. Wheeler*, No. C15-1342-JCC, 2018 U.S. Dist. LEXIS 199358, at *1 (W.D. Wash. Nov. 26, 2018) (vacating the new applicability date, so that the 2015 rule is now applicable in numerous states, though not in those states affected by the *North Dakota v. United States EPA* stay noted above).

The current U.S. presidential administration has begun to implement a plan to delay, repeal, and replace the 2015 Clean Water Rule, for which EPA and the U.S. Department of the Army (Army) have already taken rulemaking action. *See* Executive Order 13778, signed on February 28, 2017, entitled "Restoring the Rule of Law, Federalism, and Economic Growth by Reviewing the 'Waters of the United States' Rule." Since the publication of the NPRM for this triennial review, EPA and the Army have published a proposed rule defining the scope of waters subject to federal regulation as Water of the United States. *See* 84 Fed. Reg. 4154 (Feb. 14, 2019).

Modifications to Site Specific Standards [Appendix C]

In 2016, ADEQ issued site specific standards for copper for Bright Angel Wash and Transept

Canyon. EPA disapproved these site specific standards in 2016. Therefore, ADEQ is repealing the standards in this rulemaking.

7. A reference to any study relevant to the rule that the agency reviewed and proposes either to rely on or not to rely on in its evaluation of or justification for the rule, where the public may obtain or review each study, all data underlying each study, and any analysis of each study and other supporting material:

The majority of the studies reviewed by ADEQ are the § 304(a) criteria for each pollutant. ADEQ has provided references and links to these studies, in context, in this preamble. For numeric standards changes, please refer to the modifications to Appendix A. ADEQ references other studies in their respective section explanation. ADEQ does not maintain a list of studies that it did not rely on after staff considered the abstract of those studies and dismissed them as irrelevant. Likewise, ADEQ has not tracked any studies it may have reviewed in connection with elements of the SWQS that were not changed in this rulemaking.

The following studies were reviewed by ADEQ but are not referenced elsewhere in the document:

Central Arizona Salinity Study (CASS) Concentrate Management Subcommittee *Central Arizona Salinity Study* (2006), available at: https://www.usbr.gov/lc/phoenix/programs/cass/pdf/Phase2/5ConMan.pdf. This report is the result of research, review, and evaluation of various concentrate disposal technologies and practices relevant to desalination efforts in Arizona. ADEQ reviewed this study during its preparation of the EIS. However, ADEQ did not rely on the information within this report because it was specific to desalination and not treatment of ammonia or other relevant parameters.

EPA, *Principles of Design and Operations of Wastewater Treatment Pond Systems for Plant Operators, Engineers, and Managers* (2011), available at: https://nepis.epa.gov/Exe/ZyPDF.cgi/P100C8HC.PDF?Dockey=P100C8HC.PDF. ADEQ reviewed this document while preparing the EIS. While ADEQ did not directly rely on this document within the EIS, it provided some general background regarding WWTP operations.

Tetra Tech. Inc. *Evaluation of Grab Sample Analysis for Assessing Chronic WQ Standards* (2006), on file with the Department. This document had previously supported use of grab samples.

EPA, *Aquatic Life Ambient Water Quality Criteria Cadmium* (2016), available at: https://www.epa.gov/sites/production/files/2016-03/documents/cadmium-final-report-2016.pdf. ADEQ relied on this report in setting the standard for Cadmium.

EPA, *Aquatic Life Ambient Water Quality Criteria Carbaryl* (2012), available at: https://www.epa.gov/sites/production/files/2015-08/documents/aquatic_life_ambient_water_quality_criteria_for_carbaryl_-_2012.pdf. ADEQ relied on this report in setting the standard for Carbaryl.

EPA, *Quality Criteria for Water* (1986), available at: https://www.epa.gov/sites/production/files/2018-10/documents/quality-criteria-water-1986.pdf. ADEQ relied on this report (known as the EPA "Gold Book") in setting the standard for Demeton.

EPA, *Aquatic Life Ambient Water Quality Criteria Diazinon* (2005), available at: https://www.epa.gov/sites/production/files/2019-03/documents/ambient-wqc-diazinon-final.pdf. ADEQ relied on this report in setting the standard for Diazinon.

ADEQ has made a good faith effort to determine whether it reviewed any other studies that were relevant to this rulemaking. ADEQ is not aware of any such studies, other than those identified above.

8. A showing of good cause why the rulemaking is necessary to promote a statewide interest if the rulemaking will diminish a previous grant of authority of a political subdivision of this state:

Not applicable. The proposed amendments do not diminish a previous grant of authority of a political subdivision of this state.

9. The economic, small business, and consumer impact statement:

This Economic, Small Business, and Consumer Impact Statement has been prepared to meet the requirements of A.R.S. § 41-1055.

A. An identification of the rulemaking:

The rulemaking addressed by this Economic, Small Business, and Consumer Impact Statement (EIS) consists of amendments made by the Arizona Department of Environmental Quality (ADEQ) to 18 A.A.C. 11, Article 1, in order to adopt and revise Surface Water Quality Standards (SWQS) within the State of Arizona as required under Section 303(c) of the Clean Water Act (CWA).

A.R.S. § 49-222 authorizes ADEQ to adopt surface water quality standards to prevent harm to public health and the environment from polluted water. These revised standards are to assure attainable water quality; provide for protecting the public health and welfare; enhance the quality of water in Arizona; and take into consideration the use and value of water for public water

supplies, the propagation of fish and wildlife, and recreational, agricultural, industrial, and other purposes, including navigation. ADEQ is required to adopt surface water standards that establish numeric limits on the concentrations of each of the 126 toxic pollutants listed by the Environmental Protection Agency (EPA) in 40 CFR Part 423, Appendix A under CWA § 307. Fish, wildlife, tourism, drinking water supplies, and other uses of water would be adversely affected if Arizona's surface water is polluted. To ensure protection of these uses, section 303(c) of the CWA requires ADEQ to review its water quality standards at least once every three years and to modify or adopt those standards as appropriate. This rulemaking is, therefore, needed to improve clarity, correct errors, better align the SWQS with recent changes to EPA standards, and to comply with federal and state law.

Importantly, if EPA determines that ADEQ's SWQS do not meet the requirements of the CWA, EPA will disapprove these standards and promulgate federal standards. 40 C.F.R. § 131.5(b). ADEQ has, therefore, developed the proposed SWQS to comply with federal and state law, and to avoid federally promulgated SWQS. In many cases, ADEQ's standards are developed based on EPA sources. For example, in 2013, the EPA issued a new aquatic and wildlife criteria document for ammonia, which recommended more stringent ammonia standards in some cases. EPA Office of Water, *Aquatic Life Ambient Water quality Criteria for Ammonia – Freshwater* (2013). As such, the costs from stricter ammonia criteria under the revised state standards would likely also accrue if the EPA were to promulgate ammonia standards for Arizona. Likewise, other criteria made more stringent in this rulemaking are also based on EPA documents, and costs related to those revised state standards could also accrue under revised federal standards. As such, ADEQ's position is that the benefits of this rulemaking outweigh the costs, and that similar costs could still likely accrue under federally-promulgated standards. Additionally, water quality criteria must be based on sound scientific rationale to protect the designated use, and not economic considerations. *See* 40 C.F.R. § 131.11(a). In light of the foregoing, ADEQ is not aware of any less intrusive or less costly alternative that would meet ADEQ's legal obligations.

B. A brief summary of the EIS:

ADEQ, Arizona pollutant discharge elimination systems (AZPDES) permit holders, and the general public will benefit directly and indirectly from this rulemaking. This rulemaking's clarifications and correction of errors should benefit everyone, but particularly AZPDES permit holders, who read and apply the rules. This rulemaking also lessens some standards, providing relief to some dischargers while still protecting designated uses. Additionally, this rulemaking ensures that clean water will be available as a source for drinking water, bathing, cooking, and

washing clothes, as well as meet safety standards for swimming, fishing, boating, wading, or other water-based recreation. All of these uses provide substantial social and economic benefits within the State.

The primary economic costs of this rulemaking will be borne by AZPDES permit holders, specifically wastewater treatment plants (WWTPs), and laboratories. While most WWTPs will not see serious negative effects, a small number will see moderate to substantial costs associated with one-time structural and process upgrades due to stricter ammonia standards. Additionally, laboratories that test for permit compliance will likely see moderate cost increases due to process development and one-time equipment upgrades to allow these facilities to test at some of the more stringent levels set by this rulemaking. However, ADEQ has estimated this range as moderate to substantial to account for uncertainties in estimating these costs expressed by some stakeholders. These costs could likely be passed on to customers. Because most AZPDES permit holders will not see serious negative costs because of this rulemaking, the cost increases should be relatively minor, and worth the substantial benefits of this rulemaking overall.

Additionally, as stated above, ADEQ is required to review and revise its SWQS under the CWA. Revised water quality criteria must be based on sound scientific rationale to protect the designated use, and not economic considerations. Were ADEQ to propose standards that did not comport with this or any other requirement of the CWA, EPA would reject those standards and promulgate federal standards which could carry similar costs to the present rulemaking.

C. Identification of the persons who will be directly affected by, bear the costs of, or directly benefit from the rules:

This rulemaking will affect ADEQ, political subdivisions, public and private entities operating under AZPDES general permits, AZPDES individual permit holders, and public and private laboratories that test for permit compliance. It will also create health, social, and economic benefits to the general public from access to clean water and protection of fish and wildlife.

SWQS are implemented by ADEQ through various general and individual permits under the AZPDES permitting program. Individual permit holders include public and private WWTPs, publically owned treatment works (POTW), fish hatcheries, power plants, mines, truck stops, drinking water plants, marinas, and Water Quality Assurance Revolving Fund (WQARF) remediation projects. Because this rulemaking's effects will be concentrated among WWTPs and POTWs, and are not likely to significantly affect other individual permit holders, ADEQ will divide its analysis between WWTP and non-WWTP individual permit holders. Entities operating under a

general permit include a wide range of persons and industries. Because these entities are not likely to be significantly affected by this rulemaking, ADEQ addresses this group as a whole within this EIS.

Based on the information above, ADEQ has identified the following list of affected persons

State and local government agencies

ADEQ,

Agencies operating under individual or general AZPDES permits

Political subdivisions

Political subdivisions generally, public WWTPs, POTWs, public laboratories

Non-WWTP government entities operating under AZPDES individual permits

Non-WWTP government entities operating under AZPDES general permits

Privately-Owned Businesses

Private entities operating under general permits

Private, non-WWTP individual permit holders

Private WWTPs

Private laboratories

The General Public

D. Cost/benefit analysis:

1. Part I - Cost/Benefit Stakeholder Matrix:

Estimates indicate the costs or benefits to individual entities, unless otherwise indicated.

Minimal	**Moderate**	**Substantial**	**Significant**
$10,000 or less	$10,001 to $1,000,000	$1,000,001 or more	Cost/Burden cannot be calculated, but the Department expects it to be important to the analysis.

Description of Affected Groups	Description of Effect	Increased Cost/Decreased Revenue	Decreased Cost/Increased Revenue
A. State and Local Government Agencies			
ADEQ	Possible increase in number of surface waters identified as impaired and corresponding changes in 303(d) listings and TMDLs.	Minimal	
	Possible cost to ADEQ of rulemaking process before issuing variances, as required by federal regulations.	Potentially moderate	
	Improved implementation and enforcement of the SWQS.		Significant
	Predictability, reduced transaction costs, and responsiveness to stakeholders from avoiding federally-promulgated SWQS.		Significant
	Compliance with state and federal law.		Significant
	Support of ADEQ's mission to protect and enhance public health and the environment.		Significant
Political subdivisions generally	Tax revenues and indirect benefits of clean water dependent industries (including outdoor recreation, tourism, etc.).		Cumulatively substantial
Public WWTP and/or POTW	Increased monitoring costs.	Significant	
	Evaluation of compliance with new standards	Minimal to moderate	
	Cost of compliance with stricter SWQS.	Moderate to substantial for a few permit holders	
	Improved implementation and enforcement of water quality standards by political subdivisions with pretreatment programs.		Significant
	Greater flexibility in mixing zones.		Significant
	Potential delays in issuing future variances.	Could be significant in the future for some permit holders	
	Cost savings due to less stringent standards.		

Description of Affected Groups	Description of Effect	Increased Cost/Decreased Revenue	Decreased Cost/Increased Revenue
Public laboratories	Clarification and correction of errors. Testing for stricter SWQS with accompanying costs.	Moderate to substantial	Significant Significant
Non-WWTP Government entities (individual permits)	Clarification and correction of errors. Cost savings due to less stringent standards. Greater flexibility in mixing zones. Potential delays in issuing future variances. Increased monitoring costs. Cost of compliance with stricter SWQS.	Could be significant in the future for some permit holders Minimal if any Minimal, if any	Significant Significant Significant
Non-WWTP Government entities (general permits)	Clarification and correction of errors. Cost of compliance with stricter SWQS. Cost savings due to less stringent standards.	Minimal, if any	Significant Significant
B. Privately Owned Businesses			
Private entities operating under general permits	Clarification and correction of errors. Cost of compliance with stricter SWQS. Cost savings due to less stringent standards.	Minimal, if any	Significant Significant
Non-WWTP individual permit holders (Power Plants, Mines, Marinas, etc.)	Clarification and correction of errors. Cost savings due to less stringent standards. Greater flexibility in mixing zones. Potential delays in issuing future variances. Increased monitoring costs.	Could be significant in the future Minimal if any	Significant Significant Significant

Description of Affected Groups	Description of Effect	Increased Cost/Decreased Revenue	Decreased Cost/Increased Revenue
	Cost of compliance with stricter SWQS.	Minimal, if any	
	Cost savings due to less stringent standards.		Significant
Private WWTP	Clarification and correction of errors.		Significant
	Cost savings due to less stringent standards.		Significant
	Greater flexibility in mixing zones.		Significant
	Potential delays in issuing future variances.	Could be significant in the future for some permit holders	
	Increased monitoring costs.	Significant	
	Cost of compliance with stricter SWQS	Moderate to substantial for a few permit holders	
	Cost savings due to less stringent standards.		Significant
Laboratories	Clarification and correction of errors.		Significant
	Testing for stricter SWQS with accompanying costs.	Moderate to substantial	
General Public	Economic and social benefits of clean water		Cumulatively substantial

2. Part II - Individual Stakeholder Summaries/Calculations:

This section outlines ADEQ's analyses of the estimated costs and benefits of this rulemaking, made after consultation with ADEQ staff, knowledgeable individuals in the area of wastewater treatment and monitoring, and examination of relevant records and reports.

ADEQ

ADEQ may incur minimal to moderate costs in implementing this rulemaking. It is possible that this rulemaking may lead to a change in the number of surface waters that are identified as impaired waters. This may result in corresponding changes in the number of 303(d) listings for impaired waters and Total Maximum Daily Load (TMDLs) that ADEQ would be required to complete under the CWA. ADEQ estimates that any costs associated with an increase in the

number of surface waters identified as impaired, and corresponding changes in 303(d) listings and TMDLs, would be minimal. Due to EPA changes to its regulations, however, all new variances must be in rule and will be required to go through the public rulemaking process. This rulemaking reflects this requirement. As this rulemaking process would require staff time for technical review, rule composition, and public input, the ADEQ could incur potentially moderate costs.

This rulemaking will likely create significant benefits to ADEQ because of improved clarity, corrected errors, and better alignment of the SWQS with recent EPA standards changes. As a result, ADEQ's responsibility for implementing and enforcing the SWQS will correspondingly improve. Additionally, ADEQ recognizes a significant benefit from the greater predictability, reduced transaction costs, and responsiveness to stakeholders from administering its own SWQS and avoiding federally-promulgated standards. By conducting this rulemaking, ADEQ complies with state and federal law, and promotes its mission to protect and enhance public health and the environment, all of which ADEQ recognizes as significant benefits of this rulemaking.

The Number of New, Full-Time Employees Necessary to Implement and Enforce the Proposed Rule

None

Political Subdivisions

Political subdivisions could likely receive cumulatively substantial benefits because of this rulemaking. However, some may also incur individual costs if they own or operate a WWTP or POTW, or operate their own laboratory. Analyses of the effects of this rulemaking on WWTPs and laboratories are included below. Based on those analyses, ADEQ estimates that some public WWTPs and public laboratories could see moderate to substantial costs.

As this rulemaking will better protect water quality, many political subdivisions may receive benefits in the form of tax revenues tied to the use of clean water. A recent technical report on the economic contributions in Arizona for water-based outdoor recreation alone indicates that benefits could be substantial. For example, state and local tax contributions from water-based outdoor recreation ranged among Arizona counties from approximately $3 million to $323.6 million. The Audubon Society, *The Economic Impact of Arizona's Rivers, Lakes, and Streams* (2019), available at: https://www.audubon.org/economic-impact-arizonas-rivers-lakes-and-streams. Notably, these numbers do not address other benefits of clean water, which include water-based outdoor recreation jobs, money spent on supporting industries, corresponding gross domestic product (GDP), and related taxation revenues. The Tempe Town Lake is another

significant example of how clean water can serve as a significant economic driver. In 2017 alone, the Tempe Office of Tourism estimates that visitors to the Tempe Town Lake spent $19.8 million in relation to events where participants were either in or on the lake. Data supplied by the Tempe Office of Tourism, on file with ADEQ. While the benefits from this rulemaking will not accrue equally across political subdivisions, the aggregated direct and indirect benefits of the SWQS to political subdivisions will likely be substantial.

There may be additional costs and benefits for some political subdivisions that have a pretreatment program under the CWA. The pretreatment program requires political subdivisions to control industrial wastewater discharged to the sanitary sewer before it is mingled with domestic wastewater and discharged at the treatment facility. These facilities, called POTWs, have the authority to establish water quality standards and issue permits to industrial facilities that discharge pollutants to the sanitary sewer to control industrial wastewater and ensure that water quality standards are met. Currently, 21 Arizona municipalities have pretreatment programs. POTWs may see significant benefits associated with improved implementation and enforcement of water quality standards and significant benefits from potential cost savings due to less stringent standards. However, they may also incur minimal to moderate costs in reviewing this rulemaking to ensure their own compliance and to evaluate the need to change limits and controls on local industrial wastewater to ensure compliance under their AZPDES permit. If changes are necessary, a POTW would make necessary changes to its future permits issued to industrial facilities or through its local regulations.

If a POTW or publically owned WWTP must incur costs to achieve compliance with these rules, then options exist for financial assistance. The Water Infrastructure Finance Authority (WIFA) is an independent agency in Arizona and is authorized to finance the construction, rehabilitation, and/or improvement of drinking water, wastewater, wastewater reclamation, and other water quality facilities and projects. Generally, WIFA offers borrowers below market interest rates on loans for 100 percent of eligible project costs. As a “bond bank,” WIFA is able to issue water quality bonds on behalf of communities for basic water infrastructure, providing significant savings due to lower interest rates and shared/reduced closing costs.

Non-WWTP Government Entities Operating under AZPDES permits

Other government entities function under AZPDES permits in addition to political subdivisions with WWTPs and/or POTWs. For example, some fish hatcheries owned by the Arizona Game and Fish Department operate under individual AZPDES permits, and the Department of

Transportation as well as individual counties conduct certain activities under general permits. Because the effects of this rulemaking will not be significantly different for these government entities as compared to other permit holders, an analysis of the costs and benefits to these entities is found in the sections regarding AZPDES non-WWTP individual permit holders and general permit holders. ADEQ estimates that some could see significant benefits from clarification and correction of errors, potential cost savings due to less stringent standards, and greater flexibility in mixing zones. Furthermore, costs from compliance with stricter SWQS and increased monitoring costs to these entities should be minimal, if there are any costs at all. As with other non-WWTP facilities, there is the possibility that some entities could experience some costs associated with delays in issuing future variances.

Private Entities Operating Under AZPDES General Permits

ADEQ estimates that private entities operating under AZPDES general permits could see significant benefits from clarifications and correction of errors in this rulemaking, and that the cost of compliance with more stringent standards will be minimal, if there is any cost at all.

Surface water quality standards are implemented, in part, through various general and individual permits under the AZPDES permitting program. General permits are best suited for regulation of numerous, similar facilities that pose little environmental risk, while individual permits are required of facilities and sources that have a potentially significant environmental impact. Below are the numbers of authorizations for the current five-year AZPDES general permits. Most of these permits are held by businesses:

AZPDES GENERAL PERMITS	
General Permit Category	**# Per Category**
Multi-Sector General Permit (MSGP)	791
Construction General Permit (CGP)	3416
Municipal Separate Storm Sewer System (MS4) (Phase I permits)	8
Municipal Separate Storm Sewer System (MS4) (Phase II permits)	48
De Minimis General Permit	128

Clarification and Correction of Errors

This rulemaking clarifies standards and corrects errors that existed in previous SWQS. While it is difficult to quantify a numeric value for such changes, ADEQ believes the clarifications and corrections represent a significant benefit to entities operating under general permits.

Cost of Compliance with More Stringent Standards and Costs Savings from Less Stringent Standards

There are potential impacts to entities operating under general permits; however, ADEQ does not expect these rule changes to affect significantly large numbers of permittees. The De Minimis permit regulates minor discharges resulting from specified activities and is generally restricted to discharges containing minimum pollutant amounts. The other four general permits regulate stormwater discharges primarily by requiring the use of best management practices (BMPs) to lessen pollutants. This rulemaking could impact a permit holder if a numeric standard becomes stricter, or if a water is listed as impaired under the new SWQS. Conversely, if standards become less stringent, permittees could see cost savings. A project located near an impaired water that seeks general permit coverage, especially the CGP and De Minimis, could see increased monitoring requirements or additional BMPs being required to protect water quality. For example, a small or medium MS4 is not typically required to monitor under the current general permit. This would change if the MS4 had to determine the source of a pollutant if its stormwater discharge contributed to an exceedance of a new water quality standard. Any facility permitted under a general permit with discharges that are above a new water quality standard could lose eligibility under the general permit and be required to seek an individual permit with more specific requirements. However, after consultation with ADEQ permitting staff, ADEQ expects only minimal, if any, impact to each permittee discharging under general permits. Additionally, these entities could see significant benefits from costs savings due to less stringent standards.

AZPDES Non-WWTP Individual Permit Holders

ADEQ anticipates that non-WWTP individual permit holders will see significant benefits from the clarification and correction of errors, cost savings due to less stringent standards, and greater flexibility in mixing zones. Furthermore, ADEQ anticipates that the cost of compliance with more stringent standards will be minimal, if there is any cost at all. ADEQ recognizes that potential costs could result from delays in issuing future variances.

Facilities and sources that do not qualify to operate under a general permit are required to obtain an individual permit. The table below shows the number of existing AZPDES individual permits, broken down by category type.

AZPDES INDIVIDUAL Permits	
By Flow Regime	**# of Permits**
Ephemerals (EDW), canals, industrial	122
Perennial	19
By Industry	**# of Permits**
Drinking water treatment plants & well discharges	7
Power Generation	7
Mining	6
WQARF/Remediation projects	4
Fish hatcheries	4
Truck Stops	2
Marinas	1
Industrial (other)	5
Waste Water Treatment Plants (WWTP)	105

Cost of Compliance with More Stringent Standards

ADEQ believes that the changes in these rules will affect a relatively small number of existing AZPDES individual permit holders. ADEQ made this assessment after consultation with ADEQ staff and analysis of discharge monitoring reports (DMR). Based on the foregoing, ADEQ estimates that the only significantly affected permit holders will likely be WWTPs. Other individual permit holders that do not operate a WWTP such as mines, power generation facilities, etc., are not anticipated to sustain significant costs. As such, ADEQ anticipates that the costs of compliance with the new SWQS amendments will be minimal, if they exist at all, for all individual permit holders except those who operate WWTPs.

In the event that a permit holder's discharges would exceed the SWQS, options to delay, defray, or minimize the costs of coming into compliance are offered in the existing rules. Permit conditions are reviewed and revised as applicable when permit holders apply for renewal, usually every five years. These permit holders would incur costs if their discharge contains pollutants in a concentration that results in an exceedance of a new surface water quality standard. A permit holder may request a compliance schedule in a permit when a facility cannot meet a new water quality standard. This allows the facility time to evaluate, design and construct treatment or other means of meeting the new standard. Permit holders may also apply for mixing zones and variances.

Clarification and Correction of Errors

This rulemaking clarifies standards and corrects errors that existed in previous SWQS. While it is difficult to quantify a numeric value for such changes, ADEQ believes the clarifications and corrections represent a significant benefit to AZPDES individual permit holders.

Costs Savings Due to Less Stringent Standards

ADEQ has made a number of water quality criteria less stringent under this rulemaking. In some instances, depending on the designated use of a waterbody, ADEQ has raised criteria for certain parameters significantly. In cases where a permit holder is required to treat for such parameters, the less stringent standards could translate to reduced costs. Such reduced costs will necessarily vary based on the individual circumstances of permit holders, and ADEQ does not have data that would quantify the scope of those reduced costs. However, a cost benefit analysis would not be complete without accounting for such benefits. ADEQ, therefore, estimates cost savings due to less stringent standards as a potentially significant benefit to some permit holders.

Greater Flexibility in Mixing Zones:

Occasionally, due to design and economic constraints, permit holders may need to discharge certain pollutants at concentrations that exceed SWQS, using dilution by the receiving water to ameliorate toxicity. ADEQ has made changes to the mixing zone provisions in the SWQS that more accurately define the conditions of the mixing zone and allow dischargers greater flexibility in the design of the mixing zone while still protecting the environment. This may benefit dischargers that need time to come into compliance with the SWQS while stipulating that there will be no acute toxicity to aquatic organisms due to the issuance of the mixing zone. While valuation of the benefits of mixing zones is case-specific and difficult to estimate, greater

flexibility in mixing zones represents a significant benefit to permit holders directly affected by this rulemaking.

Potential Delays in Issuing Variances:

Due to changes in EPA regulations on the issuance of variances to water quality standards, all new variances must be in rule and will be required to go through the public rulemaking process. This rulemaking reflects this requirement. This may have the effect of delaying the issuance of a variance, which could create some costs to the discharger. However, a variance would ultimately allow time for upgrades to meet the SWQS. Currently, no facilities are operating with a variance. While it is difficult to quantify the costs of the changes to the variances rule, ADEQ does not anticipate any immediate costs. However, ADEQ recognizes that the requirement could potentially create a significant cost to some future dischargers.

Increased Monitoring Costs

ADEQ estimates that the cost of increased monitoring for non-WWTP individual permit holders will be minimal, if there is any cost at all. The SWQS will require some permit holders to monitor at more stringent levels for some pollutants which will increase monitoring costs in some cases. The cost of increased monitoring will vary based on individual circumstances of different facilities. After analysis of DMR data, ADEQ does not expect that non-WWTP facilities will see increased monitoring costs associated with the SWQS. To be sure, it is possible that non-WWTP could see indirect cost increases if laboratories pass on costs of testing for lower detection limits to all customers. However, ADEQ estimates that increased monitoring costs for non-WWTP individual permit holders will be minimal, if there are any costs at all.

WWTPs

As is the case with non-WWTP individual permit holders, ADEQ anticipates that WWTPs will realize significant benefits from the clarification and correction of errors, cost savings due to less stringent standards, and greater flexibility in mixing zones. However, ADEQ anticipates that some WWTPs could see increased monitoring costs and moderate to significant costs of compliance with more stringent standards. ADEQ also recognizes that there is potential for some costs due to delays in issuing future variances.

Increased Monitoring Costs

The SWQS will require some WWTPs to monitor at more stringent levels for some pollutants which will likely require increased monitoring costs in some cases. The cost of increased

monitoring will vary based on individual circumstances of facilities and laboratories. For example, the size of a system and the frequency of monitoring will directly influence the cost, with larger systems or systems who monitor more frequently spending more. Additionally, if laboratories are required to purchase new instrumentation to test at more stringent standards, then those laboratories may increase monitoring prices for WWTPs to offset those costs. Smaller laboratories may be more likely to raise prices where larger ones may be less likely. As such, it is very difficult to estimate how monitoring prices may increase. ADEQ has been unable to quantify these costs, but estimates that they could be significant.

Cost of Compliance with More Stringent Standards

Compliance costs for a typical WWTP can be difficult to estimate because of the various contributing factors. Depending on the interplay of these factors, costs of this rulemaking could range from moderate to substantial for some WWTPs.

ADEQ recognizes that changes in some rules will have more direct impact on WWTPs than other rule changes. The new standard with the highest probability to affect WWTPs is that for ammonia. These new numeric water quality standards for ammonia in surface waters may result in new water quality-based discharge limitations in AZPDES permits for WWTPs discharging to existing perennial waters, with accompanying costs. Of Arizona's 141 AZPDES individual discharge permits, 122 will not be adversely affected by the new ammonia standards, and of those, 61 will have less stringent ammonia standards. Of the 19 permits that will receive stricter ammonia standards, an analysis of DMR data indicates that only four may have issues treating to the new standard. Of those four, ADEQ estimates that only one will have significant difficulties meeting the standard.

Ammonia, a regulated pollutant, is a component of total nitrogen. Total nitrogen in wastewater is typically composed of ammonia, nitrate, organic nitrogen, and soluble organic nitrogen. Nitrogen in the form of ammonia is highly toxic to aquatic life. For wastewater treatment plants that have no other management options to achieve compliance with the ammonia standard, the most cost-effective method of ammonia removal is accomplished through the advanced treatment of biological nutrient removal (BNR) processes. The biological processes that remove the various forms of nitrogen from wastewater are called nitrification and denitrification.

A 2006 EPA report provided costs for BNR upgrades to existing WWTPs in Connecticut and Maryland. EPA, *Biological Nutrient Removal Processes and Costs* (2006), available at: https://www.epa.gov/sites/production/files/documents/criteria_nutrient_bioremoval.pdf. The total

costs of BNR retrofits in Connecticut ranged from $649,320 to $22,074,225 (2006 dollars, $810,722 to $27,561,246 adjusted for inflation). This report demonstrated that site-specific factors such as existing treatment system layout and space availability may cause costs to vary significantly between treatment plants with the same design capacities that are implementing the same type of BNR treatment upgrade. In general, the study showed that despite this variability in costs, the unit cost per mgd generally decreased as the size of the WWTP increased due to economies of scale. EPA calculated the average unit capital costs for BNR upgrades at the Maryland and Connecticut WWTPs as follows:

Average Unit Capital Costs for BNR Upgrades at MD and CT Wastewater Treatment Plants		
Flow (in mgd)	**Cost / mgd (in $2006)**	**Cost/ mgd adjusted for inflation**
> 0.1 – 1.0	$6,972,000	$8,705,000
> 1.0 – 10.0	$1,742,000	$2,175,000
> 10.0	$588,000	$734,000

Another, more recent study indicated that, for 15 WWTPs in Massachusetts, New Hampshire and Vermont, the predicted costs of installing low-cost biological nitrogen removal retrofits and associated operational changes could range, from $88,514 to $745,033 ($95,333 to $802,431 adjusted for inflation). JJ Environmental, *Final Report - Low Cost Retrofits for Nitrogen Removal at Wastewater Treatment Plants in the Upper Long Island Sound* Watershed (2015), available at: http://longislandsoundstudy.net/wp-content/uploads/2015/05/LIS-Low-Cost-Retrofit-Final-Report-March-2015-revised.pdf. In light of these reports, ADEQ anticipates that the costs for wastewater treatment upgrades to provide ammonia and nitrate removal for facilities in need of such upgrades could range from moderate to substantial, depending on the circumstances of those facilities.

Laboratories

Outreach by ADEQ to knowledgeable persons in the laboratory industry indicates that this rulemaking could create moderate to substantial costs to Arizona-based laboratories. Many of these laboratories do not currently have equipment capable of testing at some of the levels set in this rulemaking. This is not an issue in cases where the Limit of Quantitation (LOQ) is higher than the applicable standard. In those cases, the analytical method with the lowest LOQ would be used. Additionally, not all labs test for all criteria in the SWQS. However, where current analytical methods are capable of testing for a new standard, laboratories that test for that criteria would be required to meet the new standard. One local laboratory indicates that, in cases where

new equipment could allow laboratories to test at certain more stringent levels, costs could begin at around $150,000 per instrument, with multiple instruments needed. Another local laboratory roughly estimated its costs of investing in new technology at $200,000. Hiring new staff could also be required. Additionally, some of the changes to the SWQS would require new method development by labs to test at the more stringent levels, which could raise the cost of monitoring. Notably, however, not all of the standards identified as presenting large costs to laboratories have changed in this rulemaking. For example, the pollutant Aldrin was identified as potentially costing thousands to meet the standard for fish consumption, however, that standard was not modified in this rulemaking. Indeed, this rulemaking raised the Aldrin full body contact standard. Regardless, in those cases where this rulemaking does create costs due to more stringent standards, costs will vary based on the size of the facility. In light of the foregoing, ADEQ, expects moderate costs to some to laboratories. However, in recognition of the difficulty in estimating these costs, and the uncertainty expressed by some stakeholders, ADEQ has conservatively estimated these costs as moderate to substantial.

In cases where a small laboratory is unable to invest in new equipment, small laboratories may contract with other laboratories who are able to test certain parameters at the more stringent levels required by the SWQS. These contract laboratories would likely be large, well-established national firms. However, in other cases, small laboratories that cannot test at more stringent standards may potentially lose business to, or in the extreme case, be bought out by larger, more capable firms.

E. A general description of the probable impact on private and public employment in business agencies, and political subdivisions of this state directly affected by the rulemaking:

ADEQ estimates that, for the most part, this rulemaking will not have an impact on public or private employment. However, some facilities may be required to hire additional staff or contract with professionals to install and maintain new equipment when additional equipment is required to comply with this rulemaking, which would represent a positive impact on employment. ADEQ also recognizes the fact that employment could be negatively impacted in a case where an employer's costs would reduce funds available to pay employees and contractors. For example, if a small laboratory is unable to test at the levels required by this rulemaking and loses business to a large firm, there could be a resulting negative impact on employment. However, should that lab be bought out by a larger firm, any negative effect on employment could be negligible if the larger firm keeps on former employees.

F. A statement of the probable impact of the rules on small business:

In this EIS, ADEQ uses the term "small business" consistent with A.R.S. § 41-1001(21), which defines a "small business" as a concern, including its affiliates, which is independently owned and operated, which is not dominant in its field and which employs fewer than one hundred full-time employees or which had gross annual receipts of less than four million dollars in its last fiscal year.

1. An identification of the small business subject to the rules:

Among the stakeholders listed above, many meet the definition of small business as set forth in A.R.S. § 41-1001(21). For example, ADEQ estimates that all of the 24 privately owned WWTPs, a significant number of general permit holders, most small laboratories in the state, and others are small businesses. However, as a group, not all small businesses will be equally affected by this rulemaking, and ADEQ estimates that most will not be affected at all. ADEQ estimates that the small businesses that will be negatively affected by this rulemaking will be privately owned WWTPs and small laboratories. However, as set forth above, other small businesses may see benefits from this rulemaking associated with clarification and correction of errors, cost savings due to less stringent standards, and greater flexibility in mixing zones.

2. The administrative and other costs required for compliance with the rules:

Compliance costs associated with this rulemaking will vary based on the stakeholder involved. ADEQ's examination of compliance costs for private WWTPs and small laboratories is addressed in the cost benefit analysis above.

3. A description of the methods that the agency may use to reduce the impact on small businesses, as required in A.R.S. § 41-1035:

a. Establishing less stringent compliance or reporting requirements in the rule for small businesses:

Under the CWA, economic considerations may not be considered when choosing data and deriving aquatic and wildlife criteria values for toxic pollutants. The rules, however, allow the application of measures such as schedules of compliance, variances, water effects ratio studies, mixing zones and site specific standards to address specific chemical exceedances that cannot be successfully managed by the permit holder, including small businesses.

b. Establishing less stringent schedules or deadlines in the rule for compliance or reporting requirements for small businesses:

The SWQS do not set compliance or reporting requirements. However, schedules of compliance and variances may be used by dischargers, including small businesses, to extend the time needed to come into compliance with new water quality standards.

c. Consolidating or simplifying the rule's compliance or reporting requirements for small businesses:

The SWQS do not set compliance or reporting requirements. However, the State has developed an online permitting and compliance reporting portal called MyDEQ. MyDEQ offers the regulated community, including small businesses, a digital solution to better assist them in meeting their environmental priorities and responsibilities with an easy online tool, that is available at all times to meet business needs.

d. Establishing performance standards for small businesses to replace design or operational standards in the rule:

The proposed SWQS do not establish design or operational standards for permit holders.

e. Exempting small businesses from any or all requirements of the law:

The Clean Water Act makes no allowances for exemptions to water quality standards due to the size of the business. ADEQ has no authority to exempt small businesses from the requirement to comply with surface water quality standards. However, as previously stated, the rules provide other methods for reducing the immediate impact for dischargers, including small businesses.

4. The probable costs and benefits to private persons and consumers who are directly affected by the rules:

While some consumers and private persons may see higher utility bills in some cases, ADEQ anticipates the negative impact will be small because, for the greatest part, the amendments will not substantially increase existing AZPDES compliance costs. AZPDES permittees affected by a change of standard may apply for compliance schedules, mixing zones, variances or low-cost WIFA loans to address any increased

cost, alleviating or amortizing any cost to the consumer. However, overall, ADEQ estimates that the SWQS will provide substantial benefits across the State.

Consumers and the public may have to pay higher utility bills for sewer services in communities where WWTP upgrades are required to comply with new or revised water quality standards. In particular, customers served by wastewater treatment plants that discharge to perennial waters may be affected by the proposed adoption of numeric water quality standards that will limit discharges of ammonia.

ADEQ estimates that this rulemaking could provide substantial benefits to private persons and consumers within the State. Clean and safe water serves as an economic driver within the State for industries that rely on it to provide jobs, income, and pay state and local taxes. For example, the 2018 economic output of retail spending related to Arizona outdoor recreation along waterways and related multiplier effects has been estimated at approximately $13.5 billion. The Audubon Society, *The Economic Impact of Arizona's Rivers, Lakes, and Streams* (2019), available at: https://www.audubon.org/economic-impact-arizonas-rivers-lakes-and-streams. Additionally, water-based recreation was estimated to support 114,000 jobs, and to have provided $4.5 billion in household income and $1.8 billion in tax revenues. *Id.* SWQS also support agricultural productivity by protecting water quality for agricultural irrigation and livestock watering. A 2014 economic analysis of Arizona agriculture reported that agribusiness in the state contributed $17.5 billion to state output, and supported more than 88,000 jobs. Kerna and Frisvold, *Agriculture in Arizona's Economy: an Economic Contribution Analysis* (2014), available at: https://cals.arizona.edu/arec/sites/cals.arizona.edu.arec/files/publications/aginazeconomy2014%2012-9-14spreads.pdf. Additional economic benefits from clean water are realized in property values as illustrated by property development surrounding Tempe Town Lake, which is reported to have generated nearly $2 billion in economic impact since its opening. City of Tempe Website, *Economic Impact* (accessed April 16, 2019), available at: https://www.tempe.gov/government/community-services/tempe-town-lake/town-lake-financial-and-regulatory-information/economic-impact. Good water quality that meets water quality standards is essential to maintaining and enhancing the economic values realized in the state through water-based outdoor recreation, agriculture, and property values. Additionally, this calculation does not account for the social value that the public

places on clean water. Therefore, ADEQ estimates that the cumulative benefits of this rulemaking to private persons and consumers could be substantial.

G. A statement of the probable effect on state revenues:

This rulemaking should not result in a significant decrease in state revenues. As the proposed rule requires that variances must be made through formal rulemaking in order to comply with state and federal law, this rulemaking could create a moderate cost to ADEQ. Other increased and decreased costs to ADEQ are expected to be minimal, as explained above in the analysis of costs and benefits to ADEQ. Because most AZPDES permit holders will not be affected by this rulemaking, ADEQ does not anticipates a significant decrease in business activity in the state or a corresponding loss of state tax revenues.

H. A description of any less intrusive or less costly alternative methods of achieving the purpose of the rulemaking:

Under Section 303(c) of the CWA and implementing regulations, ADEQ must review and revise its SWQS. These standards must protect public health or welfare, enhance the quality of water, and serve the purposes of the CWA. This means that SWQS 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 the use and value of water for public water supplies, recreation in and on the water, and agricultural, industrial, and other purposes including navigation. 40 C.F.R § 131.2. State law imposes similar requirements of SWQS as well. A.R.S. § 49-222. EPA will review ADEQ's SWQS to determine if they are consistent with the requirements of the CWA. 40 C.F.R. § 131.5. If EPA determines that ADEQ's SWQS do not meet the requirements of the CWA, EPA will disapprove ADEQ's SWQS and promulgate federal standards. *Id.* at (b). ADEQ has, therefore, developed the proposed SWQS to comply with federal and state law, and to avoid federally promulgated SWQS. Thus costs related to this rulemaking will likely accrue within Arizona under either state or federal standards. Additionally, water quality criteria must be based on sound scientific rationale to protect the designated use, and not economic considerations. *See* 40 C.F.R. § 131.11(a). In light of the foregoing, ADEQ is not aware of any less intrusive or less costly alternative methods that would meet ADEQ's legal obligations.

I. A description of any data on which the rule is based with a detailed explanation of how the data was obtained and why the data is acceptable data:

<u>Mixing Zone Rule Modifications</u>

ADEQ established definitions for critical flow conditions for discharges and receiving waters and modified its mixing zone requirements based on Arizona Mixing Zone Water Quality Standards (Jun. 2018) (on file with ADEQ and available at: http://static.azdeq.gov/wqd/tri_rev_mixing_memo.pdf), EPA's Technical Support Document for Water Quality-based Toxics Control (1991), available at https://www3.epa.gov/npdes/pubs/owm0264.pdf, EPA's Water Quality Standards Handbook, Chapter 5 (Sept. 2014), available at: https://www.epa.gov/sites/production/files/2014-09/documents/handbook-chapter5.pdf, EPA's NPDES Permit Writers' Manual (Sept. 2010), available at https://www.epa.gov/sites/production/files/2015-09/documents/pwm_2010.pdf, Mixing Zone Guidance for Chronic Toxicity and Zones of Initial Dilution (2nd Rev., May 1992), available at: https://www.epa.gov/sites/production/files/2014-12/documents/wiwqs-mixing-zone.pdf, recommendations from a technical memorandum prepared for ADEQ by PG Environmental, available at: http://static.azdeq.gov/wqd/tri_rev_mixing_memo.pdf, conversations with PG Environmental staff, as well as ADEQ's expertise and training.

Data provided in EPA Water Quality Standards, handbooks, manuals, technical support, and other guidance are developed and published by EPA to reflect accurate scientific and technical knowledge regarding the establishment and implementation of water quality standards. PG Environmental provides technical expertise in the water sector to state and federal agencies and prepared its technical memorandum for ADEQ based on a comparative analysis of common mixing zone approaches used in other states and on PG Environmental's experience implementing mixing zones in NPDES permits. ADEQ staff are experts in their fields with significant educational and practical experience.

Modifications to Numeric Water Quality Standards

ADEQ uses a hierarchical approach when considering data for use in the derivation of human health water quality standards. Many of the Clean Water Act Toxic and Priority Pollutants have no reference doses (RfDs) or cancer potency slope factors (CPSFs) published in the EPA's Integrated Risk Information System (IRIS) database. Because of this, ADEQ uses the following ordered list of peer reviewed toxicological data when IRIS RfDs and CPSFs are not available:

- Provisional Peer-Reviewed Toxicity Values (PPRTV) used in EPA's Superfund Program.
- Minimal Risk Levels by the Agency for Toxic Substances and Disease Registry (ATSDR).

- California Environmental Protection Agency (CalEPA) values.

While these toxicity values are not expressly developed for the derivation of water quality standards for EPA listed Toxic and Priority Pollutants, they provide valuable, peer reviewed benchmarks which allowed ADEQ to derive water quality standards for the protection of human health where otherwise there would be none.

ADEQ is very careful when selecting surrogate toxicity values to use in the derivation of water quality standards. All data used in the derivation, and the toxicity values themselves must undergo rigorous peer review, including independent external peer review. The EPA IRIS database is always the first choice for toxicity values when they are available. If an RfD or CPSF is listed in the IRIS database, the data are considered adequate and have undergone internal and independent peer review. IRIS values are intended to be used by all EPA programs and are only listed after undergoing cross programmatic evaluation.

Provisional Peer-Reviewed Toxicity Values (PPRTV) are developed according to EPA Standard Operating Procedures (SOPs) and are derived after a review of the relevant scientific literature using the same methods, sources of data, and Agency guidance generally used by the EPA IRIS Program in the development of RfDs and CPSFs. All provisional toxicity values receive internal review by EPA scientists and external peer review by independently selected scientific experts. Minimal Risk Levels are developed as a part of ATSDR's Congressional mandate to produce toxicological profiles (TPs) for hazardous substances found at National Priorities List (NPL) sites. The studies utilized in the development of these TPs are held to the highest standards of data collection, and the peer-review process validates that they are scientifically accurate and reflect current scientific or laboratory best practice with consistent, factual results. The proposed MRLs derived as a part of the TP development undergo a rigorous review process. They are reviewed by ATSDR's toxicologists, a panel of external peer reviewers, an interagency MRL workgroup, with participation from other federal agencies, including NCEH (CDC's National Center for Environmental Health), ATSDR, NTP (National Toxicology Program), NIOSH (National Institute of Occupational Safety and Health), and EPA; and are then submitted for public comment.

The California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA) is statutorily mandated by the State of California to carry out human health risk assessments on commercially available pesticides and other toxicants. OEHHA follows EPA risk assessment methodology closely through the Standards and Criteria Work Group

(SCWG), a Cal/EPA Intra-agency group. All studies go through both an internal (OEHHA) and external peer review process pursuant to Health and Safety Code Section 116365(c)(3)(D).

Because Arizona separates the fish and water consumption uses in the Surface Water Quality Standards, ADEQ must calculate water quality standards for Fish Consumption using bioconcentration factors (BCF) from EPA documents or from the technical literature. Arizona has more than 27 different species of sport fish that can be taken and consumed by Arizona anglers. Each of those species occupies a different locus in the aquatic food web, depending on the community composition of each individual waterbody. Because of this variability in species, community composition and food web structure, the BCF value is, by necessity, a broad estimate.

If EPA data are not available, data is gathered from peer reviewed journals, the Extension Toxicology Network (EXTOXNET) and the U.S. National Library of Medicine among other sources. If multiple studies are available or a range given, a rounded mean is calculated for use in deriving standards.

10. A description of any changes between the proposed rulemaking, to include supplemental notices, and the final rulemaking:

R18-11-101(36)

- To remove ambiguity in the definition, removed "From these criteria, the Director identifies reference biological assemblages of macroinvertebrates and algae and calculates the Arizona Indexes of Biological Integrity." Added the phrase "Reference biological assemblages of macroinvertebrates and algae are collected from these reference condition streams for calculating the Arizona Indexes of Biological Integrity thresholds."

R18-11-107.01(B)(3)

- Changed "AZDES" to "AZPDES" to correct a typographical error.

R18-11-120(B)

- Added "~~grab~~" to correct an inadvertent omission in the NPRM.
- Added "last" in place of "least" to correct for an inadvertent typographical error in the NPRM.

- In response to Comment 25, and to resolve an oversight in the language of the NPRM, clarified that under the enforcement rule, except for chronic aquatic and wildlife criteria, the department will determine compliance with numeric water quality standard criteria from the analytical result of a single sample "unless additional samples are required under this article."

- In order to clarify that the enforcement rule does not apply to exceedances of a permit, in response to Comment 23, added, "For the purposes of this section, a "non-permitted discharge violation" does not include a discharge regulated under an AZPDES permit."

Appendix A, Table 1

- For the parameter Benz(a)anthracene, changed "0.47" to "47" to correct a typographical error in response to Comment 63.

- For the parameter 3,4 Benz(a)anthracene, changed "3,4 Benz(a)anthracene" to "Benzo[b]fluoranthene" to make consistent with the name used in the EPA list of Priority Pollutants, in response to Comment 33.

- For the parameter Cadmium, removed "see table" in the columns for A&Wc Acute (µg/L), A&Ww Acute (µg/L), A&Wedw Acute| (µg/L), and A&We Acute (µg/L), and replaced it with "See Table 2" to clarify the language.

- For the parameter Cadmium, removed "see table" in the columns for A&Wc Chronic (µg/L), A&Ww Chronic (µg/L), and A&Wedw Chronic (µg/L), and replaced it with "See Table 3" to clarify the language.

- For parameter Chloronaphthalene beta, removed "Chloronaphthalene beta" and replaced with "beta-Chloronaphthalene" to correct an inadvertent error in response to Comment 34.

- For parameter Chromium (Total), removed "100 T" from the columns FBC (µg/L), and PBC (µg/L) because the State currently has PBC and FBC standards for Chromium III and VI, in response to Comment 67.

- For parameter "DDT and its breakdown protucts," removed "protucts" and replaced with "products" to correct a typographical error.

- For parameter Demeton, in the columns for A&Wc Chronic (µg/L), A&Ww Chronic (µg/L), and A&Wedw Chronic (µg/L), removed "0.01" and replaced with "0.1" to correct a typographical error in response to Comment 68.

