

**NOTICE OF PROPOSED RULEMAKING
TITLE 18. ENVIRONMENTAL QUALITY
CHAPTER 11. DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER QUALITY
STANDARDS**

PREAMBLE

1. Article, Part, or Section Affected (as applicable) Rulemaking Action

109(A)	Amend
Appendix A	Amend
Table 1	Amend
Appendix B	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. 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: (volume #) A.A.R. (page #)

4. The agency's contact person who can answer questions about the rulemaking:

Name: Jonathan Quinsey
Address: 1110 W. Washington St.
Phoenix, AZ 85007
Telephone: (602) 771-8193
E-mail: quinsey.jonathan@azdeq.gov

Web site: azdeq.gov

5. An agency's justification and reason why a rule should be made, amended, repealed or renumbered, to include an explanation about the rulemaking:

A. Rulemaking Information and Summary of this Action

The Clean Water Act (CWA) implementing regulations at 40 CFR § 131.20 mandates that, at least once every three years, each state must review and, if necessary, update its water quality standards (WQS) for surface waters. The term "water quality standards" includes both designated uses for the water bodies (e.g., swimming, fishing, drinking water supply) and the

corresponding numeric and narrative criteria that must be met to protect those uses. This process is called a Triennial Review (TR). ADEQ's TR process is composed of 5 distinct actions:

1. **Data Collection and Analysis:** ADEQ collects and reviews relevant data on water quality. This includes monitoring data, modeling results, and other scientific studies. ADEQ assesses whether any changes to the WQS are necessary to protect the designated uses of surface waters. This process is ongoing with results presented for public input as part of the following steps.
2. **Notification:** ADEQ must provide notice of a TR to the public and other interested parties, including other government agencies, tribes, environmental organizations, and industry groups.
3. **State Water Quality Standards:** ADEQ communicates the results of data collection and analysis. If necessary, ADEQ initiates a state rulemaking to adopt new or revised WQS, to protect designated uses and meet the requirements of the CWA. A TR may or may not include rulemaking, which is a state process and separate from the CWA mandate to conduct a TR. State rulemakings may also be conducted outside a TR.
4. **Public Comment:** ADEQ is required to provide an opportunity for the public and interested parties to provide input on WQS. This may include public hearings, comment periods, and other outreach efforts. If the TR includes a state rulemaking, opportunities to comment on the TR and state rulemaking may be combined. However, to meet the TR requirement ADEQ must accept, review, and respond to all comments related to federal water quality standards, even those outside of a state rulemaking action, that are submitted by interested parties during the notice period.
5. **U.S. Environmental Protection Agency (EPA) Review and Approval:** ADEQ submits results of the TR process to EPA. If a rulemaking was conducted, ADEQ will also submit that documentation to the EPA. The EPA reviews any new or revised WQS completed through rulemaking and either approves or disapproves them. If the EPA disapproves any part of the rulemaking, it may provide recommendations for revisions or develop federal WQS for the state.

The TR process helps to ensure that WQS are up-to-date and protective of designated uses for surface waters. It also provides opportunities for public input and involvement in the water quality management process. Public comment and the results of scientific review during a TR assist ADEQ with prioritizing rulemakings based on stakeholder needs and impact to the ADEQ mission.

ADEQ is combining the 2023 TR with a state rulemaking to address issues identified in a rulemaking combined with the 2019 TR. The following draft preamble for the upcoming Notice for Public Rulemaking (NPRM) is limited to the numeric criteria that protect human health and safety in Arizona and technical edits to Appendix B to ensure waterbody descriptions are accurate. However, to meet the Clean Water Act TR mandate, ADEQ will also accept comments on any part of Arizona's federal surface water program during this rulemaking. The federal surface water program is found in Arizona Administrative Code Title 18, Chapter 11, Article 1; referred to as Article 1 in this document moving forward.

B. Current State of Arizona Water Quality Standards

Arizona's WQS designate specific uses to water bodies and then establish criteria to protect those uses. The designated uses of a surface water are an articulation of the surface waters attainment goal in Arizona's aquatic or human environment. These adopted uses express goals for the water, such as supporting aquatic life and human activities. The concept of protected surface waters having designated uses is central to establishing appropriate WQS.