- For parameter 1,4-Dichlorobenzene, in the column FBC (µg/L), removed "~~373,333~~ 373" and replaced with "373,333." In column PBC (µg/L), removed "~~373,333~~ 373" and replaced with "~~373.333~~ 373,333." This was done to correct typographical errors in the standards, the NPRM, and in response to Comment 69.

- For parameter Malathion, in the column FC(µg/L), removed "103" and replaced with "1,455" to correct a typographical error in response to Comment 59.

- For parameter Mirex, in column PBC (µg/L), removed "~~187~~ 0.26" and replaced with "187" to reflect the IRIS RfD (0.0002) for mirex, in response to comment 70.

- For parameter N-Nitrosodiphenylamine, renamed as "N-nitrosodi-n-phenylamine" to correct a typographical error in response to Comment 35.

- For parameter Nonylphenol, in the columns for A&Wc Acute (µg/L), A&Ww Acute (µg/L), A&Wedw Acute| (µg/L), and A&We Acute (µg/L), removed "27.8" and replaced with "28" to represent a rounding up of the 27.8 value, in response to comment 71.

- For the parameter Tetrachlorobenze,1,2,4,5, renamed the parameter "1,2,4,5-Tetrachlorobenzene" to correct an inadvertent error, in response to Comment 38.

Appendix A, Table 4

- In the column Chronic Aquatic and Wildlife coldwater, warmwater and edw, removed "~~19.8~~ <u>10.8</u>" and replaced with <u>19.8</u> to correct a typographical error, in response to Comment 66.

Appendix A, Table 11

- Inserted language to clarify the application of the ammonia standard, in response to Comment 78.

- Inserted a comma to correct a typographical error in the formula at the end of the table.

Appendix A, Table 12

- Inserted language to clarify the application of the ammonia standard, in response to Comment 78.
- Inserted parentheses to correct a typographical error in the formula at the end of the table.

Appendix A, Table 13

- Inserted language to clarify the application of the ammonia standard, in response to Comment 78.

Appendix A, Table 14

- Inserted language to clarify the application of the ammonia standard, in response to Comment 78.
- Inserted a comma to correct a typographical error in the formula at the end of the table.

Appendix A, Table 15

- Inserted language to clarify the application of the ammonia standard, in response to Comment 78.

Appendix A, Table 16

- Inserted language to clarify the application of the ammonia standard, in response to Comment 78.

Appendix A, Table 17

- Inserted language to clarify the application of the ammonia standard, in response to Comment 78.

Appendix B

- Removed reference to “Steele Indian School Pond,” and replaced with previous name, “Indian School Park Lake” in response to Comment 87.
- Renamed “Jack’s Canyon Creek” to “Jacks Canyon Creek,” “Havasu Canyon Creek” to “Havasu Creek,” and “Martinez Creek” to “Martinez Wash,” as well as references thereto, to conform with USGS topographic maps.
- Removed errant period in MG Salt River description.

- ADEQ is not removing Pretty Water Lake or its designated uses from Appendix B as originally proposed in the NPRM. ADEQ proposed to remove this waterbody because erroneous GIS data indicated that the lake was located in California and, therefore, outside of Arizona's CWA jurisdictional authority. The intended effect of this change was to improve the accuracy of Appendix B without affecting waterbodies or corresponding interests within State boundaries. New information now indicates that the GIS location within California was incorrect, and that additional information will be needed before further changes can be made. Therefore, ADEQ is not removing or changing the listing for Pretty Water Lake at this time. This is consistent with the intended effects of the NPRM in that it does not remove protections from any waterbody, or affect corresponding interests, within the State.

11. An agency's summary of the public or stakeholder comments made about the rulemaking and the agency response to the comments:

Comment 1: Pima County Administrator – Designated Uses

ADEQ has rejected Pima County's request to designate existing uses. We would like to urge ADEQ to designate, in this Triennial Review, at least the warm-water aquatic wildlife uses on County conservation lands we own (see attached table). ADEQ proposes to defer consideration until the next Triennial Review. We find no basis in the Clean Water Act to defer protection of existing uses of surface waters.

We have livestock and warm-water aquatic wildlife uses in Pima County that are not currently being protected. ADEQ's response to our request (Attachment 4) does not provide any further protection for Pima County's wildlife. It is not clear why existing wildlife uses on our lands must wait for recognition until ADEQ is considering other wildlife uses elsewhere in the state. Our aquatic sites are discrete and unrelated to other aquatic wildlife waters in the state. We recognize that ADEQ may benefit from considering livestock watering in a state-wide context, but again question the legal basis for deferring any designation of an existing use on lands we own in fee.

ADEQ Response 1:

ADEQ did not propose substantive changes to Appendix B in this triennial review because the underlying definition of Waters of the United States is so unsettled at this point. The EPA and the U.S. Department of the Army have recently proposed a new definition of Waters of the United States that could provide greater clarity in the future. For this reason, ADEQ did not add any additional waters or designated uses to Appendix B during this triennial review.

ADEQ notes, however, that a water body need not necessarily be listed in Appendix B to receive the protection of water quality standards. Under the Tributaries Rule, aquatic and wildlife standards (among others) are applied to tributaries of listed surface waters. AAC R18-11-105. Thus, for tributaries of listed surface waters in Pima County (as well as elsewhere in the State), protections for aquatic and wildlife apply.

ADEQ also appreciates the efforts by Pima County to identify additional AgL uses. The methodology proposed by Pima County will require further evaluation before ADEQ can make a determination that a use is presently being attained. ADEQ would be required to provide documentation justifying how its consideration of the use and value of the water support the State's action. 40 C.F.R. § 131.10(a). A use attainability analysis could be used to meet this requirement, which ADEQ would also be required to conduct. *Id*; 40 C.F.R. § 131.10(j)(1). Such an analysis would require a structured, scientific assessment of the factors affecting the attainment of the use, which could include physical, chemical, biological, and economic factors. 40 C.F.R. § 131.3(g). Additionally, ADEQ will be required to consider water quality standards of any downstream waters. 40 C.F.R. § 131.10(b). Therefore, ADEQ will include these topics for review in the next triennial review.

Comment 2: Pima County Administrator – Public Hearing Requested

We ask that ADEQ hold a public hearing on the proposed rule in Tucson. We appreciate the public meetings that ADEQ has held in Tucson. All have been well-attended, and each has afforded ADEQ the opportunity to hear the preferences and experiences of local citizens in a way that is different from computer-assisted, WebEx meetings which have proved difficult to administer.

ADEQ Response 2:

ADEQ held stakeholder meetings in both Phoenix and Tucson to gather input throughout the triennial review process. ADEQ concluded this process with a recorded hearing in Phoenix to allow stakeholders to submit formal comments. ADEQ appreciates the desire for a public hearing in Pima County. However, during the public comment period, stakeholders are encouraged to submit written comments anytime during the comment period, and attend the public hearing as their schedules allow. Written comments receive the same weight as oral comments made at a hearing. Stakeholders may also contact ADEQ staff at any time, not just during the comment period, to discuss or submit letters or emails regarding any issues of concern to stakeholders.

Comment 3: Pima County Administrator –Protection for Outstanding Waters

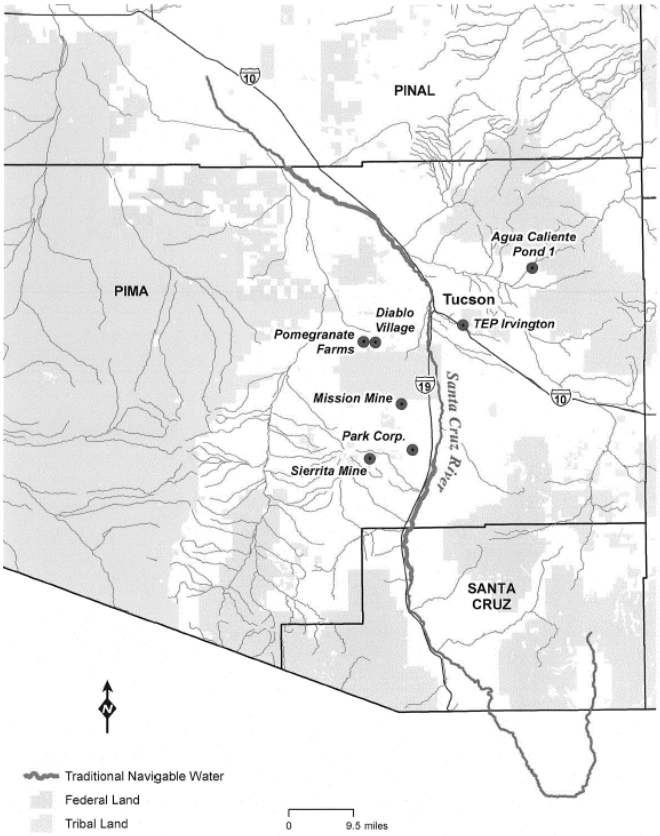
We are gratified to see that this proposed rule does not reduce any existing protections for Outstanding Waters per se.

ADEQ Response 3:

Thank you for the comment. ADEQ did not propose any revisions to the OAW rule during this triennial review.

Comment 4: Pima County Administrator – The Surface Water Definition Must Not be Narrowed

The proposed narrowing of the surface water definition to Navigable Waters, a term which is further defined in statute to mean Waters of the U.S., in the current rule proposal is of grave concern. Arizona needs to maintain a definition of surface water in the water quality rule that is expansive enough to include all surface waters that constitute "waters of the state" in accordance with that statutory definition in A.R.S. §49-201(41). The existing definition is sufficiently broad to allow ADEQ to develop rules for waters of the state, which would be distinct from Waters of the U.S. The proposed restriction of the definition is not. For this reason, we oppose narrowing the definition of surface waters in Rule 18-11. As you know, many streams and water bodies have already been classified by the U. S. Army Corps of Engineers as lacking sufficient connection to a traditionally navigable Water of the U. S. to merit continued regulation under the Clean Water Act. My staff has mapped the locations in Pima County where the U. S. Army Corps of Engineers has determined certain water bodies are no longer Waters of the U.S. *[Map provided in Attachment 5, a black on white version is presented below]* Because ADEQ has not adopted any rules for these and other surface waters in Arizona that are no longer Waters of the U.S., the state cannot continue to regulate the discharge of pollutants at these locations via the existing Clean Water Act permits. ADEQ has compiled a state-wide inventory of waterbodies listed in Appendix B that are no longer regulated under the Clean Water Act, along with those that may no longer be regulated under the existing definition of Waters of the U.S. Narrowing the definition of surface water to exclude waters of the state while retaining waters of the state in Appendix B, as is currently proposed, will create an inaccurate record.



ADEQ Response 4:

As stated in the preamble discussing the change to the definition of "surface water," under the section titled "*New or Modified Definitions [R18-11-101]*," the definition of "surface water" in Article 1 has been intended, throughout the years, to align with the federal definition. This is because the definition establishes the foundation upon which ADEQ's federally based programs are built. Unless specifically authorized by the legislature, in applying these federal programs, ADEQ must be consistent with and no more stringent than the corresponding federal law. *See* A.R.S. §§ 49-104(A)(16); 49-255.01(B). These federal programs are established to protect waters of the United States. These are the only waters for which the federal government shares oversight jurisdiction with the state under the CWA. Therefore, our interpretation of the definition of "surface water" in A.A.C. Title 18, Chapter 11, Art. 1 must be consistent with the federal definition.

Water quality standards under the CWA apply to waters of the United States. Because of this, it is important to be clear which waters are currently federally jurisdictional. This ensures that NDPES

and other CWA program requirements are met and that communication between the state and EPA, in its oversight role, is clear.

For example, under the Clean Water Act, the discharge of any pollutant by any person from any point source into waters of the United States is prohibited unless the source has a NPDES permit. *See* 33 U.S.C. § 1311(a). ADEQ has primacy over the NPDES program in Arizona, called AZPDES. NPDES permits must include appropriate limitations to ensure that water quality standards established under the CWA will be met in the event that technology-based CWA-required treatment is not enough to ensure the attainment of such standards. *See* 33 U.S.C. § 1311(b)(1)(C). EPA has the opportunity to review and object to permits that do not adequately meet water quality standards. *See* 33 U.S.C. § 1342(d). It is important then that it is clear over which waters and standards EPA has authority to review and object to a permit in order to prevent confusion and rework.

ADEQ also notes that future adjustments to Appendix B may be needed as the definition of waters of the United States becomes clearer. However, as stated in the preamble, ADEQ is not making substantive changes to Appendix B because the underlying definition of waters of the United States is so unsettled at this point. Until the scope of waters of the United States is clearer, changes made to Appendix B could lead to further confusion and inaccuracies. ADEQ, therefore, declines to make substantive changes to Appendix B.

Comment 5: Pima County Administrator – Adopt Water Quality Standards for Waters of the State

Arizona Revised Statutes §49-203 gives ADEQ the authority to adopt standards for waters of the state determined through future Approved Jurisdictional Determinations or federal Waters of the U.S. rule changes. We urge ADEQ to adopt water quality standards for streams that would allow for continued and uniform enforcement of the standard so that these could be applied to new or existing discharges of pollutants to streams (or tributaries of streams) that lose Waters of the U.S. status. The increasing discrepancy between regulated versus non-regulated stream reaches is confusing and potentially dangerous to applicants who propose to discharge into watercourses. A change in the definition of Waters of the U.S. could result in the loss of any protection to a watercourse. If further changes to the definition occur due to lawsuits, which are anticipated, there is a risk to the discharger. By developing water quality standards for the waters of the state, this risk is reduced since protections to these water bodies will remain. Counties in the state of Arizona cannot fill the governance gap left by the continued erosion of the Clean Water Act's

scope because the power to regulate discharges of pollutants is reserved to the state. State assumption of the current Corps' role in determining jurisdiction will not fill the gap. Indeed, if the state takes up the Corps' role, the state may well accelerate the growth of this emerging class of unregulated streams and lakes.

Because of the need for addressing the growing number of streams and lakes that are no longer regulated under the Clean Water Act, ADEQ should more fully develop in rule the ability to regulate pollutant discharges to waters of the state that are no longer deemed waters of the US.

ADEQ Response 5:

Thank you for your comment. ADEQ notes that while it currently does have the authority to create standards for waters of the state that are not waters of the United States (i.e. federal "navigable waters" under the CWA), ADEQ would need additional authority to broadly implement such standards at this time. *See* A.R.S. § 49-221(B). ADEQ acknowledges the recommendation for a waters of the state program, and intends to evaluate the possibility of pursuing such a program. Any development of such a program would be preceded by significant interaction with stakeholders and the general public.

Comment 6: Pima County Administrator – Use the Aquifer Protection Program

Arizona already has a well-established Aquifer Protection Program (APP) that regulates the release of pollutants to isolated bodies of water where there is a reasonable probability that the pollutant may reach an aquifer. We urge ADEQ to use the APP to establish permitting for point source discharges to waterbodies that are waters of state that are not Waters of the U.S. The APP is a permit program that could be adopted to utilize surface water standards identified in rule for waters of the state in order to set permit limits and regulate facilities in a similar manner to what is now done in the AZPDES program. Because of the need for addressing the growing number of streams and lakes that are no longer regulated under the Clean Water Act, ADEQ should more fully develop in rule the ability to regulate pollutant discharges to waters of the state that are no longer deemed waters of the US.

ADEQ Response 6:

Were the WOTUS definition to change as is currently being proposed, the existing APP program would offer protection to the level of the Aquifer Water Quality standards for discharges that have a reasonable probability of reaching an aquifer. As stated in prior responses, ADEQ intends to evaluate the possibility of establishing a waters of the state program. Adapting the existing

APP program may be one avenue by which non-WOTUS waters of the state could be provided protection; this option and others identified by ADEQ and via the associated stakeholder engagement process will be further explored in the course of that evaluation.

Comment 7: Pima County Administrator –Public process: Notification of rulemaking

Comment: ADEQ notification process biases its outreach to members of the regulated community. ADEQ should make an effort to provide a more general notification to affected communities at the beginning of each Triennial Review. ADEQ should broaden its notification methods, prior to the release of this year's public rule.

ADEQ Response 7:

Thank you for your comment. ADEQ is currently revaluating its Triennial Review process flow and will consider this recommendation in its reevaluation of the process. However, ADEQ notes that the mailings have been sent out to thousands of interested persons for each public stakeholder meeting and notification of draft or proposed rules for this rulemaking. The last mailing for the proposed rule and comment period went out to 5,407 recipients.

Comment 8: Pima County Administrator –Tribal engagement

Issue: Changes proposed by ADEQ could affect many streams that cross tribal lands.

Comment: Outreach and engagement with tribes is appropriate.

ADEQ Response 8:

Thank you for your comment. The rulemaking process is open to all residents of the state, including tribes, with the corresponding ability to engage and participate. During this current triennial review, ADEQ sent notices to representatives of Tribal Nations with an invitation to participate. Additionally, ADEQ is actively working to improve its tribal consultation policy and engagement processes.

Comment 9: Pima County Administrator – ARS 49-221, AAC R18-11-101 (41) Surface Water Definition

Issue: Current definition of "Surface water" within AAC R18-11-101 (41) is broader than CWA.

Comment: ADEQ should propose and adopt rules to provide water quality standards for waters of the state, instead of narrowing the definition to align with WOTUS. Past decisions of the U. S.

Army Corps have identified waters of the state that are not Waters of the US (WOTUS). Narrowing the definition to mean only navigable waters will change which watercourses are regulated under these rules. Even without the rule revision, the Corps are determining more streams non-navigable each year.

The term "surface waters" should include all above-ground waters in the state with "navigable waters" as a subset covering those surface waters subject to federal jurisdiction. Non-WOTUS surface waters in the state demand protection. Writing them out of the "surface water" definition makes that impossible.

The definition of WOTUS is still unclear in most parts of the state. The Corps' AJDs are made only on a project-level, not a watershed level; this piecemeal approach is another reason why aligning to WOTUS decisions should be deferred, at least until and unless ADEQ is able to assume the jurisdictional determinations.

ADEQ has not afforded the public an opportunity to understand the consequences of changing this definition. This idea was rejected by the designated-use workgroup because of the uncertainty in the direction of the national WOTUS rule.

We note that Appendix B still includes waters of state that the Corps has determined are not waters of the US. Narrowing the surface water definition while retaining the current Appendix B creates unresolved inconsistencies, indeed inaccuracies, within the rule itself. Allowing for the adoption of rules to provide water quality standards for waters of the state will preserve the protections to waters in Appendix B.

ADEQ Response 9:

Thank you for your comment. Please see Responses 4 and 5 above.

ADEQ has consistently interpreted the definition of "surface water" to mean "waters of the United States." Indeed, the existing standards were developed and approved under CWA authority. Therefore, there is no practical difference between applying statutory definition of "navigable waters" and the current rule definition. The analysis on the ground is the same and is based on federal guidance and case law.

In the event that the definition of waters of the United States should narrow, ADEQ would not be authorized to implement AAC R18-11-101 et seq. standards as they are currently applied. To systematically implement waters of the state standards, ADEQ would need additional statutory authority.

Comment 10: Pima County Administrator – Effluent Dependent Water Definition

Issue: Current definition of "Effluent Dependent Water" (EDW) within AAC R18-11-101 (17).

Comment: Revise to provide greater clarity for effluent dependent water definition.

ADEQ Response 10:

During its review of the surface water quality standards, ADEQ established an Antidegradation and Effluent Dependent Waters (EDW) workgroup to provide technical recommendations regarding the antidegradation rule and EDW definition. The workgroup produced a document with its final recommendations, available on the ADEQ website at https://azdeq.gov/node/3933. In that document, the workgroup agreed that the EDW definition should be revised to account for infrequent, short-duration discharges that may not establish an effluent dependent water. However, there was no consensus as to the exact frequency or duration required to create an EDW.

In addition to the inability to agree on a specific definition for EDW, ADEQ identified a number of other issues that complicated any effort to revise the EDW definition. One such issue was that further research regarding frequency, duration, and volume of discharges, as well as a study of stream ecosystems created by point source discharges, would be needed to scientifically support a modification. For example, some stakeholders suggested that the EDW definition should be revised to define an EDW as a waterbody that consists of a discharge that continues for longer than 14 days more than two times per year. However, it is unclear how the suggested duration and frequency was determined, and there are likely instances in which a permittee may discharge for shorter periods than 14 days much more frequently than twice per year. Another issue was that if the definition of EDW were to change, that would change the application of the surface water quality standards. Therefore, ADEQ would need to ensure that any change for each applicable water body would be justifiable under the Clean Water Act. See 40 C.F.R. § 131.10(a). Because of the complex issues surrounding a change to the EDW rule, ADEQ elected not to modify the definition of EDW in this triennial review. ADEQ will consider this issue in the next triennial review.

Comment 11: Pima County Administrator – AAC R18-11-101(30) Perennial Definition

Issue: Current definition of "Perennial water" within AAC R18-11-101(30).

Comment: We support this change.

ADEQ Response 11:

Thank you for your comment. ADEQ notes that it is not proposing changes to the definition of "perennial water" at this time.

Comment 12: Pima County Administrator – Wastewater Definition

Issue: Current definition of "Wastewater" within AAC R18-11-101 (48), which defines by exclusion. At Pima County's request, ADEQ amended the workgroup charter to discuss topic of

Comment: Provide greater clarity for wastewater definition relevant to the applicability of effluent dependent water.

ADEQ Response 12:

In meetings of the Antidegradation and EDW workgroup (discussed in Response 10), there was also a suggestion that the definition of wastewater should be modified to mean only effluent from a sewage or industrial wastewater treatment facility. This was because EDW criteria were established based on studies and assumptions related to discharges of effluent from municipal wastewater treatment plants. However, "wastewater" as used in Chapter 11, Article 1 has a broader meaning than just treated water. Rather, the word is used to describe the water discharged from a point source, which may not always be treated. ADEQ is required to regulate all non-exempted discharges of pollutants from point sources, whether the discharged water is treated or not. *See* 33 U.S.C. § 1311(a). Therefore, considering the use of "wastewater" throughout Chapter 11, Article 1, and its broad meaning, the term cannot be limited to only treated water.

In the 2008 triennial review, ADEQ explained that "wastewater" is a broader term than "treated wastewater" and must be applied broadly to comply with CWA requirements. 14 AAR 4713 (December 20, 2008). Depending on the particular circumstance, the discharge of untreated wastewater from a point source may still comply with applicable standards, regulations, and permit conditions. The 2008 triennial review used the example of a point source discharge consisting of untreated cooling wastewater from a power plant to ephemeral water. However, "discharge of wastewater" as used in the rules is more limited than "discharge of pollutants" because wastewater is defined by what it is not, excluding certain classes of pollutant discharges (e.g. stormwater). ADEQ considered modifying the term "wastewater," but could not find a different term that adequately accounted for everything that "wastewater" is, as it is used in this

article. Therefore, ADEQ intends to retain the term “wastewater” as it is currently defined.

Comment 13: Pima County Administrator – R18-11-102 Applicability to Riparian Projects

Exempt riparian restoration projects. The rationale for this change is that riparian restoration projects as described would be using high-quality recycled water, and would be operated in a manner that would prohibit discharge to surface water under normal operating conditions. In addition, ADEQ already has the Recycled Water Rules permit program, under which these facilities may be reviewed and approved for permit.

ADEQ Response 13:

ADEQ appreciates the comment. The addition of the suggested new exemption listing under R18-11-102 is a new idea which would take considerable time to evaluate. Therefore, ADEQ recommends submitting the idea for consideration in the 2022 triennial review. However, ADEQ notes that surface water quality standards apply to align with federal law. Under the Clean Water Act, the discharge of any pollutant by any person from any point source into waters of the United States is prohibited unless the source has a permit to do so. *See* 33 U.S.C. § 1311(a). If a project is anticipated to produce a discharge regulated under CWA, and is not authorized to do so, the discharge would be a violation of the CWA. ADEQ cannot exempt a class of likely dischargers to a water of the United States from its water quality standards, nor could EPA approve such an action.

Comment 14: Pima County Administrator –R18-11-102 Applicability to Pits

At Issue: (B)(2) A man-made surface impoundment and any associated ditch and conveyance used in the extraction, beneficiation, or processing of metallic ores that is not a surface water or is located in an area that once was a surface water but is no longer a surface water because it has been and remains legally converted, including

a. A pit,

Comment: ADEQ should remove the exemption in the rule R18-11-102.B.2. (Applicability) that exempts pit lakes from surface water quality standards. These should be considered waters of the state.

ADEQ Response 14:

The surface water quality standards contained in R18-11-1 only apply to a surface water. As stated in R18-11-101, a surface water is defined as a water of the United States. Since 102(B)(2) specifically relates to waters that are not or are no longer surface waters, the surface water quality standards do not apply. As such, the surface water standards set forth in Title 18, Chapter 11, Article 1 will not apply to any pit that is not a surface water. Although ADEQ has authority to adopt water quality standards for waters of the state, there is no current rule-making process to adopt state standards. However, ADEQ will engage stakeholders on any future rule-making.

Comment 15: Pima County Administrator –AAC R18-11-105, Appendix B, Designated Uses

Issue: NO ACTION to update Appendix B to improve the accuracy of designated uses. ADEQ by letter informed Pima County that they will defer until a future TR.

Comment: Define new designated uses to tributaries where warranted to protect existing uses on County-owned lands. We have AgL and A&Ww uses in Pima County that are not being protected by ADEQ's response to our request dated 12/18/2018 (attached). There is no reason why existing wildlife uses on our lands must wait for recognition until ADEQ is considering other wildlife uses elsewhere in the state.

Likewise, amend Appendix B to better identify the isolated lakes and ponds that have already been determined to be waters of the state by the Corps. Consider creation of a separate Waters of the State list (possibly adding an Appendix C) so it is clear that associated designated uses are no longer protected under the Clean Water Act.

ADEQ Response 15:

ADEQ did not propose substantive changes to Appendix B because the underlying definition of Waters of the United States is so unsettled at this point. The EPA and the U.S. Department of the Army have recently proposed a new definition of Waters of the United States that could provide greater clarity in the future. ADEQ also notes that the Army Corps of Engineers does not make waters of the State determinations.

As for additional designated use determinations, please see Response 1.

Comment 16: Pima County Administrator –AAC R18-11- 107.01(C)(4) Tier 3

Issue: Proposed to move OAW language in (C)(4) into its own new section (C)(5) and clarify

occurrence of temporary impacts cannot be “regularly occurring” The proposed change broadens the allowance of temporary impacts to Tier 3 protected OAWs so that it would include discharges beyond those regulated under §404 which require §401 approval.

Comment: The suggested use of the term “regularly occurring” in an attempt to better clarify the occurrence of temporary impacts instead invites further confusion. We do support the move of OAW language in (C)(4) into its own new section (C)(5).

ADEQ Response 16:

ADEQ understands the comment to mean that AAC R18-11-107.01(C)(4) will apply to §404 discharges that may affect existing water quality in an OAW, and not only those that require §401 approval. This is consistent with the text of the rule. ADEQ proposed moving the allowable temporary impacts from R18-11-107.01 (C)(4) into its own section (C)(5) in early triennial review discussions, but that proposal was not included in the NPRM nor will it be part of the NFRM. ADEQ’s position is that the term “regularly occurring” serves to better show what qualifies as a temporary water quality impact. While ADEQ declines to define the term in the rule, ADEQ notes here that the intent is to protect OAWs from impacts that may be less than 6 months in duration but occur every 3 months, for example.

Comment 17: Pima County Administrator –AAC R18-11-107.01 Tier 2

Consideration should be given to broaden Tier 2 antidegradation standards to include intermittent streams, as well as ephemeral reaches that are directly adjacent to or tributary to intermittent or perennial streams during the Triennial Review.

ADEQ Response 17:

ADEQ has established that the most current, scientifically defensible methodology for allocating a Tier class is by flow-regime. Significant degradation for a Tier 2 water is determined at critical flow conditions, R18-11-107.01(B)(2). R18-11-101(13) defines critical flow condition as the "lowest flow condition over seven days that has a probability of occurring once in ten years (7Q10)." Since both ephemeral and intermittent waters have extended periods of no flow, it is not possible to determine if significant degradation to water quality would occur when there is no water in the stream channel. Tier 1 antidegradation protection is therefore applied to ephemeral and intermittent waters unless an intermittent water is an OAW, where Tier 3 would apply.

Comment 18: Pima County Administrator – AAC R18-11-107.01(B)(3)(c) Tier 2 baseline

Issue: To renumber the Baseline Characterization section from R18-11-107.01(B)(3)(c) to R18-11-107.01(B)(3)(a).

Comment: We support this change.

ADEQ Response 18:

Thank you for the comment.

Comment 19: Pima County Administrator –AAC R18-11- 107(D) OAW

Issue: The anti-degradation policy prohibits any degradation of an OAW, requiring existing water quality to be maintained and protected as a "Tier 3" water.

Comment: We support the current language preventing degradation of OAWs, and are pleased to see that ADEQ rejected Hudbay's proposal to weaken protections for these streams.

ADEQ Response 19:

Thank you for the comment.

Comment 20: Pima County Administrator –R18-11-109(A).

Issues:

- New standard "Statistical Threshold Value" replaces "Single Sample Maximum" and is ambiguous regarding the confidence intervals.
- Provide SWQS consistent with scientific studies.

Comment: ADEQ proposes to use the new term "statistical threshold value" (STV) in place of "single sample maximum" (SSM). While STV is consistent with EPA's criteria, the new term is confusing because it implies the data must be evaluated statistically, instead ADEQ means that the number 410 was statistically derived. Clarification can be provided by 1) adding a footnote to the term that STV means SSM or 2) adding a new definition for STV in R18-11-101.

ADEQ Response 20:

As Pima County noted, ADEQ is removing the term "Single Sample Maximum" and replacing it with "Statistical Threshold Value" in R18-11-109(A) to be consistent with EPA's 2012 Recreational Water Quality Criteria. Pima County is correct that the Statistical

Threshold Value is statistically derived based on the 90th percentile distribution of the water quality data used to calculate the geometric mean criteria. Using the 90th percentile statistical value accounts for natural variability while limiting the number of allowable exceedances prior to determining a water is impaired. The Single Sample Maximum values were often interpreted to be "never to exceed" thresholds. That interpretation is more stringent that the 1986 Beach Act intended. As such, ADEQ declines to define the Statistical Threshold Value as the Single Sample Maximum as this could perpetuate this misunderstanding. However, ADEQ reiterates that the commenter is correct that the Statistical Threshold Value is a static number for purposes of these rules.

Comment 21: Pima County Administrator – Antidegradation reviews for CWA 401 certifications

Issue: ADEQ is proposing modification to antidegradation criteria to ensure there will be a legal mechanism to account for review of 404 permits issued by state. For state-issued 404, 401 does not apply and certification is not required.

Comment: Arizona's water bodies are principally ephemeral streams. Perennial waters are few in number, and their chemical, physical and biological integrity is greatly affected by the more numerous ephemeral and intermittent tributaries cited here, and attached for your convenience. Because of these relationships, and the extreme variability in our climate (also discussed in the attached paper), it makes little sense to limit Tier 2 designations based on rigid and imperfect distinctions on flow regime. Consideration should be given to broaden Tier 2 antidegradation standards to include intermittent streams, as well as ephemeral reaches that are directly adjacent to or tributary to intermittent or perennial streams during the Triennial Review.

ADEQ Response 21:

The comment here does not seem to relate directly to the issue identified above it. Regarding that issue (antidegradation of 404 permits issued by the state), please see the explanation in the preamble for the modifications to R18-11-107.01 and the response to Comment 29. As for broadening Tier 2 antidegradation review, please see Response 17.

Comment 22: Pima County Administrator – R18-11-112(D)(1) OAW

Criteria for flow regime and "free-flowing condition" was added in 2002 rulemaking. Support deletion of flow regime criterion entirely. Most states do not use this as a criterion. Most streams in Arizona are not perennial, but there is limited information about intermittency. Because of

this, and the extreme variability in our climate, it makes little sense to limit based on rigid and imperfect classification of flow regime.

ADEQ Response 22:

ADEQ acknowledges the concern regarding use of perennial or intermittent flows as a criterion for OAW nomination; however, ADEQ is not proposing any revisions to the OAW rule during this triennial review. This flow regime question was the subject of Charter Question #4 of the OAW Workgroup convened in November 2017 to analyze the OAW rule and provide recommendations to ADEQ. Workgroup members did not reach consensus, but did identify three positions: 1) drop the flow requirement provision entirely, 2) retain the current language, and 3) limit OAW designations to perennial waters only. For more information, the Workgroup discussion was summarized in the "Final Recommendations" document, posted on the ADEQ website at http://azdeq.gov/node/3933. ADEQ will consider the Workgroup recommendations during the next triennial review.

Comment 23: Pima County Administrator – R18-11-120: Enforcement

Issue: Delete an enforcement provision in R18-11-120(a) and (d). Alter (b) and (c).

Comment: If ADEQ merely wants to clarify that exceedances from permitted discharges are not subject to enforcement due to the permit shield, then that would be consistent with federal law for numeric standards. But the current wording is not entirely clear, so we oppose it as written. This could be discussed during the next Triennial Review.

ADEQ Response 23:

ADEQ recognizes that some ambiguity existed in the proposed rule and has added language to the enforcement rule to clarify that it will not apply to discharges regulated under a permit.

As stated previously by ADEQ, the enforcement rule at R18-11-120 does not apply to permit violations. In its response to comments in the 2002 triennial review rulemaking, ADEQ stated that this rule did not apply to discharge limitations in NPDES permits or how EPA enforces those permit conditions." *NFRM,* 8 A.A.R. 1264, 1393 (Mar. 29, 2002). Likewise, now that ADEQ has obtained federal approval of its AZPDES program, this enforcement rule does not apply to exceedances of limits or noncompliance with conditions in current permits.

In order to clarify this point, ADEQ has added the following language to subsection (B):

> For the purposes of this section, a "non-permitted discharge violation" does not include a discharge regulated under an AZPDES.

Additionally, the commenter postulates that ADEQ is attempting to clarify that "exceedances from permitted discharges are not subject to enforcement due to the permit shield…." ADEQ wishes to make clear that this rule does not apply to the application of a permit shield, and that any inference that the enforcement rule or statements made in this rulemaking articulate a standard for application of a "permit shield" for permitted facilities is incorrect. A permit shield protects permit holders from certain legal liabilities, provided the relevant permit holder complies with the terms of its permit. CWA § 402(k); see also A.R.S. § 49-255.01(F); A.A.C. R18-9-A904(A). Any application of a permit shield would necessarily involve compliance with a permit, and ADEQ has made clear that this enforcement rule does not apply to discharges regulated under a current permit. Therefore, this rule does not and cannot create any standard for application of a permit shield.

Comment 24: Arizona Mining Association (AMA) - AMA Supports ADEQ's Proposed Change to the Definition of "Surface Water" in R18-11- 101.

ADEQ proposes to change the definition of "surface water" in R18-11-101(45) to mean "navigable waters" as defined in A.R.S. § 49-201(22). AMA supports this change. A.R.S. § 49-201(22) defines "navigable waters" to correspond with the federal definition of "waters of the United States" (WOTUS) under the CWA. The proposed revision to the regulatory definition of "surface water" will allow it to be consistent with governing state and federal law and provide needed flexibility in light of the uncertainty surrounding the federal WOTUS definition.

By contrast, retaining the current definition would create confusion, as that definition is not consistent with (1) the scope of WOTUS as implemented in Arizona today (using guidance issued by EPA and the Corps following the Supreme Court's decision in *Rapanos v. United States*, 547 U.S. 715 (2006)); (2) the scope of WOTUS included in the 2015 definition of WOTUS adopted by EPA and the Corps (but not applicable in Arizona as a result of an injunction issued in *State of North Dakota et al. v. United States*, 127 F. Supp. 3d 1047 (D.N.D. 2015)); and (3) the scope of WOTUS included in the rule recently proposed by EPA and the Corps (84 Fed. Reg. 4154 (February 14, 2019)).

ADEQ correctly notes in the preamble that the existing surface water quality standards have historically been designed to align with federal requirements and implement the federal definition. ADEQ has been quite clear on this point in the past. *See, e.g.*, 8 Ariz. Admin. Reg.

1264, 1273 (March 29, 2002) ("the surface water quality standards apply to "navigable waters" as defined in the Clean Water Act. That is, they apply to waters of the United States.") (preamble to final 2002 triennial review rules). This is more than a matter of administrative discretion; the process followed by ADEQ to adopt the existing standards is one mandated under the Clean Water Act *only* for navigable waters as defined in that statute (*i.e.*, waters of the United States). *See* 40 C.F.R. § 131.3(i) (defining "water quality standards" as uses and criteria adopted "for the waters of the United States"). Moreover, even though ADEQ does possess the authority to adopt standards for "waters of the state" that do not constitute waters of the United States, it must follow a somewhat different process when doing so. Specifically, in adopting standards for waters of the state that are not waters of the United States, ADEQ must consider additional factors that it need not consider when adopting standards for waters of the United States. *See* A.R.S. § 49-221(B). ADEQ has not evaluated those additional factors when adopting the existing surface water quality standards in Title 18, Chapter 11, Article 1.

For all the foregoing reasons, AMA supports the proposal to modify the definition of "surface water" in A.A.C. R18-11-101 to track the definition of "navigable waters" provided in A.R.S. § 49-201 and used to implement Clean Water Act programs.

ADEQ Response 24:

Thank you for your comment.

Comment 25: Arizona Mining Association - AMA Strongly Disagrees with ADEQ's Proposed Changes to the Enforcement Rule, R18-11-120, and the Preamble Language Regarding the Scope and Applicability of the Rule

ADEQ proposes to modify R18-11-120 to "clarify that enforcement for all numeric standards, except for [aquatic and wildlife] chronic standards, would be determined by analysis of a single sample." 25 Ariz. Admin. Reg. 177, 186 (Feb. 1, 2019). This proposal plainly lacks any basis in law or fact, is inconsistent with existing water quality standards and must be abandoned. The illegality of the proposed revisions is demonstrated by the fact that multiple water quality standards expressly require more than one sample for purposes of determining compliance. For example:

- Suspended sediment concentration — must be determined from "a minimum of four samples collected at least seven days apart." A.A.C. R18-11-109(D).

- Nutrient criteria — must be determined from "[a] minimum of 10 samples, each taken at least 10 days apart in a consecutive 12-month period," which are then used to determine a 90th percentile that 10 percent of the samples may not exceed. A.A.C. R18-11-109(F).

Additionally, AMA has serious concerns with ADEQ's preamble language relating to the scope and applicability of R18-11-120. First, ADEQ states that this rule "should only apply to non-permitted discharges." 25 Ariz. Admin. Reg. at 186. This statement and the discussion that follows appear to reflect confusion between compliance with water-quality based effluent limitations for discharges subject to individual AZPDES permitting and compliance with water quality standards in the receiving water. R18-11-120 does not apply to "discharges" at all; it applies only to compliance with water quality standards in the receiving water. This remains true both in the permitted and non-permitted context. For example, if a permit includes a condition that requires sampling in the receiving water body, the sampling requirements specified in the applicable water quality standard would apply—such as "four samples collected at least seven days apart" in the case of suspended sediment. For ADEQ to attempt to modify the enforcement rule to avoid or override the sampling requirements in the water quality standards is arbitrary and unsupportable.

Second, ADEQ states that the enforcement rule is "not intended for CWA assessment purposes." 25 Ariz. Admin. Reg. at 186. This clearly contradicts agency statements in preambles to prior rulemakings.

Specifically, in ADEQ's 2002 preamble to the revision of R18-11-120, ADEQ clearly indicated that R18-11- 120 was relevant to, and in fact guided, the agency's "ongoing monitoring of the surface waters in the state." 8 Ariz. Admin. Reg. at 1315. The agency further explained that "ADEQ amended R18-11-120 to make it possible to assess compliance with chronic A&W water quality standards." *Id.* In its preamble to the 2002 revision of the impaired water identification rule (in Title 18, Chapter 11, Article 6 of the Arizona Administrative Code), ADEQ recognized that certain water quality standards, such as chronic aquatic and wildlife criteria, require "similar, multiple sampling events to amass the minimum number of samples to perform the necessary statistics" and do "not allow for a one time or nonrecurring event to serve as justification for listing a stream"). 8 Ariz. Admin. Reg. 3394, 3396-97, 3446 (Aug. 9, 2002). Clearly, the chronic compliance language in R18-11-120 is applicable to assessment and impairment determinations, consistent with Arizona's impaired water identification rule and prior express statements in the revisions made to R18-11-120. In the current proposal, ADEQ attempts to get around these earlier preamble statements by citing to a 2004 prepared statement by Deputy Administrative Counsel

Joan Card before the Governor's Regulatory Review Council. This is unavailing. ADEQ's prior statements in regulatory preambles, which explain the agency's official intent and justification for the rule, bear more weight than, and are not nullified by, later remarks of its counsel.

In light of ADEQ's past inconsistent statements on the application and intent of R18-11-120, we recommend that ADEQ not make any changes to R18-11-120 and not include in the final preamble any statements attempting to clarify the rule's scope at this time. Such changes should be made, if at all, at a future time after the application of the language in R18-11-120 is clarified in the context of changes to Arizona's impaired water identification rule.

ADEQ Response 25:

ADEQ acknowledges its oversight in the language regarding use of a single sample, and thanks the commenter for raising the issue. The Department has added clarifying language to the enforcement rule such that, except for chronic aquatic and wildlife criteria, the department will determine compliance with numeric water quality standard criteria from the analytical result of a single sample "unless additional samples are required under this article."

However, ADEQ disagrees with the remaining points made in this comment. CWA assessments and 303(d) listing processes are not enforcement actions. The comment incorrectly conflates these distinctions in an attempt to require ADEQ to use enforcement methodologies and sampling requirements for CWA assessments and 303(d) listing determinations. However, ADEQ rejects this position as evidenced by its statements in prior rulemakings and by ADEQ counsel.

Under the CWA, ADEQ is required to assess whether a water or segment of a water of the United States in Arizona is attaining designated uses or not, and submit this information the EPA in what is known as a 305(b) report. *See*, CWA § 305(b). Additionally, ADEQ must provide the EPA with a list of impaired waters, which are those waters identified in the 305(b) report as not attaining water quality standards. *See*, CWA § 303(d). This list, known as the 303(d) list, prioritizes those impaired waters for calculations of total maximum daily loads for each pollutant impairing the water. *Id.* In conducting assessments for use in the 305(b) report or 303(d) list, ADEQ must follow the relevant sampling requirements as set forth in A.A.C. Chapter 11, Article 1, as well as requirements on data interpretation and credibility in A.A.C. Chapter 11, Article 6.

Enforcement actions are distinct from CWA assessments and 303(d) listing processes identified above. In an attempt to conflate the two principles (between causing a water quality violation and water impairment listings), the comment quotes statements made by ADEQ in the preamble to the 2002 water quality standards revisions. However, the quoted statements do not support the

argument that enforcement actions should apply the sampling requirements for assessment and listing decisions. For example, the comment stated,

> ADEQ recognized that certain water quality standards, such as chronic aquatic and wildlife criteria, require "similar, multiple sampling events to amass the minimum number of samples to perform the necessary statistics" and do "not allow for a one time or nonrecurring event to serve as justification for listing a stream."

The statements quoted in the comment reference the sampling requirements for CWA assessments, not enforcement actions. Indeed, the last quoted sentence expressly stated that the sampling requirements applied to "justification for *listing* a stream." (Emphasis added). Later in that same preamble, ADEQ clarified that "[t]he Department has repeatedly stated that the assessment and listing processes are *not enforcement* actions…." 8 Ariz. Admin. Reg. 3419 (Aug. 9, 2002) (emphasis added).

The comment also cites to the preamble of the last revision of the enforcement rule, arguing that ADEQ "clearly indicated" that the enforcement rule "was relevant to, and in fact guided, the agency's 'ongoing monitoring of the surface waters in the state.'" ADEQ acknowledges that the language referenced by the comment was unclear. However, context is key. Within the context of other statements made in that same preamble, statements made in the preamble of the 2002 water quality standards revisions, and statements of ADEQ counsel, it is clear that enforcement actions are distinct from CWA assessments and 303(d) listing determinations. Arizona's waters are diverse, geographically distant, and often remote. The realities of enforcement *and* assessment are such that ADEQ monitoring efforts may be tailored to allow for both. However, this does not erase the distinction between the two. Indeed, later in the same preamble, ADEQ responded to a comment requesting that the enforcement rule follow the sample collection requirements of the impaired waters identification rule. ADEQ reiterated the distinction between enforcement and assessment, saying,

> The impaired water identification rule prescribes requirements for § 303(d) listing and the minimum requirements for data that is used for water quality assessment purposes. ADEQ may adopt different criteria for purposes of determining compliance with water quality standards.

8 Ariz. Admin. Reg. 1391 (Mar. 29, 2002).

Again in 2004, ADEQ clarified the distinction between enforcement and assessment and listing through statements by its counsel before the Governor's Regulatory Review Council. *See,*

Testimony by Joan Card, Deputy Administrative Counsel at ADEQ, 2004 Meeting of the Governor's Regulatory Review Council Minutes (Dec. 7, 2004). Transcripts of that testimony state,

> Ms. Card said 605(D)(2)(b), which is at issue, is the listing standard. She said it is the standard the Department uses to determine whether a water should be included on the impaired waters list. It plainly says that more than one exceedance of a standard leads to listing. It does not address the sampling and assessment methodology as is done in 120(C). She said 120(C) was a different standard-- an enforcement standard versus a listing standard. She said what the impaired waters list does is allow the agency to go forward with creating further standards called TMDLs for an impaired stream. She said it is plainly different standard that is more protective of the critters in a stream than an enforcement standard, which would result in the Agency potentially taking a punitive action.

Id. The comment attempts to dismiss this testimony as unpersuasive because they were not included within the preamble of a rule. However, this testimony is consistent with, and gives further evidence of, the Department's interpretation of the enforcement rule.

ADEQ's position is that the sampling requirements of CWA assessments and 303(d) listing determinations do not apply to the enforcement rule, as seen in the preamble to the 2002 revision to the enforcement rule, the 2002 revisions to the water quality standards, statements by agency counsel, and again in this rulemaking. 8. Ariz. Admin. Reg. 1391 (Mar. 29, 2002); 8 Ariz. Admin. Reg. 3419 (Aug. 9, 2002); *Testimony by Joan Card, Deputy Administrative Counsel at ADEQ, 2004 Meeting of the Governor's Regulatory Review Council Minutes* (Dec. 7, 2004).

The comment also states that the enforcement rule "does not apply to 'discharges' at all," but to compliance with water quality standards. The point of this statement appears to be that assessment and listing determination sampling requirements should be required for enforcement actions, or vice versa. Again, the comment conflates enforcement and assessment, but this time couples it with a distinction regarding "discharges." ADEQ's enforcement authority allows ADEQ to take action against any person who violates a water quality standard. A.R.S. § 49-263(A)(4). Under the Clean Water Act, discharge means "any addition of any pollutant to navigable waters from any point source." CWA § 502(12). Surely, discharges are included as a primary way that a person would violate a water quality standard. ADEQ maintains that this enforcement rule only applies non-permitted discharges. However, assuming for the sake of

argument that the enforcement rule did not apply to discharges, the fact remains that enforcement actions are distinct from CWA assessments and listing determinations and have distinct sampling requirements.

In light of the foregoing, the comment's assertion that the enforcement rule must use the same sampling requirements as CWA assessments and 303(d) determinations, or vice versa, is incorrect. However, ADEQ will evaluate its current Impaired Waters Identification Rule in the future, and will invite stakeholders to participate in that process. ADEQ will evaluate any suggestions stakeholders have regarding the Department's assessment methodologies at that time.

Comment 26: Arizona Mining Association - AMA Recommends Changes to R18-11-113(D) Regarding Effluent-Dependent Waters.

As ADEQ recognized in meetings with AMA, not all discharges of effluent to an ephemeral water justify automatic application of effluent-dependent water (EDW) criteria in the context of AZPDES permitting and ADEQ should have regulatory discretion to recognize such circumstances. Some proposed discharges will simply not create the type of conditions that the EDW criteria were intended to protect. Consequently, we request that the following change be made to subsection (D) of R18-11-113:

D. The Director ~~shall~~ may 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.

ADEQ Response 26:

ADEQ agrees that the frequency, duration and magnitude of point sources discharges to ephemeral streams varies greatly in Arizona and there is a need to develop criteria that further refine the application of AZPDES permitting requirements. However, simply changing "shall" to "may," as requested in R18-11-113(D), would add additional uncertainty as to the circumstances that ADEQ would classify a water as effluent-dependent as the rule is silent on the criteria ADEQ would use to determine a water is effluent-dependent. ADEQ will consider this issue in the next triennial review.

Comment 27: Arizona Mining Association - AMA Appreciates ADEQ's Commitment to Further Consider AMA's Concerns Regarding Natural Adaptive Process, Natural Background, Suspended Sediment Concentration, and the Definitions of "EDW" and "Wastewater"; AMA Would Also Like to Discuss

Outstanding Arizona Water Issues as Part of Future Triennial Reviews.

ADEQ and AMA have previously discussed AMA's concerns regarding the current regulatory language on natural adaptive process (specifically, the proposed removal of that language), natural background and suspended sediment concentration in R18-11-115(B)(5), R18-11-119 and R18-11-109(D), respectively. AMA believes that these discussions have been fruitful to date and appreciates [ADEQ's] commitment to continue these discussions in the context of the next triennial review.

AMA also appreciates ADEQ's commitment to evaluate the definition of "effluent-dependent waters" (EDW) in the context of the next triennial review. Specifically, we ask ADEQ to appropriately evaluate what effluent flow may create the conditions appropriate for imposition of the criteria adopted for EDW and then to make appropriate changes to the definition. AMA further concurs with the recommendations made by ADEQ's Antidegradation and Effluent Dependent Waters Workgroup relating to EDWs (Topic #4) and the related definition of "wastewater" (Topic #5). In particular, AMA concurs with the workgroup recommendation that the "EDW definition should be revised to account for infrequent, short duration discharges that may not establish an [EDW]." This change is critical because the EDW criteria should be limited to waters permitted to receive treated waters on a consistent basis. AMA also agrees with the recommendation that the definition of "wastewater" needs to be revised to clarify that it means effluent from a domestic wastewater treatment plant or from an industrial treatment plant treating wastewater from an industrial process.

Finally, the AMA looks forward continuing to discuss Outstanding Arizona Water (OAW) issues in future triennial reviews. As was evident from the diversity of viewpoints expressed as part of the Outstanding Arizona Waters Workgroup convened by ADEQ during this triennial review process, this is a topic of great interest to many stakeholders. ADEQ proposed no changes to the OAW rules as part of this triennial review, but we believe there are issues that will need to be addressed in the future. As we have previously commented, the state is not required under the CWA to have an outstanding waters program, and many Western states do not have such programs. Given potential implementation issues, we believe that ADEQ should re-evaluate whether an OAW program is justified. If ADEQ decides to retain the OAW program, the AMA believes that ADEQ should establish minimum data quality and quantity requirements for demonstrating good water quality (which should remain a prerequisite to listing), and that such data should cover a wide range of stream conditions. If only limited data is gathered, or the data gathered covers only certain stream conditions, then it becomes very difficult to ascertain whether

a regulated discharge is degrading existing water quality in a downstream OAW (the required analysis associated with a Tier 3 water pursuant to A.A.C. R18-11-107.01(C)(3)). There are numerous other issues associated with the current OAW program and rules, and the AMA hopes that ADEQ will be willing to discuss these issues and consider changes as part of future triennial reviews.

ADEQ Response 27:

ADEQ appreciates the AMA's comments and looks forward to working with all stakeholders during the next triennial review to address their suggestions, questions and concerns.

Comment 28: Arizona Mining Association - AMA Encourages ADEQ to Request that EPA Rescind 40 C.F.R. § 131.31(b), as Recommended by the Surface Waters and Designated Uses Workgroup

One of the consensus recommendations of the Surface Waters and Designated Uses Workgroup formed by ADEQ during this triennial review was that ADEQ should urge EPA to rescind 40 C.F.R. § 131.31(b). In that regulation, adopted in 1996, EPA assigned the fish consumption designated use to some Arizona waters, but indicated that it would remove those uses for segments where ADEQ demonstrated through a use attainability analysis (UAA) that fish consumption was not a designated use. Subsequent to the adoption of the EPA rule, ADEQ has either designated the fish consumption use, or submitted an approved UAA showing that the fish consumption use is not attainable, for every water covered in 40 C.F.R. § 131.31(b). Therefore, the federal rule is unnecessary for some waters (those where the fish consumption use has now been designated under state law), and inconsistent for others (those where ADEQ has since submitted, and EPA has approved, a UAA demonstrating that fish consumption is not an attainable use).

The AMA therefore urges ADEQ to follow through on the workgroup recommendation to request that EPA rescind 40 C.F.R. § 131.31(b). The workgroup recommendation and accompanying rationale is available at: http://static.azdeq.gov/wqd/tri_rev_topic3_finalrec.pdf.

ADEQ Response 28:

ADEQ recognizes the efforts of the Surface Waters and Designated Uses Workgroup and the recommendation that ADEQ request EPA to rescind that the federal rule because it is outdated. However, ADEQ has not implemented all of the fish consumption standards listed in 40 C.F.R. § 131.31 into Appendix B of the state standards rule. The designated uses of all fourteen surface

waters must be evaluated to ensure that uses are being adequately protected under Appendix B before ADEQ can request repeal of the federal standards in 40 C.F.R. § 131.13. ADEQ will confer with EPA during the next triennial review regarding this issue.

Comment 29: Arizona Mining Association - Rationale for Legal Gap Modification Changes to A.A.C. R18-11-107.01

The AMA does not oppose the "legal gap modification" changes suggested to A.A.C. R18-11-107.01, which ADEQ proposed in order to provide flexibility in the event that Arizona assumes the Section 404 permit program at some point in the future. In the preamble explanation of those changes, ADEQ cites to an EPA guidance document (the Water Quality Standards Handbook) for the proposition that if a proposed discharge of dredged or fill material satisfies the prohibition against significant degradation contained in the Section 404(b)(1) Guidelines (40 C.F.R. § 230.10(c)), it will be deemed consistent with the federal antidegradation requirement to protect existing uses. 25 Ariz. Admin. Reg. at 182-3. This is a reasonable approach, but the AMA believes that ADEQ should make clear that significant degradation in the context of the Guidelines and antidegradation in the context of the water quality standards are distinct concepts. Specifically, antidegradation focuses solely on water quality, whereas significant degradation may allow for consideration of broader factors. This distinction can be important when considering potential secondary effects of a discharge of dredged or fill material, particularly where such effects occur outside of the location where dredged or fill material is placed.

The AMA is not suggesting any changes to the proposed rule language, but believes some explanation of the differences between significant degradation under the Guidelines and antidegradation under A.A.C. R18- 11-107.01 may be appropriate in the preamble to the final rule.

The AMA and its member companies appreciate the opportunity to submit comments on ADEQ's proposed rulemaking on water quality standards. We respectfully request that you issue the final version of the water quality standards rulemaking consistent with these comments. If you have any questions or need any additional information, please feel free to contact me.

ADEQ Response 29:

ADEQ appreciates the request for this clarification. The comment is correct that a § 404 significant degradation analysis is distinct from an antidegradation review. However, ADEQ considers antidegradation review for individual § 404 permits to be satisfied by conducting a

"significant degradation" review of a proposed discharge under the CWA § 404(b)(1) Guidelines, except in cases where a discharge may degrade existing water quality in an OAW or a water listed on the 303(d) List of impaired waters. In those cases, ADEQ will conduct an antidegradation review.

Comment 30: Tucson Audubon - Outstanding Arizona Waters

We appreciate the decision to keep protections for Outstanding Arizona Waters. In order to continue and strengthen bird habitats across Arizona, we need to continue protecting our healthiest waters through the OAW program. We encourage ADEQ to keep up the good work keeping strong OAW protections and, hopefully soon in the future, begin accepting new waters into the program.

ADEQ Response 30:

ADEQ appreciates the comment. While no new OAWs were adopted during this triennial review, ADEQ accepts nominations at any time. Any new nominations will be reviewed and considered in the next triennial review.

Comment 31: Tucson Audubon – Surface water definition

We are extremely concerned with ADEQ's proposed change to the definition of 'surface water' in R18-11-101. Confining the definition to 'navigable waters', further narrowed to 'waters of the United States" is an unnecessary and unreasonable step for ADEQ to take and has the potential to threaten protections for over 94% of Arizona waters given the current federal legal debate of the definition of 'Waters of the United States'. Arizona needs to maintain protections for springs, seeps, ephemeral, intermittent and effluent dependent or recycled waters. Like the GWAC, we subscribe to the One Water viewpoint. All water is precious. Tying our definition of 'surface water' to 'navigable waters' would be a step backwards in ensuring these protections and maintaining waters for nature and our citizenry alike. Instead, ADEQ should take this opportunity to maintain a consistent definition of surface water in Arizona as "waters of the state" in accordance with that statutory definition in A.R.S. §49-201(41).

ADEQ Response 31:

ADEQ disagrees with the assertion that this is an unreasonable modification. The modification does not narrow the application of the definition of "surface water" and is therefore not a step backwards. The practical application of the definition is the same. Please see the responses for Comments 4, 5, and 9 above.

Comment 32: Pima County Wastewater Reclamation – Numeric Standards – CAS Numbers

The CAS numbers of analytes throughout the document are wrong. A CAS number requires the dash between numbers. For example, the listed CAS of Acenaphthene in the proposed WQS is 83329. The correct CAS for this compound is 83-32-9. This is not a new issue.

ADEQ Response 32:

As the Chemistry Abstract System (CAS) number for any one chemical is a discrete set of integers, it can be referenced either with or without hyphens. The Department chose to remove the hyphens in 2009 to simplify use of the CAS numbers by staff and the public and to align with how the USEPA displays CAS numbers in their National Recommended Criteria Tables.

Comment 33: Pima County Wastewater Reclamation – Numeric Standards - 3,4-Benzfluoranthene

3,4-Benzfluoranthene (CAS: 205-99-2) is more commonly known as Benzo[b]fluoranthene in analytical methodology. Benzo[k]fluoranthene is already listed in the WQS, so naming conventions should be kept consistent.

ADEQ Response 33:

The Department agrees. Benzo[b]fluoranthene is the synonym for this chemical used in the USEPA's list of Priority Pollutants and will be used in these standards.

Comment 34: Pima County Wastewater Reclamation – Numeric Standards - 2-chloronapthalene

2-chloronapthalene (CAS: 91-58-7): This analyte is being renamed as "Chloronaphthalene beta" even though it is known as 2-chloronapthalene in all analytical methodology. The NIST WebBook lists 2- chloronapthalene as a primary name for this compound, and it should not be changed.

ADEQ Response 34:

Chloronaphthalene beta (CAS: 91587) is referred to in USEPA's Integrated Risk Information (IRIS) database as beta-chloronaphthalene . The "beta" was moved for alphabetizing and inadvertently left in place. The Department will use beta-chloronaphthalene.

Comment 35: Pima County Wastewater Reclamation – Numeric Standards - N-

Nitrosodiphenylamine

N-Nitrosodiphenylamine (CAS: 86-30-6): This analyte is being renamed as N-nitrosodipropylamine on Page 45, which is incorrect.

ADEQ Response 35:

The Department agrees and will correct this typographical error.

Comment 36: Pima County Wastewater Reclamation – Numeric Standards - Demeton

Demeton (CAS: 8065-48-3): The CAS listed in the Draft appears incorrect. The NIST WebBook provides a CAS Number of 126-75-0 for Demeton-S.

ADEQ Response 36:

As per EPA's integrated Risk Information System database, 8065-48-3 is the correct CAS reference. The Department has chosen to simplify the number to 8065483, as it is referenced in the National Recommended Criteria Tables.

Comment 37: Pima County Wastewater Reclamation – Numeric Standards - Nonylphenol

Nonylphenol (CAS: 104-40-5): This compound is listed only as Nonylphenol in the WQS, which is a broad term for all possible nonylphenol structures, and is not specific as listed. The CAS of 104-40-5 refers strictly to the single analyte of 4-n-Nonylphenol.

ADEQ Response 37:

EPA's2005 Ambient Aquatic Life Water Quality Criteria document for nonylphenol states that: "CAS numbers 104-40-5 (phenol, 4-nonyl-) and 25154-52-3 (phenol, nonyl) have also been used to describe these compounds." As such, no change will be made.

Comment 38: Pima County Wastewater Reclamation – Numeric Standards - 1,2,4,5-Tetrachlorobenzene

1,2,4,5-Tetrachlorobenzene (CAS: 95-94-3): This is the proper naming convention, as opposed to what is in the WQS (Tetrachlorobenze,1,2,4,5-)

ADEQ Response 38:

The "1,2,4,5-" was moved for alphabetizing and inadvertently left in place. The Department will

correct to 1,2,4,5-Tetrachlorobenzene.

Comment 39: Pima County Wastewater Reclamation – Numeric Standards - 4-Chlorophenyl phenyl ether

4-Chlorophenyl phenyl ether (CAS: 7005-72-3): The Bromine analogue of this analyte is listed in the WQS as p-bromodiphenyl ether. The naming conventions should be similar, whether the decision is to rename the bromine analogue 4-Bromophenyl phenyl ether, or to name the chlorine analogue p- chlorodiphenyl ether.

ADEQ Response 39:

Both chemicals are referenced by either synonym in USEPA databases. The Department will change p-bromodiphenyl ether to 4-Bromophenyl phenyl ether to match the naming convention used in the CWA list of Priority Pollutants.

Comment 40: Pima County Wastewater Reclamation – Numeric Standards – Analytes with "No Data"

The following analytes have been added to the WQS, but are accompanied by No Data. What purpose will they have? Will limits be added later?

Analyte Name	CAS Number
2-Nitrophenol	88-75-5
4-Chlorophenyl phenyl ether	7005-72-3
Benzorghi]perylene	191-24-2
1,1-Dichloroethane	75-34-3

ADEQ Response 40:

These chemicals are listed as CWA Priority Pollutants. At this time there is no toxicological data in USEPA or ATSDR databases. The Department retains these chemicals in the Surface Water Quality Standards in order to fully address the list of Priority Pollutants and as place holders awaiting development of toxicological data.

Comment 41: Pima County Wastewater Reclamation – Numeric Standards – Analytical Standard Practice

The following analytes have been given limits that may be unreachable in standard practice. ADEQ should not set standards at levels that are not achievable by current analytical technology. Any proposed standards associated with these pollutants would go through a future triennial review process prior to being adopted.

Analyte Name	CAS Number	Proposed WQS Limit
Chrysene	218-01-9	0.6 ug/L
N-nitrosodi-n-propylamine	621-64-7	0.7 ug/L
Acrolein	107-02-8	3 ug/L
Demeton	8065-48-3	0.01 ug/L
Diazinon	333-41-5	0.17 ug/L

ADEQ Response 41:

Under the CWA, SWQS criteria must be based on "sound scientific rationale," sufficient to protect the designated use. 40 C.F.R. § 131.11(a). Notably, this requirement does not provide for economic considerations or industry standard practice. The Department sets the standards as they are calculated from the available toxicity data. This issue can be addressed in the AZPDES permitting process. If the Limit of Quantitation (LOQ) is higher than the applicable water quality standard, a permitee will use the analytical method with the lowest LOQ. In these scenarios, the permittee would report discharge monitoring results using special codes called NODI (No Detection Indicator) codes that list the result as either less than the detection limit or less than the limit of quantitation. These codes do not represent a permit violation.

Comment 42: Sierra Club – Grand Canyon Chapter; Friends of Arizona Rivers; Friends of the Sonoran Desert; Save the Scenic Santa Ritas; Center for Biological Diversity; Arizona Mining Reform Coalition; Cascabel Conservation Association; Maricopa Audubon Society *(hereafter "Conservation Groups")*– Surface Water Definition (from the letter dated March 28, 2019)

In light of proposed changes to federal definitions related to Waters of the United States (WOTUS), the definition of surface water in R18-11-101 should be strengthened to ensure protection of Arizona's unique desert watersheds. To limit water quality provisions to waters deemed to be navigable ignores the reality that ephemeral waters are critical for drinking water,

ecological health, and recreation in the arid Southwest. “Surface water” should be redefined to include springs, ephemeral streams, and cienegas.

ADEQ Response 42:

As stated in the preamble discussing the change to the definition of “surface water,” under the section titled “*New or Modified Definitions [R18-11-101]*,” the definition of “surface water” in Article 1 has been intended, throughout the years, to align with the federal definition. This is because the definition establishes the foundation upon which ADEQ’s federally based programs are built. Unless specifically authorized by the legislature, in applying these federal programs, ADEQ must be consistent with and no more stringent than the corresponding federal law. *See* A.R.S. §§ 49-104(A)(16); 49-255.01(B). Please see the responses to Comments 4, 5, 9, and 31 above.

Comment 43: Conservation Groups – Enforcement (from the letter dated March 28, 2019)

Regarding enforcement provisions, R18-11-120, we note that enforcement is narrowed to non-permitted discharge and that reference to A.R.S. Title 49, Chapter 2, Article 4 has been stricken from the rule. Restricting enforcement to non-permitted discharge and assuming that the Arizona Pollutant Discharge Elimination System (AZPDES) program alleviates the need for enforcement weakens water quality standard provisions. Violation of a permit should be enforced in state law the same as non-permitted discharge, because it essentially amounts to the same impacts. The river doesn’t recognize the difference between the exceedance by a permitted facility and non-permitted discharge. This is especially concerning at this time, as multiple non-permitted discharges occurred in Queen Creek earlier this year, raising questions about how and when enforcement actions will be taken.

To exempt permitted facilities from R18-11-120 by stating that enforcement provisions should not apply to permitted facilities is moving in the wrong direction. We need strict provisions to prevent this kind of discharge, not exemptions for permit holders. Enforcement provisions should be clear, predictable and uniformly applied when non-permitted discharge occurs. R18-11-120 describes how occurrence of a non-permitted discharge will be determined, but makes no mention of what consequences the discharger will face. Removing reference to ARS49:2.4 creates lack of clarity regarding the range of ramifications for non-permitted discharges and the context in which such enforcement actions will occur. We understand that this was removed because the applicability of enabling legislation is assumed, but enforcement provisions need more clarity, not

less. Removing reference to legislation enabling enforcement action and failing to craft any language describing what enforcement actions will occur while narrowing the scope of enforcement provisions to exclude permitted facilities raises concerns that violations of water quality standards will not be enforced in a meaningful way.

ADEQ Response 43:

ADEQ appreciates the concern for Arizona's waters and the protection of surface water quality standards. However, ADEQ does not believe the changes to the enforcement rule will adversely impact enforcement of surface water quality standards. First, the current iteration of the enforcement rule does not contemplate enforcement of AZPDES permits as evidenced by ADEQ's response to comments by EPA in the 2002 triennial review rulemaking. There, ADEQ stated that the rule did not regulate how discharge limits are set, or the enforcement of permit conditions. NFRM, 8 A.A.R. 1264, 1393 (Mar. 29, 2002). ADEQ has not weakened the rule by adding express language stating that it only applies to non-permitted discharges. Additionally, ADEQ can and does still take enforcement actions for violations of permit conditions and limits. A.R.S. § 49-261.

Second, removing reference to A.R.S. Title 49, Chapter 2, Article 4 does not create a lack of clarity regarding ramifications of non-permitted discharges. A rule is an agency statement of general applicability that implements, interprets or prescribes law or policy, or describes the procedure or practice requirements of an agency. A.R.S. § 41-1001(19). A statement or citation of statutory authority does not meet that definition and should not be included in a rule. *See* Office of Secretary of State & the Rulewriters' Consortium, *Arizona Rulemaking Manual* 2 (2011); *see also* AAC R1-1-401 (stating that Rulemaking notices shall be prepared, drafted and filed in accordance with the Arizona Rulewriters Manual). Similarly, explanatory statements should not be included in rule, but may be included in the preamble. *Arizona Rulemaking Manual* at 2. Therefore, while any reference to statute has been removed from the rule to conform with the definition of "rule" and the Arizona Rulemaking Manual, ADEQ clarifies here that all of the enforcement provisions of A.R.S. Title 49, Chapter 2, Article 4, including its provisions regarding civil penalties and criminal violations, remain in force.

Comment 44: Conservation Groups – Outstanding Arizona Waters (from the letter dated March 28, 2019)

Because these water quality standards are generally not done every three years as they should be, we think it is essential that ADEQ take greater care with them. As was noted in our previous

comments, we are extremely disappointed that ADEQ did not consider the upper Verde River for designation as an Outstanding Arizona Water (OAW). Again, the standards are not reviewed very often and Sierra Club was told repeatedly to wait until this round of rulemaking to submit its OAW nomination for this truly outstanding water.

ADEQ Response 44:

ADEQ appreciates the comment and acknowledges that the triennial review process has not happened every three years in the past. However, ADEQ has now put in place a process to facilitate review of surface water quality standards every three years.

Regarding consideration of the upper Verde River as an OAW, ADEQ reviewed the nomination and issued a response letter to Sierra Club on September 11, 2018. ADEQ indicated that additional data was needed before ADEQ would be able to make a decision regarding this nomination. As stated in that letter, ADEQ is willing to discuss the nomination in greater detail to determine how ADEQ may be able to assist with additional data collection to satisfy OAW requirements.

Comment 45: Conservation Groups– Antidegradation (from the incorporated letter dated September 27, 2018 commenting on the *draft* NPRM)

The clarification in R18-11-107.01, relating to antidegradation is appropriate as a temporary impact to a water should not be "regularly occurring."

ADEQ Response 45:

Thank you for your comment.

Comment 46: Conservation Groups – Nutrient Criteria (from the incorporated letter dated September 27, 2018 commenting on the *draft* NPRM)

ADEQ should provide additional explanation relating the changes in R18-11-114 regarding nutrient criteria. While the agency says it will reflect flexibility" and will "ensure that downstream uses will also be protected, as necessary," we are concerned about the latter part of that and would like to hear more on how the agency will ensure that is the case. In its explanation, the words "as necessary," give us pause and concern. What is "as necessary?"

ADEQ Response 46:

The comment refers to R18-11-114, however, the content seems to refer to the clarifying modifications regarding applying nutrient criteria standards as prescribed in R18-11-109. If there

is significant contribution of nutrients from any tributary to one of waters of the United States listed in the rule, it is then "necessary" to apply the nutrient criteria standard to the upstream tributary in order to protect nutrient water quality in the listed surface water. The determination of what is necessary to protect nutrient water quality in the listed surface water will be based on the volume, frequency, magnitude, and duration of the discharge, and the distance to the downstream surface water listed in the rule.

Comment 47: Conservation Groups – Mixing Zone (from the incorporated letter on *draft* NPRM dated September 27, 2018)

Regarding mixing zones in R18-11-114, we find removing the explicit length limit of 500m and replacing that language with "as small as possible" problematic, as it is ill-defined and thus unenforceable. We understand the reasons for this, but the Arizona Department of Environmental Quality (ADEQ) must find a solution that is clear, quantifiable, and enforceable, otherwise, it is all too likely that the size of the mixing zone will become whatever the regulated entity desires. We appreciate the clarification that a mixing zone cannot be lethal or acutely toxic for organisms passing through it.

ADEQ Response 47:

ADEQ has removed the 500 meter criteria and replaced it with "as small as possible" to limit the size of the mixing zone to the actual size (as demonstrated through modeling for non-rapid and incomplete mixed discharge scenarios) and provide greater flexibility to permittees for requests associated with non-acutely toxic pollutants (i.e. nutrients). The mixing zone size will need to be determined by the Permittee, and approved by ADEQ, in order to establish the mixing zone condition in the permit. The ADEQ Director has authority to approve or deny the mixing zone if it is determined a water quality standard will be violated outside of the mixing zone. (R18-11-114(E)(1)). ADEQ will also reevaluate the mixing zone during modification, or reissuance of an existing permit to determine if the size of the originally approved mixing zone is still appropriate. (R18-11-114(G)).

Comment 48: Conservation Groups – Outstanding Arizona Waters (from the incorporated letter on *draft* NPRM dated September 27, 2018)

We do not object to leaving the Outstanding Arizona Waters (OAW) designation process unchanged in this Triennial Review, although, as was noted in the process, there are things that could improve protections for Arizona waters, and are strongly supportive of retaining Davidson

Canyon, Cienega Creek and other OAWs in their current designated status. We object the omitting the Upper Verde OAW nomination we submitted. While there may have been a needed change, such as the exclusion of the reach of the Verde from Sycamore to Oak Creek due to its status as impaired for E. coli, otherwise we have demonstrated the outstanding values of these waters and continue to request their designation as OAWs.

ADEQ Response 48:

ADEQ appreciates the comment. Regarding nomination of the upper Verde River as an OAW, please see ADEQ response to comment 44.

Comment 49: Conservation Groups – Variance (from the incorporated letter on *draft* NPRM dated September 27, 2018)

Regarding variance rule modifications in R18-11-122, we disagree with ADEQ's interpretation that variances must be permitted in this rule and that somehow omitting this provision would make the rule more stringent than federal requirements. There is no requirement that you have variances, just that if you do, they be included in the rule. This variance language is a loophole to ignore designated uses as it allows the water quality criteria to diverge from the designated use criteria for the water. Further, it allows variances for more than five years. At a minimum, ADEQ should set a tight timeline for these so-called "temporary" variances from water quality criteria. The explanation of the variances being either discharger or water body specific is less than adequate as well. Who gets the variance? The first ones to ask? We do not support application of variances and ask that ADEQ remove it from the draft rule.

ADEQ Response 49:

It is currently ADEQ's position that there should be an opportunity for a facility to request a variance where the facility cannot currently meet a water quality standard but it can be met in the future. This is a stance that ADEQ has had since 1996. See NFRM, 2 A.A.R. 1783, 1795 (May 17, 1996). ADEQ also notes that A.R.S. § 49-255.01(C) directs ADEQ to establish rules that "shall provide for…. [m]odifications and variances as allowed by the clean water act." EPA explains that variances are a tool States can use to improve to improve water quality over time with accountability measures to assure the public that progress will occur. ADEQ is simply modifying its rule to align with current EPA requirements. This rule is not a loophole, but rather another method to bring a facility into compliance with a water quality standard. As stated in the preamble above in the section titled "Variances Rule Modifications [R18-11-122]," ADEQ

considers this to be a "vital tool to improving water quality in partnership with facilities."

A variance is a temporary change to a water quality standard that must be approved in rule. Once the variance is established in rule, it would be implemented through a discharger-specific AZPDES permit(s). ADEQ will review the variance during subsequent triennial reviews to ensure the highest attainable criteria is being met. The term of the variance must be a specified timeframe in rule and must only be as long as necessary to achieve the highest attainable condition. Specific criteria need to be met in order to successfully apply for a variance and obtain approval. Variances will only be issued if it is appropriate and in conformance with the rule. ADEQ notes that it does not currently have any active variances.

Comment 50: Conservation Groups– Appendix C (from the incorporated letter on *draft* NPRM dated September 27, 2018)

Regarding Appendix C and as we noted in previous comments, we do not support the site-specific standard for copper for Pinto Creek and ask that it be deleted in the draft rule. ADEQ must err on the protective end of the scale and adopt a more conservative and strict set of standards and strive for the best water quality possible in Pinto Creek to ensure that it is maintained to meet Aquatic and Wildlife standards. That means dischargers should have to do more to clean it up and help it attain the standards for copper. We attach our letter of May 30, 2017 specifically related to Pinto Creek to further document our position on this matter.

[Attached comments from above mentioned May 30, 2017 letter commenting on the ADEQ proposed Total Maximum Daily Load for Pinto Creek:

We have reviewed the TMDL analysis and find that rather than reducing the site specific standard for copper from 42 µg/L to 34 µg/L, the standard should be set at 26 µg/L, to protect the creek and dependent wildlife. Attached you will find a letter written by David Chambers, dated May 30, 2008, which articulates the factors to be taken into consideration to calculate the TMDL to ensure that Pinto Creek is maintained to meet Aquatic and Wildlife standards. Even with a reduction to 34 µg/L, the statement made in Mr. Chambers' letter of 2008 that ADEQ's choice of natural background "is higher than all of the EPA calculated values for impacts on aquatic organisms" is still true.

Attached you will also find notes from visits to numerous sites along Pinto Creek, detailing impacts to the creek from roads and mine tailings. The ecological significance of a remaining creek with perennial flow in the Sonoran Desert is such that it must be handled with caution and care. The more protective standard of 26 µg/L, or the calculated background minus the 8 µg/L

margin of error, should be adopted. The Arizona Department of Environmental Quality (ADEQ) has not adequately determined natural background, because it is based on samples taken from tributaries, which while assumed to be relatively unaffected by anthropogenic sources are typified by well over a hundred years of mineral exploration and extraction and still littered with abandoned mine shafts, open pits, tailings piles both large and small, and untold numbers of all of the aforementioned throughout the surrounding uplands. Because of this, it is extremely difficult to postulate that those referenced tributaries are unaffected by human activities. Further, with Carlota continuing to mine the Eder pits and with the planned expansion of the Pinto Valley Mine, it's imperative to set strict standards and strive for the best water quality possible in Pinto Creek. That is why ADEQ must err on the protective end of the scale and adopt a more conservative and more protective standard for Pinto Creek.]

ADEQ Response 50:

ADEQ has not reduced the site-specific standard for Pinto Creek in this rulemaking, and is not proposing any revisions to that standard during this triennial review. In 2016, ADEQ set the site-specific standard for dissolved copper in Pinto Creek at 34 µg/L. This was not a reduction of a previous standard, but was less than a previously-proposed, site-specific standard for Pinto Creek. ADEQ continues to rely on the justification it articulated in the 2016 rulemaking for the 34 µg/L standard. *See*, NFRM 22 A.A.R. 2333-34 (Sep. 2, 2016).

Comment 51: Conservation Groups – Outstanding Arizona Waters – Upper Verde River (from incorporated letter dated May 15, 2018, submitted in preliminary stages of this Triennial Review)

The Sierra Club – Grand Canyon Chapter has sought to nominate the Upper Verde for OAW designation since 2012. The ADEQ stated repeatedly that the Triennial Review would be the appropriate time for a nomination and consideration of such a nomination. The fact that changes to the language governing OAW designation are being considered is not a compelling reason to refuse to consider such a nomination now. Any time the rule is opened, changes to language may be proposed. Changes may be considered concurrently with consideration of nominations based on the language that existed at the time of nomination. We ask that ADEQ consider the nomination of the Upper Verde River for OAW during this rulemaking process.

ADEQ Response 51:

ADEQ appreciates the comment and considered a nomination to designate the Upper Verde as an OAW once it was determined that ADEQ would not revise the OAW program during this triennial review. See ADEQ Response 44 regarding ADEQ's response to this nomination.

Comment 52: Conservation Groups – Outstanding Arizona Waters (from incorporated letter dated May 15, 2018, submitted in preliminary stages of this Triennial Review)

We also strongly support keeping Davidson Canyon, Cienega Creek, and other OAWs as OAWs and urge ADEQ to work with stakeholders to ensure that the values for which this waters were designated are protected. As precious as our waters are in Arizona, we should not be looking at removing special designations and the accompanying protections.

ADEQ Response 52:

Thank you for the comment. ADEQ is not proposing any revisions to the OAW rule during this triennial review.

Comment 53: Conservation Groups – Outstanding Arizona Waters – "Good Water Quality" (from incorporated letter dated May 15, 2018, submitted in preliminary stages of this Triennial Review)

How can ADEQ define "good water quality" (R18-11-112(D)(3)) more clearly to avoid confusion in determining whether a water is eligible for OAW consideration? "Good water quality" should be removed from OAW criteria to avoid confusion. If water quality is sufficient to support the recreational and/or ecological values for which an OAW was designated, no further consideration of water quality should be required. Furthermore, requiring "good water quality" may incentivize pollution of a reach by entities seeking to prevent any such future designation, and rigorous water quality monitoring is unfortunately prohibitively expensive for public agencies and private nonprofit organizations. Once an OAW has been established for outstanding recreational and/or ecological values, water quality should not be allowed to be degraded in any way that would impact those values, and all examination of water quality should be in the context of preserving those values.

ADEQ Response 53:

ADEQ acknowledges the concern that the "good water quality" provision of the OAW rule needs clarification, however ADEQ is not proposing any revisions to the OAW rule during this triennial

review. This provision of the rule was the subject of Charter Question #1 of the OAW Workgroup convened in November 2017 to analyze the OAW rule and provide recommendations to ADEQ. There was no consensus within the Workgroup on how to update the "good water quality" provision in the rule, and opposing arguments were summarized in a "Final Recommendations" document, posted on the ADEQ website at http://azdeq.gov/node/3933. ADEQ will consider the Workgroup recommendations during the next triennial review."

Comment 54: Conservation Groups – Outstanding Arizona Waters – Tier 3 Protection (from incorporated letter dated May 15, 2018, submitted in preliminary stages of this Triennial Review)

Once a water has become an OAW what action should be undertaken to ensure that it is being maintained and protected as a Tier 3 water under R18-11-107(D)? Again, OAWs should be eligible for establishment and continued designated status based on recreational and ecological values independent of water quality. Requiring nominating entities and/or ADEQ to provide baseline data prior to nomination would be unnecessarily burdensome, impractical, and counterproductive. ADEQ should consider establishing baseline data subsequent to an OAW listing. Also, if available information points to a new source of degradation in an OAW, steps should be taken to identify and address the source.

ADEQ Response 54:

ADEQ acknowledges the concern that the "baseline water quality" provision of the OAW rule is problematic for nominations. However, ADEQ is not proposing any revisions to the OAW rule during this triennial review. This provision of the rule was the subject of Charter Question #2 of the OAW Workgroup, which was convened in November 2017 to analyze the OAW rule and provide recommendations to ADEQ. The Workgroup discussed but did not agree on a solution to the baseline water quality issue. The Workgroup discussion was summarized in the "Final Recommendations" document, posted on the ADEQ website at http://azdeq.gov/node/3933.

Comment 55: Conservation Groups – Outstanding Arizona Waters – Data from OAWs (from incorporated letter dated May 15, 2018, submitted in preliminary stages of this Triennial Review)

What actions should ADEQ take if data show that water quality is degrading in or if impairment status is determined on a water that is listed as an OAW? If degradation or impairment is identified in an OAW, the water should be prioritized for action including identification of the

source of degradation, cessation of the degradation, and restoration as needed. Removal of OAW designation must only occur through rulemaking, just as designation of OAWs occurs through rulemaking, and should be avoided. ADEQ should instead focus on protecting OAWs. As stated above, once an OAW has been established for exceptional values, water quality should not be allowed to be degraded in any way that would impact those values, so ADEQ should act long before values could be so degraded that any removal of designation could be justified.

ADEQ Response 55:

ADEQ recognizes the concern regarding degradation of water quality in an OAW. Degradation of water quality in an OAW was a topic addressed by the OAW Workgroup during the triennial review process, however ADEQ is not proposing any revisions to the OAW rule during this triennial review. The OAW Workgroup discussion of this topic can be found in the "Final Recommendations" document, posted on the ADEQ website at http://azdeq.gov/node/3933. ADEQ will consider the Workgroup recommendations during the next triennial review.

Comment 56: Conservation Groups – Outstanding Arizona Water – flow regime eligibility (from incorporated letter dated May 15, 2018, submitted in preliminary stages of this Triennial Review)

Should ADEQ consider modifying the flow-regime based OAW eligibility requirements in this rulemaking? If so, what changes are recommended by the workgroup, and why? As with reference to "good water quality," reference to flow regime should be removed from OAW eligibility requirements. If flow is adequate to support exceptional recreational and/or ecological values for which a water was designated, no further demonstration of flow should be required. Such requirements may be counterproductive by discouraging nomination, as flow data are not always available and, as many of our remarkable and truly outstanding waters are ephemeral. In addition to their support of plants and animals, they also help to recharge groundwater, something which is critically important in our arid state. Again, as with "good water quality," reference to flow may incentivize bad actors who wish to prevent future designations. Limiting designation based on flow regimes was added in 2002 to limit the nomination of OAWs. It was inappropriate then and it is inappropriate now.

ADEQ Response 56:

ADEQ acknowledges the concern regarding use of perennial or intermittent flows as a criterion for OAW nomination, however ADEQ is not proposing any revisions to the OAW rule during

this triennial review. This flow regime question was the subject of Charter Question #4 of the OAW Workgroup convened in November 2017, to analyze the OAW rule and provide recommendations to ADEQ. No consensus was reached among the Workgroup members, but three positions were identified: 1) drop the flow requirement provision entirely, 2) retain the current language, and 3) limit OAW designations to perennial waters only. For more information, the Workgroup discussion was summarized in the "Final Recommendations" document, posted on the ADEQ website at http://azdeq.gov/node/3933. ADEQ will consider the Workgroup recommendations during the next triennial review.

Comment 57: Conservation Groups – Antidegradation – Temporary Impacts (from incorporated letter dated May 15, 2018, submitted in preliminary stages of this Triennial Review)

ADEQ is proposing that the temporary impacts to OAWs language found in R18-11-107.01 (C)(4) be moved to its own section (5) and clarify that the temporary impacts cannot be "regularly occurring."

Temporary impacts to OAWs should not be regularly occurring and should generally be a one-time impact. If they are regularly occurring, then they are not temporary and should not be allowed. A closer look at the actual impacts of a so-called "temporary impact" is needed. If it is temporary, but wipes out threatened or endangered species or destroys a healthy macroinvertebrate community, then is the impact really temporary? We also oppose the idea of extending temporary impacts to other kinds of permits.

Throughout its regulations, ADEQ should consider, and to the best of its ability manage and mitigate, the future impacts of climate change on Arizona's rivers. Our rivers will take the brunt of the impacts which the climatologists are predicting to be: 1) overall warming and drying, and 2)increased extremes in precipitation and stream flows (greater number of low flow conditions and a greater number of flash flood events). These changing conditions call for slower, steadier, cleaner releases of storm water from urban areas into washes and rivers, where riparian vegetation can assist with cleaning the flow.

ADEQ Response 57:

While this comment was incorporated in the Conservation Groups' formal comment letter, the comment regarding temporary impacts does not appear to apply to the current proposed rule. ADEQ is not proposing to move the "temporary water quality impacts" language into its own

section. Also, it appears that ADEQ addressed the commenters issue that temporary impacts should not be regularly occurring as the proposed rule adds the phrase, "and are not regularly occurring," to R18-11-107.01(C)(4).

Regarding the request that ADEQ consider climate change in its regulations, ADEQ thanks you for your comment.

Comment 58: City of Phoenix - Numeric Standards - Appendix A – Provisional or Screening Data

The following table lists new or revised proposed standards derived using provisional data or screening values from the Environmental Protection Agency (EPA); this list may not be inclusive of all such examples in the proposed rule. Use of provisional or screening data for setting SWQS is questionable, particularly because the EPA reference document identifies several of these values as low confidence or inappropriate to derive a reference dose (RfD) for the parameter (e.g., thallium). In addition, 4,6-dinitro-o-cresol appears to use an inappropriate uncertainty factor. Several standards were also noted with Integrated Risk Information System (IRIS) data of low or medium confidence and/or inadequate carcinogenicity data. *Please justify use of the provisional data, screening data, and data with low confidence in developing SWQS, and provide an explanation of how the new or revised standards were derived using this data.*

Parameter/CAS Number	**Page**	**Relevant Standard** **DWS** (domestic water source) **FBC** (full-body contact) **PBC** (partial-body contact) **FC** (fish consumption)
Provisional or Screening Value		
bis(2-chloroethoxy)methane/111911	189, 193, 196, 215	New: DWS, FBC, PBC
chloroethane/75003	189, 193, 196, 216	New: DWS, FBC, PBC
di-n-octyl phthalate/117840	194, 196, 217	Revised: FBC, PBC
4,6-dinitro-o-cresol/534521	190, 191, 194, 196, 216	Revised: DWS, FC, FBC, PBC
parathion/56382	190, 192, 195, 197, 217	New: DWS, FC, FBC, PBC
thallium/7440280	192, 195, 197, 218	Revised: FC, FBC, PBC
IRIS data of low or medium confidence/ inadequate carcinogenicity data		
n-nitrosodi-n-phenylamine OR n-nitrosodipropylamine/86306	195, 197, 217	Revised: FBC, PBC
n-nitrosodi-n-propylamine/621647	195, 197, 217	Revised: FBC, PBC
pentachlorobenzene/608935	190, 195, 197, 217	New: DWS, FBC, PBC
1,2,4,5-tetrachlorobenzene/95943	190, 195, 197, 218	New: DWS, FBC, PBC
toluene/108883	192, 195, 197, 218	Revised: FC, FBC, PBC
2,4,5-trichlorophenol/ 95954	190, 195, 198, 218	New: DWS, FBC, PBC

ADEQ Response 58:

ADEQ uses a hierarchical approach when considering data for use in the derivation of human health water quality standards. As many listed CWA Toxic and Priority Pollutants have no reference doses (RfDs) or cancer potency slope factors (CPSFs) published in the USEPA's Integrated Risk Information System (IRIS) database, in order to provide surface water quality standards that are protective of the health of the public, the Department defaults to the following ordered list of peer reviewed toxicological data when IRIS RfDs and CPSFs are not available:

- Provisional Peer-Reviewed Toxicity Values (PPRTV) used in EPA's Superfund Program.
- Minimal Risk Levels produced by the Agency for Toxic Substances and Disease Registry (ATSDR).
- California Environmental Protection Agency (CalEPA) values.

While these toxicity values are not expressly developed for the derivation of water quality standards for USEPA listed Toxic and Priority Pollutants, they provide valuable, peer reviewed benchmarks which allow the Department to derive water quality standards for the protection of human health where otherwise, there would be none.

ADEQ is very careful when selecting surrogate toxicity values to use in the derivation of Surface Water Quality Standards. All data used in the derivation, and the toxicity values themselves must undergo rigorous peer review, including independent external peer review. The USEPA IRIS database is always the first choice for toxicity values when they are available. If an RfD or CPSF is listed in the IRIS database, the data are considered adequate and have undergone internal and independent peer review. IRIS values are intended to be used by all USEPA programs and are only listed after undergoing cross programmatic evaluation.

Provisional Peer-Reviewed Toxicity Values (PPRTV) are developed according to USEPA Standard Operating Procedures (SOPs) and are derived after a review of the relevant scientific literature using the same methods, sources of data, and Agency guidance generally used by the EPA IRIS Program in the development of RfDs and CPSFs. All provisional toxicity values receive internal review by EPA scientists and external peer review by independently selected scientific experts.

Minimal Risk Levels are developed as a part of ATSDR's Congressional mandate to produce toxicological profiles (TPs) for hazardous substances found at National Priorities List (NPL) sites. The studies utilized in the development of these TPs are held to the highest standards of

data collection, and the peer-review process validates that they are scientifically accurate and reflect current scientific or laboratory best practice with consistent, factual results. The proposed MRLs derived as a part of the TP development undergo a rigorous review process. They are reviewed by ATSDR's toxicologists, a panel of external peer reviewers, an interagency MRL workgroup, with participation from other federal agencies, including NCEH (CDC's National Center for Environmental Health), ATSDR, NTP (National Toxicology Program), NIOSH (National Institute of Occupational Safety and Health), and EPA; and are then submitted for public comment.

The California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA) is statutorily mandated by the State of California to carry out human health risk assessments on commercially available pesticides and other toxicants. OEHHA follows USEPA risk assessment methodology closely through the Standards and Criteria Work Group (SCWG), a Cal/EPA Intra-agency group. All studies go through both an internal (OEHHA) and external peer review process pursuant to Health and Safety Code Section 116365(c)(3)(D).

The commenter specifically references thallium and 4,6-dinitro-o-cresol. The Department's rationale for these pollutants is as follows:

Thallium: The Department bases the RfD for thallium on the 2012 PPRTV screening chronic provisional RfD. The State of California (CalEPA) derived the same value using the same study, toxic endpoint and uncertainty factors. Other states including Massachusetts, Minnesota, Michigan and New Jersey have also adopted this toxicity value. Beyond the principal study used in the development of the provisional RfD, there is evidence of kidney damage, blood pressure variations and alopecia in humans. Some human and animal data also suggest thallium may produce developmental toxicity. ADEQ believes that given the supplementary supporting data found within the IRIS Chemical Assessment Summary, there is ample evidence as to the toxicity of thallium and will retain the standard as proposed.

4,6-dinitro-o-cresol appears to use an inappropriate uncertainty factor: 4,6-dinitro-o-cresol is a low use chemical used in the plastics industry to inhibit polymerization in styrene. The Department is using the RfD from the 2010 USEPA PPRTV which derives a less stringent standard than the criterion published in the 2015 USEPA Update of Human Health Ambient Water Quality Criteria: 2-Methyl-4,6-dinitrophenol (a synonym for 4,6-dinitro-o-cresol) The reference have been changed in the preamble. The Department will research using the USEPA

304(a) criterion in the next Triennial Review.

The commenter questions the use of " IRIS (US EPA) data of low or medium confidence/ inadequate carcinogenicity data". The Department's rationale for the use of these peer reviewed data is as follows:

The confidence designation given to data used in an IRIS assessment does not indicate the confidence in the derived toxicity value, but to the likelihood that more data might precipitate a change in the future. If a toxicity value is published in an IRIS assessment, this means that USEPA methodology has been followed and internal and external peer review have found the data adequate. Quantifiable evidence of human toxicity or carcinogenicity that can be used to determine IRIS toxicity values is rare and collected through episodic human epidemiological studies. Because of this, animal models are often the primary source of the data used in deriving toxicity values. When animal data are used, human data is often labeled as "inadequate." This is not an indication that the other IRIS data are inappropriate for deriving water quality standards, it means that data derived from animal models and other supporting evidence were used.

Comment 59: City of Phoenix - Numeric SWQS, Appendix A – Fish Consumption Data

The following table of proposed new FC standards derived by ADEQ using bioconcentration (BCF) data use reference documents that indicate these parameters are estimates (dinoseb), are derived using averages (chlorpyrifos, malathion), or the BCF value used is not specifically listed in the provided reference document (diquat, endothall). This list may not be inclusive of all such examples in the proposed rule, but are the instances noted by the City during our review. *Please provide the rational applied for using this BCF data, and provide an explanation of how the new standards were derived using this data.*

Parameter/CAS Number	**Page**	**Relevant Standard** **FC** (fish consumption)
chlorpyrifos/2921882	191,216	New: FC
dinoseb/88857	191,217	New: FC
diquat/85007	191,217	New: FC
endothall/145733	191,217	New: FC
malathion/121755	191,217	New: FC Note: The preamble (1455 ug/L) and rule (103 ug/L) have different values for the new FC standard. *Please provide correct value and justification for the calculation***.**

ADEQ Response 59:

Because ADEQ separates the fish and water consumption uses in the Surface Water Quality Standards, water quality standards for our Fish Consumption use are calculated using bioconcentration factors (BCF) from USEPA documents or from the technical literature. BCFs are a measure of how much a pollutant in the water column will concentrate in the tissue over time. It is important to address bioconcentration for the fish consumption use because the standard, as calculated, is functionally a translator that guards against the buildup of the pollutant in question to concentrations that may pose a threat to those that may consume wild caught fish. Arizona has more than 27 different species of sport fish that can be taken and consumed by Arizona anglers. Each of those species occupies a different locus in the aquatic food web, depending on the community composition of each individual waterbody. Because of this variability in species, community composition and food web structure, the BCF value is, by necessity, a broad estimate.

If USEPA data are not available, data is gathered from peer-reviewed journals, the Extension Toxicology Network (EXTOXNET) and the U.S. National Library of Medicine among other sources. If multiple studies are available or a range given, a rounded mean is calculated for use in deriving standards. *Methodologies for Deriving Criteria for the Fish Consumption (FC) Designated Use*

Numeric water quality criteria for the fish consumption (FC) designated use were derived using the following equations:

For carcinogens:

$$\frac{70\text{kg} * 10^{-6}}{OCSF * 17.5\frac{grams}{day} * BCF}$$

Example: Aldrin

$$\frac{70*10^{-6}}{17*17.5*4670} = 0.00005\ \mu\text{g/L}$$

For non-carcinogens:

$$\frac{\text{RfD} * \text{RSC} * 70\ \text{kg}}{17.5\frac{\text{grams}}{\text{day}} * \text{BCF}}$$

Example: Chlorpyrifos $\frac{0.003*0.2*70}{17.5*2500} = 0.96$ µg/L (rounded to 0.1 µg/L)

In the carcinogen equation, 70 kg is the average weight of a human male in kilograms; 10^{-6} is the excess cancer risk level; OCSF is the oral cancer slope factor, 17.5 grams /day is the national average fish consumption rate, and BCF is a bioconcentration factor. In the non-carcinogen equation, RfD is the reference dose, RSC is the relative source contribution factor, 70 kg is the average weight of a human male in kilograms, 17.5 grams/day is the national average fish consumption rate, and BCF is the bioconcentration factor.

Malathion: The value listed in the Appendix A. table (103 µ/L) is a typographical error. The value listed in the preamble (1455 µ/L) is correct. The Department used the mean bioconcentration factor of 11 for edible fish tissue from the April, 2018 USDA Draft Human Health and Ecological Risk Assessment for Malathion in Exotic Fruit Fly Applications.

Comment 60: City of Phoenix - Numeric SWQS, Appendix A

The following table lists proposed revised PBC standards that were derived with no RfD listed in the provided reference documents. This list may not be inclusive of all such examples in the proposed rule, but were parameters noted by the City. Per the preamble, the RfD and relative source contribution (RSC) factor are used to calculate the PBC standard (page 195). *Please provide an explanation as to how these revised PBC standards were obtained with no RfD, and provide reference links.* In addition, the RSC factor used to calculate new standards using the non-carcinogenic formula for Arizona is not provided for FC, FBC, and PBC standards. *Please provide an explanation of the RSC values and how the RSC was used in the revised or new standard calculations for FC, FBC, and PBC.*

Parameter/CAS Number	Page	Relevant Standard **FBC** (full-body contact) **PBC** (partial-body contact)
bis(chloroethyl) ether/111444	193,196,215	Revised: PBC No RfD; Minimum Risk Level (MRL) is for inhalation.
2,6-dinitrotoluene/606202	194,196,216	Revised: PBC No RfD. Note: The reference document link for the RfD PBC and oral cancer slope factor (OCSF) FBC does not work.
n-nitrosodi-n-phenylamine OR n-nitrosodipropylamine/86306	195,197,217	Revised: PBC No RfD; no MRL provided.
n-nitrosodi-n-propylamine/621647	195,197,217	Revised: PBC No RfD; no MRL provided.