Arizona's "menu" of designated uses listed in Article 1, Appendix B, provides for the protection and propagation of drinking water, recreation in and on the water, agriculture, and wildlife that live in or use the water. Arizona designated uses are:

1. Domestic water source (DWS),
2. Fish consumption (FC),
3. Full body contact recreation (FBC),
4. Partial body contact recreation (PBC),
5. Aquatic and wildlife (cold water) (A&Wc),
6. Aquatic and wildlife (warm water) (A&Ww),
7. Aquatic and wildlife (effluent-dependent water) (A&Wedw),
8. Aquatic and wildlife (ephemeral water) (A&We),
9. Agricultural irrigation (AgI), and
10. Agricultural livestock watering (AgL).

ADEQ uses the term "Human Health and Safety Uses" throughout this rulemaking document to refer to the combination of DWS, FC, FBC and PBC designated uses. The DWS designated use applies to a surface water that has a public drinking water system intake. The water quality criteria for the DWS designated use were developed assuming that treatment is necessary to yield drinking water suitable for human consumption. The FC designated use is intended to protect human health when fish or other aquatic organisms in surface water are consumed by people. FBC and PBC designated uses are intended to maintain and protect water quality for swimming, water-skiing, boating, wading, fishing, and other recreational uses. The FBC designated use is intended to protect public health when people engage in recreational activities that may involve full submergence in the water and likely ingestion of the water. The PBC designated use is intended to protect public health when people engage in water-based recreational activities where full submergence and ingestion of the water are unlikely such as wading or boating. ADEQ is updating WQS that protect the Human Health and Safety Uses in this rulemaking.

ADEQ's four subcategories of aquatic and wildlife designated uses are meant to protect fish, shellfish, plants and wildlife (A&Wc, A&Ww, A&Wedw, and A&We). ADEQ refers to these four uses together as "Aquatic and Wildlife Uses". ADEQ also recognizes the use and value of surface waters for agricultural purposes by establishing the agricultural irrigation (AgI) and agricultural livestock watering (AgL) designated uses. ADEQ refers to these two uses together

as “Agricultural Uses”. ADEQ is not modifying WQS for these designated uses in this rulemaking.

These designated uses and the corresponding numeric and narrative criteria that protect them are codified in Article 1. ADEQ uses the best available science to justify modifications to Arizona WQS through the state rulemaking process, but those changes do not take effect until EPA approval is received. EPA is required to review any modifications ADEQ makes to Article 1 and approve WQS that meet the requirements of the CWA.

Once ADEQ submits final documentation for a state rulemaking modifying WQS, EPA must approve or disapprove WQS within a set amount of time established in the CWA and implementing regulations. If EPA approves the WQS, the agency must notify ADEQ within 60 days of receiving the submission. If EPA disapproves of Arizona’s WQS, it must do so within 90 days of receiving the complete submittal. If EPA disapproves WQS, EPA must notify ADEQ, specifying:

1. Why the WQS are not in compliance with the CWA, and
2. The revisions ADEQ must make to the WQS to assure compliance with the CWA. 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.

ADEQ met the requirements of the CWA and submitted to EPA the regulatory modifications made during a state rulemaking associated with TR on November 19, 2019 (2019 TR). During the subsequent review process of the modifications, EPA signaled to ADEQ that a non-trivial number of individual pollutant parameters developed by ADEQ and listed in Article 1 for certain designated uses would be disapproved as they did not meet the requirements of the CWA due to incorrect assumptions ADEQ made during their development. For example, ADEQ used outdated EPA recommended numbers for body weight, fish consumption rate, and drinking water intake in the 2019 calculations, which were less than the more current recommendations. In response, ADEQ submitted a request to formally withdraw portions of the 2019 TR on December 21, 2021. Specifically, ADEQ withdrew modifications for the individual numeric pollutant parameters established for the Human Health and Safety Uses.