ADEQ Response 60:

Bis(chloroethyl) ether: Bis(chloroethyl) ether is a CWA Priority Pollutant, listed in the USEPA National Recommended Water Quality Criteria – Human Health Criteria Table and is classified by the USEPA as a B2, or *probable*, human carcinogen on the strength of causing hepatomas in hybrid mouse strains and being a direct acting mutagen in microbial studies. On this basis, the Department chose to use the OCSF to set a PBC standard in the absence of an available RfD. The resultant new standard is less stringent than the current PBC standard or the value listed in the USEPA Human Health Criteria Table. The Department believes this to be an important exception to the standard practice of using only RfDs when deriving PBC standards and has noted this excursion in the preamble. See the ADEQ decision criteria hierarchy in the *Methodologies for Deriving Criteria for the Partial Body Contact (PBC) Designated Use*.

2,6-dinitrotoluene: The Department used the PPRTV chronic provisional reference dose of 0.0003 $(mg/Kg\text{-}d)^{-1}$ from the USEPA 2013 final Provisional Peer-Reviewed Toxicity Values for 2,6-Dinitrotoluene. The reference document has been clarified in the preamble.

N-nitrosodiphenylamine: N-nitrosodiphenylamine is a CWA Priority Pollutant, listed in the USEPA National Recommended Water Quality Criteria – Human Health Criteria Table and is a B2, or *probable* human carcinogen on the strength of increased bladder tumors in male and female rats and DNA damage assays in rats. On this basis, the Department chose to use the OCSF to set a PBC standard in the absence of an available RfD. The resultant new standard is more stringent than the current PBC standard and less stringent than the value listed in the USEPA Human Health Criteria Table. The Department believes this to be an important exception to the

standard practice of using only RfDs when deriving PBC standards and has noted this excursion in the preamble (see the ADEQ decision criteria hierarchy in the *Methodologies for Deriving Criteria for the Partial Body Contact (PBC) Designated Use*).

N-nitrosodi-n-propylamine: N-nitrosodi-n-propylamine is a CWA Priority Pollutant, listed in the USEPA National Recommended Water Quality Criteria – Human Health Criteria Table and is a B2, or *probable* human carcinogen on the strength of liver carcinomas and esophageal and tongue tumors in rats. Macaque monkeys also showed an increased incidence of hepatocellular carcinomas. On this basis, the Department chose to use the OCSF to set a PBC standard in the absence of an available RfD. The resultant new standard is more stringent than the current PBC standard and less stringent than the value listed in the USEPA Human Health Criteria Table. The Department believes this to be an important exception to the standard practice of using only RfDs when deriving PBC standards and has noted this excursion in the preamble (see the ADEQ decision criteria hierarchy in the *Methodologies for Deriving Criteria for the Partial Body Contact (PBC) Designated Use*).

Comment 61: City of Phoenix - Numeric SWQS, Appendix A

The following table lists items that need additional explanation, substantive typographical errors and inconsistencies that were noted by the City during our review; this list may not be inclusive of all such examples in the proposed rule. The comment for each parameter is noted below.

ADEQ Response 61:

ADEQ has divided the table referenced in this comment based on parameter and has responded to each in turn. These comments and ADEQ's responses comprise Comments and Responses 62-74.

Comment 62: City of Phoenix - Numeric SWQS, Appendix A-acenaphthylene/208968 (pp.189, 193, 196, 215)

The provided preamble reference link for this new standard is for a different parameter: acenaphthene (CAS/83329). Please specify which parameter the new DWS, FBC, and PBC standards apply to and provide justification for these new standards. In addition, acenaphthylene is a new parameter, there should be no strikethrough text "cenapthylene" in the proposed rule.

ADEQ Response 62:

Acenaphthylene: The reference to "cenapthylene" in the proposed rule was a carryover from a transcription mistake in the draft and has been deleted in the proposed rule.

For the polycyclic aromatic hydrocarbons (PAH) with no published RfD or OCSF, the Department uses the toxicity endpoints from benzo[*a*]pyrene and anthracene as surrogates to calculate standards for carcinogens or non-carcinogens, respectively. This use is based on data indicating PAHs that cause cancer are typically first modified by enzymes found in living tissue into compounds that react with DNA, causing mutations to occur. When DNA associated with cell replication is affected, the result can sometimes be cancer. Mutagenic PAHs, such as benzo[*a*]pyrene, usually have a "bay region," a pocket with four or more sides in its molecular structure that increases reactivity of the molecule with DNA. There is no convincing evidence that the PAHs lacking a bay region structure (acenaphthene, acenaphthylene, and fluorene) are genotoxic. Because of this difference in structure, the Department chose to use the RfD from the closely related acenaphthene to calculate the standard for acenaphthylene rather than the surrogate toxicity endpoints used for carcinogenic PAHs (benzo[*a*]pyrene).

Comment 63: City of Phoenix - Numeric SWQS, Appendix A- benz(a)anthracene/ 56553 (pp.193, 215)

The preamble (47.0 ug/L) and rule (0.47 ug/L) have different values for the revised FBC standard. The nomenclature of this parameter is inconsistent throughout the rule and preamble. *Please provide the correct revised FBC standard, justification for the standard, and correct parameter nomenclature.*

ADEQ Response 63:

Benz(a)anthracene: The FBC standard listed in the preamble is correct. Appendix A. will be corrected to reflect the 47 µ/L value. This standard is based on the USEPA OCSF of 7.3 $(mg/Kg\text{-}d)^{-1}$ for the polycyclic aeromantic hydrocarbon benzo (a) pyrene, which is used as a surrogate in this instance. Typographical errors in the nomenclature will be corrected throughout the document. See the discussion under acenaphthylene (Response 62) for an explanation of the use of toxicological surrogates for PAHs.

Comment 64: City of Phoenix - Numeric SWQS, Appendix A- bis(chloromethyl)ether/ 542881 (pp.193, 215)

EPA 304(a) criteria is used to determine the new FBC standard. There is no justification for use of the EPA 304(a) criteria for determining the FBC in the preamble pages 192 – 193. In addition, please specify which EPA 304(a) criteria is used. The only 304(a) values listed by EPA are: Human Health for the consumption of Water + Organism 0.00015 µg/L and Human Health for

the consumption of Organism 0.017 µg/L. *Please justify the use of the EPA 304(a) criteria for the FBC standard and how the standard was calculated.*

ADEQ Response 64:

Bis(chloromethyl)ether: Bis(chloromethyl)ether is a class A, demonstrated human carcinogen on the basis of statistically significant increases in lung tumors observed in six studies of exposed workers. The reference to the Clean Water Act 304(a) human health ambient water quality criterion noted in the preamble was in error. The Department used the USEPA IRIS OCSF of 220 $(mg/Kg\text{-}d)^{-1}$ to calculate the FBC standard.

Comment 65: City of Phoenix - Numeric SWQS, Appendix A - dissolved cadmium/7440439 (pp.215-216)

For all Aquatic &Wildlife standards, the specific Table reference (2 or 3) and footnote d (hardness) have been removed from Table 1. *Please include the appropriate table number for each standard and clarification if footnote (d) still applies to dissolved cadmium.*

ADEQ Response 65:

The corrections to the tables and footnotes have been made.

Comment 66: City of Phoenix - Numeric SWQS, Appendix A -dissolved chromium Ill/16065831 (pp.200-201, 216, 219-220)

For the chronic A&Wc, A&Ww and A&Wedw standards, the preamble states that Appendix A, Table 4 was updated to correct a rounding error at hardness 20 mg/L from "19.8 µg/L" to "10.8 µg/L." In the 2009 rule, this standard was "19.84 µg/L" at hardness 20 mg/L. *There does not appear to be a typographical error. Please provide an explanation of this typographical error or revert back to the current standard.*

ADEQ Response 66:

Dissolved Chromium III The commenter is correct. The published draft standard for chromium III at a hardness of 20 (10.8) is a typographical error. The value should be 19.8. The published formula returns the correct value as well.

Comment 67: City of Phoenix - Numeric SWQS, Appendix A - total chromium/7440473 (pp.193, 196, 216)

According to the preamble, total chromium FBC & PBC standards have: "Reverted to old standards despite lack of EPA data." These standards are lower than those for total chromium III and chromium VI. Chromium III results are determined by subtracting chromium VI from total chromium so the total standard cannot be lower than the component standards. *Please provide justification for these new standards or remove.*

ADEQ Response 67:

Total Chromium The draft standard for total chromium was based on USEPA correspondence which stated that ADEQ…"*can't eliminate* (PBC and FBC total chromium standards) *without replacement. Ask ADEQ to correct in next triennial review*." This statement was later retracted. As the Department currently has PBC and FBC standards for Chromium III and VI, the two species that make up total chromium, the Department removed the total chromium PBC and FBC standards.

Comment 68: City of Phoenix - Numeric SWQS, Appendix A - demeton/8065483 (pp.198, 216)

The proposed new Aquatic &Wildlife chronic standards do not match the EPA 304(a) criteria which is listed as 0.1 µg/L for Freshwater (chronic). *Please provide justification or correction for this difference.* This parameter has a typographical error in nomenclature on page 198.

ADEQ Response 68:

The commenter is correct. The typographical error will be corrected to match the USEPA 304(a) criterion of 0.1 µg/L for Freshwater (chronic).

Comment 69: City of Phoenix - Numeric SWQS, Appendix A - 1,4-dichlorobenzene/ 106467 (pp.194, 196, 216)

The PBC & FBC standards have been lowered significantly due to a "corrected mistake*." Please provide justification/background in the rule preamble for this corrected mistake.*

ADEQ Response 69:

In the 2009 triennial review rulemaking, ADEQ revised both the PBC and FBC standards for 1,4-dichlorobenzene from 560,000 µg/L to 373,333 µg/L, as explained in the preamble to the final rule. 14 AAR 4708, 4728; 4738 (December 26, 2008). The full text of the rule correctly listed the standard for FBC as 373,333 µg/L, but mistakenly replaced a comma with a decimal point for the PBC standard, listing it as 373.333 µg/L. During this current triennial review, ADEQ recognized

that an error occurred and sought to correct the mistake. However, ADEQ incorrectly changed the FBC standard to mirror the PBC standard in the NPRM when it should have done the opposite. The correct standard for both the PBC and FBC uses is 373,333 µg/L, as derived using the ATSDR MRL of 0.4 mg/Kg/day found at https://www.atsdr.cdc.gov/toxprofiles/tp10-c8.pdf.

Comment 70: City of Phoenix - Numeric SWQS, Appendix A -mirex/2385855 (pp.195,197, 217)

The preamble states that the data used to calculate the revised FBC and PBC standards are the RfD. However, pages 195 and 197 of the preamble "data source" states changed OCSF and BCF. In addition, the link: https://oehha.ca.gov/chemicals/mirex does not appear to list the RfD, but the RfD is listed in the second link. *Please provide the RfD and clarify if the RfD is used to calculate the revised FBC and PBC standards, and ensure links are correct.*

ADEQ Response 70:

Mirex: The OCSF for mirex from the first OEHHA reference (18) was used to calculate the FBC standard. The PBC standard has been changed to reflect the IRIS RfD (0.0002) for mirex. The references have been changed in the preamble.

Comment 71: City of Phoenix - Numeric SWQS, Appendix A – nonylphenol/104405 (pp.200, 217)

The (chemical abstracts service) CAS number listed in ADEQ rule does not match the CAS number on the EPA 304a criteria (CAS 84852153). In addition, the Freshwater (acute) value in the EPA 304a criteria is 28 ug/L, not 27.8 ug/L as in the ADEQ rules. *Please provide justification or correction for these differences.*

ADEQ Response 71:

The 2005 USEPA Ambient Aquatic Life Water Quality Criteria document for nonylphenol states that: "CAS numbers 104-40-5 (phenol, 4-nonyl-) and 25154-52-3 (phenol, nonyl) have also been used to describe these compounds." Also in this USEPA criteria document, the final calculated Criterion Maximum Concentration (CMC) is 27.75 µ/L. The Department has rounded this value to 28 µ/L. No change will be made to the CAS number.

Comment 72: City of Phoenix - Numeric SWQS, Appendix A - oxamyl/23135220 (pp. 217)

A new FC standard has been added to rule, but is not noted in the preamble. *Please provide justification for this new standard.*

ADEQ Response 72:

A new standard was added because a new BCF of 3.1 was incorporated from the US National Library of Medicine, National Center for Biotechnology Information (NCBI). https://pubchem.ncbi.nlm.nih.gov/compound/oxamyl . The notation has been made in the preamble.

Comment 73: City of Phoenix - Numeric SWQS, Appendix A - paraquat/1910425 (pp.217)

A new FC standard has been added to rule, but is not noted in the preamble. *Please provide justification for this new standard.*

ADEQ Response 73:

A new BCF of 0.3 was incorporated from the Extension Toxicology Network (EXTOXNET) Pesticide Information Profile for Paraquat. http://pmep.cce.cornell.edu/profiles/extoxnet/metiram-propoxur/paraquat-ext.html. The notation has been made in the preamble.

Comment 74: City of Phoenix - Numeric SWQS, Appendix A - picloram/1918021 (pp.192, 217)

The reference link for the FC RfD is incorrect. In addition, the EPA RfD is 0.05 mg/kg/day not 0.07 mg/kg/day per the reference. *Please provide the correct link, correct RfD, and justification for the new FC standard.*

ADEQ Response 74:

The RfD referenced in the preamble and employed in the standard calculation is correct as per the USEPA IRIS database. A typographical error listed the reference for the RfD for permethrin in the preamble. The correct link to the picloram reference dose is https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0256_summary.pdf and has been incorporated in the preamble.

Comment 75: City of Phoenix - Proposed Numeric SWQS, Appendix A, Ammonia - Tables 11 to 17

More stringent standards for ammonia have been added due to the Unionidae mussel family,

particularly "making the standard more stringent for waters where unionids are present" (preamble page 201). The preamble also states that "for the aquatic & wildlife cold and warm water uses, Unionidae will be assumed to be present unless a study is performed demonstrating that they are absent and there is no historic evidence of their presence, or hydrologic modification has altered the flow regime that would prevent their reestablishment" (page 201) However, this assumption of presence and therefore, application of this standard to the entire state is excessive based on current knowledge regarding the extent of this mussel family presence as detailed in the 2009 Arizona Game & Fish Department (AGFD) Heritage Grant Study I07011. *Please consider coordinating with AGFD to determine where probable habitat is likely present to more appropriately apply these standards.*

ADEQ Response 75:

While the number of locations where present or historic evidence of Unionidae has been found in the study by Dr. Meyers is relatively small, this is an artifact of the extent of the study and should not be construed as a historic range, or the potential range of a recovered population. Given that evidence of, or extant populations were found at altitudes from 80 ft. ASL at the southern border to over 8000 ft. ASL in the White Mountains, ADEQ will assume Unionidae to be present unless a study is performed demonstrating that they are absent and there is no historic evidence of their presence, or hydrologic modification has altered the flow regime in a way that would prevent their reestablishment.

The stated goals of the CWA are to restore and maintain the integrity of the Nation's waters. While Unionidae have been extirpated from large portions of the State's waters, the goal of the CWA to restore these waters necessitates intact and viable ecosystems, including native organisms. It is important that ADEQ address ammonia toxicity to unionids, where they occur or where they could be reestablished. It is the Department's position that perennial waters with either the A&Wc or A&Ww designated uses provide appropriate conditions for habitation by Unionid mussels.

Comment 76: City of Phoenix - Proposed Numeric SWQS, Appendix A, Ammonia - Tables 11 to 17

ADEQ has not applied the unionid mussel standard to A&Wedw "because effluent dependent waters are situated in channels that were dry prior to permitted discharges" (preamble page 201). However, the following waters that are classified as A&Ww in the Middle Gila also would fall

under this category:

Urban Lakes – man-made isolated waterbodies.

Middle Gila Salt River segment "Below Interstate 10 bridge to the City of Phoenix 23rd Ave WWTP outfall at 33°24'44" N, 112°07'59'' W" – segment of the Salt River for which the City has an AZPDES permit to create the Rio Salado Habitat Restoration Area. In addition, a hydrologic study to substantiate the modification of the flow regime in the Salt River, downstream of Granite Reef Dam and Tempe Town Lake seems excessive to prove unionid mussel absence.

Please consider classifying these surface waters as unionid mussel absent as these surface water cannot support the-Unionidae mussel species.

ADEQ Response 76:

An analysis will need to be conducted on a waterbody specific basis and consider water source, connectivity, historic flow regime, design intent and de facto public uses, among other factors. As the Middle Gila/Salt River segment in question was designated A&We prior to 2009, and the downstream segment is designated A&Wedw, this segment may meet the hydrological modification exemption due to upstream dams, long term dewatering, and channelization. As this segment is now designated A&Ww, a site-specific analysis considering these modifications, present sources of water, and historic dewatering will need to be performed. ADEQ will further consider the application of this rule to man-made, isolated waterbodies in the next triennial review.

Comment 77: City of Phoenix - Proposed Numeric SWQS, Appendix A, Ammonia - Tables 11 to 17

Please provide links to U.S. Fish and Wildlife Service guidance or protocols on how the permittee would conduct a study or survey demonstrating the presence / absence of the unionid mussel, which is not stated in the preamble and rule.

ADEQ Response 77:

As of this writing, there is no specific USFWS guidance for undertaking surveys for unionid mussels. Dr. Terry Meyers suggested the use of:

- Strayer, David L. and David R. Smith. *A guide to sampling freshwater mussel populations* (2003) American Fisheries Society, Monograph 8. Bethesda, Maryland. ISBN 1-888569-50-6.
- *The Mollusks: A guide to their study, collection and preservation*, Edited by Sturm, Pearce, and Valdes. A publication of the American Malacological Society. ISBN 1-58112-930-0.

Comment 78: City of Phoenix - Proposed Numeric SWQS, Appendix A, Ammonia - Tables 11 to 17

The City suggests adding a notation in the rule that the unionid mussel present standards do not apply to A&Wedw, Aquatic & Wildlife ephemeral (A&We) or to other classifications of waters that would be predominantly dry without permitted discharges.

ADEQ Response 78:

The Department has added notes clarifying the application of the ammonia standard to each table.

Comment 79: City of Phoenix - AAC R18-11-101, Definitions – "Critical flow conditions of the receiving water"

Please define "harmonic mean flow" which is used in section (c) of this definition.

ADEQ Response 79:

The EPA Technical Support Document For Water Quality Based Toxics Control (1991), defines the harmonic mean flow as "the number of daily flow measurements divided by the sum of the reciprocals of the flows. That is, it is the reciprocal of the mean of reciprocals." Because EPA's definition is consistent with the commonly understood definition of harmonic mean, ADEQ has not defined the term "harmonic mean flow" in the rule.

Comment 80: City of Phoenix - AAC R18-11-101, Definitions – "Pollution Minimization Program"

The City suggests changing "and" to "or" in the following statement: "…pollutant controls that will prevent or reduce pollutant loadings." Not all surface waters have established TMDLs.

ADEQ Response 80:

The definition the City is referring to is Pollutant Minimization Program (R18-11-101(34)). This definition was added in support of revisions to the variance language contained in R18-11-122. The definition is consistent with the federal definition found at 40 CFR 131.3(p), therefore,

ADEQ will retain the proposed definition. The reduced pollutant loadings referred to in the definition are not explicitly related to TMDLs. The Pollution Minimization Program in this context refers to those actions taken by a permittee to reduce pollutant loadings where additional pollutant control technologies are not available.

Comment 81: City of Phoenix - AAC R18-11-101, Definitions – "Statistical Threshold"

Please add a definition for "statistical threshold" as it relates to the new E.coli reporting requirements.

ADEQ Response 81:

The term "statistical threshold" does not relate to new *E. coli* reporting requirements, rather it relates to how the proposed surface water quality standard was derived mathematically. Changes to AZPDES reporting requirements are addressed during the permitting process not in the triennial review. Please see Response 20 for discussion regarding the definition of Statistical Threshold Value.

Comment 82: City of Phoenix - AAC R18-11-101, Definitions – "Highest Attainable Condition"

ADEQ has removed the definition proposed in the informal draft rule for "Highest attainable condition" as it relates to variances/R18-11-122, but does not provide justification for why this definition was removed from the proposed rule. The City suggests that a definition for "Highest attainable condition" be added to the rule.

ADEQ Response 82:

While ADEQ's informal draft included a definition of "highest attainable condition," ADEQ received negative comments regarding this informally proposed definition. For that reason, and given that the federal government did not define the term, ADEQ did not include the definition in its Notice of Proposed Rulemaking or the final rule.

Comment 83: City of Phoenix - AAC R18-11-101, Definitions – "Zone of Initial Dilution"

Please consider specifying the criteria for determining the "Zone of Initial Dilution" in the variance rule/R18-11-122, specifically the terms "small area" and "turbulence is high and causes rapid mixing with the surrounding water."

ADEQ Response 83:

ADEQ has adapted the "Zone of Initial Dilution" (ZID) definition from several different sources, which are summarized in the EPA Guidance Document titled, "Compilation of Mixing Zone Guidance Documents" found here: https://www.epa.gov/sites/production/files/2018-10/documents/compilation-epa-mixingzone-documents.pdf.

The ZID is applicable to toxic pollutants and the ZID's specific area or size would be characterized on a case-by-case basis using hydraulic modeling. The model determines the size of the ZID by evaluating how much dilution occurs initially (subsequently determines how rapidly mixing occurs) by using the critical flow conditions of the receiving water, critical flow condition of the discharge, and the upstream receiving water and discharge concentration variables. One can assume if there is a relatively high amount of water upstream in the receiving water compared to a relatively low amount of water in the discharge the dilution ratio will be larger and the size of ZID would be smaller compared to the alternative. Because these determinations will be made on a case-by-case basis, ADEQ will not specify criteria for the terms "small area" and "turbulence is high and causes rapid mixing with the surrounding water."

Comment 84: City of Phoenix – R18-11-107.01 Antidegradation Criteria

Under subsection (d) review of a Section 404 permit, it states that for an individual Section 404 permit, ADEQ will conduct an antidegradation review if the discharge may degrade existing water quality in an Outstanding Arizona Water (OAW) or a 303(d)-listed water. 404(b)(1) guidelines apply to discharges in all Waters of the U.S., not just OAW or 303(d)-listed waters. Please update this section to reflect 404(b)(1) antidegradation review requirements per 40 Code of Federal Regulations 230.10(c).

ADEQ Response 84:

ADEQ agrees that water quality antidegradation protections extend to all surface waters. It is ADEQ's position that, for purposes of individual § 404 permits, antidegradation review is satisfied by conducting a "significant degradation" review of a proposed discharge under the CWA § 404(b)(1) Guidelines, except in cases where a discharge may degrade existing water quality in an OAW or a water listed on the 303(d) List of impaired waters. In those cases, ADEQ will conduct an antidegradation review. R18-11-107.01(D) was crafted to ensure antidegradation protections extend to all surface waters while accounting for the interplay between various facets of the § 404 permitting process and antidegradation review, and is not intended to be

substantively different from the currently applicable antidegradation rule as approved by EPA on January 21, 2009. Please see the preamble section entitled *Legal Gap Modifications*, and Response 29.

Comment 85: City of Phoenix - AAC RlB-11-109, *E. Coli* bacterial Numeric Water Quality Standards

Please provide clarification regarding subsection (A) to explain how the new E. coli standard (sampling, reporting, exceedances, etc.) will be applied.

ADEQ Response 85:

ADEQ does not anticipate any changes in the current sampling or reporting procedures for E. coli. The change is to the criteria only. The Statistical Threshold Value (term replacing SSM) is statistically arrived at but does not require a statistical analysis to determine if monitoring data meets the value. Sample results will directly compared to the applicable STV. Any changes to AZPDES permit limits will occur during permit renewal following the adoption of the new criteria.

Comment 86: City of Phoenix - AAC Rl8-11-122, Variances

ADEQ must comply with new federal regulations that say that variances are water quality standards, and must go through the rulemaking process when they were issued as part of AZPDES permits.

AAC R18-11-122(M) has been added, which states "Upon expiration of a variance, point source dischargers shall comply with the water quality standard." The AZPDES program and associated rules and permits should implement variance requirements for point source dischargers, and reference to point source dischargers should be removed from the SWQS. *The City suggests AAC R18-11-122(M) be removed.*

ADEQ Response 86:

As mentioned in the preamble, variances are now a change to a water quality standard pursuant to federal law and in Arizona water quality standards must be established by rule. See 40 C.F.R. § 131.14 and A.R.S. § 49-221(A). As of the promulgation date of this proposed rule, no ADEQ Permittee is operating under a variance. However, ADEQ is updating the variance rules to be consistent with federal law because variances can still be a vital tool to improving water quality in partnership with point source dischargers. Because variances are now a change to a water quality standard (although temporary) and can be discharger specific, the language in AAC R18-11-

122(M) and all other references to point source discharges needs to be maintained in the SWQS in order to properly implement variances in Arizona consistent with the federal rule. For additional explanation of this rule, please see Response 49.

Comment 87: City of Phoenix - Appendix B-Surface Waters and Designated Uses. Middle Gila Watershed

ADEQ has incorrectly renamed "Indian School Park Lake" to "Steele Indian School Pond" because - per preamble page 202 - the "City of Phoenix changed the name of the waterbody." Indian School Park Lake is a Scottsdale lake, not a Phoenix lake. The current version of Appendix B correctly refers to the location of this lake at Indian School Road & Hayden Road, Scottsdale at 33°29'39" N, 111°54'37" W. *Please restore to the existing listing of this lake in Appendix B.*

ADEQ Response 87:

ADEQ renamed Indian School Park Lake to Steele Indian School Pond in the draft rule in error. We thank the City of Phoenix for this observation. The name will be reverted to the correct original name in the final rule.

Comment 88 and Response 88: Laboratories – Appendix A – Cost of testing more stringent standards.

A number of laboratories provided comments to assist ADEQ in preparing the Economic, Small Business, and Consumer Impact Statement. Generally, these responses indicated that testing for some of the more stringent levels set by this rulemaking could create a large costs to laboratories, and that some levels surpassed laboratories' current detection capabilities. ADEQ appreciates these comments, and has incorporated these comments into the Economic, Small Business, and Consumer Impact Statement. Please see also Response 41 for discussion regarding economic considerations in setting water quality criteria.

Comment 89 and ADEQ Response: Tempe Tourism Office – Economic Impact of Tempe Town Lake

ADEQ received data from the Tempe Tourism Office indicating the significant economic impact of Tempe Town Lake. ADEQ appreciates this information and has included it in the Economic, Small Business, and Consumer Impact Statement.

12. All agencies shall list other matters prescribed by statute applicable to the specific

agency or to any specific rule or class of rules. Additionally, an agency subject to Council review under A.R.S. §§ 41-1052 and 41-1055 shall respond to the following questions:

There are no other matters prescribed by statute applicable specifically to ADEQ or this specific rulemaking.

a. Whether the rule requires a permit, whether a general permit is used and if not, the reasons why a general permit is not used:

Not applicable. This rulemaking is a water quality standards rulemaking and does not require a permit.

b. Whether a federal law is applicable to the subject of the rule, whether the rule is more stringent than federal law and if so, citation to the statutory authority to exceed the requirements of federal law:

The federal Clean Water Act and implementing regulations adopted by EPA apply to the subject of this rule, as described in section 5 above. This rulemaking is no more stringent than required by federal law. However, pursuant to A.R.S. § 49-221(B), ADEQ does have inherent authority to establish water quality standards for all waters of the state, including waters beyond those required to be regulated under the Clean Water Act.

c. Whether a person submitted an analysis to the agency that compares the rule's impact of the competitiveness of business in this state to the impact on business in other states:

No such analysis has been submitted.

13. A list of any incorporated by reference material as specified in A.R.S. § 41-1028 and its location in the rules:

None.

14. Whether the rule was previously made, amended, or repealed as an emergency rule. If so, cite the notice published in the Register as specified in R1-1-409(A). Also, the agency shall state where the text was changed between the emergency and the final rulemaking packages:

This rule was not.

15. The full text of the rules follows:

TITLE 18. ENVIRONMENTAL QUALITY

CHAPTER 11. DEPARTMENT OF ENVIRONMENTAL QUALITY

WATER QUALITY STANDARDS

ARTICLE 1. WATER QUALITY STANDARDS FOR SURFACE WATER

Section

R18-11-101. Definitions

R18-11-107.01. Antidegradation Criteria

R18-11-109. Numeric Water Quality Standards

R18-11-114. Mixing Zones

R18-11-115. Site-Specific Standards

R18-11-120. Enforcement of Non-Permitted Discharges

R18-11-122. Variances

Appendix A. Numeric Water Quality Standards

Table 1. Water Quality Criteria By Designated Use

Table 2. Acute Water Quality Standards for Dissolved Cadmium

Table 3. Chronic Water Quality Standards for Dissolved Cadmium

Table 4. Water Quality Standards for Dissolved Chromium III

Table 5. Water Quality Standards for Dissolved Copper

Table 6. Water Quality Standards for Dissolved Lead

Table 11. ~~Acute Criteria for Total Ammonia (in mg/L as N) Aquatic and Wildlife coldwater, warmwater, and edw~~ Acute Standards for Total Ammonia (in mg/L, as N) for Aquatic and Wildlife coldwater, Unionid Mussels Present

Table 12. ~~Chronic Criteria for Total Ammonia (mg/L as N) Aquatic and Wildlife coldwater, warmwater, and edw~~ Acute Standards for Total Ammonia (in mg/L, as N) for Aquatic and Wildlife warmwater, Unionid Mussels Present

Table 13. ~~Repealed~~ Chronic Criteria for Total Ammonia (in mg/L, as N) for Aquatic and Wildlife coldwater and warmwater, Unionid Mussels Present

Table 14. ~~Repealed~~ Acute Standards for Total Ammonia (in mg/L, as N) for Aquatic and Wildlife Coldwater, Unionid Mussels Absent

Table 15. ~~Repealed~~ Acute Standards for Total Ammonia (in mg/L, as N) for Aquatic and Wildlife Warmwater and Effluent Dependent, Unionid Mussels Absent

Table 16. ~~Repealed~~ Chronic Standards for Total Ammonia (in mg/L, as N) for Aquatic and Wildlife Warmwater and Effluent Dependent, Unionid Mussels Absent

Table 17. ~~Repealed~~ Chronic Criteria for Total Ammonia (in mg/L, as N) for Aquatic and Wildlife coldwater, Unionid Mussels Absent

Appendix B. Surface Waters and Designated Uses

Appendix C. Site-Specific Standards

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. "Complete Mixing" means the location at which concentration of a pollutant across a transect of a surface water differs by less than five percent.

~~12~~13. "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~~14. "Critical flow ~~condition~~ conditions of the discharge" means the ~~lowest flow over seven consecutive days that has a probability of occurring once in 10 years (7-Q-10)~~ hydrologically based discharge flow averages that the director uses to calculate and implement applicable water quality criteria to a mixing zone's receiving water as follows:

a. For acute aquatic water quality standard criteria, the discharge flow critical condition is represented by the maximum one-day average flow analyzed over a reasonably representative timeframe.
b. For chronic aquatic water quality standard criteria, the discharge flow critical flow condition is represented by the maximum monthly average flow analyzed over a reasonably representative timeframe.

c. For human health based water quality standard criteria, the discharge flow critical condition is the long-term arithmetic mean flow, averaged over several years so as to simulate long-term exposure.

15. "Critical flow conditions of the receiving water" means the hydrologically based receiving water low flow averages that the director uses to calculate and implement applicable water quality criteria:

a. For acute aquatic water quality standard criteria, the receiving water critical condition is represented as the lowest one-day average flow event expected to occur once every ten years, on average (1Q10).

b. For chronic aquatic water quality standard criteria, the receiving water critical flow condition is represented as the lowest seven-consecutive-day average flow expected to occur once every ten years, on average (7Q10), or

c. For human health based water quality standard criteria, in order to simulate long-term exposure, the receiving water critical flow condition is the harmonic mean flow.

~~14.~~16. "Deep lake" means a lake or reservoir with an average depth of more than 6 meters.

~~15.~~17. "Designated use" means a use specified in Appendix B of this Article for a surface water.

~~16.~~18. "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.~~19. "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.~~20. "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.~~21. "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.~~22. "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.~~23. "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.~~24. "Geometric mean" means the nth root of the product of n items or values. The geometric mean is calculated using the following formula:

$$GM_Y = \sqrt[n]{(Y_1)(Y_2)(Y_3)¼\,(Y_n)}$$

~~23.~~25. "Hardness" means the sum of the calcium and magnesium concentrations, expressed as calcium carbonate ($CaCO_3$) in milligrams per liter.

~~24.~~26. "Igneous lake" means a lake located in volcanic, basaltic, or granite geology and soils.

~~25.~~27. "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.~~28. "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.~~29. "Oil" means petroleum in any form, including crude oil, gasoline, fuel oil, diesel oil, lubricating oil, or sludge.

~~28.~~30. "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.~~31. "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.~~32. "Perennial water" means a surface water that flows continuously throughout the year.

~~31.~~33. *"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)

34. "Pollutant Minimization Program" means a structured set of activities to improve processes and pollutant controls that will prevent and reduce pollutant loadings.

~~32.~~35. "Practical quantitation limit" means the lowest level of quantitative measurement that can be reliably achieved during a routine laboratory operation.

~~33.~~36. "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~~ abiotic physical stream habitat, water quality, and site selection criteria established by the Director that describe the typical characteristics of stream sites in a region that are least disturbed by environmental stressors. Reference biological assemblages of macroinvertebrates and algae are collected from these reference condition streams for calculating the Arizona Indexes of Biological Integrity thresholds.

~~34.~~37. "Regional Administrator" means the Regional Administrator of Region IX of the U.S. Environmental Protection Agency.

~~35.~~38. "Regulated discharge" means a point-source discharge regulated under an AZPDES permit, a discharge regulated by a § 404 permit, and any discharge authorized by a federal permit or license that is subject to state water quality certification under § 401 of the Clean Water Act.

~~36.~~39. "Riffle habitat" means a stream segment where moderate water velocity and substrate roughness produce moderately turbulent conditions that break the surface tension of the water and may produce breaking wavelets that turn the surface water into white water.

~~37.~~40. "Run habitat" means a stream segment where there is moderate water velocity that does not break the surface tension of the water and does not produce breaking wavelets that turn the surface water into white water.

~~38.~~41. "Sedimentary lake" means a lake or reservoir in sedimentary or karst geology and soils.

~~39.~~42. "Shallow lake" means a lake or reservoir, excluding an urban lake, with a smaller, flatter morphology and an average depth of less than 3 meters and a maximum depth of less than 4 meters.

~~40.~~43. "Significant degradation" means:

a. The consumption of 20 percent or more of the available assimilative capacity for a pollutant of concern at critical flow conditions, or

b. Any consumption of assimilative capacity beyond the cumulative cap of 50 percent of assimilative capacity.

~~41.~~44. "Surface water" means ~~a water of the United States and includes the following:~~

~~a. A water that is currently used, was used in the past, or may be susceptible to use in interstate or foreign commerce;~~

~~b. An interstate water, including an interstate wetland;~~

~~c. All other waters, such as an intrastate lake, reservoir, natural pond, river, stream (including an intermittent or ephemeral stream), creek, wash, draw, mudflat, sandflat, wetland, slough, backwater, prairie pothole, wet meadow, or playa lake, the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce, including any such water:~~

~~i. That is or could be used by interstate or foreign travelers for recreational or other purposes;~~

~~ii. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or~~

~~iii. That is used or could be used for industrial purposes by industries in interstate or foreign commerce;~~

~~d. An impoundment of a surface water as defined by this definition;~~

~~e. A tributary of a surface water identified in subsections (41)(a) through (d); and~~

~~f. A wetland adjacent to a surface water identified in subsections (41)(a) through (e).~~ "Navigable waters" as defined in A.R.S. § 49-201(22).

~~42.~~45. "Total nitrogen" means the sum of the concentrations of ammonia (NH_3), ammonium ion (NH_4+), nitrite (NO_2), and nitrate (NO_3), and dissolved and particulate organic nitrogen expressed as elemental nitrogen.

~~43.~~46. "Total phosphorus" means all of the phosphorus present in a sample, regardless of form, as measured by a persulfate digestion procedure.

~~44.~~47. "Toxic" means a pollutant or combination of pollutants, that after discharge and upon exposure, ingestion, inhalation, or assimilation into an organism, either directly from the environment or indirectly by ingestion through food chains, may cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), or physical deformations in the organism or its offspring.

~~45.~~48. "Urban lake" means a manmade lake within an urban landscape.

~~46.~~49. "Use attainability analysis" means a structured scientific assessment of the factors affecting the attainment of a designated use including physical, chemical, biological, and economic factors.

50. "Variance" means a time-limited designated use and criterion for a specific pollutant(s) or water quality parameter(s) that reflect the highest attainable condition during the term of the variance.

~~47.~~51. "Wadeable" means a surface water can be safely crossed on foot and sampled without a boat.

~~48.~~52. "Wastewater" does not mean:

a. Stormwater,

b. Discharges authorized under the De Minimus General Permit,

c. Other allowable non-stormwater discharges permitted under the Construction General Permit or the Multi-sector General Permit, or

d. Stormwater discharges from a municipal storm sewer system (MS4) containing incidental amounts of non-stormwater that the MS4 is not required to prohibit.

~~49~~53. "Wetland" means an area that is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. A wetland includes a swamp, marsh, bog, cienega, tinaja, and similar areas.

~~50. "Zone of passage" means a continuous water route of volume, cross-sectional area, and quality necessary to allow passage of free-swimming or drifting organisms with no acutely toxic effect produced on the organisms.~~

54. "Zone of initial dilution" means a small area in the immediate vicinity of an outfall structure in which turbulence is high and causes rapid mixing with the surrounding water.

R18-11-107.01. Antidegradation Criteria

A. Tier 1 antidegradation protection.

1. Tier 1 antidegradation protection applies to the following surface waters:

   a. A surface water listed on the 303(d) list for the pollutant that resulted in the listing,

   b. An effluent dependent water,

   c. An ephemeral water,

   d. An intermittent water, and

   e. A canal listed in Appendix B.

2. A regulated discharge shall not cause a violation of a surface water quality standard or a wasteload allocation in a total maximum daily load approved by EPA.

3. Except as provided in subsections (E) and (F), Tier 1 antidegradation review requirements are satisfied for a point-source discharge regulated under an individual AZPDES permit to an ephemeral water, effluent dependent water, intermittent water, or a canal listed in Appendix B, if water quality-based effluent limitations designed to achieve compliance with applicable surface water quality standards are established in the permit and technology-based requirements of the Clean Water Act for the point source discharge are met.

B. Tier 2 antidegradation protection.

1. Tier 2 antidegradation protection applies to a perennial water with existing water quality that is better than applicable water quality standards. A perennial water that is not listed in subsection (A)(1) nor classified as an OAW under A.A.C. R18-9-112(G) has Tier 2 antidegradation protection for all pollutants of concern.
2. A regulated discharge that meets the following criteria, at critical flow conditions, does not cause significant degradation:
   a. The regulated discharge consumes less than 20 percent of the available assimilative capacity for each pollutant of concern, and
   b. At least 50 percent of the assimilative capacity for each pollutant of concern remains available in the surface water for each pollutant of concern.
3. Antidegradation review. Any person proposing a new or expanded regulated discharge under an individual AZPDES permit that may cause significant degradation shall provide ADEQ with the following information:
   a. Baseline characterization. A person seeking authorization to discharge under an individual AZPDES permit to a perennial water shall provide baseline water quality data on pollutants of concern where no data exists or there are insufficient data to characterize baseline water quality and to determine available assimilative capacity. A discharger shall characterize baseline water quality at a location upstream of the proposed discharge location;
   ~~a~~b. Alternative analysis.
      i. The person seeking authorization for the discharge shall prepare and submit a written analysis of alternatives to the discharge. The analysis shall provide information on all reasonable, cost-effective, less-degrading or non-degrading discharge alternatives. Alternatives may include wastewater treatment process changes or upgrades, pollution prevention measures, source reduction, water reclamation, alternative discharge locations, groundwater recharge, land application or treatment, local pretreatment programs, improved operation and maintenance of existing systems, seasonal or controlled discharge to avoid critical flow conditions, and zero discharge;
      ii. The alternatives analysis shall include cost information on base pollution control measures associated with the regulated discharge and cost information for each alternative;
      iii. The person shall implement the alternative that is cost-effective and reasonable, results in the least degradation, and is approved by the Director. An alternative is cost-effective and reasonable if treatment costs associated with the alternative are less than a 10 percent increase above the cost of base pollution control measures;
      iv. For purposes of this subsection, "base pollution control measures" are water pollution control measures required to meet technology-based requirements of the Clean Water Act and water quality-based effluent limits designed to achieve compliance with applicable water quality standards; and
   ~~b~~c. Social and economic justification. The person shall demonstrate to the Director that significant degradation is necessary to accommodate important economic or social development in the local area. The person seeking authorization for the discharge shall prepare a written social and economic justification that includes a description of the following:

i. The geographic area where significant degradation of existing water quality will occur;

ii. The current baseline social and economic conditions in the local area;

iii. The net positive social and economic effects of development associated with the regulated discharge and allowing significant degradation;

iv. The negative social, environmental, and economic effects of allowing significant degradation of existing water quality; and

v. Alternatives to the regulated discharge that do not significantly degrade water quality yet may yield comparable social and economic benefits~~;~~.

~~c. Baseline characterization. A person seeking authorization to discharge under an individual AZPDES permit to a perennial water shall provide baseline water quality data on pollutants of concern where no data exist or there are insufficient data to characterize baseline water quality and to determine available assimilative capacity. A discharger shall characterize baseline water quality at a location upstream of the proposed discharge location; and~~

4. For purposes of this Section, the term "pollutant of concern" means a pollutant with either a numeric or narrative water quality standard.

5. Public participation. The Director shall provide public notice and an opportunity to comment on an antidegradation review under subsection (B)(3) and shall provide an opportunity for a public hearing under A.A.C. R18-9-A908(B).

C. Tier 3 antidegradation protection.

1. Tier 3 antidegradation protection applies only to an OAW listed in R18-11-112(G).

2. A new or expanded point-source discharge directly to an OAW is prohibited.

3. A person seeking authorization for a regulated discharge to a tributary to, or upstream of, an OAW shall demonstrate in a permit application or in other documentation submitted to ADEQ that the regulated discharge will not degrade existing water quality in the downstream OAW.

4. A discharge regulated under a § 404 permit that may affect existing water quality of an OAW requires ~~an individual § 401 water quality certification~~ a determination by the Director to ensure that existing water quality is maintained and protected and any water quality impacts are temporary. Temporary water quality impacts are those impacts that occur for a period of six months or less and are not regularly occurring. The form of such a determination shall be as follows:

   a. For Corps-issued § 404 permits, an individual § 401 water quality certification.

   b. For Director-issued § 404 permits, a § 404 permit action, wherein the Director shall conduct a water quality evaluation as a part of the state's requirements for issuing § 404 permits and in accordance with this section.

D. Antidegradation review of a § 404 permit~~.~~ shall be conducted as follows:

1. For a Corps-issued § 404 permit. The Director shall conduct the antidegradation review of any discharge authorized under a nationwide or regional § 404 permit as part of the § 401 water quality certification prior to issuance of the nationwide or regional permit. The Director shall conduct the antidegradation review of an

individual § 404 permit if the discharge may degrade existing water quality in an OAW or a water listed on the 303(d) List of impaired waters. For regulated discharges that may degrade water quality in an OAW or a water that is on the 303(d) List of impaired waters, the Director shall conduct the antidegradation review as part of the § 401 water quality certification process.

2. For a Director-issued § 404 permit. The Director shall conduct the antidegradation review of any discharge authorized under a general § 404 permit as a part of its determination whether to issue a general permit in accordance with state requirements for issuing a § 404 general permit and with this section. The Director shall conduct the antidegradation review of an individual § 404 permit as part of the § 404 permit action in accordance with state requirements for issuing a § 404 permit and in accordance with this section.

E. Antidegradation review of an AZPDES stormwater permit. An individual stormwater permit for a municipal separate storm sewer system (MS4) meets antidegradation requirements if the permittee complies with the permit, including developing a stormwater management plan containing controls that reduce the level of pollutants in stormwater discharges to the maximum extent practicable.

F. Antidegradation review of a general permit. The Director shall conduct the antidegradation review of a regulated discharge authorized by a general permit at the time the general permit is issued or renewed. A person seeking authorization to discharge under a general permit is not required to undergo an individual antidegradation review at the time the Notice of Intent is submitted unless the discharge may degrade existing water quality in an OAW or a water listed on the 303(d) List of impaired waters.

R18-11-109. Numeric Water Quality Standards

A. *E. coli* bacteria. The following water quality standards for *Escherichia coli* (*E. coli*) are expressed in colony forming units per 100 milliliters of water (cfu / 100 ml) or as a Most Probable Number (MPN):

E. coli	**FBC**	**PBC**
Geometric mean (minimum of four samples in 30 days)	126	126
~~Single sample maximum~~Statistical threshold value	~~235~~410	~~575~~576

B. pH. The following water quality standards for pH are expressed in standard units:

pH	**DWS**	**FBC, PBC, A&W [1]**	**AgI**	**AgL**
Maximum	9.0	9.0	9.0	9.0
Minimum	5.0	6.5	4.5	6.5

Footnotes:

1. "1" Includes A&Wc, A&Ww, A&Wedw, and A&We.

C. The maximum allowable increase in ambient water temperature, due to a thermal discharge is as follows:

A&Ww	A&Wedw	A&Wc
3.0° C	3.0° C	1.0° C

D. Suspended sediment concentration.

1. The following water quality standards for suspended sediment concentration, expressed in milligrams per liter (mg/L), are expressed as a median value determined from a minimum of four samples collected at least seven days apart:

A&Wc	A&Ww
25	80

2. The Director shall not use the results of a suspended sediment concentration sample collected during or within 48 hours after a local storm event to determine the median value.

E. Dissolved oxygen. A surface water meets the water quality standard for dissolved oxygen when either:

1. The percent saturation of dissolved oxygen is equal to or greater than 90 percent, or
2. The single sample minimum concentration for the designated use, as expressed in milligrams per liter (mg/L) is as follows:

Designated Use	Single sample minimum concentration in mg/L
A&Ww	6.0
A&Wc	7.0
A&W edw for a sample taken from three hours after sunrise to sunset	3.0
A&W edw for a sample taken from sunset to three hours after sunrise	1.0

The single sample minimum concentration is the same for the designated use in a lake, but the sample must be taken from a depth no greater than one meter.

F. Nutrient criteria. The following are water quality standards for total phosphorus and total nitrogen (expressed in milligrams per liter (mg/L)) that apply to the surface waters listed below. A minimum of 10 samples, each taken at least 10 days apart in a consecutive 12-month period, are required to determine a 90th percentile. Not more than 10 percent of the samples may exceed the 90th percentile value listed below. The Director will apply these water quality standards for total phosphorus and total nitrogen to ~~a~~ the surface ~~water~~ waters listed below, and to their perennial tributaries, if listed. The Director may also apply these total phosphorus and total nitrogen standards to any source discharging to ~~a~~ any tributary (ephemeral, intermittent, effluent dependent water, or

perennial) of the surface waters listed below, if necessary to protect nutrient water quality in the listed surface water, based on the volume, frequency, magnitude and duration of the discharge, and distance to the downstream surface water listed below:

1. Verde River and its perennial tributaries from the Verde headwaters to Bartlett Lake:

Surface Water	**Annual Mean**	**90th Percentile**	**Single Sample Maximum**
Total phosphorus	0.10	0.30	1.00
Total nitrogen	1.00	1.50	3.00

2. Black River, Tonto Creek and their perennial tributaries for any segments that are not located on tribal lands:

Surface Water	**Annual Mean**	**90th Percentile**	**Single Sample Maximum**
Total phosphorus	0.10	0.20	0.80
Total nitrogen	0.50	1.00	2.00

3. Salt River and its perennial tributaries above Roosevelt Lake for any segments that are not located on tribal lands:

Surface Water	**Annual Mean**	**90th Percentile**	**Single Sample Maximum**
Total phosphorus	0.12	0.30	1.00
Total nitrogen	0.60	1.20	2.00

4. Salt River below Stewart Mountain Dam to its confluence with the Verde River:

Surface Water	**Annual Mean**	**90th Percentile**	**Single Sample Maximum**
Total phosphorus	0.05	–	0.20
Total nitrogen	0.60	–	3.00

5. Little Colorado River and its perennial tributaries upstream from:
   a. The headwaters to River Reservoir,
   b. South Fork of Little Colorado River at 34°00’49”/109°24’18” to above South Fork Campground at 34°04’49”/109°24’18”, and
   c. The headwaters of Water Canyon Creek to the Apache-Sitgreaves National Forest boundary:

Surface Water	**Annual Mean**	**90th Percentile**	**Single Sample Maximum**
Total phosphorus	0.08	0.10	0.75
Total nitrogen	0.60	0.75	1.10

6. From the Little Colorado River and State Route 260 at 34°06’39”/109°18’55” to Lyman Lake:

Surface Water	**Annual Mean**	**90th Percentile**	**Single Sample Maximum**
Total phosphorus	0.20	0.30	0.75
Total nitrogen	0.70	1.20	1.50

7. Colorado River at the Northern International Boundary near Morelos Dam:

Surface Water	**Annual Mean**	**90th Percentile**	**Single Sample Maximum**
Total phosphorus	–	0.33	–
Total nitrogen	–	2.50	–

8. Oak Creek from its headwaters at 35°01'30"/111°44'12" to its confluence with the Verde River and the West Fork of Oak Creek from its headwaters at 35°02'44"/111°54'48" to its confluence with Oak Creek.

Surface Water	**Annual Mean**	**90th Percentile**	**Single Sample Maximum**
Total phosphorus	0.1	0.25	0.30
Total nitrogen	1.00	1.50	2.50

9. No discharge of wastewater to Show Low Creek or its perennial tributaries upstream of and including Fools Hollow Lake shall exceed 0.16 mg/L total phosphates as P.
10. No discharge of wastewater to the San Francisco River or its perennial tributaries upstream of Luna Lake Dam shall exceed 1.0 mg/L total phosphates as P.

~~**G.** Footnotes:~~

~~1. "1" Includes A&Wc, A&Ww, A&Wedw, and A&We.~~

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 individual AZPDES permit on a pollutant-by-pollutant basis. A mixing zone is prohibited in an ephemeral water or where there is no water for dilution, or as prohibited pursuant to subsection (H) of this section.

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~~ is where ~~the concentration of wastewater across a transect of the surface water differs by less than five percent~~ complete mixing occurs; 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. The description shall also address the factors listed in subsection (D) of this section that the Director must consider when deciding to grant or deny a request and shall address the mixing zone requirements in subsection (H) of this section.

~~**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.**~~**C.** 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.~~**D.** 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.~~**E.** 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.~~**F.** 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.~~**G.** Mixing zone requirements.

1. ~~The length of a mixing zone shall not exceed 500 meters in a stream.~~ A mixing zone shall be as small as practicable in that it shall not extend beyond the point in the waterbody at which complete mixing occurs under the critical flow conditions of the discharge and of the receiving water.
2. The total horizontal area allocated to all mixing zones on a lake shall not exceed 10 percent of the surface area of the lake.
3. Adjacent mixing zones in a lake shall not overlap or be located closer together than the greatest horizontal dimension of the largest mixing zone.

~~4. A mixing zone shall provide for a zone of passage of not less than 50 percent of the cross-sectional area of a river or stream.~~

~~5.~~4. The design of any discharge outfall shall maximize initial dilution of the wastewater in a surface water.

~~6.~~5. The size of the zone of initial dilution in a mixing zone shall prevent lethality to organisms passing through the zone of initial dilution. The mixing zone shall prevent acute toxicity and lethality to organisms passing through the mixing zone.

~~I.~~**H.** The Director shall not establish a mixing zone in an AZPDES permit for the following persistent, bioaccumulative pollutants:

1. Chlordane,
2. DDT and its metabolites (DDD and DDE),
3. Dieldrin,
4. Dioxin,
5. Endrin,
6. Endrin aldehyde,
7. Heptachlor,

8. Heptachlor epoxide,
9. Lindane,
10. Mercury,
11. Polychlorinated biphenyls (PCBs), and
12. Toxaphene.

R18-11-115. Site-Specific Standards

A. The Director shall adopt a site-specific standard by rule.

B. The Director may adopt a site-specific standard based upon a request or upon the Director's initiative for any of the following reasons:

1. Local physical, chemical, or hydrological conditions of a surface water such as pH, hardness, fate and transport, or temperature alters the biological availability or toxicity of a pollutant;
2. The sensitivity of resident aquatic organisms that occur in a surface water to a pollutant differs from the sensitivity of the species used to derive the numeric water quality standards to protect aquatic life in Appendix A;
3. Resident aquatic organisms that occur in a surface water represent a narrower mix of species than those in the dataset used by ADEQ to derive numeric water quality standards to protect aquatic life in Appendix A;
4. The natural background concentration of a pollutant is greater than the numeric water quality standard to protect aquatic life prescribed in Appendix A. "Natural background" means the concentration of a pollutant in a surface water due only to non-anthropogenic sources; or
5. ~~Natural adaptive processes have enabled a viable, balanced population of aquatic life to exist in a surface water where the level of a pollutant is greater than the numeric water quality standard to protect aquatic life prescribed in Appendix A;or~~

~~6.~~5. Other factors or combination of factors that upon review by the Director warrant changing a numeric water quality standard for a surface water.

C. Site-specific standard by request. To request that the Director adopt a site-specific standard, a person must conduct a study to support the development of a site-specific standard using a scientifically-defensible procedure.

1. Before conducting the study, a person shall submit a study outline to the Director for approval that contains the following elements:
   a. Identifies the pollutant;
   b. Describes the reach's boundaries;
   c. Uses one of the following procedures, as defined by the most recent EPA guidance documents:
      i. The recalculation procedure,
      ii. The water effects ratio for metals,
      iii. The streamlined water effects ratio, or
      iv. The Biotic ligand model.
   d. Demonstrates that all designated uses are protected.
2. Alternatively, a study outline submitted for the Director's approval must contain the following elements:

a. Identifies the pollutant;

b. Describes the reach's boundaries;

c. Describes the hydrologic regime of the waterbody;

d. Describes the scientifically-defensible procedure, which can include relevant aquatic life studies, ecological studies, laboratory tests, biological translators, fate and transport models, and risk analyses;

e. Describes and compares the taxonomic composition, distribution and density of the aquatic biota within the reach to a reference reach and describes the basis of any major taxonomic differences;

f. Describes the pollutant's effect on the affected species or appropriate surrogate species and on the other designated uses listed for the reach;

g. Demonstrates that all designated uses are protected; and

h. A person seeking to develop a site-specific standard based on natural background may use statistical or modeling approaches to determine natural background concentration. Modeling approaches include Better Assessment Science Integrating Source and Nonpoint Sources (Basins), Hydrologic Simulation Program-Fortran (HSPF), and Hydrologic Engineering Center (HEC) programs developed by the U.S. Army Corps of Engineers.

R18-11-120. Enforcement of Non-permitted Discharges

~~**A.** Any person who causes a violation of a water quality standard or any provision of this Article is subject to the enforcement provisions in A.R.S. Title 49, Chapter 2, Article 4.~~

~~**B.**~~**A.** The Department may establish a numeric water quality standard at a concentration that is below the practical quantitation limit. ~~In such cases,~~ Therefore, in enforcement actions pursuant to subsection (B) of this section, the water quality standard is enforceable at the practical quantitation limit.

~~**C.**~~**B.** ~~The~~ Except for chronic aquatic and wildlife criteria, for non-permitted discharge violations, the Department shall determine compliance with numeric water quality standard criteria ~~acute aquatic and wildlife criteria~~ from the analytical result of a ~~grab~~ single sample, unless additional samples are required under this article. ~~Compliance with~~ For chronic aquatic and wildlife criteria, compliance for non-permitted discharge violations shall be determined from the geometric mean of the analytical results of the last four samples taken at least 24 hours apart. For the purposes of this section, a "non-permitted discharge violation" does not include a discharge regulated under an AZPDES permit.

~~**D.** A person is not subject to penalties for violation of a water quality standard provided that the person is in compliance with the provisions of a compliance schedule issued under R18-11-121.~~

R18-11-122. Variances

~~**A.** The Director shall consider a variance from a water quality standard for a point source discharge if the discharger demonstrates that treatment more advanced than that required to comply with technology-based effluent limitations is necessary to comply with the water quality standard and:~~

~~1. It is not technically feasible to achieve compliance within the next five years,~~

~~2. The cost of the treatment would result in substantial and widespread economic and social impact, or~~

~~3. Human-caused conditions or sources of pollution prevent attainment of the water quality standard and cannot be remedied within the next five years.~~

~~**B.** If the Director grants a variance for a point source discharge:~~

~~1. The Director shall issue the variance for a fixed term not to exceed five years,~~

~~2. The variance shall apply only on a pollutant-specific basis. The point source discharge shall meet all other applicable water quality standards for which a variance is not granted, and~~

~~3. The variance shall not modify a water quality standard. Other point source discharges to the surface water shall meet applicable water quality standards.~~

~~**C.** Upon expiration of a variance, a point source discharger shall either comply with the water quality standard or apply for renewal of the variance. To renew a variance, the applicant shall demonstrate reasonable progress towards compliance with the water quality standard during the term of the variance.~~

~~**D.** The Director shall reevaluate a variance upon the issuance, reissuance, or modification of the AZPDES permit for the point source discharge.~~

~~**E.** A person who seeks a variance from a water quality standard shall submit a written request for a variance to the Director. A request for a variance shall include the following information:~~

~~1. Identification of the specific pollutant and water quality standard for which a variance is sought;~~

~~2. Identification of the receiving surface water;~~

~~3. For an existing point source discharge, a detailed description of the existing discharge control technologies that are used to achieve compliance with applicable water quality standards. For a new point source discharge, a detailed description of the proposed discharge control technologies that will be used to achieve compliance with applicable water quality standards;~~

~~4. Documentation that the existing or proposed discharge control technologies will comply with applicable technology-based effluent limitations and that more advanced treatment technology is necessary to achieve compliance with the water quality standard for which a variance is sought;~~

~~5. A detailed discussion of the reasons why compliance with the water quality standard cannot be achieved;~~

~~6. A detailed discussion of the discharge control technologies that are available for achieving compliance with the water quality standard for which a variance is sought;~~

~~7. Documentation of one of the following:~~

~~a. That it is not technically feasible to install and operate any of the available discharge control technologies to achieve compliance with the water quality standard for which a variance is sought,~~

~~b. That installation and operation of each of the available discharge technologies to achieve compliance with the water quality standard would result in substantial and widespread economic and social impact, or~~

~~c. That human-caused conditions or sources of pollution prevent the attainment of the water quality standard for which the variance is sought and it is not possible to remedy the conditions or sources of pollution within the next five years,~~

~~8. Documentation that the point source discharger has reduced, to the maximum extent practicable, the discharge of the pollutant for which a variance is sought through implementation of a local pretreatment, source reduction, or waste minimization program; and~~

~~9. A detailed description of proposed interim discharge limitations that represent the highest level of treatment achievable by the point source discharger during the term of the variance.~~

~~**F.** The Director shall consider the following factors when deciding whether to grant or deny a variance request:~~

~~1. Bioaccumulation,~~

~~2. The predicted exposure of biota and the likelihood that resident biota will be adversely affected,~~

~~3. The known or predicted safe exposure levels for the pollutant for which the variance is requested, and~~

~~4. The likelihood of adverse human health effects.~~

~~**G.** The Director shall issue a public notice and provide an opportunity for a public hearing on whether the request for a variance should be granted or denied under A.A.C. R18-9-A907 and A.A.C. R18-9-A908. An interested party may request a public hearing on a variance under A.A.C. R18-9-A908(B).~~

~~**H.** Any variance granted by the Director is subject to review and approval by the Regional Administrator.~~

~~**I.** Any person who is adversely affected by a decision of the Director to grant or deny a variance and who has exercised any right to comment on the decision may appeal the decision under A.R.S. § 49-321 et seq. and A.R.S. § 41-1092 et seq.~~

~~**J.** The Director shall not grant a variance for a point source discharge to an OAW listed in R18-11-112(G).~~

A. Upon request, the Director may establish, by rule, a discharger-specific or water segment(s)-specific variance from a water quality standard if requirements pursuant to this section are met.

B. A person who requests a variance must demonstrate all of the following information:

1. Identification of the specific pollutant and water quality standard for which a variance is sought.
2. Identification of the receiving surface water segment or segments to which the variance would apply.
3. A detailed discussion of the need for the variance, including the reasons why compliance with the water quality standard cannot be achieved over the term of the proposed variance, and any other useful information or analysis to evaluate attainability.
4. A detailed discussion of the discharge control technologies that are available for achieving compliance with the water quality standard for which a variance is sought.
5. Documentation that more advanced treatment technology than applicable technology-based effluent limitations is necessary to achieve compliance with the water quality standard for which a variance is sought.
6. A detailed description of proposed interim discharge limitations and pollutant control activities that represent the highest level of treatment achievable by a point source discharger or dischargers during the term of the variance.
7. Documentation that the proposed term is only as long as necessary to achieve the highest attainable condition.
8. Documentation that is appropriate to the type of use to which the variance would apply as follows:

a. For a water quality standard variance to a use specified in Clean Water Act § 101(a)(2), documentation must include demonstration of at least one of the following factors that preclude attainment of the use during the term of the variance:

i. Naturally occurring pollutant concentrations prevent attainment of the use;

ii. 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;

iii. That human-caused conditions or sources of pollution prevent the attainment of the water quality standard for which the variance is sought and either (1) it is not possible to remedy the conditions or sources of pollution or (2) remedying the human-caused conditions would cause more environmental damage to correct than to leave in place;

iv. 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 n a way that would result in the attainment of the use;

v. 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;

vi. That installation and operation of each of the available discharge technologies more advanced than those required to comply with technology-based effluent limitations to achieve compliance with the water quality standard would result in substantial and widespread economic and social impact; or

vii. Actions necessary to facilitate lake, wetland, or stream restoration through dam removal or other significant reconfiguration activities preclude attainment of the designated use and criterion while the actions are being implemented.

b. For a water quality standard variance to a use other than those uses specified in Clean Water Act § 101(a)(2), documentation must justify how consideration and value of the water subject to the use appropriately supports the variance and term. A demonstration consistent with (B)(8)(a) of this section may be used to satisfy this requirement.

9. For a waterbody segment(s)-specific variance, the following information is required before the Director may issue a variance, in addition to all other required documentation pursuant to this section:

a. Identification and documentation of any cost-effective and reasonable best management practices for nonpoint source controls related to the pollutant(s) or water quality parameter(s) and water body or waterbody segment(s) specified in the variance that could be implemented to make progress towards attaining the underlying designated use and criterion; and

b. If any variance pursuant to (B)(9)(a) of this section previously applied to the water body or waterbody segment(s), documentation must also demonstrate whether and to what extent best management practices for nonpoint source controls were implemented to address the pollutant(s) or water quality parameter(s) subject to the water quality variance and the water quality progress achieved.

10. For a discharger-specific variance, the following information is required before the Director may issue a variance, in addition to all other required documentation pursuant to this section:
    a. Identification of the permittee subject to the variance;
    b. For an existing point source discharge, a detailed description of the existing discharge control technologies that are used to achieve compliance with applicable water quality standards. For a new point source discharge, a detailed description of the proposed discharge control technologies that will be used to achieve compliance with applicable water quality standards; and
    c. Documentation that the existing or proposed discharge control technologies will comply with applicable technology-based effluent limitations.

C. The Director shall consider the following factors when deciding whether to grant or deny a variance request:
1. Bioaccumulation,
2. The predicted exposure of biota and the likelihood that resident biota will be adversely affected,
3. The known or predicted safe exposure levels for the pollutant for which the variance is requested, and
4. The likelihood of adverse human health effects.

D. The variance shall represent the highest attainable condition of the water body or water body segment applicable throughout the term of the variance.

E. A variance shall not result in any lowering of the currently attained ambient water quality, unless the variance is necessary for restoration activities, consistent with (B)(8)(a)(vii) of this section. The Director must specify the highest attainable condition of the water body or waterbody segment as a quantifiable expression of one of the following:
1. The highest attainable interim criterion,
2. The interim effluent condition that reflects the greatest pollutant reduction achievable; or
3. If no additional feasible pollutant control technology can be identified, the interim criterion or interim effluent condition that reflects the greatest pollutant reduction achievable with the pollutant control technologies installed at the time of the issuance of the variance, and the adoption and implementation of a Pollutant Minimization Program.

F. A variance shall not modify the underlying designated use and criterion. A variance is only a time limited exception to the underlying standard. For discharge-specific variances, other point source dischargers to the surface water that are not granted a variance shall still meet all applicable water quality standards.

G. Point source discharges shall meet all other applicable water quality standards for which a variance is not granted.

H. The Director may not grant a variance for a point source discharge to an OAW listed in R18-11-112(G).

I. Each variance established by the Director is subject to review and approval by the Regional Administrator.

J. The term of the water quality variance may only be as long as necessary to achieve the highest attainable condition and must be consistent with the supporting documentation in subsection (E) of this section. The variance term runs from the approval of the variance by the Regional Administrator.

K. The Director shall reevaluate, in its triennial review, whether each variance continues to represent the highest attainable condition. Comment on the variance shall be considered regarding whether the variance continues to

represent the highest attainable condition. If the Director determines that the requirements of the variance do not represent the highest attainable condition, then the Director shall modify or repeal the variance in its triennial review rulemaking.

L. If the variance is modified by rulemaking, the requirements of the variance shall represent the highest attainable condition at the time of initial adoption of the variance, or the highest attainable condition identified during the current reevaluation, whichever is more stringent.

M. Upon expiration of a variance, point source dischargers shall comply with the water quality standard.

N. The following are discharger-specific variances adopted by the Director:

1. [Reserved]

O. The following are water body and waterbody segment-specific variances adopted by the Director:

1. [Reserved]

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			
Acenaphthylene	208968	420		56,000	56,000									
Acrolein	107028	3.5	1.9	467	467	~~34~~ 3	~~30~~ 3	~~34~~ 3	~~30~~ 3	~~34~~ 3	~~30~~ 3	3		
Acrylonitrile	107131	~~0.06~~ 0.006	0.2	~~3~~ 9	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~~ 0.27	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~~ Tables 11 (present) & 14 (absent)	See (e) & ~~Table 12~~ Tables 13 (present) & 17 (absent)	See (e) & ~~Table 11~~ Tables 12 (present) & 15 (absent)	See (e) & ~~Table 12~~ Tables 13 (present) & 16 (absent)	See (e) & Table ~~11~~ 15 (absent)	See (e) & Table ~~12~~ 16 (absent)			
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~~ 186,667 T	~~98,000 T~~ 186,667 T									
Benz(a)anthracene	56553	0.005	0.02	~~0.2~~ 47	~~0.2~~ 280									
Benzene	71432	5	~~140~~ 114	~~93~~ 133	3,733	2,700	180	2,700	180	8,800	560			
Benzo[b]fluoranthene Benzfluoranthene	205992	0.005	0.02	~~1.9~~ 47	~~1.9~~ 280									
Benzidine	92875	0.0002	0.0002	~~0.01~~ 0.02	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~~ 0.1	~~0.2~~ 47	~~0.2~~ 280									
Benzo(k)fluoranthene	207089	0.005	0.02	~~1.9~~ 47	~~1.9~~ 280									
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		4 millirems												

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)
emitters		/year See (i)												
Bis(2-chloroethoxy) methane	111911	21		2,800	2,800									
Bis(2-chloroethyl) ether	111444	0.03	0.5	~~1~~ 4	~~1~~ 4	120,000	6,700	120,000	6,700	120,000	6,700			
Bis(2-chloroisopropyl) ether	108601	280	3,441	37,333	37,333									
Bis(chloromethyl) ether	542881	0.00015		0.02										
Boron	7440428	1,400 T		186,667 T	186,667 T								1,000 T	
Bromodichloromethane	75274	TTHM See (g)	17	TTHM	18,667									
to 4-Bromophenyl phenyl ether	101553					180	14	180	14	180	14			
Bromoform	75252	TTHM See (g)	133	~~180~~ 591	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~~ 6 T	~~700 T~~ 467 T	~~700 T~~ 467 T	~~See (d) & Table 2~~ See Table 2	~~See (d) & Table 3~~ See Table 3	~~See (d) & Table 2~~ See Table 2	~~See (d) & Table 3~~ See Table 3	~~See (d) & Table 2~~ See Table 2	~~See (d) & Table 3~~ See Table 3	~~See (d) & Table 2~~ See Table 2	50	50
Carbaryl	63252					2.1	2.1	2.1	2.1	2.1	2.1	2.1		
Carbofuran	1563662	40		4,667	4,667	650	50	650	50	650	50			
Carbon tetrachloride	56235	5	~~2~~ 3	~~11~~ 67	~~980~~ 3,733	18,000	1,100	18,000	1,100	18,000	1,100			
Chlordane	57749	2	0.0008	4 13	467	2.4	0.004	2.4	0.2	2.4	0.2	3.2		
Chlorine (total residual)	7782505	4,000		~~4,000~~ 93,333	~~4,000~~ 93,333	19	11	19	11	19	11			
Chlorobenzene	108907	100	1,553	18,667	18,667	3,800	260	3,800	260	3,800	260			
Chloroethane	75003	280		93,333	93,333									
2-Chloroethyl vinyl ether	110758					180,000	9,800	180,000	9,800	180,000	9,800			
Chloroform	67663	TTHM See (g)	~~470~~ 2,133	~~230~~ 9,333	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~~ beta-Chloronaphthalene	91587	~~560~~ 2240	~~317~~ 1267	~~74,667~~ 298,667	~~74,667~~ 298,667									
2-Chlorophenol	95578	35	30	4,667	4,667	2,200	150	2,200	150	2,200	150			
Chloropyrifos	2921882	21	1.0	2,800	2,800	0.08	0.04	0.08	0.04	0.08	0.04			
Chromium III	16065831	10,500	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~~ 0.6	~~19~~ 0.6									
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~~ 504 T	~~18,667 T~~ 588 T	~~18,667 T~~ 588 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									
DDT and its breakdown products	50293	0.1	0.0003	14	467	1.1	0.001	1.1	0.001	1.1	0.001	1.1	0.001	0.001
Demeton	8065483						0.1		0.1		0.1			

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Diazinon	333415					0.17	0.17	0.17	0.17	0.17	0.17	0.17		
Dibenz (ah) anthracene	53703	~~0.005~~ 0.350	0.02	~~1.9~~ 47.0	~~1.9~~ 280.0									
Dibromochloromethane	124481	TTHM See (g)	13	TTHM	18,667									
1,2-Dibromo-3-chloropro- pane	96128	0.2		2,800	2,800									
1,2-Dibromoethane	106934	~~0.05~~ 0.02		~~8,400~~ 2	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	5755	373,333	~~373.333~~ 373,333	560	210	2,000	780	2,000	780	6,500		
3,3'-Dichlorobenzidine	91941	0.08	0.03	~~3~~ 10	~~3~~ 10									
~~p,p'-Dichlorodiphenyltri-chloroethane (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~~ 1,867	~~70~~ 1,867									
1,2-trans-Dichloroethylene	156605	100	10,127	18,667	18,667	68,000	3,900	68,000	3,900	68,000	3,900			
Dichloromethane	75092	5	~~593~~ 2,222	~~190~~ 2,333	~~56,000~~ 5,600	97,000	5,500	97,000	5,500	97,000	5,500			
2,4-Dichlorophenol	120832	21	59	2,800	2,800	1,000	88	1,000	88	1,000	88			
2,4-Dichlorophenoxyacetic acid (2,4-D)	94757	70		9,333	9,333									
1,2-Dichloropropane	78875	5	17,518	84,000	84,000	26,000	9,200	26,000	9,200	26,000	9,200			
1,3-Dichloropropene	542756	0.7	42	~~420~~ 93	28,000	3,000	1,100	3,000	1,100	3,000	1,100			
Dieldrin	60571	0.002	0.00005	~~0.09~~ 0.3	47	0.2	0.06	0.2	0.06	0.2	0.06	4	0.003	See (b)
Diethyl phthalate	84662	5,600	8,767	746,667	746,667	26,000	1,600	26,000	1,600	26,000	1,600			
Di (2-ethylhexyl) adipate	103231	400		~~560,000~~ 3,889	560,000									
Di (2-ethylhexyl) phthalate	117817	6	3	~~100~~ 333	18,667	400	360	400	360	400	360	3,100		
2,4-Dimethylphenol	105679	140	171	18,667	18,667	1,000	310	1,000	310	1,000	310	150,000		
Dimethyl phthalate	131113					17,000	1,000	17,000	1,000	17,000	1,000			
4,6-Dinitro-o-cresol	534521	~~28~~ 0.6	~~582~~ 12	~~3,733~~ 75	~~3,733~~ 75	310	24	310	24	310	24			
2,4-Dinitrophenol	51285	14	1,067	1,867	1,867	110	9.2	110	9.2	110	9.2			
2,4-Dinitrotoluene	121142	14	421	1,867	1,867	14,000	860	14,000	860	14,000	860			
2,6-Dinitrotoluene	606202	0.05		~~2~~ 7	~~3,733~~ 280									
Di-n-octyl phthalate	117840	~~2,800~~ 70		~~373,333~~ 9,333	~~373,333~~ 9,333									
Dinoseb	88857	7	12	933	933									
1,2-Diphenylhydrazine	122667	0.04	0.2	~~1.8~~ 6	~~1.8~~ 6	130	11	130	11	130	11			
Diquat	85007	20	176	2,053	2,053									
Endosulfan sulfate	1031078	42	18	5,600	5,600	0.2	0.06	0.2	0.06	0.2	0.06	3		
Endosulfan (Total)	115297	42	18	5,600	5,600	0.2	0.06	0.2	0.06	0.2	0.06	3		
Endothall	145733	100	16,000	18,667	18,667									
Endrin	72208	2	0.06	~~280~~ 1,120	~~280~~ 1,120	0.09	0.04	0.09	0.04	0.09	0.04	0.7	0.004	0.004

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Endrin aldehyde	7421933	2	0.06	1,120	1,120	0.09	0.04	0.09	0.04	0.09	0.04	0.7		
Ethylbenzene	100414	700	2,133	93,333	93,333	23,000	1,400	23,000	1,400	23,000	1,400			
Fluoranthene	206440	280	28	37,333	37,333	2,000	1,600	2,000	1,600	2,000	1,600			
Fluorene	86737	280	1,067	37,333	37,333									
Fluoride	7782414	4,000		140,000	140,000									
Glyphosate	1071836	700	266,667	93,333	93,333									
Guthion	86500	21	92	2,800	2,800		0.01		0.01		0.01			
Heptachlor	76448	0.4	0.00008	~~0.4~~ 1	467	0.5	0.004	0.5	0.004	0.6	0.01	0.9		
Heptachlor epoxide	1024573	0.2	0.00004	~~0.2~~ 0.5	12	0.5	0.004	0.5	0.004	0.6	0.01	0.9		
Hexachlorobenzene	118741	1	0.0003	~~1~~ 3	747	6	3.7	6	3.7	6	3.7			
Hexachlorobutadiene	87683	0.4	18	~~18~~ 60	187	45	8.2	45	8.2	45	8.2			
Hexachlorocyclohexane alpha	319846	0.006	0.005	~~0.22~~ 0.7	7,467	1,600	130	1,600	130	1,600	130	1,600		
Hexachlorocyclohexane beta	319857	0.02	0.02	~~0.78~~ 3	560	1,600	130	1,600	130	1,600	130	1,600		
Hexachlorocyclohexane delta	319868					1,600	130	1,600	130	1,600	130	1,600		
Hexachlorocyclohexane gamma (lindane)	58899	0.2	~~1.8~~ 5	~~280~~ 700	~~280~~ 700	1	0.08	1	0.28	1	0.61	11		
Hexachlorocyclopentadi-ene	77474	50	~~580~~ 74	~~9,800~~ 11,200	~~9,800~~ 11,200	3.5	0.3	3.5	0.3	3.5	0.3			
Hexachloroethane	67721	~~2.5~~ 0.9	~~3.3~~ 1	~~100~~ 117	~~933~~ 653	490	350	490	350	490	350	850		
Hydrogen sulfide	7783064						2 See (c)		2 See (c)		2 See (c)			
Indeno (1,2,3-cd) pyrene	193395	~~0.05~~ 0.4	~~0.49~~ 1	~~1.9~~ 47	~~1.9~~ 47									
Iron	7439896						1,000 D		1,000 D		1,000 D			
Isophorone	78591	37	961	~~1,500~~ 4,912	186,667	59,000	43,000	59,000	43,000	59,000	43,000			
Lead	7439971	15 T		15 T	15 T	See (d) & Table 6	See (d) & Table 6	See (d) & Table 6	See (d) & Table 6	See (d) & Table 6	See (d) & Table 6	See (d) & Table 6	10,000 T	100 T
Malathion	121755	140	1,455	18,667	18,667		0.1		0.1		0.1			
Manganese	7439965	980		130,667	130,667								10,000	
Mercury	7439976	2 T		280 T	280 T	2.4 D	0.01 D	2.4 D	0.01 D	2.4 D	0.01 D	5 D		10 T
Methoxychlor	72435	40		~~4,667~~ 18,667	~~4,667~~ 18,667		0.03		0.03		0.03			
Methylmercury	22967926		0.3 mg/kg											
Mirex	2385855	1	0.0002	~~187~~ 0.26	187		0.001		0.001		0.001			
Naphthalene	91203	140	1,524	18,667	18,667	1,100	210	3,200	580	3,200	580			
Nickel	7440020	~~140 T~~ 210 T	~~4,600 T~~ 511 T	28,000 T	28,000 T	See (d) & Table 7	See (d) & Table 7	See (d) & Table 7	See (d) & Table 7	See (d) & Table 7	See (d) & Table 7	See (d) & Table 7		
Nitrate	14797558	10,000		3,733,333	3,733,333									
Nitrite	14797650	1,000		233,333	233,333									
Nitrate + Nitrite		10,000												
Nitrobenzene	98953	~~3.5~~ 14	~~138~~ 554	~~467~~ 1,867	~~467~~ 1,867	1,300	850	1,300	850	1,300	850			
p-Nitrophenol	100027					4,100	3,000	4,100	3,000	4,100	3,000			
Nitrosodibutylamine	924163	0.006	0.2	0.9										
Nitrosodiethylamine	55185	0.0002	0.1	0.03										

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N-nitrosodimethylamine	62759	0.001	3	~~0.03~~ 0.09	~~0.03~~ 0.09									
~~N-nitrosodi-n-phenylamine~~ N-Nitrosodiphenylamine	86306	7.1	6	~~290~~ 952	~~290~~ 952	2,900	200	2,900	200	2,900	200			
N-nitrosodi-n-propylamine	621647	0.005	0.5	~~0.2~~ 0.7	~~88,667~~ 0.7									
N-nitrosopyrrolidine	930552	0.02	34	2										
Nonylphenol	104405					28	6.6	28	6.6	28	6.6	28		
Oxamyl	23135220	200	6452	23,333	23,333									
Parathion	56382	42	16	5,600	5,600	0.07	0.01	0.07	0.01	0.07	0.01			
Pentachlorobenzene	608935	6		747	747									
Paraquat	1910425	32	12,000	4,200	4,200	100	54	100	54	100	54			
Pentachlorophenol	87865	1	~~1,000~~ 111	12	~~28,000~~ 4,667	See (e), (j) & Table 10	See (e), (j) & Table 10	See (e), (j) & Table 10	See (e), (j) & Table 10	See (e), (j) & Table 10	See (e), (j) & Table 10	See (e), (j) & Table 10		
Permethrin	52645531	350	77	46,667	46,667	0.3	0.2	0.3	0.2	0.3	0.2			
Phenanthrene	85018					30	6.3	30	6.3	30	6.3			
Phenol	108952	2,100	37	280,000	280,000	5,100	730	7,000	1,000	7,000	1,000	180,000		
Picloram	1918021	500	~~2,710~~ 1,806	65,333	65,333									
Polychlorinatedbiphenyls (PCBs)	1336363	0.5	0.00006	~~19~~ 2	19	2	0.01	2	0.02	2	0.02	11	0.001	0.001
Pyrene	129000	210	800	28,000	28,000									
Radium 226 + Radium 228		5 pCi/L												
Selenium	7782492	50 T	667 T	4,667 T	4,667 T		2 T		2 T		2 T	33 T	20 T	50 T
Silver	7440224	35 T	8,000 T	4,667 T	4,667 T	See (d) & Table 8		See (d) & Table 8		See (d) & Table 8		See (d) & Table 8		
Simazine	112349	4		4,667	4,667									
Strontium	7440246	8 pCi/L												
Styrene	100425	100		186,667	186,667	5,600	370	5,600	370	5,600	370			
Sulfides												100		
1,2,4,5-Tetrachlorobenzene	95943	2.1		280	280									
2,3,7,8-Tetrachlorod-ibenzo-p-dioxin (2,3,7,8-TCDD)	1746016	0.00003	~~5x10-9~~ 0.0000001	~~0.00003~~ 0.0007	~~0.0009~~ 0.0007	0.01	0.005	0.01	0.005	0.01	0.005	0.1		
1,1,2,2-Tetrachloroethane	79345	0.2	~~4~~ 32,000	~~7~~ 23	~~56,000~~ 186,667	4,700	3,200	4,700	3,200	4,700	3,200			
Tetrachloroethylene	127184	5	~~261~~ 62	~~9,333~~ 2,222	~~9,333~~ 5,600	2,600	280	6,500	680	6,500	680	15,000		
Thallium	7440280	2 T	~~7.2 T~~ 0.07 T	~~75 T~~ 9 T	~~75 T~~ 9 T	700 D	150 D	700 D	150 D	700 D	150 D			
Toluene	108883	1,000	~~201,000~~ 11,963	~~280,000~~ 149,333	~~280,000~~ 149,333	8,700	180	8,700	180	8,700	180			
Toxaphene	8001352	3	0.0003	~~1.3~~ 4	~~933~~ 1,867	0.7	0.0002	0.7	0.0002	0.7	0.0002	11	0.005	0.005
~~Tributylin~~ Tributyltin	688733		0.08	280	280	0.5	0.07	0.5	0.07	0.5	0.07			
1,2,4-Trichlorobenzene	120821	70	70	9,333	9,333	750	130	1,700	300	1,700	300			
1,1,1-Trichloroethane	71556	200	~~428,571~~ 285,714	1,866,667	1,866,667	2,600	1,600	2,600	1,600	2,600	1,600		1,000	

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1,1,2-Trichloroethane	79005	5	16	~~25~~ 82	3,733	18,000	12,000	18,000	12,000	18,000	12,000			
Trichloroethylene	79016	5	~~29~~ 8	~~280,000~~ 101	~~280~~ 467	20,000	1,300	20,000	1,300	20,000	1,300			
2,4,5- Trichlorophenol	95954	700		93,333	93,333									
2,4,6-Trichlorophenol	88062	3.2	2	~~130~~ 424	~~130~~ 424	160	25	160	25	160	25	3,000		
2,4,5-Trichlorophenoxy proprionic acid (2,4,5-TP)	93721	50		~~7,467~~ 29,867	~~7,467~~ 29,867									
Trihalomethanes (T)		80												
Tritium	10028178	20,000 pCi/L												
Uranium	7440611	30 D		2,800	2,800									
Vinyl chloride	75014	2	5	~~2~~ 6	2,800									
Xylenes (T)	1330207	10,000		186,667	186,667									
Zinc	7440666	2,100 T	5,106 T	280,000 T	280,000 T	See (d) & Table 9	See (d) & Table 9	See (d) & Table 9	See (d) & Table 9	See (d) & Table 9	See (d) & Table 9	See (d) & Table 9	10,000 T	25,000 T
2-nitrophenol	88755		No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
1,1-dichloroethane	85343		No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
4-chlorophenyl phenyl ether	7005723		No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Benzo (ghi) perylene	191242		No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

Footnotes

a. The asbestos standard is 7 million fibers (longer than 10 micrometers) per liter.

b. The aldrin/dieldrin standard is exceeded when the sum of the two compounds exceeds 0.003 µg/L.

c. In lakes, the acute criteria for hydrogen sulfide apply only to water samples taken from the epilimnion, or the upper layer of a lake or reservoir.

d. Hardness, expressed as mg/L $CaCO_3$, is determined according to the following criteria:

   i. If the receiving water body has an A&Wc or A&Ww designated use, then hardness is based on the hardness of the receiving water body from a sample taken at the same time that the sample for the metal is taken, except that the hardness may not exceed 400 mg/L $CaCO_3$.

   ii. If the receiving water has an A&Wedw or A&We designated use, then the hardness is based on the hardness of the effluent from a sample taken at the same time that the sample for the metal is taken, except that the hardness may not exceed 400 mg/L $CaCO_3$.

   iii. The mathematical equations for the hardness-dependent parameter represent the water quality standards. Examples of criteria for the hardness-dependent parameters have been calculated and are presented in separate tables at the end of Appendix A for the convenience of the user.

e. pH is determined according to the following criteria:

i. If the receiving water has an A&Wc or A&Ww designated use, then pH is based on the pH of the receiving water body from a sample taken at the same time that the sample for pentachlorophenol or ammonia is taken.

ii. If the receiving water body has an A&Wedw or A&We designated use, then the pH is based on the pH of the effluent from a sample taken at the same time that the sample for pentachlorophenol or ammonia is taken.

iii. The mathematical equations for ammonia represent the water quality standards. Examples of criteria for ammonia have been calculated and are presented in separate tables at the end of Appendix A for the convenience of the user.

f. Table 1 abbreviations.

i. µg/L = micrograms per liter,

ii. mg/kg = milligrams per kilogram,

iii. pCi/L = picocuries per liter,

iv. D = dissolved,

v. T = total recoverable,

vi. TTHM indicates that the chemical is a trihalomethane.

g. The total trihalomethane (TTHM) standard is exceeded when the sum of these four compounds exceeds 80 µg/L, as a rolling annual average.

h The concentration of gross alpha particle activity includes radium-226, but excludes radon and uranium.

i. The average annual concentration of beta particle activity and photon emitters from manmade radionuclides shall not produce an annual dose equivalent to the total body or any internal organ greater than four millirems per year.

j. The mathematical equations for the pH-dependent parameters represent the water quality standards. Examples of criteria for the pH-dependent parameters have been calculated and are presented in separate tables at the end of Appendix A for the convenience of the user.

k. Abbreviations for the mathematical equations are as follows:

e = the base of the natural logarithm and is a mathematical constant equal to 2.71828

LN = is the natural logarithm

CMC = Criterion Maximum Concentration (acute)

CCC= Criterion Continuous Concentration (chronic)

Table 2. Acute Water Quality Standards for Dissolved Cadmium

Aquatic and Wildlife coldwater		Aquatic and Wildlife		Aquatic and Wildlife ephemeral

		warmwater, and edw			
Hard. mg/L	**Std. µg/L**	**Hard. mg/L**	**Std. µg/L**	**Hard. mg/L**	**Std. µg/L.**
20	~~0.42~~ 0.40	20	~~0.74~~ 2.1	20	~~11.3~~ 4.9
100	~~2.0~~1.8	100	~~4.3~~ 9.4	100	~~64.6~~ 22
400	~~7.7~~6.5	400	~~19.1~~ 34	400	~~290~~ 80
~~$e^{(1.0166*LN(Hardness)-3.924)}$*(1.136672-LN(Hardness)*0.041838)~~ $e^{(0.9789*LN(Hardness)-3.866)}$*(1.136672-LN(Hardness)*0.041838)		~~$e^{(1.128*LN(Hardness)-3.6867)}$*(1.136672-LN(Hardness)*0.041838)~~ $e^{(0.9789*LN(Hardness)-2.208)}$*(1.136672-LN(Hardness)*0.041838)		~~$e^{(1.128*LN(Hardness)-0.9691)}$*(1.136672-LN(Hardness)*0.041838)~~ $e^{(0.9789*LN(Hardness)-1.363)}$*(1.136672-LN(Hardness)*0.041838)	

Table 3. Chronic Water Quality Standards for Dissolved Cadmium

Aquatic and Wildlife coldwater, warmwater, and edw		~~**Aquatic and Wildlife warmwater, and edw**~~	
Hard. mg/L	**Std. µg/L**	~~**Hard. mg/L**~~	~~**Std. µg/L**~~
20	~~0.08~~ 0.21	~~20~~	~~0.68~~
100	~~0.25~~ 0.72	~~100~~	~~2.2~~
400	~~0.64~~ 2.0	~~400~~	~~6.2~~
~~$e^{(0.7409*LN(Hardness)-4.719)}$*(1.101672-LN(Hardness)*0.041838)~~ $e^{(0.7977*LN(Hardness)-3.909)}$*(1.101672-LN(Hardness)*0.041838)		~~$e^{(0.7852*LN(Hardness)-2.715)}$*(1.101672-LN(Hardness)*0.041838)~~	

Table 4. Water Quality Standards for Dissolved Chromium III

Acute Aquatic and Wildlife coldwater, warmwater and edw		**Chronic Aquatic and Wildlife coldwater, warmwater and edw**		**Acute Aquatic and Wildlife ephemeral**	
Hard. mg/L	**Std. µg/L**	**Hard. mg/L**	**Std. µg/L**	**Hard. mg/L**	**Std. µg/L**
20	152	20	19.8	20	512
100	570	100	74.1	100	1,912
400	1,773	400	231	400	5,950

$e^{(0.819*LN(Hardness)+3.7256)}*(0.316)$	$e^{(0.819*LN(Hardness)+0.6848)}*(0.86)$	$e^{(0.819*LN(Hardness)+4.9361)}*(0.316)$

Table 5. Water Quality Standards for Dissolved Copper

Acute Aquatic and Wildlife coldwater, warmwater and edw		Chronic Aquatic and Wildlife coldwater, warmwater and edw		Acute Aquatic and Wildlife ephemeral	
Hard. mg/L	**Std. µg/L**	**Hard. mg/L**	**Std. µg/L**	**Hard. mg/L**	**Std. µg/L**
20	2.9	20	2.3	20	5.1
100	~~13.4~~ 13	100	9.0	100	~~23.3~~ 23
400	~~49.6~~ 50	400	~~29.3~~ 29	400	~~85.9~~ 86
$e^{(0.9422*LN(Hardness)-1.702)}*(0.96)$		$e^{(0.8545*LN(Hardness)-1.702)}*(0.96)$		$e^{(0.9422*LN(Hardness)-1.1514)}*(0.96)$	

Table 6. Water Quality Standards for Dissolved Lead

Acute Aquatic and Wildlife coldwater, warmwater and edw		Chronic Aquatic and Wildlife coldwater, warmwater and edw		Acute Aquatic and Wildlife ephemeral	
Hard. mg/L	**Std. µg/L**	**Hard. mg/L**	**Std. µg/L**	**Hard. mg/L**	**Std. µg/L**
20	10.8	20	~~0.4~~ 0.42	20	22.8
100	64.6	100	2.5	100	136.3
400	281	400	10.9	400	592.7
$e^{(1.273*LN(Hardness)-1.46)}*(1.46203-(LN(Hardness))*(0.145712))$		$e^{(1.273*LN(Hardness)-4.705)}*(1.46203-(LN(Hardness))*(0.145712))$		$e^{(1.273*(LN(Hardness))-0.7131)}*(1.46203-(LN(Hardness))*(0.145712))$	

~~Table 11. Acute Criteria for Total Ammonia (in mg/L as N) Aquatic and Wildlife coldwater, warmwater, and edw~~

~~pH~~	~~A&Wc~~	~~A&Ww and A&W edw~~
~~6.5~~	~~32.6~~	~~48.8~~
~~6.6~~	~~31.3~~	~~46.8~~
~~6.7~~	~~29.8~~	~~44.6~~
~~6.8~~	~~28.1~~	~~42.0~~
~~6.9~~	~~26.2~~	~~39.1~~
~~7.0~~	~~24.1~~	~~36.1~~
~~7.1~~	~~22.0~~	~~32.8~~

~~7.2~~	~~19.7~~					~~29.5~~				
~~7.3~~	~~17.5~~					~~26.2~~				
~~7.4~~	~~15.4~~					~~23.0~~				
~~7.5~~	~~13.3~~					~~19.9~~				
~~7.6~~	~~11.4~~					~~17.0~~				
~~7.7~~	~~9.7~~					~~14.4~~				
~~7.8~~	~~8.1~~					~~12.1~~				
~~7.9~~	~~6.8~~					~~10.1~~				
~~8.0~~	~~5.6~~					~~8.4~~				
~~8.1~~	~~4.6~~					~~7.0~~				
~~8.2~~	~~3.8~~					~~5.7~~				
~~8.3~~	~~3.2~~					~~4.7~~				
~~8.4~~	~~2.6~~					~~3.9~~				
~~8.5~~	~~2.1~~					~~3.2~~				
~~8.6~~	~~1.8~~					~~2.7~~				
~~8.7~~	~~1.5~~					~~2.2~~				
~~8.8~~	~~1.2~~					~~1.8~~				
~~8.9~~	~~1.0~~					~~1.6~~				
~~9.0~~	~~0.9~~					~~1.3~~				
~~Formula:~~	~~CMC~~	~~=~~	$\frac{0.275}{1+10^{7.204-pH}}$	~~+~~	$\frac{39.0}{1+10^{pH-7.204}}$	~~CMC~~	~~=~~	$\frac{0.411}{1+10^{7.204-pH}}$	~~+~~	$\frac{58.4}{1+10^{pH-7.204}}$

Table 11. Acute Standards for Total Ammonia (in mg/L, as N) for Aquatic and Wildlife coldwater, Unionid Mussels Present

For the aquatic and wildlife coldwater uses, unionids will be assumed to be present unless a study is performed demonstrating that they are absent and there is no historic evidence of their presence, or hydrologic modification has altered the flow regime in a way that would prevent their reestablishment.