After the partial withdrawal of Human Health and Safety Uses in the 2019 TR, EPA approved the revisions to the definitions, antidegradation, mixing zones and variance standards adopted in 2019 on January 24, 2022. The EPA also approved portions of 2019 TR that made minor formatting revisions and other corrections that were non-substantive.

EPA later communicated to ADEQ that some of the descriptions of waters in Appendix B were incorrect in the 2019 TR. ADEQ rescinded these revisions in letters to the EPA on July 14, 2022, and June 2, 2023.

As of August 23, 2023, EPA has not fully acted (i.e. approved or disapproved) the 2019 TR individual pollutant parameters in Appendix A, Table 1 for the Aquatic and Wildlife Uses and Agricultural Uses. For the Aquatic and Wildlife Uses, EPA has communicated to ADEQ that they are waiting on the U. S. Fish and Wildlife Service to complete a consultation as to whether ADEQ’s proposed standards are protective enough of Arizona’s threatened and endangered species.

More information regarding WQS currently in effect and outstanding 2019 TR actions can be found at <https://azdeq.gov/SW-QS-rulemaking-status>.

The above facts have left Arizona with a patchwork of effective standards to apply to CWA protected waters, as illustrated below. Specifically:

1. For the Human Health and Safety Uses, the individual pollutant parameters from Arizona’s 2016 TR will apply until modified and approved by the EPA; those modifications are the focus of this rulemaking.
2. For the Aquatic and Wildlife Uses and Agricultural Uses, the individual pollutant parameters from Arizona’s 2016 TR are currently effective until EPA approves the modifications made during the 2019 TR.
3. Narrative standards and changes made to the definitions, antidegradation, mixing zone, and variance portions of Arizona’s water quality standards in the 2019 TR are currently effective.

Effective Version of Water Quality Standards		
Standard	Current Effective Version of Standards 4/1/2023	The version of Standards Expected to be Effective During this Rulemaking Process
Individual Parameters for Domestic Water Source Use	2016	2016
Individual Parameters for Fish Consumption	2016	2016
Individual Parameters for Full-Body Contact	2016	2016
Individual Parameters for Partial Body Contact	2016	2016
Individual Parameters for Aquatic and Wildlife Uses	2016	2019*
Individual Parameters for Agricultural Irrigation Use	2016	2019*

Individual Parameters for Agricultural Livestock Use	2016	2019*
R18-11-101. Definitions	2019	2019
R18-11-107. Antidegradation	2019	2019
R18-11-114. Mixing Zones	2019	2019
R18-11-122. Variances	2019	2019

*Pending EPA approval

This draft rulemaking package associated with the 2023 TR is ADEQ delivering on the commitment to resolving the WQS issues identified by EPA and associated with the Human Health and Safety Uses. In this effort, EPA staff has worked jointly with ADEQ staff to ensure that the modifications made in this rulemaking package are justified with the scientific rigor required by the CWA.

C. Data Collection and Analysis

When updating numeric WQS for individual pollutants, ADEQ reviews various types of data related to that particular pollutant. This includes:

1. Toxicity data: ADEQ reviews toxicity data on the specific pollutant, which provides information on how toxic it is to humans and other organisms. This data helps determine the appropriate level at which to set the numeric criteria.
2. Exposure data: ADEQ reviews exposure data on the pollutant, which provides information on how much of it is present in the environment and how much people or wildlife are exposed to it. This data helps determine the level of protection needed to safeguard public health and the environment.
3. Scientific studies: ADEQ reviews relevant scientific studies on the pollutant, which can include research on its behavior in the environment, its potential impacts on human health and the environment and the effectiveness of various control measures.

When calculating WQS for Human Health and Safety Uses, ADEQ uses the base equation factors found in EPA human health criteria methodology documentation, and then arranges the formulas to reflect the designated uses assigned to Arizona surface waters. Arizona's Human Health and Safety Uses are broken down into the 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. ADEQ has adopted a FBC and a PBC designated use because the CWA differentiates between recreation use criteria as primary and secondary contact.