	Temperature (°C)																	
pH	0-14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
6.5	33	33	32	29	27	25	23	21	19	18	16	15	14	13	12	11	9.9
6.6	31	31	30	28	26	24	22	20	18	17	16	14	13	12	11	10	9.5
6.7	30	30	29	27	24	22	21	19	18	16	15	14	13	12	11	9.8	9
6.8	28	28	27	25	23	21	20	18	17	15	14	13	12	11	10	9.2	8.5
6.9	26	26	25	23	21	20	18	17	15	14	13	12	11	10	9.4	8.6	7.9
7	24	24	23	21	20	18	17	15	14	13	12	11	10	9.4	8.6	8	7.3
7.1	22	22	21	20	18	17	15	14	13	12	11	10	9.3	8.5	7.9	7.2	6.7
7.2	20	20	19	18	16	15	14	13	12	11	9.8	9.1	8.3	7.7	7.1	6.5	6

	Temperature (°C)																
pH	0-14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
7.3	18	18	17	16	14	13	12	11	10	9.5	8.7	8	7.4	6.8	6.3	5.8	5.3
7.4	15	15	15	14	13	12	11	9.8	9	8.3	7.7	7	6.5	6	5.5	5.1	4.7
7.5	13	13	13	12	11	10	9.2	8.5	7.8	7.2	6.6	6.1	5.6	5.2	4.8	4.4	4
7.6	11	11	11	10	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5
7.7	9.6	9.6	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5	3.2	3
7.8	8.1	8.1	7.9	7.2	6.7	6.1	5.6	5.2	4.8	4.4	4	3.7	3.4	3.2	2.9	2.7	2.5
7.9	6.8	6.8	6.6	6	5.6	5.1	4.7	4.3	4	3.7	3.4	3.1	2.9	2.6	2.4	2.2	2.1
8	5.6	5.6	5.4	5	4.6	4.2	3.9	3.6	3.3	3	2.8	2.6	2.4	2.2	2	1.9	1.7
8.1	4.6	4.6	4.5	4.1	3.8	3.5	3.2	3	2.7	2.5	2.3	2.1	2	1.8	1.7	1.5	1.4
8.2	3.8	3.8	3.7	3.5	3.1	2.9	2.7	2.4	2.3	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2
8.3	3.1	3.1	3.1	2.8	2.6	2.4	2.2	2	1.9	1.7	1.6	1.4	1.3	1.2	1.1	1	0.96
8.4	2.6	2.6	2.5	2.3	2.1	2	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1	0.93	0.86	0.79
8.5	2.1	2.1	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2	1.1	0.98	0.9	0.83	0.77	0.71	0.65
8.6	1.8	1.8	1.7	1.6	1.5	1.3	1.2	1.1	1	0.96	0.88	0.81	0.75	0.69	0.63	0.59	0.54
8.7	1.5	1.5	1.4	1.3	1.2	1.1	1	0.94	0.87	0.8	0.74	0.68	0.62	0.57	0.53	0.49	0.45
8.8	1.2	1.2	1.2	1.1	1	0.93	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37
8.9	1	1	1	0.93	0.85	0.79	0.72	0.67	0.61	0.56	0.52	0.48	0.44	0.4	0.37	0.34	0.32
9	0.88	0.88	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37	0.34	0.32	0.29	0.27

-

$$MIN\left(\left(\frac{0.275}{1+10^{7.204-pH}}+\frac{39.0}{1+10^{pH-7.204}}\right),\left(0.7249\times\left(\frac{0.0114}{1+10^{7.204-pH}}+\frac{1.6181}{1+10^{pH-7.204}}\right)\times\left(23.12\times10^{0.036\times(20-T)}\right)\right)$$

~~**Table 12. Chronic Criteria for Total Ammonia (mg/L as N) Aquatic and Wildlife coldwater, warmwater, and edw**~~

	~~**Temperature, °C**~~									
~~**pH**~~	~~**0**~~	~~**14**~~	~~**16**~~	~~**18**~~	~~**20 22**~~		~~**24**~~	~~**26**~~	~~**28**~~	~~**30**~~
~~6.5~~	~~6.7~~	~~6.7~~	~~6.1~~	~~5.3~~	~~4.7~~	~~4.1~~	~~3.6~~	~~3.2~~	~~2.8~~	~~2.5~~
~~6.6~~	~~6.6~~	~~6.6~~	~~6.0~~	~~5.3~~	~~4.6~~	~~4.1~~	~~3.6~~	~~3.1~~	~~2.8~~	~~2.4~~
~~6.7~~	~~6.4~~	~~6.4~~	~~5.9~~	~~5.2~~	~~4.5~~	~~4.0~~	~~3.5~~	~~3.1~~	~~2.7~~	~~2.4~~
~~6.8~~	~~6.3~~	~~6.3~~	~~5.7~~	~~5.0~~	~~4.4~~	~~3.9~~	~~3.4~~	~~3.0~~	~~2.6~~	~~2.3~~
~~6.9~~	~~6.1~~	~~6.1~~	~~5.6~~	~~4.9~~	~~4.3~~	~~3.8~~	~~3.3~~	~~2.9~~	~~2.6~~	~~2.3~~
~~7.0~~	~~5.9~~	~~5.9~~	~~5.4~~	~~4.7~~	~~4.2~~	~~3.6~~	~~3.2~~	~~2.8~~	~~2.5~~	~~2.2~~
~~7.1~~	~~5.7~~	~~5.7~~	~~5.2~~	~~4.5~~	~~4.0~~	~~3.5~~	~~3.1~~	~~2.7~~	~~2.4~~	~~2.1~~
~~7.2~~	~~5.4~~	~~5.4~~	~~4.9~~	~~4.3~~	~~3.8~~	~~3.3~~	~~2.9~~	~~2.6~~	~~2.3~~	~~2.0~~
~~7.3~~	~~5.1~~	~~5.1~~	~~4.6~~	~~4.1~~	~~3.6~~	~~3.1~~	~~2.8~~	~~2.4~~	~~2.1~~	~~1.9~~

~~7.4~~	~~4.7~~	~~4.7~~	~~4.3~~	~~3.8~~	~~3.3~~	~~2.9~~	~~2.6~~	~~2.3~~	~~2.0~~	~~1.7~~
~~7.5~~	~~4.4~~	~~4.4~~	~~4.0~~	~~3.5~~	~~3.1~~	~~2.7~~	~~2.4~~	~~2.1~~	~~1.8~~	~~1.6~~
~~7.6~~	~~4.0~~	~~4.0~~	~~3.6~~	~~3.2~~	~~2.8~~	~~2.5~~	~~2.2~~	~~1.9~~	~~1.7~~	~~1.5~~
~~7.7~~	~~3.6~~	~~3.6~~	~~3.3~~	~~2.9~~	~~2.5~~	~~2.2~~	~~1.9~~	~~1.7~~	~~1.5~~	~~1.3~~
~~7.8~~	~~3.1~~	~~3.2~~	~~2.9~~	~~2.5~~	~~2.2~~	~~2.0~~	~~1.7~~	~~1.5~~	~~1.3~~	~~1.2~~
~~7.9~~	~~2.8~~	~~2.8~~	~~2.5~~	~~2.2~~	~~2.0~~	~~1.7~~	~~1.5~~	~~1.3~~	~~1.2~~	~~1.0~~
~~8.0~~	~~2.4~~	~~2.4~~	~~2.2~~	~~1.9~~	~~1.7~~	~~1.5~~	~~1.3~~	~~1.2~~	~~1.0~~	~~0.90~~
~~8.1~~	~~2.1~~	~~2.1~~	~~1.9~~	~~1.7~~	~~1.5~~	~~1.3~~	~~1.1~~	~~1.0~~	~~0.88~~	~~0.77~~
~~8.2~~	~~1.8~~	~~1.8~~	~~1.6~~	~~1.4~~	~~1.3~~	~~1.1~~	~~0.97~~	~~0.86~~	~~0.75~~	~~0.66~~
~~8.3~~	~~1.5~~	~~1.5~~	~~1.4~~	~~1.2~~	~~1.1~~	~~0.94~~	~~0.83~~	~~0.73~~	~~0.64~~	~~0.56~~
~~8.4~~	~~1.3~~	~~1.3~~	~~1.2~~	~~1.0~~	~~0.91~~	~~0.80~~	~~0.70~~	~~0.62~~	~~0.54~~	~~0.48~~
~~8.5~~	~~1.1~~	~~1.1~~	~~1.0~~	~~0.90~~	~~0.77~~	~~0.67~~	~~0.59~~	~~0.52~~	~~0.46~~	~~0.40~~
~~8.6~~	~~0.92~~	~~0.92~~	~~0.84~~	~~0.74~~	~~0.65~~	~~0.57~~	~~0.50~~	~~0.44~~	~~0.37~~	~~0.34~~
~~8.7~~	~~0.78~~	~~0.78~~	~~0.71~~	~~0.62~~	~~0.55~~	~~0.48~~	~~0.42~~	~~0.37~~	~~0.33~~	~~0.29~~
~~8.8~~	~~0.66~~	~~0.66~~	~~0.60~~	~~0.53~~	~~0.46~~	~~0.41~~	~~0.36~~	~~0.32~~	~~0.28~~	~~0.24~~
~~8.9~~	~~0.57~~	~~0.57~~	~~0.51~~	~~0.45~~	~~0.40~~	~~0.35~~	~~0.31~~	~~0.27~~	~~0.24~~	~~0.21~~
~~9.0~~	~~0.49~~	~~0.49~~	~~0.44~~	~~0.39~~	~~0.34~~	~~0.30~~	~~0.26~~	~~0.23~~	~~0.20~~	~~0.18~~

$$\cancel{CCC = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH}}\right) \cdot MIN\left(2.85, 1.45*10^{0.028\,(25-T)}\right)}$$

Table 12. Acute Standards for Total Ammonia (in mg/L, as N) for Aquatic and Wildlife warmwater, Unionid Mussels Present

For the aquatic and wildlife warmwater uses, unionids will be assumed to be present unless a study is performed demonstrating that they are absent and there is no historic evidence of their presence, or hydrologic modification has altered the flow regime in a way that would prevent their reestablishment.

	Temperature (°C)																				
pH	0-10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
6.5	51	48	44	41	37	34	32	29	27	25	23	21	19	18	16	15	14	13	12	11	9.9
6.6	49	46	42	39	36	33	30	28	26	24	22	20	18	17	16	14	13	12	11	10	9.5
6.7	46	44	40	37	34	31	29	27	24	22	21	19	18	16	15	14	13	12	11	9.8	9
6.8	44	41	38	35	32	30	27	25	23	21	20	18	17	15	14	13	12	11	10	9.2	8.5
6.9	41	38	35	32	30	28	25	23	21	20	18	17	15	14	13	12	11	10	9.4	8.6	7.9
7	38	35	33	30	28	25	23	21	20	18	17	15	14	13	12	11	10	9.4	8.6	7.9	7.3
7.1	34	32	30	27	25	23	21	20	18	17	15	14	13	12	11	10	9.3	8.5	7.9	7.2	6.7
7.2	31	29	27	25	23	21	19	18	16	15	14	13	12	11	9.8	9.1	8.3	7.7	7.1	6.5	6

Temperature (°C)																					
pH	0-10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
7.3	27	26	24	22	20	18	17	16	14	13	12	11	10	9.5	8.7	8	7.4	6.8	6.3	5.8	5.3
7.4	24	22	21	19	18	16	15	14	13	12	11	9.8	9	8.3	7.7	7	6.5	6	5.5	5.1	4.7
7.5	21	19	18	17	15	14	13	12	11	10	9.2	8.5	7.8	7.2	6.6	6.1	5.6	5.2	4.8	4.4	4
7.6	18	17	15	14	13	12	11	10	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5
7.7	15	14	13	12	11	10	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5	3.2	2.9
7.8	13	12	11	10	9.3	8.5	7.9	7.2	6.7	6.1	5.6	5.2	4.8	4.4	4	3.7	3.4	3.2	2.9	2.7	2.5
7.9	11	9.9	9.1	8.4	7.7	7.1	6.6	3	5.6	5.1	4.7	4.3	4	3.7	3.4	3.1	2.9	2.6	2.4	2.2	2.1
8	8.8	8.2	7.6	7	6.4	5.9	5.4	5	4.6	4.2	3.9	3.6	3.3	3	2.8	2.6	2.4	2.2	2	1.9	1.7
8.1	7.2	6.8	6.3	5.8	5.3	4.9	4.5	4.1	3.8	3.5	3.2	3	2.7	2.5	2.3	2.1	2	1.8	1.7	1.5	1.4
8.2	6	5.6	5.2	4.8	4.4	4	3.7	3.4	3.1	2.9	2.7	2.4	2.3	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2
8.3	4.9	4.6	4.3	3.9	3.6	3.3	3.1	2.8	2.6	2.4	2.2	2	1.9	1.7	1.6	1.4	1.3	1.2	1.1	1	0.96
8.4	4.1	3.8	3.5	3.2	3	2.7	2.5	2.3	2.1	2	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1	0.93	0.86	0.79
8.5	3.3	3.1	2.9	2.7	2.4	2.3	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2	1.1	0.98	0.9	0.83	0.77	0.71	0.65
8.6	2.8	2.6	2.4	2.2	2	1.9	1.7	1.6	1.5	1.3	1.2	1.1	1	0.96	0.88	0.81	0.75	0.69	0.63	0.58	0.54
8.7	2.3	2.2	2	1.8	1.7	1.6	1.4	1.3	1.2	1.1	1	0.94	0.87	0.8	0.74	0.68	0.62	0.57	0.53	0.49	0.45
8.8	1.9	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1	0.93	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37
8.9	1.6	1.5	1.4	1.3	1.2	1.1	1	0.93	0.85	0.79	0.72	0.67	0.61	0.56	0.52	0.48	0.44	0.4	0.37	0.34	0.32
9	1.4	1.3	1.2	1.1	1	0.93	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37	0.34	0.32	0.29	0.27

$$0.7249 \times \left(\frac{0.0114}{1+10^{7.204-pH}} + \frac{1.6181}{1+10^{pH-7.204}}\right) \times MIN(51.93, 23.12 \times 10^{0.036\times(20-T)})$$

~~**Table 13. Repealed**~~

Table 13. Chronic Criteria for Total Ammonia (in mg/L, as N) for Aquatic and Wildlife coldwater and warmwater, Unionid Mussels Present

For the aquatic and wildlife cold and warm water uses, unionids will be assumed to be present unless a study is performed demonstrating that they are absent and there is no historic evidence of their presence, or hydrologic modification has altered the flow regime in a way that would prevent their reestablishment.

Temperature (°C)																									
pH	0-7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
6.5	4.9	4.6	4.3	4.1	3.8	3.6	3.3	3.1	2.9	2.8	2.6	2.4	2.3	2.1	2	1.9	1.8	1.6	1.5	1.5	1.4	1.3	1.2	1.1
6.6	4.8	4.5	4.3	4	3.8	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1
6.7	4.8	4.5	4.2	3.9	3.7	3.5	3.2	3	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1
6.8	4.6	4.4	4.1	3.8	3.6	3.4	3.2	3	2.8	2.6	2.4	2.3	2.1	2	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1
6.9	4.5	4.2	4	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1

	Temperature (°C)																							
pH	0-7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
7	4.4	4.1	3.8	3.6	3.4	3.2	3	2.8	2.6	2.4	2.3	2.2	2	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	0.99
7.1	4.2	3.9	3.7	3.5	3.2	3	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1	0.95
7.2	4	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1	0.96	0.9
7.3	3.8	3.5	3.3	3.1	2.9	2.7	2.6	2.4	2.2	2.1	2	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1	0.97	0.91	0.85
7.4	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1	0.96	0.9	0.85	0.79
7.5	3.2	3	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1	0.95	0.89	0.83	0.78	0.73
7.6	2.9	2.8	2.6	2.4	2.3	2.1	2	1.9	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.1	1.1	0.98	0.92	0.86	0.81	0.76	0.71	0.67
7.7	2.6	2.4	2.3	2.2	2	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1	0.94	0.88	0.83	0.78	0.73	0.68	0.64	0.6
7.8	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1	0.95	0.89	0.84	0.79	0.74	0.69	0.65	0.61	0.57	0.53
7.9	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1	0.95	0.89	0.84	0.79	0.74	0.69	0.65	0.61	0.57	0.53	0.5	0.47
8	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1	0.94	0.88	0.83	0.78	0.73	0.68	0.64	0.6	0.56	0.53	0.5	0.44	0.44	0.41
8.1	1.5	1.5	1.4	1.3	1.2	1.1	1.1	0.99	0.92	0.87	0.81	0.76	0.71	0.67	0.63	0.59	0.55	0.52	0.49	0.46	0.43	0.4	0.38	0.35
8.2	1.3	1.2	1.2	1.1	1	0.96	0.9	0.84	0.79	0.74	0.7	0.65	0.61	0.57	0.54	0.5	0.47	0.44	0.42	0.39	0.37	0.34	0.32	0.3
8.3	1.1	1.1	0.99	0.93	0.87	0.82	0.76	0.72	0.67	0.63	0.59	0.55	0.52	0.49	0.46	0.43	0.4	0.38	0.35	0.33	0.31	0.29	0.27	0.26
8.4	0.95	0.89	0.84	0.79	0.74	0.69	0.65	0.61	0.57	0.53	0.5	0.47	0.44	0.41	0.39	0.36	0.34	0.32	0.3	0.28	0.26	0.25	0.23	0.22
8.5	0.8	0.75	0.71	0.67	0.62	0.58	0.55	0.51	0.48	0.45	0.42	0.4	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.24	0.22	0.21	0.2	0.18
8.6	0.68	0.64	0.6	0.56	0.53	0.49	0.46	0.43	0.41	0.38	0.36	0.33	0.31	0.29	0.28	0.26	0.24	0.23	0.21	0.2	0.19	0.18	0.16	0.15
8.7	0.57	0.54	0.51	0.47	0.44	0.42	0.39	0.37	0.34	0.32	0.3	0.28	0.27	0.25	0.23	0.22	0.21	0.19	0.18	0.17	0.16	0.15	0.14	0.13
8.8	0.49	0.46	0.43	0.4	0.38	0.35	0.33	0.31	0.29	0.27	0.26	0.24	0.23	0.21	0.2	0.19	0.17	0.16	0.15	0.14	0.13	0.13	0.12	0.11
8.9	0.42	0.39	0.37	0.34	0.32	0.3	0.28	0.27	0.25	0.23	0.22	0.21	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.1	0.09
9	0.36	0.34	0.32	0.3	0.28	0.26	0.24	0.23	0.21	0.2	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.11	0.1	0.09	0.09	0.08

$$0.8876 \times \left(\frac{0.0278}{1+10^{7.688-pH}} + \frac{1.1994}{1+10^{pH-7.688}}\right) \times \left(2.126 \times 10^{0.028\times(20-MAX(T,7))}\right)$$

~~**Table 14. Repealed**~~

Table 14. Acute Standards for Total Ammonia (in mg/L, as N) for Aquatic and Wildlife Coldwater, Unionid Mussels Absent

For the aquatic and wildlife coldwater uses, unionids will be assumed to be present unless a study is performed demonstrating that they are absent and there is no historic evidence of their presence, or hydrologic modification has altered the flow regime in a way that would prevent their reestablishment.

	Temperature (°C)																
pH	0-14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
6.5	33	33	33	33	33	33	33	33	33	33	33	33	33	33	31	29	27
6.6	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	28	26
6.7	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	26	24
6.8	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	25	23
6.9	26	26	26	26	26	26	26	26	26	26	26	26	26	26	25	23	21
7	24	24	24	24	24	24	24	24	24	24	24	24	24	24	23	21	20
7.1	22	22	22	22	22	22	22	22	22	22	22	22	22	22	21	19	18
7.2	20	20	20	20	20	20	20	20	20	20	20	20	20	20	19	17	16
7.3	18	18	18	18	18	18	18	18	18	18	18	18	18	18	17	16	14
7.4	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	14	13
7.5	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	12	11
7.6	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	10	9.3
7.7	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.3	8.6	7.9
7.8	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	7.8	7.2	6.6
7.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.5	6	5.5
8	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.4	5	4.6
8.1	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.5	4.1	3.8
8.2	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.7	3.4	3.1
8.3	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3	2.8	2.6
8.4	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.3	2.1
8.5	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	1.9	1.8
8.6	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.6	1.4
8.7	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.4	1.3	1.2
8.8	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1
8.9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.92	0.85
9	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.85	0.78	0.72

$$MIN\left(\left(\frac{0.275}{1+10^{7.204-pH}}+\frac{39.0}{1+10^{pH-7.204}}\right),\left(0.7249\times\left(\frac{0.0114}{1+10^{7.204-pH}}+\frac{1.6181}{1+10^{pH-7.204}}\right)\times\left(62.15\times10^{0.036\times(20-T)}\right)\right)\right)$$

~~**Table 15. Repealed**~~

Table 15. Acute Standards for Total Ammonia (in mg/L, as N) for Aquatic and Wildlife Warmwater and Effluent Dependent, Unionid Mussels Absent

For the aquatic and wildlife warmwater uses, unionids will be assumed to be present unless a study is performed

demonstrating that they are absent and there is no historic evidence of their presence, or hydrologic modification has altered the flow regime in a way that would prevent their reestablishment. For the aquatic and wildlife effluent dependent uses, unionids will be assumed to be absent.

	Temperature (°C)																
pH	0-14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
6.5	51	51	51	51	51	51	51	51	51	48	44	40	37	34	31	29	27
6.6	49	49	49	49	49	49	49	49	49	46	42	39	36	33	30	28	26
6.7	46	46	46	46	46	46	46	46	46	43	40	37	34	31	29	26	24
6.8	44	44	44	44	44	44	44	44	44	41	38	35	32	29	27	25	23
6.9	41	41	41	41	41	41	41	41	41	38	35	32	30	27	25	23	21
7	38	38	38	38	38	38	38	38	38	35	32	30	27	25	23	21	20
7.1	34	34	34	34	34	34	34	34	34	32	29	27	25	23	21	19	18
7.2	31	31	31	31	31	31	31	31	31	29	26	24	22	21	19	17	16
7.3	27	27	27	27	27	27	27	27	27	26	23	22	20	18	17	16	14
7.4	24	24	24	24	24	24	24	24	24	22	21	19	17	16	15	14	13
7.5	21	21	21	21	21	21	21	21	21	19	18	16	15	14	13	12	11
7.6	18	18	18	18	18	18	18	18	18	17	15	14	13	12	11	10	9.3
7.7	15	15	15	15	15	15	15	15	15	14	13	12	11	10	9.3	8.6	7.9
7.8	13	13	13	13	13	13	13	13	13	12	11	10	9.2	8.5	7.8	7.2	6.6
7.9	11	11	11	11	11	11	11	11	11	9.9	9.1	8.4	7.7	7.1	6.5	6	5.5
8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.2	7.5	6.9	6.4	5.9	5.4	5	4.6
8.1	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	6.8	6.2	5.7	5.3	4.9	4.5	4.1	3.8
8.2	6	6	6	6	6	6	6	6	6	5.6	5.1	4.7	4.4	4	3.7	3.4	3.1
8.3	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.6	4.2	3.9	3.6	3.3	3	2.8	2.6
8.4	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	3.8	3.4	3.2	3	2.7	2.5	2.3	2.1
8.5	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.1	2.9	2.6	2.4	2.2	2.1	1.9	1.8
8.6	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.6	2.4	2.2	2	1.9	1.7	1.6	1.4
8.7	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2	1.8	1.7	1.5	1.4	1.3	1.2
8.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1
8.9	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.5	1.4	1.3	1.2	1.1	1	0.92	0.85
9	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.2	1.1	1	0.93	0.85	0.78	0.72

$$0.7249 \times \left(\frac{0.0114}{1+10^{7.204-pH}} + \frac{1.6181}{1+10^{pH-7.204}}\right) \times MIN\left(51.93, \left(62.15 \times 10^{0.036\times(20-T)}\right)\right)$$

~~**Table 16. Repealed**~~

Table 16. Chronic Standards for Total Ammonia (in mg/L, as N) for Aquatic and Wildlife Warmwater and Effluent Dependent, Unionid Mussels Absent

For the aquatic and wildlife warmwater uses, unionids will be assumed to be present unless a study is performed demonstrating that they are absent and there is no historic evidence of their presence, or hydrologic modification has altered the flow regime in a way that would prevent their reestablishment. For the aquatic and wildlife effluent dependent uses, unionids will be assumed to be absent.

Temperature (°C)																								
pH	0-7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
6.5	19	17	16	15	14	13	13	12	11	10	9.7	9.1	8.5	8	7.5	7	6.6	6.2	5.8	5.4	5.1	4.8	4.5	4.2
6.6	18	17	16	15	14	13	12	12	11	10	9.6	9	8.4	7.9	7.4	6.9	6.5	6.1	5.7	5.4	5	4.7	4.4	4.1
6.7	18	17	16	15	14	13	12	11	11	10	9.4	8.8	8.3	7.7	7.3	6.8	6.4	6	5.6	5.3	4.9	4.6	4.3	4.1
6.8	17	16	15	14	14	13	12	11	10	9.8	9.2	8.6	8.1	7.6	7.1	6.7	6.2	5.8	5.5	5.1	4.8	4.5	4.2	4
6.9	17	16	15	14	13	12	12	11	10	9.5	8.9	8.4	7.8	7.4	6.9	6.5	6.1	5.7	5.3	5	4.7	4.4	4.1	3.9
7	16	15	14	14	13	12	11	10	9.8	9.2	8.6	8.1	7.6	7.1	6.7	6.2	5.9	5.5	5.1	4.8	4.5	4.2	4	3.7
7.1	16	15	14	13	12	11	11	10	9.4	8.8	8.3	7.7	7.3	6.8	6.4	6	5.6	5.3	4.9	4.6	4.3	4.1	3.8	3.6
7.2	15	14	13	12	12	11	10	9.5	9	8.4	7.9	7.4	6.9	6.5	6.1	5.7	5.3	5	4.7	4.4	4.1	3.9	3.6	3.4
7.3	14	13	12	12	11	10	9.6	9	8.4	7.9	7.4	6.9	6.5	6.1	5.7	5.4	5	4.7	4.4	4.1	3.9	3.6	3.4	3.2
7.4	13	12	12	11	10	9.5	9	8.4	7.9	7.4	6.9	6.5	6.1	5.7	5.3	5	4.7	4.4	4.1	3.9	3.6	3.4	3.2	3
7.5	12	11	11	10	9.4	8.8	8.2	7.7	7.2	6.8	6.4	6	5.6	5.2	4.9	4.6	4.3	4.1	3.8	3.6	3.3	3.1	2.9	2.8
7.6	11	10	10	9.1	8.5	8	7.5	7	6.6	6.2	5.8	5.4	5.1	4.8	4.5	4.2	3.9	3.7	3.5	3.2	3	2.9	2.7	2.5
7.7	9.9	9.3	8.7	8.1	7.7	7.2	6.8	6.3	5.9	5.6	5.2	4.9	4.6	4.3	4	3.8	3.5	3.3	3.1	2.9	2.7	2.6	2.4	2.3
7.8	8.8	8.3	7.8	7.3	6.8	6.4	6	5.6	5.3	5	4.6	4.4	4.1	3.8	3.6	3.4	3.2	3	2.8	2.6	2.4	2.3	2.1	2
7.9	7.8	7.3	6.8	6.4	6	5.6	5.3	5	4.6	4.4	4.1	3.8	3.6	3.4	3.2	3	2.8	2.6	2.4	2.3	2.1	2	1.9	1.8
8	6.8	6.3	6	5.6	5.2	4.9	4.6	4.3	4	3.8	3.6	3.3	3.1	2.9	2.7	2.6	2.4	2.3	2.1	2	1.9	1.7	1.6	1.5
8.1	5.8	5.5	5.1	4.8	4.5	4.2	4	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2	1.8	1.7	1.6	1.5	1.4	1.3
8.2	5	4.7	4.4	4.1	3.9	3.6	3.4	3.2	3	2.8	2.6	2.5	2.3	2.2	2	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1
8.3	4.2	4	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1	0.96
8.4	3.6	3.4	3.2	3	2.8	2.6	2.4	2.3	2.1	2	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	0.99	0.92	0.87	0.81
8.5	3	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1	0.95	0.89	0.83	0.78	0.73	0.69
8.6	2.6	2.4	2.2	2.1	2	1.9	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1	0.97	0.91	0.85	0.8	0.75	0.7	0.66	0.62	0.58
8.7	2.2	2	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1	0.93	0.88	0.82	0.77	0.72	0.68	0.63	0.6	0.56	0.52	0.49
8.8	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1	0.96	0.9	0.85	0.79	0.74	0.7	0.65	0.61	0.58	0.54	0.51	0.47	0.44	0.42
8.9	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1	0.94	0.88	0.82	0.77	0.72	0.68	0.64	0.6	0.56	0.52	0.49	0.46	0.43	0.4	0.38	0.36
9	1.4	1.3	1.2	1.1	1	0.98	0.92	0.86	0.81	0.76	0.71	0.66	0.62	0.58	0.55	0.51	0.48	0.45	0.42	0.4	0.37	0.35	0.33	0.31

Temperature (°C)																							
pH	0-7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

$$0.9405 \times \left(\frac{0.0278}{1+10^{7.688-pH}} + \frac{1.1994}{1+10^{pH-7.688}}\right) \times \left(7.547 \times 10^{0.028\times(20-MAX(T,7))}\right)$$

~~**Table 17. Repealed**~~

Table 17. Chronic Criteria for Total Ammonia (in mg/L, as N) for Aquatic and Wildlife coldwater, Unionid Mussels Absent

For the aquatic and wildlife coldwater uses, unionids will be assumed to be present unless a study is performed demonstrating that they are absent and there is no historic evidence of their presence, or hydrologic modification has altered the flow regime in a way that would prevent their reestablishment.

Temperature (°C)																	
pH	0-14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
6.5	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7	6.6	6.2	5.8	5.4	5.1	4.8	4.5	4.2
6.6	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	6.9	6.5	6.1	5.7	5.4	5	4.7	4.4	4.1
6.7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	6.8	6.4	6	5.6	5.3	4.9	4.6	4.3	4.1
6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.6	6.2	5.8	5.5	5.1	4.8	4.5	4.2	4
6.9	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.5	6.1	5.7	5.3	5	4.7	4.4	4.1	3.9
7	6.5	6.5	6.5	6.5	6.5	6.5	**6.5**	6.5	6.2	5.8	5.5	5.1	4.8	4.5	4.2	4	3.7
7.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6	5.6	5.3	4.9	4.6	4.3	4.1	3.8	3.6
7.2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.7	5.3	5	4.7	4.4	4.1	3.9	3.6	3.4
7.3	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.4	5	4.7	4.4	4.1	3.9	3.6	3.4	3.2
7.4	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5	4.7	4.4	4.1	3.9	3.6	3.4	3.2	3
7.5	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.6	4.3	4.1	3.8	3.6	3.3	3.1	2.9	2.8
7.6	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.2	3.9	3.7	3.5	3.2	3	2.9	2.7	2.5
7.7	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.8	3.5	3.3	3.1	2.9	2.7	2.6	2.4	2.3
7.8	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.4	3.2	3	2.8	2.6	2.4	2.3	2.1	2
7.9	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3	2.8	2.6	2.4	2.3	2.1	2	1.9	1.8
8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.6	2.4	2.3	2.1	2	1.9	1.7	1.6	1.5
8.1	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3
8.2	2	2	2	2	2	2	2	2	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1
8.3	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1	0.96
8.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.2	1.1	1.1	0.99	0.93	0.87	0.81
8.5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1	0.95	0.89	0.83	0.78	0.73	0.69
8.6	1	1	1	1	1	1	1	1	0.97	0.91	0.85	0.8	0.75	0.7	0.66	0.62	0.58
8.7	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.82	0.77	0.72	0.68	0.64	0.6	0.56	0.52	0.49
8.8	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.7	0.65	0.61	0.58	0.54	0.51	0.47	0.44	0.42

Temperature (°C)																	
pH	0-14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
8.9	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.6	0.56	0.52	0.49	0.46	0.43	0.41	0.38	0.36
9	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.51	0.48	0.45	0.42	0.4	0.37	0.35	0.33	0.31

$$0.9405 \times \left(\frac{0.0278}{1+10^{7.688-pH}} + \frac{1.1994}{1+10^{pH-7.688}}\right) \times MIN\left(6.920, \left(7.547 \times 10^{0.028\times(20-T)}\right)\right)$$

Appendix B. Surface Waters and Designated Uses

(Coordinates are from the North American Datum of 1983 (NAD83). All latitudes in Arizona are north and all longitudes are west, but the negative signs are not included in the Appendix B table. Some web-based mapping systems require a negative sign before the longitude values to indicate it is a west longitude.)

Watersheds:

BW = Bill Williams

CG = Colorado – Grand Canyon

CL = Colorado – Lower Gila

LC = Little Colorado

MG = Middle Gila

SC = Santa Cruz – Rio Magdelena – Rio Sonoyta

SP = San Pedro – Willcox Playa – Rio Yaqui

SR = Salt River

UG = Upper Gila

VR = Verde River

Other Abbreviations:

WWTP = Wastewater Treatment Plant

Km = kilometers

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
BW	Alamo Lake	34°14'06"/113°35'00"	Deep		A&Ww			FBC			FC		AgL
BW	Big Sandy River	Headwaters to Alamo Lake			A&Ww			FBC			FC		AgL
BW	Bill Williams River	Alamo Lake to confluence with Colorado River			A&Ww			FBC			FC		AgL
BW	Blue Tank	34°40'14"/112°58'17"			A&Ww			FBC			FC		AgL
BW	Boulder Creek	Headwaters to confluence with unnamed tributary at 34°41'13"/113°03'37"		A&Wc				FBC			FC		AgL
BW	Boulder Creek	Below confluence with unnamed tributary to confluence with Burro Creek			A&Ww			FBC			FC		AgL
BW	Burro Creek (OAW)	Headwaters to confluence with Boulder Creek			A&Ww			FBC			FC		AgL
BW	Burro Creek	Below confluence with Boulder Creek to confluence with Big Sandy River			A&Ww			FBC			FC		AgL
BW	Carter Tank	34°52'27"/112°57'31"			A&Ww			FBC			FC		AgL
BW	Conger Creek	Headwaters to confluence with unnamed tributary at 34°45'15"/113°05'46"		A&Wc				FBC			FC		AgL
BW	Conger Creek	Below confluence with unnamed tributary to confluence with Burro Creek			A&Ww			FBC			FC		AgL
BW	Copper Basin Wash	Headwaters to confluence with unnamed tributary at 34°28'12"/112°35'33"		A&Wc				FBC			FC		AgL
BW	Copper Basin Wash	Below confluence with unnamed tributary to confluence with Skull Valley Wash				A&We			PBC				AgL

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
BW	Cottonwood Canyon	Headwaters to Bear Trap Spring		A&Wc				FBC			FC		AgL
BW	Cottonwood Canyon	Below Bear Trap Spring to confluence at ~~Smith Canyon~~ Sycamore Creek			A&Ww			FBC			FC		AgL
BW	Date Creek	Headwaters to confluence with Santa Maria River			A&Ww			FBC			FC		AgL
BW	Francis Creek (OAW)	Headwaters to confluence with Burro Creek			A&Ww			FBC		DWS	FC	AgI	AgL
BW	Kirkland Creek	Headwaters to confluence with Santa Maria River			A&Ww			FBC			FC	AgI	AgL
BW	Knight Creek	Headwaters to confluence with Big Sandy River			A&Ww			FBC			FC		AgL
BW	Peeples Canyon (OAW)	Headwaters to confluence with Santa Maria River			A&Ww			FBC			FC		AgL
BW	Red Lake	35°12'18"/113°03'57"	Sedimentary		A&Ww			FBC			FC		AgL
BW	Santa Maria River	Headwaters to Alamo Lake			A&Ww			FBC			FC	AgI	AgL
BW	Trout Creek	Headwaters to confluence with unnamed tributary at 35°06'47"/113°13'01"		A&Wc				FBC			FC		AgL
BW	Trout Creek	Below confluence with unnamed tributary to confluence with Knight Creek			A&Ww			FBC			FC		AgL
CG	Agate Canyon ~~Creek~~	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Beaver Dam Wash	Headwaters to confluence with the Virgin River			A&Ww			FBC			FC		AgL
CG	Big Springs Tank	36°36'08"/112°21'01"		A&Wc				FBC			FC		AgL
CG	Boucher Creek	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Bright Angel Creek	Headwaters to confluence with Roaring Springs Creek		A&Wc				FBC			FC		
CG	Bright Angel Creek	Below Roaring Spring Springs Creek to confluence with Colorado River			A&Ww			FBC			FC		
CG	Bright Angel Wash	Headwaters to Grand Canyon National Park South Rim WWTP outfall at 36°02'59"/112°09'02"				A&We			PBC				
CG	Bright Angel Wash (EDW)	Grand Canyon National Park South Rim WWTP outfall to Coconino Wash					A&Wedw		PBC				AgL
~~**Watershed**~~	~~**Surface Waters**~~	~~**Segment Description and Location (Latitude and Longitudes are in NAD 83)**~~	~~**Lake Category**~~	~~**Aquatic and Wildlife**~~	~~**Human Health**~~	~~**Agricultural**~~							
CG	Bulrush Canyon Wash	Headwaters to confluence with Kanab Creek				A&We			PBC				
CG	Cataract Creek	Headwaters to Santa Fe Reservoir		A&Wc				FBC		DWS	FC	AgI	AgL
CG	Cataract Creek	Santa Fe Reservoir to City of Williams WWTP outfall at 35°14'40"/112°11'18"		A&Wc				FBC			FC	AgI	AgL
CG	Cataract Creek (EDW)	City of Williams WWTP outfall to 1 km downstream					A&Wedw		PBC				
CG	Cataract Creek	Red Lake Wash to Havasupai Indian Reservation boundary				A&We			PBC				AgL
CG	Cataract Lake	35°15'04"/112°12'58"	Igneous	A&Wc				FBC		DWS	FC		AgL
CG	Chuar Creek	Headwaters to confluence with unnamed tributary at 36°11'35"/111°52'20"		A&Wc				FBC			FC		
CG	Chuar Creek	Below unnamed tributary to confluence with the Colorado River			A&Ww			FBC			FC		
CG	City Reservoir	35°13'57"/112°11'25"	Igneous	A&Wc				FBC		DWS	FC		
CG	Clear Creek	Headwaters to confluence with unnamed tributary at 36°07'33"/112°00'03"		A&Wc				FBC			FC		
CG	Clear Creek	Below confluence with unnamed tributary to confluence with Colorado River			A&Ww			FBC			FC		
CG	Coconino Wash (EDW)	South Grand Canyon Sanitary District Tusayan WRF outfall at 35°58'39"/112°08'25" to 1 km downstream					A&Wedw		PBC				
CG	Colorado River	Lake Powell to Lake Mead		A&Wc				FBC		DWS	FC	AgI	AgL
CG	Cottonwood Creek	Headwaters to confluence with unnamed tributary at 35°20'46"/113°35'31"		A&Wc				FBC			FC		AgL
CG	Cottonwood Creek	Below confluence with unnamed tributary to confluence with Colorado River			A&Ww			FBC			FC		AgL
CG	Crystal Creek	Headwaters to confluence with unnamed tributary at 36°13'41"/112°11'49"		A&Wc				FBC			FC		
CG	Crystal Creek	Below confluence with unnamed tributary to confluence with Colorado River			A&Ww			FBC			FC		
CG	Deer Creek	Headwaters to confluence with unnamed tributary at 36°26'15"/112°28'20"		A&Wc				FBC			FC		

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
CG	Deer Creek	Below confluence with unnamed tributary to confluence with Colorado River			A&Ww			FBC			FC		
CG	Detrital Wash	Headwaters to Lake Mead				A&We			PBC				
CG	Dogtown Reservoir	35°12'40"/112°07'54"	Igneous	A&Wc				FBC		DWS	FC	AgI	AgL
CG	Dragon Creek	Headwaters to confluence with Milk Creek		A&Wc				FBC			FC		
CG	Dragon Creek	Below confluence with Milk Creek to confluence with Crystal Creek			A&Ww			FBC			FC		
CG	Garden Creek	Headwaters to confluence with Pipe Creek			A&Ww			FBC			FC		
CG	Gonzalez Lake	35°15'26"/112°12'09"	Shallow		A&Ww			FBC			FC	AgI	AgL
CG	Grand Wash	Headwaters to ~~Lake Mead~~ Colorado River				A&We			PBC				
CG	Grapevine Creek	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Grapevine Wash	Headwaters to ~~Lake Mead~~ Colorado River				A&We			PBC				
CG	Hakatai Canyon ~~Creek~~	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Hance Creek	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Havasu ~~Canyon~~ Creek	From the Havasupai Indian Reservation boundary to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Hermit Creek	Headwaters to Hermit Pack Trail crossing at 36°03'38"/112°14'00"		A&Wc				FBC			FC		
CG	Hermit Creek	Below Hermit Pack Trail crossing to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Horn Creek	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Hualapai Wash	Headwaters to Lake Mead				A&We			PBC				
CG	Jacob Lake	36°42'27"/112°13'50"	Sedimentary	A&Wc				FBC			FC		
CG	Kaibab Lake	35°17'04"/112°09'32"	Igneous	A&Wc				FBC		DWS	FC	AgI	AgL
CG	Kanab Creek	Headwaters to confluence with the Colorado River			A&Ww			FBC		DWS	FC		AgL
CG	Kwagunt Creek	Headwaters to confluence with unnamed tributary at 36°13'37"/111°54'50"		A&Wc				FBC			FC		
CG	Kwagunt Creek	Below confluence with unnamed tributary to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Lake Mead	36°06'18"/114°26'33"	Deep	A&Wc				FBC		DWS	FC	AgI	AgL
CG	Lake Powell	36°59'53"/111°08'17"	Deep	A&Wc				FBC		DWS	FC	AgI	AgL
CG	Lonetree Canyon Creek	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Matkatamiba Creek	Below Havasupai Indian Reservation boundary to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Monument Creek	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
CG	Nankoweap Creek	Headwaters to confluence with unnamed tributary at 36°15'29"/111°57'26"		A&Wc				FBC			FC		
CG	Nankoweap Creek	Below confluence with unnamed tributary to confluence with Colorado River			A&Ww			FBC			FC		
CG	National Canyon Creek	Headwaters to Hualapai Indian Reservation boundary at 36°15'15"/112°52'34"			A&Ww			FBC			FC		
CG	North Canyon Creek	Headwaters to confluence with unnamed tributary at 36°33'58"/111°55'41"		A&Wc				FBC			FC		
CG	North Canyon Creek	Below confluence with unnamed tributary to confluence with Colorado River			A&Ww			FBC			FC		
CG	Olo ~~Creek~~ Canyon	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Parashant Canyon	Headwaters to confluence with unnamed tributary at 36°21'02"/113°27'56"		A&Wc				FBC			FC		
CG	Parashant Canyon	Below confluence with unnamed tributary to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Paria River	Utah border to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Phantom Creek	Headwaters to confluence with unnamed tributary at 36°09'29"/112°08'13"		A&Wc				FBC			FC		

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
CG	Phantom Creek	Below confluence with unnamed tributary to confluence with Bright Angel Creek			A&Ww			FBC			FC		
CG	Pipe Creek	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Red Canyon Creek	Headwaters to confluence with the Colorado River '			A&Ww			FBC			FC		
CG	Red Lake	35°40'03"/114°04'07"			A&Ww			FBC			FC		AgL
CG	Roaring Springs	36°11'45"/112°02'06"		A&Wc				FBC		DWS	FC		
CG	Roaring Springs Creek	Headwaters to confluence with Bright Angel Creek		A&Wc				FBC			FC		
CG	Rock Canyon	Headwaters to confluence with Truxton Wash				A&We			PBC				
CG	Royal Arch Creek	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Ruby Canyon ~~Creek~~	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Russell Tank	35°52'21"/111°52'45"		A&Wc				FBC			FC		AgL
CG	Saddle Canyon Creek	Headwaters to confluence with unnamed tributary at 36°21'36"/112°22'43"		A&Wc				FBC			FC		
CG	Saddle Canyon Creek	Below confluence with unnamed tributary to confluence with Colorado River			A&Ww			FBC			FC		
CG	Santa Fe Reservoir	35°14'31"/112°11'10"	Igneous	A&Wc				FBC		DWS	FC		
CG	Sapphire Canyon ~~Creek~~	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Serpentine Canyon ~~Creek~~	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Shinumo Creek	Headwaters to confluence with unnamed tributary at 36°18'18"/112°18'07"		A&Wc				FBC			FC		
CG	Shinumo Creek	Below confluence with unnamed tributary to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Short Creek	Headwaters to confluence with ~~the Virgin River~~ Fort Pearce Wash				A&We			PBC				
CG	Slate Creek	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Spring Canyon Creek	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Stone Creek	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Tapeats Creek	Headwaters to confluence with the Colorado River		A&Wc				FBC			FC		
CG	Thunder River	Headwaters to confluence with Tapeats Creek		A&Wc				FBC			FC		
CG	Trail Canyon Creek	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Transept Canyon	Headwaters to Grand Canyon National Park North Rim WWTP outfall at 36°12'20"/112°03'35"				A&We			PBC				
CG	Transept Canyon (EDW)	Grand Canyon National Park North Rim WWTP outfall to 1 km downstream					A&Wedw		PBC				
CG	Transept Canyon	From 1 km downstream of the Grand Canyon National Park North Rim WWTP outfall to confluence with Bright Angel Creek				A&We			PBC				
CG	Travertine Canyon Creek	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Truxton Wash	Headwaters to Red Lake				A&We			PBC				
CG	Turquoise Canyon ~~Creek~~	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Unkar Creek	Below confluence with unnamed tributary at 36°07'54"/111°54'06" to confluence with Colorado River			A&Ww			FBC			FC		
CG	Unnamed Wash (EDW)	Grand Canyon National Park Desert View WWTP outfall at 36°02'06"/111°49'13" to confluence with Cedar Canyon					A&Wedw		PBC				
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
CG	Unnamed Wash (EDW)	Valle Airpark WRF outfall at 35°38'34"/112°09'22" to confluence with Spring Valley Wash					A&Wedw		PBC				
CG	Vasey's Paradise	A spring at 36°29'52"/111°51'26"		A&Wc				FBC			FC		
CG	Virgin River	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC	AgI	AgL
CG	Vishnu Creek	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
CG	Warm Springs Creek	Headwaters to confluence with the Colorado River			A&Ww			FBC			FC		
CG	West Cataract Creek	Headwaters to confluence with Cataract Creek		A&Wc				FBC			FC		AgL
CG	White Creek	Headwaters to confluence with unnamed tributary at 36°18'45"/112°21'03"		A&Wc				FBC			FC		
CG	White Creek	Below confluence with unnamed tributary to confluence with the Colorado River			A&Ww			FBC			FC		
CG	Wright Canyon Creek	Headwaters to confluence with unnamed tributary at 35°20'48"/113°30'40"		A&Wc				FBC			FC		AgL
CG	Wright Canyon Creek	Below confluence with unnamed tributary to confluence with Truxton Wash			A&Ww			FBC			FC		AgL
CL	A10 Backwater	33°31'45"/114°33'19"	Shallow		A&Ww			FBC			FC		
CL	A7 Backwater	33°34'27"/114°32'04"	Shallow		A&Ww			FBC			FC		
CL	Adobe Lake	33°02'36"/114°39'26"	Shallow		A&Ww			FBC			FC		
CL	Cibola Lake	33°14'01"/114°40'31"	Shallow		A&Ww			FBC			FC		
CL	Clear Lake	33°01'59"/114°31'19"	Shallow		A&Ww			FBC			FC		
CL	Columbus Wash	Headwaters to confluence with the Gila River				A&We			PBC				
CL	Colorado River	Lake Mead to Topock Marsh		A&Wc				FBC		DWS	FC	AgI	AgL
CL	Colorado River	Topock Marsh to Morelos Dam			A&Ww			FBC		DWS	FC	AgI	AgL
CL	Gila River	Painted Rock Dam to confluence with the Colorado River			A&Ww			FBC			FC	AgI	AgL
CL	Holy Moses Wash	Headwaters to City of Kingman Downtown WWTP outfall at 35°10'33"/114°03'46"				A&We			PBC				
CL	Holy Moses Wash (EDW)	City of Kingman Downtown WWTP outfall to 3 km downstream					A&Wedw		PBC				
CL	Holy Moses Wash	From 3 km downstream of City of Kingman Downtown WWTP outfall to confluence with Sawmill Wash				A&We			PBC				
CL	Hunter's Hole Backwater	32°31'13"/114°48'07"	Shallow		A&Ww			FBC			FC		AgL
CL	Imperial Reservoir	32°53'02"/114°27'54"	Shallow		A&Ww			FBC		DWS	FC	AgI	AgL
CL	Island Lake	33°01'44"/114°36'42"	Shallow		A&Ww			FBC			FC		
CL	Laguna Reservoir	32°51'35"/114°28'29"	Shallow		A&Ww			FBC		DWS	FC	AgI	AgL
CL	Lake Havasu	34°35'18"/114°25'47"	Deep		A&Ww			FBC		DWS	FC	AgI	AgL
CL	Lake Mohave	35°26'58"/114°38'30"	Deep	A&Wc				FBC		DWS	FC	AgI	AgL
CL	Martinez Lake	32°58'49"/114°28'09"	Shallow		A&Ww			FBC			FC	AgI	AgL
CL	Mittry Lake	32°49'17"/114°27'54"	Shallow		A&Ww			FBC			FC		
CL	Mohave Wash	Headwaters ~~to Lake Havasu~~ to Lower Colorado River				A&We			PBC				
CL	Nortons Lake	33°02'30"/114°37'59"	Shallow		A&Ww			FBC			FC		
CL	Painted Rock (Borrow Pit) Lake	33°04'55"/113°01'17"	Sedimentary		A&Ww			FBC			FC	AgI	AgL
CL	Pretty Water Lake	33°19'51"/114°42'19"	Shallow		A&Ww			FBC			FC		
CL	Quigley Pond~~s~~	32°43'40"/113°57'44"	Shallow		A&Ww			FBC			FC		
CL	Redondo Lake	32°44'32"/114°29'03"	Shallow		A&Ww			FBC			FC		
CL	Sacramento Wash	Headwaters to Topock Marsh				A&We			PBC				
CL	Sawmill Canyon	Headwaters to abandoned gaging station at 35°09'45"/113°57'56"			A&Ww			FBC			FC		AgL
CL	Sawmill Canyon	Below abandoned gaging station to confluence with Holy Moses Wash				A&We			PBC				AgL
CL	Topock Marsh	34°43'27"/114°28'59"	Shallow		A&Ww			FBC		DWS	FC	AgI	AgL
CL	Tyson Wash (EDW)	Town of Quartzsite WWTP outfall at 33°42'39"/ 114°13'10" to 1 km downstream					A&Wedw		PBC				
CL	Wellton Canal	Wellton-Mohawk Irrigation District								DWS		AgI	AgL
CL	Wellton Ponds	32°40'32"/114°00'26"			A&Ww			FBC			FC		
CL	~~YPG~~ Yuma Proving Ground Pond	32°50'58"/114°26'14"			A&Ww			FBC			FC		
CL	Yuma Area Canals	Above municipal water treatment plant intakes								DWS		AgI	AgL

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
CL	Yuma Area Canals	Below municipal water treatment plant intakes and all drains										AgI	AgL
LC	Als Lake	35°02'10"/111°25'17"	Igneous		A&Ww			FBC			FC		AgL
LC	Ashurst Lake	35°01'06"/111°24'18"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Atcheson Reservoir	33°59'59"/109°20'43"	Igneous		A&Ww			FBC			FC	AgI	AgL
LC	Auger Creek	Headwaters to confluence with Nutrioso Creek		A&Wc				FBC			FC		AgL
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
LC	Barbershop Canyon Creek	Headwaters to confluence with East Clear Creek		A&Wc				FBC			FC		AgL
LC	Bear Canyon Creek	Headwaters to confluence with General Springs Canyon		A&Wc				FBC			FC		AgL
LC	Bear Canyon Creek	Headwaters to confluence with Willow Creek		A&Wc				FBC			FC		AgL
LC	Bear Canyon Lake	34°24'00"/111°00'06"	Sedimentary	A&Wc				FBC			FC	AgI	AgL
LC	Becker Lake	34°09'11"/109°18'23"	Shallow	A&Wc				FBC			FC		AgL
LC	Billy Creek	Headwaters to confluence with Show Low Creek		A&Wc				FBC			FC		AgL
LC	Black Canyon ~~Creek~~	Headwaters to confluence with Chevelon Creek		A&Wc				FBC			FC	AgI	AgL
LC	Black Canyon Lake	34°20'32"/110°40'13"	Sedimentary	A&Wc				FBC		DWS	FC	AgI	AgL
~~LC~~	~~Blue Ridge Reservoir~~	~~34°32'40"/111°11'33"~~	~~Deep~~	~~A&Wc~~				~~FBC~~			~~FC~~	~~AgI~~	~~AgL~~
LC	Boot Lake	34°58'54"/111°20'11"	Igneous	A&Wc				FBC			FC		AgL
LC	Bow and Arrow Wash	Headwaters to confluence with Rio de Flag				A&We			PBC				
LC	Buck Springs Canyon Creek	Headwaters to confluence with Leonard Canyon Creek		A&Wc				FBC			FC		AgL
LC	Bunch Reservoir	34°02'20"/109°26'48"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Camillo Tank	34°55'03"/111°22'40"	Igneous		A&Ww			FBC			FC		AgL
LC	Carnero Lake	34°06'57"/109°31'42"	Shallow	A&Wc				FBC			FC		AgL
LC	Chevelon Canyon Lake	34°29'18"/110°49'30"	Sedimentary	A&Wc				FBC			FC	AgI	AgL
LC	Chevelon Creek	Headwaters to confluence with the Little Colorado River		A&Wc				FBC			FC	AgI	AgL
LC	Chevelon Creek, West Fork	Headwaters to confluence with Chevelon Creek		A&Wc				FBC			FC		AgL
LC	Chilson Tank	34°51'43"/111°22'54"	Igneous		A&Ww			FBC			FC		AgL
LC	Clear Creek	Headwaters to confluence with the Little Colorado River		A&Wc				FBC		DWS	FC		AgL
LC	Clear Creek Reservoir	34°57'09"/110°39'14"	Shallow	A&Wc				FBC		DWS	FC	AgI	AgL
LC	Coconino Reservoir	35°00'05"/111°24'10"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Colter Creek	Headwaters to confluence with Nutrioso Creek		A&Wc				FBC			FC		AgL
LC	Colter Reservoir	33°56'39"/109°28'53"	Shallow	A&Wc				FBC			FC		AgL
LC	Concho Creek	Headwaters to confluence with Carrizo Wash		A&Wc				FBC			FC		AgL
LC	Concho Lake	34°26'37"/109°37'40"	Shallow	A&Wc				FBC			FC	AgI	AgL
LC	Cow Lake	34°53'14"/111°18'51"	Igneous		A&Ww			FBC			FC		AgL
LC	Coyote Creek	Headwaters to confluence with the Little Colorado River		A&Wc				FBC			FC	AgI	AgL
LC	Cragin Reservoir (formerly Blue Ridge Reservoir)	34°32'40"/111°11'33"	Deep	A&Wc				FBC			FC	AgI	AgL
LC	Crisis Lake (Snake Tank #2)	34°47'51"/111°17'32"			A&Ww			FBC			FC		AgL
LC	Dane Canyon Creek	Headwaters to confluence with Barbershop Canyon Creek		A&Wc				FBC			FC		AgL
LC	Daves Tank	34°44'22"/111°17'15"			A&Ww			FBC			FC		AgL
LC	Deep Lake	35°03'34"/111°25'00"	Igneous		A&Ww			FBC			FC		AgL
LC	Dry Lake (EDW)	34°38'02"/110°23'40"	EDW				A&Wedw		PBC				
LC	Ducksnest Lake	34°59'14"/111°23'57"			A&Ww			FBC			FC		AgL
LC	East Clear Creek	Headwaters to confluence with Clear Creek		A&Wc				FBC			FC	AgI	AgL

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
LC	Ellis Wiltbank Reservoir	34°05'25"/109°28'25"	Igneous		A&Ww			FBC			FC	AgI	AgL
LC	Estates at Pine Canyon lakes (EDW)	35°09'32"/111°38'26"	EDW				A&Wedw		PBC				
LC	Fish Creek	Headwaters to confluence with the Little Colorado River		A&Wc				FBC			FC		AgL
LC	Fool's Hollow Lake	34°16'30"/110°03'43"	Igneous	A&Wc				FBC			FC		AgL
LC	General Springs Canyon Creek	Headwaters to confluence with East Clear Creek		A&Wc				FBC			FC		AgL
LC	Geneva Reservoir	34°01'45"/109°31'46"	Igneous		A&Ww			FBC			FC		AgL
LC	Hall Creek	Headwaters to confluence with the Little Colorado River		A&Wc				FBC			FC	AgI	AgL
LC	Hart Canyon Creek	Headwaters to confluence with Willow Creek		A&Wc				FBC			FC		AgL
LC	Hay Lake	34°00'11"/109°25'57"	Igneous	A&Wc				FBC			FC		AgL
LC	Hog Wallow Lake	33°58'57"/109°25'39"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Horse Lake	35°03'55"/111°27'50"			A&Ww			FBC			FC		AgL
LC	Hulsey Creek	Headwaters to confluence with Nutrioso Creek		A&Wc				FBC			FC		AgL
LC	Hulsey Lake	33°55'58"/109°09'40"	Sedimentary	A&Wc				FBC			FC		AgL
LC	Indian Lake	35°00'39"/111°22'41"			A&Ww			FBC			FC		AgL
LC	~~Jack's~~ Jacks Canyon Creek	Headwaters to confluence with the Little Colorado River		A&Wc				FBC			FC	AgI	AgL
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
LC	Jarvis Lake	33°58'59"/109°12'36"	Sedimentary		A&Ww			FBC			FC		AgL
LC	Kinnikinick Lake	34°53'53"/111°18'18"	Igneous	A&Wc				FBC			FC		AgL
LC	Knoll Lake	34°25'38"/111°05'13"	Sedimentary	A&Wc				FBC			FC		AgL
LC	Lake Humphreys (EDW)	35°11'51"/111°35'19"	EDW				A&Wedw		PBC				
LC	Lake Mary, Lower	35°06'21"/111°34'38"	Igneous	A&Wc				FBC		DWS	FC		AgL
LC	Lake Mary, Upper	35°03'23"/111°28'34"	Igneous	A&Wc				FBC		DWS	FC		AgL
LC	Lake of the Woods	34°09'40"/109°58'47"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Lee Valley Creek (OAW)	Headwaters to Lee Valley Reservoir		A&Wc				FBC			FC		
LC	Lee Valley Creek	From Lee Valley Reservoir to confluence with the East Fork of the Little Colorado River		A&Wc				FBC			FC		AgL
LC	Lee Valley Reservoir	33°56'29"/109°30'04"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Leonard Canyon Creek	Headwaters to confluence with Clear Creek		A&Wc				FBC			FC		AgL
LC	Leonard Canyon Creek, East Fork	Headwaters to confluence with Leonard Canyon Creek		A&Wc				FBC			FC		AgL
LC	Leonard Canyon Creek, Middle Fork	Headwaters to confluence with Leonard Canyon, West Fork		A&Wc				FBC			FC		AgL
LC	Leonard Canyon Creek, West Fork	Headwaters to confluence with Leonard Canyon, East Fork		A&Wc				FBC			FC		AgL
LC	Lily Creek	Headwaters to confluence with Coyote Creek		A&Wc				FBC			FC		AgL
LC	Little Colorado River	Headwaters to Lyman Reservoir		A&Wc				FBC			FC	AgI	AgL
LC	Little Colorado River	Below Lyman Reservoir to confluence with the Puerco River		A&Wc				FBC		DWS	FC	AgI	AgL
LC	Little Colorado River	~~Below confluence with the Puerco River to the Navajo Nation Reservation boundary.~~ Below Puerco River confluence to the Colorado River, excluding segments on Native American Lands			A&Ww			FBC		DWS	FC	AgI	AgL
LC	Little Colorado River, East Fork	Headwaters to confluence with the Little Colorado River		A&Wc				FBC			FC		AgL
LC	Little Colorado River, South Fork	Headwaters to confluence with the Little Colorado River		A&Wc				FBC			FC		AgL
LC	Little Colorado River, West Fork (OAW)	Headwaters to Government Springs		A&Wc				FBC			FC		

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
LC	Little Colorado River, West Fork	Below Government Springs to confluence with the Little Colorado River		A&Wc				FBC			FC		AgL
LC	Little George Reservoir	34°00'37"/109°19'15"	Igneous		A&Ww			FBC			FC	AgI	
LC	Little Mormon Lake	34°17'00"/109°58'06"	Igneous		A&Ww			FBC			FC	AgI	AgL
LC	Little Ortega Lake	34°22'47"/109°40'06"	Igneous	A&Wc				FBC			FC		
LC	Long Lake, Lower	34°47'16"/111°12'40"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Long Lake, Upper	35°00'08"/111°21'23"	Igneous	A&Wc				FBC			FC		AgL
LC	Long Tom Tank	34°20'35"/110°49'22"		A&Wc				FBC			FC		AgL
LC	Lower Walnut Canyon Lake (EDW)	35°12'04"/111°34'07"	EDW				A&Wedw		PBC				
LC	Lyman Reservoir	34°21'21"/109°21'35"	Deep	A&Wc				FBC			FC	AgI	AgL
LC	Mamie Creek	Headwaters to confluence with Coyote Creek		A&Wc				FBC			FC		AgL
LC	Marshall Lake	35°07'18"/111°32'07"	Igneous	A&Wc				FBC			FC		AgL
LC	McKay Reservoir	34°01'27"/109°13'48"		A&Wc				FBC			FC	AgI	AgL
LC	Merritt Draw Creek	Headwaters to confluence with Barbershop Canyon Creek		A&Wc				FBC			FC		AgL
LC	Mexican Hay Lake	34°01'58"/109°21'25"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Milk Creek	Headwaters to confluence with Hulsey Creek		A&Wc				FBC			FC		AgL
LC	Miller Canyon Creek	Headwaters to confluence with East Clear Creek		A&Wc				FBC			FC		AgL
LC	Miller Canyon Creek, East Fork	Headwaters to confluence with Miller Canyon Creek		A&Wc				FBC			FC		AgL
LC	Mineral Creek	Headwaters to Little Ortega Lake		A&Wc				FBC			FC	AgI	AgL
LC	Mormon Lake	34°56'38"/111°27'25"	Shallow	A&Wc				FBC		DWS	FC	AgI	AgL
LC	Morton Lake	34°53'37"/111°17'41"	Igneous	A&Wc				FBC			FC		AgL
LC	Mud Lake	34°55'19"/111°21'29"	Shallow		A&Ww			FBC			FC		AgL
LC	Ned Lake (EDW)	34°17'17"/110°03'22"	EDW				A&Wedw		PBC				
LC	Nelson Reservoir	34°02'52"/109°11'19"	Sedimentary	A&Wc				FBC			FC	AgI	AgL
LC	Norton Reservoir	34°03'57"/109°31'27"	Igneous		A&Ww			FBC			FC		AgL
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
LC	Nutrioso Creek	Headwaters to confluence with the Little Colorado River		A&Wc				FBC			FC	AgI	AgL
LC	Paddy Creek	Headwaters to confluence with Nutrioso Creek		A&Wc				FBC			FC		AgL
LC	Phoenix Park Wash	Headwaters to Dry Lake				A&We			PBC				
LC	Pierce Seep	34°23'39"/110°31'17"		A&Wc					PBC				
LC	Pine Tank	34°46'49"/111°17'21"	Igneous		A&Ww			FBC			FC		AgL
LC	Pintail Lake (EDW)	34°18'05"/110°01'21"	EDW				A&Wedw		PBC				
LC	Porter Creek	Headwaters to confluence with Show Low Creek		A&Wc				FBC			FC		AgL
LC	Potato Lake	35°03'15"/111°24'13"	Igneous	A&Wc				FBC			FC		AgL
LC	Pratt Lake	34°01'32"/109°04'18"	Sedimentary	A&Wc				FBC			FC		
LC	Puerco River	Headwaters to confluence with the Little Colorado River			A&Ww			FBC		DWS	FC	AgI	AgL
LC	Puerco River (EDW)	Sanders Unified School District WWTP outfall at 35°12'52"/109°19'40" to 0.5 km downstream					A&Wedw		PBC				
LC	Rainbow Lake	34°09'00"/109°59'09"	Shallow Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Reagan Reservoir	34°02'09"/109°08'41"	Igneous		A&Ww			FBC			FC		AgL
LC	Rio de Flag	Headwaters to City of Flagstaff WWTP outfall at 35°12'21"/111°39'17"				A&We			PBC				
LC	Rio de Flag (EDW)	From City of Flagstaff WWTP outfall to the confluence with San Francisco Wash					A&Wedw		PBC				

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
LC	River Reservoir	34°02'01"/109°26'07"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Rogers Reservoir	33°56'30"/109°16'20"	Igneous		A&Ww			FBC			FC		AgL
LC	Rudd Creek	Headwaters to confluence with Nutrioso Creek		A&Wc				FBC			FC		AgL
LC	Russel Reservoir	33°59'29"/109°20'01"	Igneous		A&Ww			FBC			FC	AgI	AgL
LC	San Salvador Reservoir	33°58'51"/109°19'55"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Scott Reservoir	34°10'31"/109°57'31"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Show Low Creek	Headwaters to confluence with Silver Creek		A&Wc				FBC			FC	AgI	AgL
LC	Show Low Lake	34°11'36"/110°00'12"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Silver Creek	Headwaters to confluence with the Little Colorado River		A&Wc				FBC			FC	AgI	AgL
LC	Slade Reservoir	33°59'41"/109°20'26"	Igneous		A&Ww			FBC			FC	AgI	AgL
LC	Soldiers Annex Lake	34°47'15"/111°13'51"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Soldiers Lake	34°47'47"/111°14'04"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Spaulding Tank	34°30'17"/111°02'06"			A&Ww			FBC			FC		AgL
LC	Sponseller Lake	34°14'09"/109°50'45"	Igneous	A&Wc				FBC			FC		AgL
LC	St Johns Reservoir (Little Reservoir)	34°29'10"/109°22'06"	Igneous		A&Ww			FBC			FC	AgI	AgL
LC	Telephone Lake (EDW)	34°17'35"/110°02'42"	EDW				A&Wedw		PBC				
LC	Tremaine Lake	34°46'02"/111°13'51"	Igneous	A&Wc				FBC			FC		AgL
LC	Tunnel Reservoir	34°01'53"/109°26'34"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Turkey Draw (EDW)	High Country Pines II WWTP outfall at 33°25'35"/ 110°38'13" to confluence with Black Canyon Creek					A&Wedw		PBC				
LC	Unnamed Wash (EDW)	Bison Ranch WWTP outfall at 34°23'31"/110°31'29" to Pierce Seep					A&Wedw		PBC				
LC	Unnamed Wash (EDW)	Black Mesa Ranger Station WWTP outfall at 34°23'35"/110°33'36" to confluence of Oklahoma Flat Draw					A&Wedw		PBC				
LC	Vail Lake	35°05'23"/111°30'46"	Igneous	A&Wc				FBC			FC		AgL
LC	Walnut Creek	Headwaters to confluence with Billy Creek		A&Wc				FBC			FC		AgL
LC	Water Canyon Creek	Headwaters to confluence with the Little Colorado River		A&Wc				FBC			FC		AgL
LC	Water Canyon Reservoir	34°00'16"/109°20'05"	Igneous		A&Ww			FBC			FC	AgI	AgL
LC	Whale Lake (EDW)	35°11'13"/111°35'21"	EDW				A&Wedw		PBC				
LC	Whipple Lake	'34°16'49"/109°58'29"	Igneous		A&Ww			FBC			FC		AgL
LC	White Mountain Lake	34°21'57"/109°59'21"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	White Mountain Reservoir	34°00'12"/109°30'39"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Willow Creek	Headwaters to confluence with Clear Creek		A&Wc				FBC			FC		AgL
LC	Willow Springs Canyon Creek	Headwaters to confluence with Chevelon Creek		A&Wc				FBC			FC		AgL
LC	Willow Springs Lake	34°18'13"/110°52'16"	Sedimentary	A&Wc				FBC			FC	AgI	AgL
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
LC	Woodland Reservoir	34°07'35"/109°57'01"	Igneous	A&Wc				FBC			FC	AgI	AgL
LC	Woods Canyon Creek	Headwaters to confluence with Chevelon Creek		A&Wc				FBC			FC		AgL
LC	Woods Canyon Lake	34°20'09"/110°56'45"	Sedimentary	A&Wc				FBC			FC	AgI	AgL
LC	Zuni River	Headwaters to confluence with the Little Colorado River		A&Wc				FBC			FC	AgI	AgL
MG	Agua Fria River	Headwaters to confluence with unnamed tributary at 34°35'14"/112°16'18"				A&We			PBC				AgL

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
MG	Agua Fria River (EDW)	Below confluence with unnamed tributary to State Route 169					A&Wedw		PBC				AgL
MG	Agua Fria River	From State Route 169 to Lake Pleasant			A&Ww			FBC		DWS	FC	AgI	AgL
MG	Agua Fria River	Below Lake Pleasant to the City of El Mirage WWTP at ' 33°34'20"/112°18'32"				A&We			PBC				AgL
MG	Agua Fria River (EDW)	From City of El Mirage WWTP outfall to 2 km downstream					A&Wedw		PBC				
MG	Agua Fria River	Below 2 km downstream of the City of El Mirage WWTP to City of Avondale WWTP outfall at 33°23'55"/112°21'16"				A&We			PBC				
MG	Agua Fria River	From City of Avondale WWTP outfall to confluence with Gila River					A&Wedw		PBC				
MG	Alvord Park Lake	35th Avenue & Baseline Road, Phoenix at 33°22'23"/ 112°08'20"	Urban		A&Ww				PBC		FC		
MG	Andorra Wash	Headwaters to confluence with Cave Creek Wash				A&We			PBC				
MG	Antelope Creek	Headwaters to confluence with Martinez ~~Creek~~ Wash			A&Ww			FBC			FC		AgL
MG	Arlington Canal	From Gila River at 33°20'54"/112°35'39" to Gila River at 33°13'44"/112°46'15"											AgL
MG	Ash Creek	Headwaters to confluence with Tex Canyon		A&Wc				FBC			FC	AgI	AgL
MG	Ash Creek	Below confluence with Tex Canyon to confluence with Agua Fria River			A&Ww			FBC			FC	AgI	AgL
MG	Beehive Tank	32°52'37"/111°02'20"			A&Ww			FBC			FC		AgL
MG	Big Bug Creek	Headwaters to confluence with Eugene Gulch		A&Wc				FBC			FC	AgI	AgL
MG	Big Bug Creek	Below confluence with Eugene Gulch to confluence with Agua Fria River			A&Ww			FBC			FC	AgI	AgL
MG	Black Canyon Creek	Headwaters to confluence with the Agua Fria River			A&Ww			FBC			FC		AgL
MG	Blind Indian Creek	Headwaters to confluence with the Hassayampa River			A&Ww			FBC			FC		AgL
MG	Bonsall Park Lake	59th Avenue & Bethany Home Road, Phoenix at 33°31'24"/112°11'08"	Urban		A&Ww				PBC		FC		
MG	Canal Park Lake	College Avenue & Curry Road, Tempe at 33°26'54"/ 111°56'19"	Urban		A&Ww				PBC		FC		
MG	Cave Creek	Headwaters to the Cave Creek Dam			A&Ww			FBC			FC		AgL
MG	Cave Creek	Cave Creek Dam to the Arizona Canal				A&We			PBC				
MG	Centennial Wash	Headwaters to confluence with the Gila River at 33°16'32"/112°48'08"				A&We			PBC				AgL
MG	Centennial Wash Ponds	33°54'52"/113°23'47"			A&Ww			FBC			FC		AgL
MG	Chaparral Park Lake	Hayden Road & Chaparral Road, Scottsdale at 33°30'40"/111°54'27"	Urban		A&Ww				PBC		FC	AgI	
MG	Cortez Park Lake	35th Avenue & Dunlap, Glendale at 33°34'13"/ 112°07'52"	Urban		A&Ww				PBC		FC	AgI	
MG	Desert Breeze Lake	Galaxy Drive, West Chandler at 33°18'47"/ 111°55'10"	Urban		A&Ww				PBC		FC		
MG	Devils Canyon	Headwaters to confluence with Mineral Creek			A&Ww				FBC		FC		AgL
MG	Dobson Lake	Dobson Road & Los Lagos Vista Avenue, Mesa at 33°22'48"/111°52'35"	Urban		A&Ww				PBC		FC		
MG	East Maricopa Floodway	From Brown and Greenfield Rds to the Gila River Indian Reservation Boundary			A&We				PBS				AgL
MG	Eldorado Park Lake	Miller Road & Oak Street, Tempe at 33°28'25"/ 111°54'53"	Urban		A&Ww				PBC		FC		
MG	Encanto Park Lake	15th Avenue & Encanto Blvd., Phoenix at 33°28'28"/ 112°05'18"	Urban		A&Ww				PBC		FC	AgI	
MG	Fain Lake	Town of Prescott Valley Park Lake 34°34'29"/ 112°21'06"	Urban		A&Ww				PBC		FC		
MG	French Gulch	Headwaters to confluence with Hassayampa River			A&Ww				PBC				AgL

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
MG	Galena Gulch	Headwaters to confluence with the Agua Fria River				A&We			PBC				AgL
MG	Galloway Wash (EDW)	Town of Cave Creek WWTP outfall at 33°50'15"/ 111°57'35" to confluence with Cave Creek					A&Wedw		PBC				
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricul tural~~							
MG	Gila River	San Carlos Indian Reservation boundary to the Ashurst-Hayden Dam			A&Ww			FBC			FC	AgI	AgL
MG	Gila River	Ashurst-Hayden Dam to the Town of Florence WWTP outfall at 33°02'20"/111°24'19"				A&We			PBC				AgL
MG	Gila River (EDW)	Town of Florence WWTP outfall to Felix Road					A&Wedw		PBC				
MG	Gila River	Felix Road to the Gila River Indian Reservation boundary				A&We			PBC				AgL
MG	Gila River (EDW)	From the confluence with the Salt River to Gillespie Dam					A&Wedw		PBC		FC	AgI	AgL
MG	Gila River	Gillespie Dam to confluence with Painted Rock Dam			A&Ww			FBC			FC	AgI	AgL
MG	Granada Park Lake	6505 North 20th Street, Phoenix at 33°31'56"/ 112°02'16"	Urban		A&Ww				PBC		FC		
MG	Groom Creek	Headwaters to confluence with the Hassayampa River		A&Wc				FBC		DWS	FC		AgL
~~MG~~	~~Lower Lake Pleasant~~	~~33°50'32"/112°16'03"~~			~~A&Ww~~			~~FBC~~			~~FC~~	~~AgI~~	~~AgL~~
MG	Hassayampa Lake	34°25'45"/112°25'33"	Igneous	A&Wc				FBC		DWS	FC		
MG	Hassayampa River	Headwaters to confluence with ~~unnamed tributary at 34°26'09"/112°30'32"~~ Copper Creek		A&Wc				FBC			FC	AgI	AgL
MG	Hassayampa River	Below confluence with ~~unnamed tributary to confluence with unnamed tributary at 33°51'52"/ 112°39'56"~~ Copper Creek to the confluence with Blind Indian Creek.			A&Ww			FBC			FC	AgI	AgL
MG	Hassayampa River	Below confluence with Blind Indian Creek ~~unnamed tributary~~ to the Buckeye Irrigation Company Canal				A&We			PBC				AgL
MG	Hassayampa River	Below Buckeye Irrigation Company canal to the Gila River			A&Ww			FBC			FC		AgL
MG	Horsethief Lake	34°09'42"/112°17'57"	Igneous	A&Wc				FBC		DWS	FC		AgL
MG	Indian Bend Wash	Headwaters to confluence with the Salt River				A&We			PBC				
MG	Indian Bend Wash Lakes	Scottsdale at 33°30'32"/111°54'24"	Urban		A&Ww				PBC		FC		
MG	Indian School Park Lake	Indian School Road & Hayden Road, Scottsdale at 33°29'39"/111°54'37"	Urban		A&Ww				PBC		FC		
MG	Kiwanis Park Lake	6000 South Mill Avenue, Tempe at 33°22'27"/ 111°56'22"	Urban		A&Ww				PBC		FC	AgI	
MG	Lake Pleasant	33°53'46"/112°16'29"	Deep		A&Ww			FBC		DWS	FC	AgI	AgL
MG	Lake Pleasant, Lower	33°50'32"/112°16'03"			A&Ww			FBC			FC	AgI	AgL
~~MG~~	~~The Lake Tank~~	~~32°54'14"/111°04'15"~~			~~A&Ww~~			~~FBC~~			~~FC~~		~~AgL~~
MG	Lion Canyon	Headwaters to confluence with Weaver Creek			A&Ww			FBC			FC		AgL
MG	Little Ash Creek	Headwaters to confluence with Ash Creek at			A&Ww			FBC			FC		AgL
MG	Lynx Creek	Headwaters to confluence with unnamed tributary at 34°34'29"/112°21'07"		A&Wc				FBC			FC		AgL
MG	Lynx Creek	Below confluence with unnamed tributary at 34°34'29"/112°21'07" to confluence with Agua Fria River			A&Ww			FBC			FC		AgL
MG	Lynx Lake	34°31'07"/112°23'07"	Deep	A&Wc				FBC		DWS	FC	AgI	AgL
MG	Maricopa Park Lake	33°35'28"/112°18'15"	Urban		A&Ww				PBC		FC		
MG	Martinez Canyon	Headwaters to confluence with Box Canyon			A&Ww			FBC			FC		AgL
MG	Martinez ~~Creek~~ Wash	Headwaters to confluence with the Hassayampa River			A&Ww			FBC			FC	AgI	AgL
MG	McKellips Park Lake	Miller Road & McKellips Road, Scottsdale at 33°27'14"/111°54'49"	Urban		A&Ww				PBC		FC	AgI	
MG	McMicken Wash (EDW)	City of Peoria Jomax WWTP outfall at 33°43'31"/ 112°20'15" to confluence with Agua Fria River					A&Wedw		PBC				

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
MG	Mineral Creek	Headwaters to 33°12'34"/110°59'58"			A&Ww			FBC			FC		AgL
MG	Mineral Creek (diversion tunnel and lined channel)	33°12'24"/110°59'58" to 33°07'56"/110°58'34"						PBC					
MG	Mineral Creek	End of diversion channel to confluence with Gila River			A&Ww			FBC			FC		AgL
MG	Minnehaha Creek	Headwaters to confluence with the Hassayampa River			A&Ww			FBC			FC		AgL
~~MG~~	~~Mountain Valley Park Ponds (EDW)~~	~~Town of Prescott Valley WWTP outfall 002 at 34°36'07"/112°18'48" to Navajo Wash~~	~~EDW~~				~~A&Wedw~~		~~PBC~~				
MG	New River	Headwaters to Interstate 17 at 33°54'19.5"/112°08'46"			A&Ww			FBC			FC	AgI	AgL
MG	New River	Below Interstate 17 to confluence with Agua Fria River				A&We			PBC				AgL
MG	Painted Rock Reservoir	33°04'23"/113°00'38"	Sedimentary		A&Ww			FBC			FC	AgI	AgL
MG	Papago Park Ponds	Galvin Parkway, Phoenix at 33°27'15"/111°56'45"	Urban		A&Ww				PBC		FC		
MG	Papago Park South Pond	Curry Road, Tempe 33°26'22"/111°55'55"	Urban		A&Ww				PBC		FC		
MG	Perry Mesa Tank	34°11'03"/112°02'01"			A&Ww			FBC			FC		AgL
MG	Phoenix Area Canals	Granite Reef Dam to all municipal WTP intakes								DWS		AgI	AgL
MG	Phoenix Area Canals	Below municipal WTP intakes and all other locations										AgI	AgL
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
MG	Picacho Reservoir	32°51'10"/111°28'25"	Shallow		A&Ww			FBC			FC	AgI	AgL
MG	Poland Creek	Headwaters to confluence with Lorena Gulch		A&Wc				FBC			FC		AgL
MG	Poland Creek	Below confluence with Lorena Gulch to confluence with Black Canyon Creek			A&Ww			FBC			FC		AgL
MG	Queen Creek	Headwaters to the Town of Superior WWTP outfall at 33°16'33"/111°07'44"			A&Ww				PBC		FC		AgL
MG	Queen Creek (EDW)	Below Town of Superior WWTP outfall to confluence with Potts Canyon					A&Wedw		PBC				
MG	Queen Creek	Below Potts Canyon to ' Whitlow Dam			A&Ww			FBC			FC		AgL
MG	Queen Creek	Below Whitlow Dam to confluence with Gila River				A&We			PBC				
MG	Riverview Park Lake	Dobson Road & 8th Street, Mesa at 33°25'50"/ 111°52'29"	Urban		A&Ww				PBC		FC		
MG	Roadrunner Park Lake	36th Street & Cactus, Phoenix at 33°35'56"/ 112°00'21"	Urban		A&Ww				PBC		FC		
MG	Salt River	Verde River to 2 km below Granite Reef Dam			A&Ww			FBC		DWS	FC	AgI	AgL
MG	Salt River	2 km below Granite Reef Dam to City of Mesa NW WRF outfall at 33°26'22"/111°53'14"				A&We			PBC				
MG	Salt River (EDW)	City of Mesa NW WRF outfall to Tempe Town Lake					A&Wedw		PBC				
MG	Salt River	Below Tempe Town Lake to Interstate 10 bridge				A&We			PBC				
MG	Salt River	Below Interstate 10 bridge to the City of Phoenix 23rd Avenue WWTP outfall at~~-~~ 33°24'44"/ 112°07'59"			A&Ww				PBC		FC		
MG	Salt River (EDW)	From City of Phoenix 23rd Avenue WWTP outfall to confluence with Gila River					A&Wedw		PBC		FC	AgI	AgL
MG	Siphon Draw (EDW)	Superstition Mountains CFD WWTP outfall at 33°21'40"/111°33'30" to 6 km downstream					A&Wedw		PBC				
MG	Sycamore Creek	Headwaters to confluence with Tank Canyon		A&Wc				FBC			FC		AgL
MG	Sycamore Creek	Below confluence with Tank Canyon to confluence with Agua Fria River			A&Ww			FBC			FC		AgL
MG	Tempe Town Lake	At Mill Avenue Bridge at 33°26'00"/111°56'26"	Urban		A&Ww			FBC			FC		
MG	The Lake Tank	32°54'14"/111°04'15"			A&Ww			FBC			FC		AgL
MG	Tule Creek	Headwaters to confluence with the Agua Fria River			A&Ww			FBC			FC		AgL

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
MG	Turkey Creek	Headwaters to confluence with unnamed tributary at 34°19'28"/112°21'33"		A&Wc				FBC			FC	AgI	AgL
MG	Turkey Creek	Below confluence with unnamed tributary to confluence with Poland Creek			A&Ww			FBC			FC	AgI	AgL
MG	Unnamed Wash (EDW)	Gila Bend WWTP outfall to confluence with the Gila River					A&Wedw		PBC				
MG	Unnamed Wash (EDW)	Luke Air Force Base WWTP outfall at ~~33°32'00"/ 112°19'03"~~ 33°32'21"/112°19'15" to confluence with the Agua Fria River					A&Wedw		PBC				
MG	Unnamed Wash (EDW)	North Florence WWTP outfall at 33°03'50"/ 111°23'13" to confluence with Gila River					A&Wedw		PBC				
MG	Unnamed Wash (EDW)	Town of Prescott Valley WWTP outfall at34°35'16"/ 112°16'18" to confluence with the Agua Fria River					A&Wedw		PBC				
MG	Unnamed Wash (EDW)	Town of Cave Creek WRF outfall at 33°48'02"/ 111°59'22" to confluence with Cave Creek					A&Wedw		PBC				
MG	Wagner Wash (EDW)	City of Buckeye Festival Ranch WRF outfall at 33°39'14"/112°40'18" to 2 km downstream					A&Wedw		PBC				
MG	Walnut Canyon Creek	Headwaters to confluence with the Gila River			A&Ww			FBC			FC		AgL
MG	Weaver Creek	Headwaters to confluence with Antelope Creek, tributary to Martinez Wash			A&Ww			FBC			FC		AgL
MG	White Canyon Creek	Headwaters to confluence with Walnut Canyon Creek			A&Ww			FBC			FC		AgL
MG	Yavapai Lake (EDW)	Town of Prescott Valley WWTP outfall 002 at 34°36'07"/112°18'48" to Navajo Wash	EDW				A&Wedw		PBC				
SC	Agua Caliente Lake	12325 East Roger Road, Tucson 32°16'51"/ 110°43'52"	Urban		A&Ww				PBC		FC		
SC	Agua Caliente Wash	Headwaters to confluence with Soldier Trail			A&Ww			FBC			FC		AgL
SC	Agua Caliente Wash	Below Soldier Trail to confluence with Tanque Verde Creek				A&We			PBC				AgL
SC	Aguirre Wash	From the Tohono O'odham Indian Reservation boundary to 32°28'38"/111°46'51"				A&We			PBC				
SC	Alambre Wash	Headwaters to confluence with Brawley Wash				A&We			PBC				
SC	Alamo Wash	Headwaters to confluence with Rillito Creek				A&We			PBC				
SC	Altar Wash	Headwaters to confluence with Brawley Wash				A&We			PBC				
SC	Alum Gulch	Headwaters to 31°28'20"/110°43'51"				A&We			PBC				AgL
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
SC	Alum Gulch	From 31°28'20"/110°43'51" to 31°29'17"/110°44'25"			A&Ww			FBC			FC		AgL
SC	Alum Gulch	Below 31°29'17"/110°44'25" to confluence with Sonoita Creek				A&We			PBC				AgL
SC	Arivaca Creek	Headwaters to confluence with Altar Wash			A&Ww			FBC			FC		AgL
SC	Arivaca Lake	31°31'52"/111°15'06"	Igneous		A&Ww			FBC			FC	AgI	AgL
SC	Atterbury Wash	Headwaters to confluence with Pantano Wash				A&We			PBC				AgL
SC	Bear Grass Tank	31°33'01"/111°11'03"			A&Ww			FBC			FC		AgL
SC	Big Wash	Headwaters to confluence with Cañada del Oro				A&We			PBC				
SC	Black Wash (EDW)	Pima County WWMD Avra Valley WWTP outfall at 32°09'58"/111°11'17" to confluence with Brawley Wash					A&Wedw		PBC				
SC	Bog Hole Tank	31°28'36"/110°37'09"			A&Ww			FBC			FC		AgL
SC	Brawley Wash	Headwaters to confluence with Los Robles Wash				A&We			PBC				
SC	California Gulch	Headwaters To U.S./Mexico border			A&Ww			FBC			FC		AgL
SC	Cañada del Oro	Headwaters to State Route 77			A&Ww			FBC			FC	AgI	AgL
SC	Cañada del Oro	Below State Route 77 to confluence with the Santa Cruz River				A&We			PBC				AgL

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
SC	Cienega Creek	Headwaters to confluence with Gardner Canyon			A&Ww			FBC			FC		AgL
SC	Cienega Creek (OAW)	From confluence with Gardner Canyon to USGS gaging station (#09484600)			A&Ww			FBC			FC		AgL
SC	Davidson Canyon	Headwaters to unnamed spring at 31°59'00"/ 110°38'49"				A&We			PBC				AgL
SC	Davidson Canyon (OAW)	From unnamed Spring to confluence with unnamed tributary at 31°59'09"/110°38'44"			A&Ww			FBC			FC		AgL
SC	Davidson Canyon (OAW)	Below confluence with unnamed tributary to unnamed spring at 32°00'40"/110°38'36"				A&We			PBC				AgL
SC	Davidson Canyon (OAW)	From unnamed spring to confluence with Cienega Creek			A&Ww			FBC			FC		AgL
SC	Empire Gulch	Headwaters to unnamed spring at 31°47'18"/ 110°38'17"				A&We			PBC				
SC	Empire Gulch	From 31°47'18"/110°38'17" to 31°47'03"/110°37'35"			A&Ww			FBC			FC		
SC	Empire Gulch	From 31°47'03"/110°37'35" to 31°47'05"/ 110°36'58"				A&We			PBC				AgL
SC	Empire Gulch	From 31°47'05"/110°36'58" to confluence with Cienega Creek			A&Ww			FBC			FC		
SC	Flux Canyon	Headwaters to confluence with Alum ~~Canyon~~ Gulch				A&We			PBC				AgL
SC	Gardner Canyon Creek	Headwaters to confluence with Sawmill Canyon		A&Wc				FBC			FC		
SC	Gardner Canyon Creek	Below Sawmill Canyon to confluence with Cienega Creek			A&Ww			FBC			FC		
SC	Greene Wash	~~Greene Reservoir at 32°37'09"/111°41'12" to the Tohono O'odham Indian Reservation boundary~~ Santa Cruz River to the Tohono O'odham Indian Reservation boundary				A&We			PBC				
SC	Greene Wash	Tohono O'odham Indian Reservation boundary to confluence with Santa Rosa Wash at 32°53'52"/ 111°56'48"				A&We			PBC				
SC	Harshaw Creek	Headwaters to confluence with Sonoita Creek at				A&We			PBC				AgL
SC	Hit Tank	32°43'57"/111°03'18"			A&Ww			FBC			FC		AgL
SC	Holden Canyon Creek	Headwaters to U.S./Mexico border			A&Ww			FBC			FC		
SC	Huachuca Tank	31°21'11"/110°30'18"			A&Ww			FBC			FC		AgL
SC	Julian Wash	Headwaters to confluence with the Santa Cruz River				A&We			PBC				
SC	Kennedy Lake	Mission Road & Ajo Road, Tucson at 32°10'49"/ 111°00'27"	Urban		A&Ww				PBC		FC		
SC	Lakeside Lake	8300 East Stella Road, Tucson at 32°11'11"/ 110°49'00"	Urban		A&Ww				PBC		FC		
SC	Lemmon Canyon Creek	Headwaters to confluence with unnamed tributary at 32°23'48"/110°47'49"		A&Wc				FBC			FC		
SC	Lemmon Canyon Creek	Below unnamed tributary at 32°23'48"/110°47'49" to confluence with Sabino Canyon Creek			A&Ww			FBC			FC		
SC	Los Robles Wash	Headwaters to confluence with the Santa Cruz River				A&We			PBC				
SC	Madera Canyon Creek	Headwaters to confluence with unnamed tributary at 31°43'42"/110°52'51"		A&Wc				FBC			FC		AgL
SC	Madera Canyon Creek	Below unnamed tributary at 31°43'42"/110°52'51 to confluence with the Santa Cruz River			A&Ww			FBC			FC		AgL
SC	Mattie Canyon	Headwaters to confluence with Cienega Creek "			A&Ww			FBC			FC		AgL
SC	Nogales Wash	Headwaters to confluence with Potrero Creek			A&Ww				PBC		FC		
SC	Oak Tree Canyon	Headwaters to confluence with Cienega Creek				A&We			PBC				
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
SC	Palisade Canyon ~~Creek~~	Headwaters to confluence with unnamed tributary at ~~32°21'59"/110°46'16"~~ 32°22'33"/110°45'31"		A&Wc				FBC			FC		
SC	Palisade Canyon ~~Creek~~	Below ~~unnamed tributary~~ 32°22'33"/110°45'31" to unnamed tributary of ~~confluence with~~ Sabino Canyon ~~Creek~~			A&Ww			FBC			FC		
SC	Pantano Wash	Headwaters to confluence with Tanque Verde Creek				A&We			PBC				

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
SC	Parker Canyon Creek	Headwaters to confluence with unnamed tributary at 31°24'17"/110°28'47"	A&Wc					FBC			FC		
SC	Parker Canyon Creek	Below unnamed tributary to U.S./Mexico border			A&Ww			FBC			FC		
SC	Parker Canyon Lake	31°25'35"/110°27'15"	Deep	A&Wc				FBC			FC	AgI	AgL
SC	Patagonia Lake	31°29'56"/110°50'49"	Deep		A&Ww			FBC			FC	AgI	AgL
SC	Peña Blanca Lake	31°24'15"/111°05'12"	Igneous		A&Ww			FBC			FC	AgI	AgL
SC	Potrero Creek	Headwaters to Interstate 19				A&We			PBC				AgL
SC	Potrero Creek	Below Interstate 19 to confluence with Santa Cruz River			A&Ww			FBC			FC		AgL
SC	Puertocito Wash	Headwaters to confluence with Altar Wash				A&We			PBC				
SC	Quitobaquito Spring	(Pond and Springs) 31°56'39"/113°01'06"			A&Ww			FBC			FC		AgL
SC	Redrock Canyon Creek	Headwaters to confluence with Harshaw Creek			A&Ww			FBC			FC		
SC	Rillito Creek	Headwaters to confluence with the Santa Cruz River				A&We			PBC				AgL
SC	Romero Canyon Creek	Headwaters to confluence with unnamed tributary at 32°24'29"/110°50'39"		A&Wc				FBC			FC		
SC	Romero Canyon Creek	Below unnamed tributary to confluence with Sutherland Wash			A&Ww			FBC			FC		
SC	Rose Canyon Creek	Headwaters to ~~Rose Canyon Lake~~ confluence with Sycamore Canyon		A&Wc				FBC			FC		
SC	Rose Canyon Lake	32°23'13"/110°42'38"	Igneous	A&Wc				FBC			FC		AgL
SC	Ruby Lakes	31°26'29"/111°14'22"	Igneous		A&Ww			FBC			FC		AgL
SC	Sabino Canyon ~~Creek~~	Headwaters to ~~confluence with unnamed tributary at 32°23'28"/110°47'03"~~ 32°23'20"/110°47'06"		A&Wc				FBC		DWS	FC	AgI	
SC	Sabino Canyon ~~Creek~~	Below ~~unnamed tributary~~ 32°23'20"/110°47'06" to confluence with Tanque Verde River			A&Ww			FBC		DWS	FC	AgI	
SC	Salero Ranch Tank	31°35'43"/110°53'25"			A&Ww			FBC			FC		AgL
SC	Santa Cruz River	Headwaters to the at U.S./Mexico border			A&Ww			FBC			FC	AgI	AgL
SC	Santa Cruz River	U.S./Mexico border to the Nogales International WWTP outfall at 31°27'25"/110°58'04"			A&Ww			FBC		DWS	FC	AgI	AgL
SC	Santa Cruz River (EDW)	Nogales International WWTP outfall to the ~~Tubac Bridge~~ Josephine Canyon					A&Wedw		PBC				AgL
SC	Santa Cruz River	~~Tubac Bridge~~ Josephine Canyon to Agua Nueva WRF outfall at 32°17'04"/111°01'45"				A&We			PBC				AgL
SC	Santa Cruz River (EDW)	Agua Nueva WRF outfall to Baumgartner Road					A&Wedw		PBC				
SC	Santa Cruz River, West Branch	Headwaters to the confluence with Santa Cruz River				A&We			PBC				AgL
SC	Santa Cruz ~~Wash~~ River	Baumgartner Road to the Ak Chin Indian Reservation boundary				A&We			PBC				AgL
SC	Santa Cruz Wash, North Branch	Headwaters to City of Casa Grande WRF outfall at 32°54'57"/111°47'13"				A&We			PBC				
SC	Santa Cruz Wash, North Branch (EDW)	City of Casa Grande WRF outfall to 1 km downstream					A&Wedw		PBC				
SC	Santa Rosa Wash	Below Tohono O'odham Indian Reservation to the Ak Chin Indian Reservation				A&We			PBC				
SC	Santa Rosa Wash (EDW)	Palo Verde Utilities ~~WWTP~~ CO-WRF outfall at 33°04'20"/ 112°01'47" to the ~~Gila River~~ Chin Indian Reservation					A&Wedw		PBC				
SC	Soldier ~~Lake~~ Tank	32°25'34"/110°44'43"		A&Wc				FBC			FC		AgL
SC	Sonoita Creek	Headwaters to the Town of Patagonia WWTP outfall at 31°32'25"/110°45'31"				A&We			PBC				AgL
SC	Sonoita Creek (EDW)	Town of Patagonia WWTP outfall to permanent groundwater upwelling point approximately 1600 feet downstream of outfall					A&Wedw		PBC				AgL
SC	Sonoita Creek	Below 1600 feet downstream of Town of Patagonia WWTP outfall groundwater upwelling point to confluence with the Santa Cruz River			A&Ww			FBC			FC	AgI	AgL
SC	Split Tank	31°28'11"/111°05'12"			A&Ww			FBC			FC		AgL

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
SC	Sutherland Wash	Headwaters to confluence with Cañada del Oro			A&Ww			FBC			FC		
SC	Sycamore Canyon	Headwaters to 32°21'60" / 110°44'48"		A&Wc				FBC			FC		
SC	Sycamore Canyon	From 32°21'60" / 110°44'48" to Sycamore Reservoir			A&Ww			FBC			FC		
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
SC	Sycamore Canyon ~~Creek~~	Headwaters to the U.S./Mexico border			A&Ww			FBC			FC		AgL
SC	Sycamore Reservoir	32°20'57'/110°47'38"		A&Wc				FBC			FC		AgL
SC	Tanque Verde Creek	Headwaters to Houghton Road			A&Ww			FBC			FC		AgL
SC	Tanque Verde Creek	Below Houghton Road to confluence with Rillito Creek				A&We			PBC				AgL
SC	Three R Canyon	Headwaters to Unnamed Trib to Three R Canyon at 31°28'26"/110°46'04"				A&We			PBC				AgL
SC	Three R Canyon	From 31°28'26"/110°46'04" to 31°28'28"/110°47'15" (Cox Gulch)			A&Ww			FBC			FC		AgL
SC	Three R Canyon	From (Cox Gulch) 31°28'28"/110°47'15" to confluence with Sonoita Creek				A&We			PBC				AgL
SC	Tinaja Wash	Headwaters to confluence with the Santa Cruz River				A&We			PBC				AgL
SC	Unnamed Wash (EDW)	Oracle Sanitary District WWTP outfall at 32°36'54"/ 110°48'02" to 5 km downstream					A&Wedw		PBC				
SC	Unnamed Wash (EDW)	Arizona City Sanitary District WWTP outfall at 32°45'43"/111°44'24" to confluence with Santa Cruz Wash					A&Wedw		PBC				
SC	Unnamed Wash (EDW)	Saddlebrook WWTP outfall at 32°32'00"/110°53'01" to confluence with Cañada del Oro					A&Wedw		PBC				
SC	Vekol Wash	Headwater to Santa Cruz Wash: Those reaches not located on the Ak-Chin, Tohono O'odham and Gila River Indian Reservations				A&We			PBC				
SC	Wakefield Canyon	Headwaters to confluence with unnamed tributary at 31°52'48"/110°26'27"		A&Wc				FBC			FC		AgL
SC	Wakefield Canyon	Below confluence with unnamed tributary to confluence with Cienega Creek			A&Ww			FBC			FC		AgL
SC	Wild Burro Canyon	Headwaters to confluence with unnamed tributary at 32°27'43"/111°05'47"			A&Ww			FBC			FC		AgL
SC	Wild Burro Canyon	Below confluence with unnamed tributary to confluence with Santa Cruz River				A&We			PBC				AgL
~~SC~~	~~Williams Ranch Tanks~~	~~31°55'14"/110°25'31"~~			~~A&Ww~~			~~FBC~~			~~FC~~		~~AgL~~
SP	Abbot Canyon	Headwaters to confluence with Whitewater Draw			A&Ww			FBC			FC		AgL
SP	Aravaipa Creek	Headwaters to confluence with Stowe Gulch			A&Ww			FBC			FC		AgL
SP	Aravaipa Creek (OAW)	Stowe Gulch to downstream boundary of Aravaipa Canyon Wilderness Area			A&Ww			FBC			FC		AgL
SP	Aravaipa Creek	Below downstream boundary of Aravaipa Canyon Wilderness Area to confluence with the San Pedro River			A&Ww			FBC			FC		AgL
SP	Ash Creek	Headwaters to 31°50'28"/109°40'04"			A&Ww			FBC			FC	AgI	AgL
SP	Babocomari River	Headwaters to confluence with the San Pedro River			A&Ww			FBC			FC		AgL
SP	Bass Canyon Creek	Headwaters to confluence with unnamed tributary at 32°26'06"/110°13'22"		A&Wc				FBC			FC		AgL
SP	Bass Canyon Creek	Below confluence with unnamed tributary to confluence with Hot Springs Canyon Creek			A&Ww			FBC			FC		AgL
SP	Bass Canyon Tank	32°24'00"/110°13'00"			A&Ww			FBC			FC		AgL
SP	Bear Creek	Headwaters to U.S./Mexico border			A&Ww			FBC			FC		AgL
SP	Big Creek	Headwaters to confluence with Pitchfork Canyon		A&Wc				FBC			FC		AgL
SP	Blacktail Pond	Fort Huachuca Military Reservation at ~~31°24'13"/110°17'23"~~ 31°31'04"/110°24'47", headwater lake in Blacktail Canyon			A&Ww			FBC			FC		
SP	Black~~water~~ Draw	Headwaters to the U.S./Mexico border			A&Ww			FBC			FC		AgL