For WQS related to Human Health and Safety Uses, 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. RfD is an estimate of the amount of a pollutant that a person can be exposed to on a daily basis and not cause adverse health effects over their lifetime. Also, because humans do not 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 non-water 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.

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 (10^{-6}) is considered an “acceptable” risk when calculating standards. Every exposure carries exactly the same risk for developing cancer.

Unlike WQS for aquatic and wildlife, human health standards are not broken down into chronic and acute concentrations. A more conservative approach is employed for human health standards, which assumes acute but incremental lifetime exposure due to:

1. The unknowns due to lack of empirical data;
2. Other uncontrolled exposures to toxins;
3. The statistical nature of carcinogenic standards; and
4. The fact that standards are set for the human population as a whole.

C1. Methodologies for Deriving Criteria for the Domestic Water Source (DWS) Designated Use

Numeric criteria to maintain and protect water quality for the 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:

$$(BW * RISK) / (OCSF * DWS CR)$$

For non-carcinogens:

$$(RfD * RSC * BW) / DWS CR$$

In equations above:

- BW equals the EPA recommended average weight of a human male in kilograms, which is 80kg.
- RISK equals the excess cancer risk of 10^{-6} .
- OCSF is the oral cancer slope factor, which is an estimate of the cancer risk from oral exposure to a pollutant dose of 1 mg/kg-day over an average life expectancy.
- DWS CR equals the EPA recommended domestic water source consumption rate of 2.4 liters per day.
- RfD equals the reference dose.
- RSC equals the relative source contribution factor. EPA typically 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. ADEQ uses 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 and criteria 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 EPA's 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 provides information regarding the DWS criteria reviewed for this TR and NPRM. The table includes the formula used to derive the numeric value and citations to where ADEQ sourced variables to calculate the value. The purpose of this table is to provide the public with the methodology behind ADEQ's data collection and analysis portion of this TR. Absolute values for these pollutants are addressed in the State Water Quality Standards section of this preamble.

Table 1. Domestic Water Source Data Collection and Assessment Information.

Cas#	Pollutant	MCL	Formula (µg/L)	RSC/RfD	OCSF	Carcinogenicity
50-29-3	p,p'-Dichlorodiphenyltrichloroethane (DDT) and metabolites (DDD) and	NA	No formula; name correction only: "DDT and its Breakdown Products"			