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
SP	Booger Canyon ~~Creek~~	Headwaters to confluence with Aravaipa Creek			A&Ww			FBC			FC		AgL
SP	Buck Canyon	Headwaters to confluence with Buck Creek Tank			A&Ww			FBC			FC		AgL
SP	Buck Canyon	Below Buck Creek Tank to confluence with Dry Creek				A&We			PBC				AgL
SP	Buehman Canyon Creek (OAW)	Headwaters to confluence with unnamed tributary at 32°24'54"/110°32'10"			A&Ww			FBC			FC		AgL
SP	Buehman Canyon Creek	Below confluence with unnamed tributary to confluence with San Pedro River			A&Ww			FBC			FC		AgL
SP	Bull Tank	32°31'13"/110°12'52"			A&Ww			FBC			FC		AgL
SP	Bullock Canyon	Headwaters to confluence with Buehman Canyon			A&Ww			FBC			FC		AgL
SP	Carr Canyon Creek	Headwaters to confluence with unnamed tributary at 31°27'01"/110°15'48"		A&Wc				FBC			FC		AgL
SP	Carr Canyon Creek	Below confluence with unnamed tributary to confluence with the San Pedro River			A&Ww			FBC			FC		AgL
SP	Copper Creek	Headwaters to confluence with Prospect Canyon			A&Ww			FBC			FC		AgL
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
SP	Copper Creek	Below confluence with Prospect Canyon to confluence with the San Pedro River				A&We			PBC				AgL
SP	Deer Creek	Headwaters to confluence with unnamed tributary at 32°59'57"/110°20'11"		A&Wc				FBC			FC		AgL
SP	Deer Creek	Below confluence with unnamed tributary to confluence with Aravaipa Creek			A&Ww			FBC			FC		AgL
SP	Dixie Canyon	Headwaters to confluence with Mexican Canyon			A&Ww			FBC			FC		AgL
SP	Double R Canyon Creek	Headwaters to confluence with Bass Canyon			A&Ww			FBC			FC		
SP	Dry Canyon	Headwaters to confluence with ~~Abbot Canyon~~ Whitewater draw			A&Ww			FBC			FC		AgL
SP	East Gravel Pit Pond	Fort Huachuca Military Reservation at 31°30'54"/ 110°19'44"	Sedimentary		A&Ww			FBC			FC		
SP	Espiritu Canyon Creek	Headwaters to confluence with Soza Wash			A&Ww			FBC			FC		AgL
SP	Fly Pond	Fort Huachuca Military Reservation at 31°32'53"/ 110°21'16"			A&Ww			FBC			FC		
SP	Fourmile ~~Canyon~~ Creek	Headwaters to confluence with Aravaipa Creek			A&Ww			FBC			FC		AgL
SP	Fourmile Canyon, Left Prong	Headwaters to confluence with unnamed tributary at 32°43'15"/110°23'46"		A&Wc				FBC			FC		AgL
SP	Fourmile Canyon, Left Prong	Below confluence with unnamed tributary to confluence with Fourmile Canyon Creek			A&Ww			FBC			FC		AgL
SP	Fourmile Canyon, Right Prong	Headwaters to confluence with Fourmile Canyon			A&Ww			FBC			FC		AgL
SP	Gadwell Canyon	Headwaters to confluence with Whitewater Draw			A&Ww			FBC			FC		AgL
SP	Garden Canyon Creek	Headwaters to confluence with unnamed tributary at 31°29'01"/110°19'44"		A&Wc				FBC		DWS	FC	AgI	
SP	Garden Canyon Creek	Below confluence with unnamed tributary to confluence with the San Pedro River			A&Ww			FBC		DWS	FC	AgI	
SP	Glance Creek	Headwaters to confluence with Whitewater Draw			A&Ww			FBC			FC		AgL
SP	Gold Gulch	Headwaters to U.S./Mexico border			A&Ww			FBC			FC		AgL
~~SP~~	~~Golf Course Pond~~	~~Fort Huachuca Military Reservation at 31°32'14"/ 110°18'52"~~	~~Sedimentary~~		~~A&Ww~~				~~PBC~~		~~FC~~		
SP	Goudy Canyon ~~Creek~~ Wash	Headwaters to confluence with Grant Creek		A&Wc				FBC			FC		AgL
SP	Grant Creek	Headwaters to confluence with unnamed tributary at 32°38'10"/109°56'37"		A&Wc				FBC		DWS	FC		AgL
SP	Grant Creek	Below confluence with unnamed tributary to terminus near Willcox Playa			A&Ww			FBC			FC		AgL
SP	Gravel Pit Pond	Fort Huachuca Military Reservation at 31°30'52"/ 110°19'49"	Sedimentary		A&Ww			FBC			FC		

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
SP	~~Greenbrush~~ Greenbush Draw	From U.S./Mexico border to confluence with San Pedro River				A&We			PBC				
SP	Hidden Pond	Fort Huachuca Military Reservation at 32°30'30"/ 109°22'17"			A&Ww			FBC			FC		
SP	High Creek	Headwaters to confluence with unnamed tributary at 32°33'08"/110°14'42"		A&Wc				FBC			FC		AgL
SP	High Creek	Below confluence with unnamed tributary to terminus near Willcox Playa			A&Ww			FBC			FC		AgL
SP	Horse Camp Canyon ~~Creek~~	Headwaters to confluence with Aravaipa Creek			A&Ww			FBC			FC		AgL
SP	Hot Springs Canyon Creek	Headwaters to confluence with the San Pedro River			A&Ww			FBC			FC		AgL
SP	Johnson Canyon	Headwaters to Whitewater Draw at 31°32'46"/ 109°43'32"			A&Ww			FBC			FC		AgL
SP	Lake Cochise (EDW)	South of Twin Lakes Municipal Golf Course at 32°13'50"/109°49'27"	EDW				A&Wedw		PBC				
SP	Leslie Canyon Creek	Headwaters to confluence with Whitewater Draw			A&Ww			FBC			FC		AgL
SP	Lower Garden Canyon Pond	Fort Huachuca Military Reservation at 31°29'39"/ 110°18'34"			A&Ww			FBC			FC		
SP	Mexican Canyon	Headwaters to confluence with Dixie Canyon			A&Ww			FBC			FC		AgL
SP	Miller Canyon ~~Creek~~	Headwaters to Broken Arrow Ranch Road at 31°25'35"/110°15'04"		A&Wc				FBC		DWS	FC		AgL
SP	Miller Canyon ~~Creek~~	Below Broken Arrow Ranch Road to confluence with the San Pedro River			A&Ww			FBC		DWS	FC		AgL
SP	Moonshine Creek	Headwaters to confluence with Post Creek		A&Wc				FBC			FC		AgL
SP	Mountain View Golf Course Pond	Fort Huachuca Military Reservation at 31°32'14"/ 110°18'52"	Sedimentary		A&Ww				PBC		FC		
SP	Mule Gulch	Headwaters to the Lavender Pit at 31°26'11"/ 109°54'02"			A&Ww				PBC		FC		
SP	Mule Gulch	The Lavender Pit to the' Highway 80 bridge at 31°26'30"/109°49'28"				A&We			PBC				
SP	Mule Gulch	Below the Highway 80 bridge to confluence with Whitewater Draw				A&We			PBC				AgL
SP	Oak Grove Canyon	Headwaters to confluence with Turkey Creek			A&Ww			FBC			FC		AgL
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
SP	Officers Club Pond	Fort Huachuca Military Reservation at 31°32'51"/ 110°21'37"	Sedimentary		A&Ww				PBC		FC		
SP	Paige Canyon Creek	Headwaters to confluence with the San Pedro River			A&Ww			FBC			FC		AgL
SP	Parsons Canyon Creek	Headwaters to confluence with Aravaipa Creek			A&Ww			FBC			FC		AgL
SP	Pinery Creek	Headwaters to State Highway 181		A&Wc				FBC		DWS	FC		AgL
SP	Pinery Creek	Below State Highway 181 to terminus near Willcox Playa			A&Ww			FBC		DWS	FC		AgL
SP	Post Creek	Headwaters to confluence with Grant Creek		A&Wc				FBC			FC	AgI	AgL
SP	Ramsey Canyon Creek	Headwaters to Forest Service Road #110 at 31°27'44"/110°17'30"		A&Wc				FBC			FC	AgI	AgL
SP	Ramsey Canyon Creek	Below Forest Service Road #110 to confluence with Carr Wash			A&Ww			FBC			FC	AgI	AgL
SP	Rattlesnake ~~Canyon~~ Creek	Headwaters to confluence with Brush Canyon		A&Wc				FBC			FC		AgL
SP	Rattlesnake ~~Canyon~~ Creek	Below confluence with Brush Canyon to confluence with Aravaipa Creek			A&Ww			FBC			FC		AgL
SP	Redfield Canyon ~~Creek~~	Headwaters to confluence with unnamed tributary at 32°33'40"/110°18'42"		A&Wc				FBC			FC		AgL
SP	Redfield Canyon ~~Creek~~	Below confluence with unnamed tributary to confluence with the San Pedro River			A&Ww			FBC			FC		AgL
SP	Riggs Lake	32°42'28"/109°57'53"	Igneous	A&Wc				FBC			FC	AgI	AgL
SP	Rock Creek	Headwaters to confluence with Turkey Creek Alc						FBC			FC		AgL
SP	Rucker Canyon ~~Creek~~	Headwaters to confluence with Whitewater Draw		A&Wc				FBC			FC		AgL

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
SP	Rucker Canyon Lake	31°46'46"/109°18'30"	Shallow	A&Wc				FBC			FC		AgL
SP	San Pedro River	U.S./ Mexico Border to ~~Redington~~ Buehman Canyon			A&Ww			FBC			FC	AgI	AgL
SP	San Pedro River	From ~~Redington~~ Buehman canyon to confluence with the Gila River			A&Ww			FBC			FC		AgL
SP	Snow Flat Lake	32°39'10"/109°51'54"	Igneous	A&Wc				FBC			FC	AgI	AgL
SP	Soldier Creek	Headwaters to confluence with Post Creek at 32°40'50"/109°54'41"		A&Wc				FBC			FC		AgL
SP	Soto Canyon	Headwaters to confluence with Dixie Canyon			A&Ww			FBC			FC		AgL
SP	Swamp Springs Canyon ~~Creek~~	Headwaters to confluence with Redfield Canyon			A&Ww			FBC			FC		AgL
SP	Sycamore Pond I	Fort Huachuca Military Reservation at 31°35'12"/ 110°26'11"	Sedimentary		A&Ww			FBC			FC		
SP	Sycamore Pond II	Fort Huachuca Military Reservation at 31°34'39"/ 110°26'10"	Sedimentary		A&Ww			FBC			FC		
SP	Turkey Creek	Headwaters to confluence with Aravaipa Creek			A&Ww			FBC			FC		AgL
SP	Turkey Creek	Headwaters to confluence with Rock Creek		A&Wc				FBC			FC	AgI	AgL
SP	Turkey Creek	Below confluence with Rock Creek to terminus near Willcox Playa			A&Ww			FBC			FC	AgI	AgL
SP	Unnamed Wash (EDW)	Mt. Lemmon WWTP outfall at 32°26'51"/110°45'08" to 0.25 km downstream					A&Wedw		PBC				
SP	Virgus Canyon ~~Creek~~	Headwaters to confluence with Aravaipa Creek			A&Ww			FBC			FC		AgL
SP	Walnut Gulch	Headwaters to Tombstone WWTP outfall at 31°43'47"/110°04'06"				A&We			PBC				
SP	Walnut Gulch (EDW)	Tombstone WWTP outfall to the confluence with Tombstone Wash					A&Wedw		PBC				
SP	Walnut Gulch	Tombstone Wash to confluence with San Pedro River				A&We			PBC				
SP	Ward Canyon ~~Creek~~	Headwaters to confluence with Turkey Creek		A&Wc				FBC			FC		AgL
SP	Whitewater Draw	Headwaters to confluence with unnamed tributary at 31°20'36"/109°43'48"				A&We			PBC				AgL
SP	Whitewater Draw	Below confluence with unnamed tributary to U.S./ Mexico border			A&Ww			FBC			FC		AgL
SP	Willcox Playa	From 32°08'19"/109°50'59" in the Sulphur Springs Valley	Sedimentary		A&Ww			FBC			FC		AgL
SP	Woodcutters Pond	Fort Huachuca Military Reservation at 31°30'09"/ 110°20'12"	Igneous		A&Ww			FBC			FC		
SR	Ackre Lake	33°37'01"/109°20'40"		A&Wc				FBC			FC	AgI	AgL
SR	Apache Lake	33°37'23"/111°12'26"	Deep		A&Ww			FBC		DWS	FC	AgI	AgL
SR	Barnhardt Creek	Headwaters to confluence with unnamed tributary at 34°05'37/111°26'40"		A&Wc				FBC			FC		AgL
SR	Barnhardt Creek	Below confluence with unnamed tributary to confluence with Rye Creek			A&Ww			FBC			FC		AgL
SR	Basin Lake	33°55'00"/109°26'09"	Igneous		A&Ww			FBC			FC		AgL
SR	Bear Creek	Headwaters to confluence with the Black River		A&Wc				FBC			FC	AgI	AgL
SR	Bear Wallow Creek (OAW)	Headwaters to confluence with the Black River		A&Wc				FBC			FC		AgL
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
SR	Bear Wallow Creek, North Fork (OAW)	Headwaters to confluence with Bear Wallow Creek		A&Wc				FBC			FC		AgL
SR	Bear Wallow Creek, South Fork (OAW)	Headwaters to confluence with Bear Wallow Creek		A&Wc				FBC			FC		AgL
SR	Beaver Creek	Headwaters to confluence with Black River		A&Wc				FBC			FC	AgI	AgL
SR	Big Lake	33°52'36"/109°25'33"	Igneous	A&Wc				FBC		DWS	FC	AgI	AgL
SR	Black River	Headwaters to confluence with Salt River		A&Wc				FBC		DWS	FC	AgI	AgL

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
SR	Black River, East Fork	From 33°51'19"/109°18'54" to confluence with the Black River		A&Wc				FBC		DWS	FC	AgI	AgL
SR	Black River, North Fork of East Fork	Headwaters to confluence with ~~Black River, East Fork~~ Boneyard Creek		A&Wc				FBC		DWS	FC	AgI	AgL
SR	Black River, West Fork	Headwaters to confluence with the Black River		A&Wc				FBC		DWS	FC	AgI	AgL
SR	Bloody Tanks Wash	Headwaters to Schultze Ranch Road				A&We			PBC				AgL
SR	Bloody Tanks Wash	Schultze Ranch Road to confluence with Miami Wash				A&We			PBC				
SR	Boggy Creek	Headwaters to confluence with Centerfire Creek		A&Wc				FBC			FC	AgI	AgL
SR	Boneyard Creek	Headwaters to confluence with Black River, East Fork		A&Wc				FBC			FC	AgI	AgL
SR	Boulder Creek	Headwaters to confluence with LaBarge Creek			A&Ww			FBC			FC		
SR	Campaign Creek	Headwaters to Roosevelt Lake			A&Ww			FBC			FC		AgL
SR	Canyon Creek	Headwaters to the White Mountain Apache Reservation boundary		A&Wc				FBC		DWS	FC	AgI	AgL
SR	Canyon Lake	33°32'44"/111°26'19"	Deep		A&Ww			FBC		DWS	FC	AgI	AgL
SR	Centerfire Creek	Headwaters to confluence with the Black River		A&Wc				FBC			FC	AgI	AgL
SR	Chambers Draw Creek	Headwaters to confluence with the North Fork of the East Fork of Black River		A&Wc				FBC			FC		AgL
SR	Cherry Creek	Headwaters to confluence with unnamed tributary at 34°05'09"/110°56'07"		A&Wc				FBC			FC	AgI	AgL
SR	Cherry Creek	Below unnamed tributary to confluence with the Salt River			A&Ww			FBC			FC	AgI	AgL
SR	Christopher Creek	Headwaters to confluence with Tonto Creek		A&Wc				FBC			FC	AgI	AgL
SR	Cold Spring Canyon Creek	Headwaters to confluence with unnamed tributary at 33°49'50"/110°52'58"		A&Wc				FBC			FC		AgL
SR	Cold Spring Canyon Creek	Below confluence with unnamed tributary to confluence with Cherry Creek			A&Ww			FBC			FC		AgL
SR	Conklin Creek	Headwaters to confluence with the Black River		A&Wc				FBC			FC	AgI	AgL
SR	Coon Creek	Headwaters to confluence with unnamed tributary at 33°46'41"/110°54'26"		A&Wc				FBC			FC		AgL
SR	Coon Creek	Below confluence with unnamed tributary to confluence with Salt River			A&Ww			FBC			FC		AgL
SR	Corduroy Creek	Headwaters to confluence with Fish Creek		A&Wc				FBC			FC	AgI	AgL
SR	Coyote Creek	Headwaters to confluence with the Black River, East Fork		A&Wc				FBC			FC	AgI	AgL
SR	Crescent Lake	33°54'38"/109°25'18"	Shallow	A&Wc				FBC			FC	AgI	AgL
SR	Deer Creek	Headwaters to confluence with the Black River, East Fork		A&Wc				FBC			FC		AgL
SR	Del Shay Creek	Headwaters to confluence with Gun Creek			A&Ww			FBC			FC		AgL
SR	Devils Chasm Creek	Headwaters to confluence with unnamed tributary at 33°48'46" /110°52'35"		A&Wc				FBC			FC		AgL
SR	Devils Chasm Creek	Below confluence with unnamed tributary to confluence with Cherry Creek			A&Ww			FBC			FC		AgL
SR	Dipping Vat Reservoir	33°55'47"/109°25'31"	Igneous		A&Ww			FBC			FC		AgL
SR	Double Cienega Creek	Headwaters to confluence with Fish Creek		A&Wc				FBC			FC		AgL
SR	Fish Creek	Headwaters to confluence with the Black River		A&Wc				FBC			FC	AgI	AgL
SR	Fish Creek	Headwaters to confluence with the Salt River			A&Ww			FBC			FC		
SR	Gold Creek	Headwaters to confluence with unnamed tributary at 33°59'47"/111°25'10"		A&Wc				FBC			FC		AgL
SR	Gold Creek	Below confluence with unnamed tributary to confluence with Tonto Creek			A&Ww			FBC			FC		AgL
SR	Gordon Canyon Creek	Headwaters to confluence with Hog Canyon		A&Wc				FBC			FC		AgL
SR	Gordon Canyon Creek	Below confluence with Hog Canyon to confluence with Haigler Creek			A&Ww			FBC			FC		AgL
SR	Greenback Creek	Headwaters to confluence with Tonto Creek			A&Ww			FBC			FC		AgL

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
SR	Haigler Creek	Headwaters to confluence with unnamed tributary at 34°12'23"/111°00'15"		A&Wc				FBC			FC	AgI	AgL
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
SR	Haigler Creek	Below confluence with unnamed tributary to confluence with Tonto Creek			A&Ww			FBC			FC	AgI	AgL
SR	Hannagan Creek	Headwaters to confluence with Beaver Creek		A&Wc				FBC			FC		AgL
SR	Hay Creek (OAW)	Headwaters to confluence with the Black River, West Fork		A&Wc				FBC			FC		AgL
SR	Home Creek	Headwaters to confluence with the Black River, West Fork		A&Wc				FBC			FC		AgL
SR	Horse Creek	Headwaters to confluence with the Black River, West Fork		A&Wc				FBC			FC		AgL
SR	Horse Camp Creek	Headwaters to confluence with unnamed tributary at 33°54'00"/110°50'07"		A&Wc				FBC			FC		AgL
SR	Horse Camp Creek	Below confluence with unnamed tributary to confluence with Cherry Creek			A&Ww			FBC			FC		AgL
SR	Horton Creek	Headwaters to confluence with Tonto Creek		A&Wc				FBC			FC	AgI	AgL
SR	Houston Creek	Headwaters to confluence with Tonto Creek			A&Ww			FBC			FC		AgL
SR	Hunter Creek	Headwaters to confluence with Christopher Creek		A&Wc				FBC			FC		AgL
SR	LaBarge Creek	Headwaters to Canyon Lake			A&Ww			FBC			FC		
SR	Lake Sierra Blanca	33°52'25"/109°16'05"		A&Wc				FBC			FC	AgI	AgL
SR	Miami Wash	Headwaters to confluence with Pinal Creek				A&We			PBC				
SR	Mule Creek	Headwaters to confluence with Canyon Creek		A&Wc				FBC		DWS	FC	AgI	AgL
SR	Open Draw Creek	Headwaters to confluence with the East Fork of Black River		A&Wc				FBC			FC		AgL
SR	P B Creek	Headwaters to Forest Service Road #203 at 33°57'08"/110°56'12"		A&Wc				FBC			FC		AgL
SR	P B Creek	Below Forest Service Road #203 to Cherry Creek			A&Ww			FBC			FC		AgL
SR	Pinal Creek	Headwaters to confluence with unnamed EDW wash (Globe WWTP) at 33°25'29"/110°48'20"				A&We			PBC				AgL
SR	Pinal Creek (EDW)	Confluence with unnamed EDW wash (Globe WWTP) to 33°26'55"/110°49' 25"					A&Wedw		PBC				
SR	Pinal Creek	From 33°26'55"/110°49'25" to Lower Pinal Creek water treatment plant outfall #001 at 33°31'04"/ 110°51'55"				A&We			PBC				AgL
SR	Pinal Creek	From Lower Pinal Creek WTP outfall # to See Ranch Crossing at 33°32'25"/110°52'28"					A&Wedw		PBC				
SR	Pinal Creek	From See Ranch Crossing to confluence with unnamed tributary at 33°35'28"/110°54'31"			A&Ww			FBC					
SR	Pinal Creek	From unnamed tributary to confluence with Salt River			A&Ww			FBC			FC		
SR	Pine Creek	Headwaters to confluence with the Salt River			A&Ww			FBC			FC		
SR	Pinto Creek	Headwaters to confluence with unnamed tributary at 33°19'27"/110°54'58"		A&Wc				FBC			FC	AgI	AgL
SR	Pinto Creek	Below confluence with unnamed tributary to Roosevelt Lake			A&Ww			FBC			FC	AgI	AgL
SR	~~Pool~~ Pole Corral Lake	33°30'38"/110°00'15"	Igneous		A&Ww			FBC			FC	AgI	AgL
SR	Pueblo Canyon Creek	Headwaters to confluence with unnamed tributary at 33°50'23"/110°51'37"		A&Wc				FBC			FC		AgL
SR	Pueblo Canyon Creek	Below confluence with unnamed tributary to confluence with Cherry Creek			A&Ww			FBC			FC		AgL
SR	Reevis Creek	Headwaters to confluence with Pine Creek			A&Ww			FBC			FC		
SR	Reservation Creek	Headwaters to confluence with the Black River		A&Wc				FBC			FC		AgL
SR	Reynolds Creek	Headwaters to confluence with Workman Creek		A&Wc				FBC			FC		AgL
SR	Roosevelt Lake	33°52'17"/111°00'17"	Deep		A&Ww			FBC		DWS	FC	AgI	AgL
SR	Russell Gulch	FromHeadwaters to confluence with Miami Wash				A&We			PBC				
SR	Rye Creek	Headwaters to confluence with Tonto Creek			A&Ww			FBC			FC		AgL
SR	Saguaro Lake	33°33'44"/111°30'55"	Deep		A&Ww			FBC		DWS	FC	AgI	AgL

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
SR	Salome Creek	Headwaters to confluence with the Salt River			A&Ww			FBC			FC	AgI	AgL
SR	Salt House Lake	33°57'04"/109°20'11"	Igneous		A&Ww			FBC			FC		AgL
SR	Salt River	White Mountain Apache Reservation Boundary at 33°48'52"/110°31'33" to Roosevelt Lake			A&Ww			FBC			FC		AgL
SR	Salt River	Theodore Roosevelt Dam to 2 km below Granite Reef Dam			A&Ww			FBC		DWS	FC	AgI	AgL
SR	Slate Creek	Headwaters to confluence with Tonto Creek			A&Ww			FBC			FC		AgL
SR	Snake Creek (OAW)	Headwaters to confluence with the Black River		A&Wc				FBC			FC		AgL
SR	Spring Creek	Headwaters to confluence with Tonto Creek			A&Ww			FBC			FC		AgL
SR	Stinky Creek (OAW)	Headwaters to confluence with the Black River, West Fork		A&Wc				FBC			FC		AgL
SR	Thomas Creek	Headwaters to confluence with Beaver Creek		A&Wc				FBC			FC		AgL
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
SR	Thompson Creek	Headwaters to confluence with the West Fork of the Black River		A&Wc				FBC			FC		AgL
SR	Tonto Creek	Headwaters to confluence with unnamed tributary at 34°18'11"/111°04'18"		A&Wc				FBC			FC	AgI	AgL
SR	Tonto Creek	Below confluence with unnamed tributary to Roosevelt Lake			A&Ww			FBC			FC	AgI	AgL
SR	Turkey Creek	Headwaters to confluence with Rock Creek		A&Wc				FBC			FC		
SR	Wildcat Creek	Headwaters to confluence with Centerfire Creek		A&Wc				FBC			FC		AgL
SR	Willow Creek	Headwaters to confluence with Beaver Creek		A&Wc				FBC			FC		AgL
SR	Workman Creek	Headwaters to confluence with Reynolds Creek		A&Wc				FBC			FC	AgI	AgL
SR	Workman Creek	Below confluence with Reynolds Creek to confluence with Salome Creek			A&Ww			FBC			FC	AgI	AgL
UG	Apache Creek	Headwaters to confluence with the Gila River			A&Ww			FBC			FC		AgL
UG	Ash Creek	Headwaters to confluence with unnamed tributary at 32°46'15"/109°51'45"		A&Wc				FBC			FC		AgL
UG	Ash Creek	Below confluence with unnamed tributary to confluence with the Gila River			A&Ww			FBC			FC		AgL
UG	Bennett Wash	Headwaters to the Gila River				A&We			PBC				
UG	Bitter Creek	Headwaters to confluence with the Gila River			A&Ww			FBC			FC		
UG	Blue River	Headwaters to confluence with Strayhorse Creek at 33°29'02"/109°12'14"		A&Wc				FBC			FC	AgI	AgL
UG	Blue River	Below confluence with Strayhorse Creek to confluence with San Francisco River			A&Ww			FBC			FC	AgI	AgL
UG	Bonita Creek (OAW)	San Carlos Indian Reservation boundary to confluence with the Gila River			A&Ww			FBC		DWS	FC		AgL
UG	~~Buckalou~~ Buckelew Creek	Headwaters to confluence with Castle Creek		A&Wc				FBC			FC		AgL
UG	Campbell Blue Creek	Headwaters to confluence with the Blue River		A&Wc				FBC			FC		AgL
UG	Castle Creek	Headwaters to confluence with Campbell Blue Creek		A&Wc				FBC			FC		AgL
UG	Cave Creek (OAW)	Headwaters to confluence with South Fork Cave Creek		A&Wc				FBC			FC	AgI	AgL
UG	Cave Creek (OAW)	Below confluence with South Fork Cave Creek to Coronado National Forest boundary			A&Ww			FBC			FC	AgI	AgL
UG	Cave Creek	Below Coronado National Forest boundary to New Mexico border			A&Ww			FBC			FC	AgI	AgL
UG	Cave Creek, South Fork	Headwaters to confluence with Cave Creek		A&Wc				FBC			FC	AgI	AgL
UG	Chase Creek	Headwaters to the Phelps-Dodge Morenci Mine			A&Ww			FBC			FC		AgL
UG	Chase Creek	Below the Phelps-Dodge Morenci Mine to confluence with San Francisco River				A&We			PBC				
UG	Chitty Canyon Creek	Headwaters to confluence with Salt House Creek		A&Wc				FBC			FC		AgL
UG	Cima Creek	Headwaters to confluence with Cave Creek		A&Wc				FBC			FC		AgL

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
UG	Cluff ~~Ranch Pond~~ Reservoir #1	32°48'55"/109°50'46"	Sedimentary		A&Ww			FBC			FC	AgI	AgL
UG	Cluff ~~Ranch Pond~~ Reservoir #3	32°48'21"/109°51'46"	Sedimentary		A&Ww			FBC			FC	AgI	AgL
UG	Coleman Creek	Headwaters to confluence with Campbell Blue Creek		A&Wc				FBC			FC		AgL
UG	Dankworth Lake	32°43'13"/109°42'17"	Sedimentary	A&Wc				FBC			FC		
UG	Deadman Canyon Creek	Headwaters to confluence with unnamed tributary at 32°43'50"/109°49'03"		A&Wc				FBC		DWS	FC		AgL
UG	Deadman Canyon Creek	Below confluence with unnamed tributary to confluence with Graveyard Wash			A&Ww			FBC		DWS	FC		AgL
UG	Eagle Creek	Headwaters to confluence with unnamed tributary at 33°22'32"/109°29'43"		A&Wc				FBC		DWS	FC	AgI	AgL
UG	Eagle Creek	Below confluence with unnamed tributary to confluence with the Gila River			A&Ww			FBC		DWS	FC	AgI	AgL
UG	East Eagle Creek	Headwaters to confluence with Eagle Creek		A&Wc				FBC			FC		AgL
UG	East Turkey Creek	Headwaters to confluence with unnamed tributary at 31°58'22"/109°12'20"		A&Wc				FBC			FC		AgL
UG	East Turkey Creek	Below confluence with unnamed tributary to terminus near San Simon River			A&Ww			FBC			FC		AgL
UG	East Whitetail	Headwaters to terminus near San Simon River			A&Ww			FBC			FC		AgL
UG	Emigrant Canyon	Headwaters to terminus near San Simon River			A&Ww			FBC			FC		AgL
UG	Evans Pond #1	32°49'19"/109°51'12"	Sedimentary		A&Ww			FBC			FC	AgI	AgL
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
UG	Evans Pond #2	32°49'14"/109°51'09"	Sedimentary		A&Ww			FBC			FC	AgI	AgL
UG	Fishhook Creek	Headwaters to confluence with the Blue River		A&Wc				FBC			FC		AgL
UG	Foote Creek	Headwaters to confluence with the Blue River		A&Wc				FBC			FC		AgL
UG	Frye Canyon Creek	Headwaters to Frye Mesa Reservoir		A&Wc				FBC		DWS	FC		AgL
UG	Frye Canyon Creek	~~Highline CanalHeadwaters to terminus near San Simon River~~Frye Mesa reservoir to terminus at Highline Canal.			A&Ww			FBC			FC		AgL
UG	Frye Mesa Reservoir	32°45'14"/109°50'02"	Igneous	A&Wc				FBC		DWS	FC		
UG	Gibson Creek	Headwaters to confluence with Marijilda Creek		A&Wc				FBC			FC		AgL
UG	Gila River	New Mexico border to the San Carlos Indian Reservation boundary			A&Ww			FBC			FC	AgI	AgL
UG	Grant Creek	Headwaters to confluence with the Blue River		A&Wc				FBC			FC		AgL
UG	Judd Lake	33°51'15"/109°09'35"	Sedimentary	A&Wc				FBC			FC		
UG	K P Creek (OAW)	Headwaters to confluence with the Blue River		A&Wc				FBC			FC		AgL
UG	Lanphier Canyon Creek	Headwaters to confluence with the Blue River		A&Wc				FBC			FC		AgL
UG	Little Blue Creek	Headwaters to confluence with Dutch Blue Creek		A&Wc				FBC			FC		AgL
UG	Little Blue Creek	Below confluence with Dutch Blue Creek to confluence with Blue Creek			A&Ww			FBC			FC		AgL
UG	Little Creek	Headwaters to confluence with the San Francisco River		A&Wc				FBC			FC		
UG	~~Lower~~ George's ~~Reservoir~~ Tank	33°51'24"/109°08'30"	Sedimentary	A&Wc				FBC			FC		AgL
UG	Luna Lake	33°49'50"/109°05'06"	Sedimentary	A&Wc				FBC			FC		AgL
UG	Marijilda Creek	Headwaters to confluence with Gibson Creek		A&Wc				FBC			FC		AgL
UG	Marijilda Creek	Below confluence with Gibson Creek to confluence with Stockton Wash			A&Ww			FBC			FC	AgI	AgL
UG	Markham Creek	Headwaters to confluence with the Gila River			A&Ww			FBC			FC		AgL
UG	Pigeon Creek	Headwaters to confluence with the Blue River			A&Ww			FBC			FC		AgL
UG	Raspberry Creek	Headwaters to confluence with the Blue River		A&Wc				FBC			FC		

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
UG	Roper Lake	32°45'23"/109°42'14"	Sedimentary		A&Ww			FBC			FC		
UG	San Francisco River	Headwaters to the New Mexico border		A&Wc				FBC			FC	AgI	AgL
UG	San Francisco River	New Mexico border to confluence with the Gila River			A&Ww			FBC			FC	AgI	AgL
UG	San Simon River	Headwaters to confluence with the Gila River				A&We			PBC				AgL
UG	Sheep Tank	32°46'14"/109°48'09"	Sedimentary		A&Ww			FBC			FC		AgL
UG	Smith Pond	32°49'15"/109°50'36"	Sedimentary		A&Ww			FBC			FC		
UG	Squaw Creek	Headwaters to confluence with Thomas Creek		A&Wc				FBC			FC		AgL
UG	Stone Creek	Headwaters to confluence with the San Francisco River		A&Wc				FBC			FC	AgI	AgL
UG	Strayhorse Creek	Headwaters to confluence with the Blue River		A&Wc				FBC			FC		
UG	Thomas Creek	Headwaters to confluence with Rousensock Creek		A&Wc				FBC			FC		AgL
UG	Thomas Creek	Below confluence with Rousensock Creek to confluence with Blue River			A&Ww			FBC			FC		AgL
UG	Tinny Pond	33°47'49"/109°04'27"	Sedimentary		A&Ww			FBC			FC		AgL
UG	Turkey Creek	Headwaters to confluence with Campbell Blue Creek		A&Wc				FBC			FC		AgL
VR	American Gulch	Headwaters to the Northern Gila County Sanitary District WWTP outfall at 34°14'02"/111°22'14"			A&Ww			FBC			FC	AgI	AgL
VR	American Gulch (EDW)	Below Northern Gila County Sanitary District WWTP outfall to confluence with the East Verde River					A&Wedw		PBC				
VR	Apache Creek	Headwaters to confluence with Walnut Creek			A&Ww			FBC			FC		AgL
VR	Ashbrook Wash	Headwaters to the Fort McDowell Indian Reservation boundary				A&We			PBC				
VR	Aspen Creek	Headwaters to confluence with Granite Creek			A&Ww			FBC			FC		
VR	Bar Cross Tank	35°00'41"/112°05'39"			A&Ww			FBC			FC		AgL
VR	Barrata Tank	35°02'43"/112°24'21"			A&Ww			FBC			FC		AgL
VR	Bartlett Lake	33°49'52"/111°37'44"	Deep		A&Ww			FBC		DWS	FC	AgI	AgL
VR	Beaver Creek	Headwaters to confluence with the Verde River			A&Ww			FBC			FC		AgL
VR	Big Chino Wash	Headwaters to confluence with Sullivan Lake				A&We			PBC				AgL
VR	Bitter Creek	Headwaters to the Jerome WWTP outfall at 34°45'12"/112°06'24"				A&We			PBC				AgL
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
VR	Bitter Creek (EDW)	Jerome WWTP outfall to the Yavapai Apache Indian Reservation boundary					A&Wedw		PBC				AgL
VR	Bitter Creek	Below the Yavapai Apache Indian Reservation boundary to confluence with the Verde River			A&Ww			FBC			FC	AgI	AgL
VR	Black Canyon Creek	Headwaters to confluence with unnamed tributary at 34°39'20"/112°05'06"		A&Wc				FBC			FC		AgL
VR	Black Canyon Creek	Below confluence with unnamed tributary to confluence with the Verde River			A&Ww			FBC			FC		AgL
VR	Bonita Creek	Headwaters to confluence with Ellison Creek		A&Wc				FBC			FC		
VR	Bray Creek	Headwaters to confluence with Webber Creek		A&Wc				FBC			FC		AgL
VR	Camp Creek	Headwaters to confluence with the ~~Verde River~~ Sycamore Creek			A&Ww			FBC			FC		AgL
VR	Cereus Wash	Headwaters to the Fort McDowell Indian Reservation boundary				A&We			PBC				
VR	Chase Creek	Headwaters to confluence with the East Verde River		A&Wc				FBC		DWS	FC		
VR	Clover Creek	Headwaters to confluence withHeadwaters of West Clear Creek		A&Wc				FBC			FC		AgL
VR	Coffee Creek	Headwaters to confluence with Spring Creek			A&Ww			FBC			FC		AgL
VR	Colony Wash	Headwaters to the Fort McDowell Indian Reservation boundary				A&We			PBC				

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
VR	Dead Horse Lake	34°45'08"/112°00'42"	Shallow		A&Ww			FBC			FC		
VR	Deadman Creek	Headwaters to Horseshoe Reservoir			A&Ww			FBC			FC		AgL
VR	Del Monte ~~Wash~~ Gulch	Headwaters to confluence with City of Cottonwood WWTP outfall 002 at 34°43'57"/112°02'46"				A&We			PBC				
VR	Del Monte ~~Wash~~ Gulch (EDW)	City of Cottonwood WWTP outfall 002 at 34°43'57"/ 112°02'46" to confluence with ~~Verde River~~ Blowout Creek					A&Wedw		PBC				
VR	Del Rio Dam Lake	34°48'55"/112°28'03"	Sedimentary		A&Ww			FBC			FC		AgL
VR	Dry Beaver Creek	Headwaters to confluence with Beaver Creek			A&Ww			FBC			FC	AgI	AgL
VR	Dry Creek (EDW)	Sedona Ventures WWTP outfall at 34°50'02"/ 111°52'17" to 34°48'12"/111°52'48"					A&Wedw		PBC				
VR	Dude Creek	Headwaters to confluence with the East Verde River		A&Wc				FBC			FC	AgI	AgL
VR	East Verde River	Headwaters to confluence with Ellison Creek		A&Wc				FBC		DWS	FC	AgI	AgL
VR	East Verde River	Below confluence with Ellison Creek to confluence with the Verde River			A&Ww			FBC		DWS	FC	AgI	AgL
VR	Ellison Creek	Headwaters to confluence with the East Verde River		A&Wc				FBC			FC		AgL
VR	Fossil Creek (OAW)	Headwaters to confluence with the Verde River			A&Ww			FBC			FC		AgL
VR	Fossil Springs (OAW)	34°25'24"/111°34'27"			A&Ww			FBC		DWS	FC		
VR	Foxboro Lake	34°53'42"/111°39'55"			A&Ww			FBC			FC		AgL
VR	Fry Lake	35°03'45"/111°48'04"			A&Ww			FBC			FC		AgL
VR	Gap Creek	Headwaters to confluence with Government Spring		A&Wc				FBC			FC		AgL
VR	Gap Creek	Below Government Spring to confluence with the Verde River			A&Ww			FBC			FC		AgL
VR	Garrett Tank	35°18'57"/112°42'20"			A&Ww			FBC			FC		AgL
VR	Goldwater Lake, Lower	34°29'56"/112°27'17"	Sedimentary	A&Wc				FBC		DWS	FC		
VR	Goldwater Lake, Upper	34°29'52"/112°26'59"	Igneous	A&Wc				FBC		DWS	FC		
VR	Granite Basin Lake	34°37'01"/112°32'58"	Igneous	A&Wc				FBC			FC	AgI	AgL
VR	Granite Creek	Headwaters to Watson Lake		A&Wc				FBC			FC	AgI	AgL
VR	Granite Creek	Below Watson Lake to confluence with the Verde River			A&Ww			FBC			FC	AgI	AgL
VR	Green Valley Lake (EDW)	34°13'54"/111°20'45"	Urban				A&Wedw		PBC		FC		
VR	Heifer Tank	35°20'27"/112°32'59"			A&Ww			FBC			FC		AgL
VR	~~Hell~~ Hells Canyon Tank	35°04'59"/112°24'07"	Igneous		A&Ww			FBC			FC		AgL
VR	Homestead Tank	35°21'24"/112°41'36"	Igneous		A&Ww			FBC			FC		AgL
VR	Horse Park Tank	34°58'15"/111°36'32"			A&Ww			FBC			FC		AgL
VR	Horseshoe Reservoir	34°00'25"/111°43'36"	Sedimentary		A&Ww			FBC			FC	AgI	AgL
VR	Houston Creek	Headwaters to confluence with the Verde River			A&Ww			FBC			FC		AgL
VR	Huffer Tank	34°27'46"/111°23'11"			A&Ww			FBC			FC		AgL
VR	J.D. Dam Lake	35°04'02"/112°01'48"	Shallow	A&Wc				FBC			FC	AgI	AgL
VR	Jacks Canyon ~~Wash~~	Headwaters to Big Park WWTP outfall at 34°45'46"/ 111°45'51"				A&We			PBC				
VR	Jacks Canyon ~~Wash~~ (EDW)	Below Big Park WWTP outfall to confluence with Dry Beaver Creek					A&Wedw		PBC				
~~Watershed~~	~~Surface Waters~~	~~Segment Description and Location (Latitude and Longitudes are in NAD 83)~~	~~Lake Category~~	~~Aquatic and Wildlife~~	~~Human Health~~	~~Agricultural~~							
VR	Lime Creek	Headwaters to Horseshoe Reservoir			A&Ww			FBC			FC		AgL
VR	Masonry Number 2 Reservoir	35°13'32"/112°24'10"		A&Wc				FBC			FC	AgI	AgL
VR	McLellan Reservoir	35°13'09"/112°17'06"	Igneous		A&Ww			FBC			FC	AgI	AgL

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
VR	Meath Dam Tank	35°07'52"/112°27'35"			A&Ww			FBC			FC		AgL
VR	Mullican Place Tank	34°44'16"/111°36'10"	Igneous		A&Ww			FBC			FC		AgL
VR	Oak Creek (OAW)	Headwaters to confluence with unnamed tributary at 34°59'15"/111°44'47"		A&Wc				FBC		DWS	FC	AgI	AgL
VR	Oak Creek (OAW)	Below confluence with unnamed tributary to confluence with Verde River			A&Ww			FBC		DWS	FC	AgI	AgL
VR	Oak Creek, West Fork (OAW)	Headwaters to confluence with Oak Creek		A&Wc				FBC			FC		AgL
VR	Odell Lake	34°56'5"/111°37'53"	Igneous	A&Wc				FBC			FC		
VR	Peck's Lake	34°46'51"/112°02'01"	Shallow		A&Ww			FBC			FC	AgI	AgL
VR	Perkins Tank	35°06'42"/112°04'12"	Shallow	A&Wc				FBC			FC		AgL
VR	Pine Creek	Headwaters to confluence with unnamed tributary at 34°21'51"/111°26'49"		A&Wc				FBC		DWS	FC	AgI	AgL
VR	Pine Creek	Below confluence with unnamed tributary to confluence with East Verde River			A&Ww			FBC		DWS	FC	AgI	AgL
VR	Red Creek	Headwaters to confluence with the Verde River			A&Ww			FBC			FC		AgL
VR	Reservoir #1	35°13'5"/111°50'09"	Igneous		A&Ww			FBC			FC		
VR	Reservoir #2	35°13'17"/111°50'39"	Igneous		A&Ww			FBC			FC		
VR	Roundtree Canyon Creek	Headwaters to confluence with Tangle Creek			A&Ww			FBC			FC		AgL
VR	Scholze Lake	35°11'53"/112°00'37"	Igneous	A&Wc				FBC			FC		AgL
VR	Spring Creek	Headwaters to confluence with unnamed tributary at 34°57'23"/111°57'21"		A&Wc				FBC			FC	AgI	AgL
VR	Spring Creek	Below confluence with unnamed tributary to confluence with Oak Creek			A&Ww			FBC			FC	AgI	AgL
VR	Steel Dam Lake	35°13'36"/112°24'54"	Igneous	A&Wc				FBC			FC		AgL
VR	Stehr Lake	34°22'01"/111°40'02"	Sedimentary		A&Ww			FBC			FC		AgL
~~VR~~	~~Stone Dam Lake~~	~~35°13'32"/112°24'10"~~		~~A&Wc~~				~~FBC~~			~~FC~~	~~AgI~~	~~AgL~~
VR	Stoneman Lake	34°46'47"/111°31'14"	Shallow	A&Wc				FBC			FC	AgI	AgL
VR	Sullivan Lake	34°51'42"/112°27'51"			A&Ww			FBC			FC	AgI	AgL
VR	Sycamore Creek	Headwaters to confluence with unnamed tributary at 35°03'41"/111°57'31"		A&Wc				FBC			FC	AgI	AgL
VR	Sycamore Creek	Below confluence with unnamed tributary to confluence with Verde River			A&Ww			FBC			FC	AgI	AgL
VR	Sycamore Creek	Headwaters to confluence with Verde River at 33°37'55"/111°39'58"			A&Ww			FBC			FC	AgI	AgL
VR	Sycamore Creek	Headwaters to confluence with Verde River at 34°04'42"/111°42'14"			A&Ww			FBC			FC		AgL
VR	Tangle Creek	Headwaters to confluence with Verde River			A&Ww			FBC			FC	AgI	AgL
VR	Trinity Tank	35°27'44"/112°48'01"			A&Ww			FBC			FC		AgL
VR	Unnamed Wash	Flagstaff Meadows WWTP outfall at '35°13'59"/ 111°48'35" to Volunteer Wash					A&Wedw		PBC				
VR	Verde River	~~From confluence of Chino Wash and Granite Creek to Bartlett Lake Dam~~ From headwaters at confluence of Chino Wash and Granite Creek to Bartlett Lake Dam			A&Ww			FBC			FC	AgI	AgL
VR	Verde River	Below Bartlett Lake Dam to Salt River			A&Ww			FBC		DWS	FC	AgI	AgL
VR	Walnut Creek	Headwaters to confluence with Big Chino Wash			A&Ww			FBC			FC		AgL
VR	Watson Lake	34°34'58"/112°25'26"	Igneous		A&Ww			FBC			FC	AgI	AgL
VR	Webber Creek	Headwaters to confluence with the East Verde River		A&Wc				FBC			FC		AgL
VR	West Clear Creek	Headwaters to confluence with Meadow Canyon		A&Wc				FBC			FC		AgL
VR	West Clear Creek	Below confluence with Meadow Canyon to confluence with the Verde River			A&Ww			FBC			FC	AgI	AgL
VR	Wet Beaver Creek	Headwaters to unnamed springs at 34°41'17"/ 111°34'34"		A&Wc				FBC			FC	AgI	AgL
VR	Wet Beaver Creek	Below unnamed springs to confluence with Dry Beaver Creek			A&Ww			FBC			FC	AgI	AgL
VR	Whitehorse Lake	35°06'59"/112°00'48"	Igneous	A&Wc				FBC		DWS	FC	AgI	AgL

Watershed	Surface Waters	Segment Description and Location (Latitude and Longitudes are in NAD 83)	Lake Category	Aquatic and Wildlife				Human Health				Agricultural	
				A&Wc	A&Ww	A&We	A&Wedw	FBC	PBC	DWS	FC	AgI	AgL
VR	Williamson Valley Wash	Headwaters to confluence with Mint Wash				A&We			PBC				AgL
VR	Williamson Valley Wash	From confluence of Mint Wash to 10.5 km downstream			A&Ww			FBC			FC		AgL
VR	Williamson Valley Wash	From 10.5 km downstream of Mint Wash confluence to confluence with Big Chino Wash				A&We			PBC				AgL
VR	Williscraft Tank	35°11'22"/112°35'40"			A&Ww			FBC			FC		AgL
VR	Willow Creek	Above Willow Creek Reservoir		A&Wc				FBC			FC		AgL
VR	Willow Creek	Below Willow Creek Reservoir to confluence with Granite Creek			A&Ww			FBC			FC		AgL
VR	Willow Creek Reservoir	34°36'17"/112°26'19"	Shallow		A&Ww			FBC			FC	AgI	AgL
VR	Willow Valley Lake	34°41'08"/111°20'02"	Sedimentary		A&Ww			FBC			FC		AgL

~~**Watersheds**~~

~~BW = Bill Williams~~

~~CG = Colorado – Grand Canyon~~

~~CL = Colorado – Lower Gila~~

~~LC = Little Colorado~~

~~MG = Middle Gila~~

~~SC = Santa Cruz – Rio Magdelena – Rio Sonoyta~~

~~SP = San Pedro – Willcox Playa – Rio Yaqui~~

~~SR = Salt River~~

~~UG = Upper Gila~~

~~VR = Verde River~~

~~**Other Abbreviations**~~

~~WWTP = Wastewater Treatment Plant~~

~~Km = kilometers~~

Appendix C. Site-Specific Standards

Watershed	Surface Water	Surface Water Description & Location	Parameter	Site-Specific Criterion
LC	Rio de Flag (EDW)	Flagstaff WWTP outfall to the confluence with San Francisco Wash ~~at 35°14'04"/111°28'02.5"~~	Copper (D)	36 µg/L (A&Wedw)
CL	Yuma East Wetlands	From inlet culvert from Colorado River into restored channel to Ocean Bridge	Selenium (T)	2.2 ~~mg/L~~µg/L (A&Ww chronic)
			Total residual chlorine	33 µg/L (A&Ww acute)
				20 µg/L (A&Ww chronic)
SR	Pinto Creek	From confluence of Ellis Ranch tributary at 33°19'26.7"/110°54'57.5" to the confluence of	Copper (D)	34 µg/L (A&Ww acute for

Watershed	Surface Water	Surface Water Description & Location	Parameter	Site-Specific Criterion
		West Fork of Pinto Creek at 33°27'32.3"/111°00'19.7"		hardness values below 268 mg/L)
				34 µg/L (A&Ww chronic)
~~CG~~	~~Bright Angel Wash~~	~~South Rim Grand Canyon National Park WWTP at 36°02'59"/112°09'02" to Coconino Wash~~	~~Copper (D)~~	~~42.5 µg/L (A&W edw)~~
~~CG~~	~~Transept Canyon~~	~~North Rim Grand Canyon WWTP at 36°12'20"/112°03'35" to1km downstream~~	~~Copper (D)~~	~~42.5 µg/L (A&W edw)~~