	(DDE)				
106-93-4	1,2-Dibromoethane	0.05 µg/L	Carcinogen: $((BW \cdot Risk) / (OCSF \cdot DWS \cdot CR)) \cdot 1000 = (80 \cdot 0.000001) / (2 \cdot 2.4) \cdot 1000 = 0.0167$		Dibromoethane CASRN 106-93-4 IRIS US EPA, ORD
95-94-3	1,2,4,5-Tetrachlorobenzene	NA	Non-Carcinogen: $((RfD \cdot BW \cdot RSC) / DWS \cdot CR) \cdot 1000 = ((0.0003 \cdot 80 \cdot 0.2) / 2.4) \cdot 1000 = 2$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	1,2,4,5-Tetrachlorobenzene Provisional Peer-Reviewed Toxicity Values (PPRTV) US EPA 2013
95-95-4	2,4,5-Trichlorophenol	NA	Non-Carcinogen: $((RfD \cdot BW \cdot RSC) / DWS \cdot CR) \cdot 1000 = ((0.1 \cdot 80 \cdot 0.2) / 2.4) \cdot 1000 = 666.66$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	2,4,5-Trichlorophenol Provisional Peer-Reviewed Toxicity Values (PPRTV) US EPA 2007
534-52-1	4,6-Dinitro-o-cresol	NA	Non-Carcinogen: $((RfD \cdot BW \cdot RSC) / DWS \cdot CR) \cdot 1000 = ((0.0003 \cdot 80 \cdot 0.2) / 2.4) \cdot 1000 = 2.0$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	4,6-Dinitro-o-cresol Provisional Peer-Reviewed Toxicity Values (PPRTV) US EPA 2010
107-13-1	Acrylonitrile	NA	Carcinogen: $(BW \cdot Risk) / (OCSF \cdot DWS \cdot CR) \cdot 1000 = (80 \cdot 0.000001) / (0.54 \cdot 2.4) \cdot 1000 = 0.0617$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria Acrylonitrile CASRN 107-13-1 IRIS US EPA, ORD 1991
91-58-7	beta-Chloronaphthalene	NA	Non-Carcinogen: $((RfD \cdot BW \cdot RSC) / DWS \cdot CR) \cdot 1000 = ((0.08 \cdot 80 \cdot 0.8) / 2.4) \cdot 1000 = 2,133$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	2-Chloronaphthalene Provisional Peer-Reviewed Toxicity Values (PPRTV) US EPA 2009
111-91-1	Bis(2-chloroethoxy)methane	NA	Non-carcinogen: $((RfD \cdot BW \cdot RSC) / DWS \cdot CR) \cdot 1000 = ((0.003 \cdot 80 \cdot 0.2) / 2.4) \cdot 1000 = 20$	Bis(2-chloroethoxy)methane Provisional Peer-Reviewed Toxicity Values (PPRTV) US EPA 2006	Bis(2-chloroethoxy)methane CASRN 111-91-1 IRIS US EPA, ORD 1991
542-88-1	Bis(chloromethyl) ether	NA	Carcinogen: $(BW \cdot Risk) / (OCSF \cdot DWS \cdot CR) \cdot 1000 = (80 \cdot 0.000001) / (220 \cdot 2.4) \cdot 1000 = 0.00015$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria Bis(chloromethyl) ether (BCME) CASRN 542-88-1 IRIS US EPA, ORD 1991
75-00-3	Chloroethane	NA	Non-Carcinogen: $((RfD \cdot BW \cdot RSC) / DWS \cdot CR) \cdot 1000 = ((0.1 \cdot 80 \cdot 0.2) / 2.4) \cdot 1000 = 666.67$	Chloroethane Provisional Peer-Reviewed Toxicity Values (PPRTV) US EPA 2007	ATSDR Chloroethane Tox Profile 1998

117-84-0	Di-n-octyl phthalate	NA	Non-Carcinogen: $((RfD \cdot BW \cdot RSC) / DWS \text{ CR}) \cdot 1000 =$ $((0.01 \cdot 80 \cdot 0.2) / 2.4) \cdot 1000 = 66.67$	https://cfpub.epa.gov/ncea/pprtv/chemicalLanding.cfm?pprtv_sub_id=1837 2012		https://cfpub.epa.gov/ncea/pprtv/chemicalLanding.cfm?pprtv_sub_id=1837 2012
53-70-3	Dibenz (ah) anthracene	NA	Carcinogen: $(BW \cdot Risk) / (OCSF \cdot DWS \text{ CR}) \cdot 1000 =$ $(80 \cdot 0.00001) / (7.3 \cdot 2.4) \cdot 1000 = 0.00456$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Dibenz[a,h]anthracene CASRN 53-70-3 IRIS US EPA, ORD 1990
7421-93-3	Endrin aldehyde	NA	Non-Carcinogen: $((RfD \cdot BW \cdot RSC) / DWS \text{ CR}) \cdot 1000 =$ $((0.0003 \cdot 80 \cdot 0.8) / 2.4) \cdot 1000 = 8.0 \mu\text{g/L}$ Correct Cas # 7421-93-4	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		https://cfpub.epa.gov/ncea/pprtv/chemicalLanding.cfm?pprtv_sub_id=1737 2008
67-72-1	Hexachloroethane	NA	Carcinogen: $(BW \cdot Risk) / (OCSF \cdot DWS \text{ CR}) \cdot 1000 =$ $(80 \cdot 0.00001) / (0.04 \cdot 2.4) \cdot 1000 = 0.83$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Hexachloroethane CASRN 67-72-1 IRIS US EPA, ORD 2011
193-39-5	Indeno(1,2,3-cd)pyrene	NA	Carcinogen: $(BW \cdot Risk) / (OCSF \cdot DWS \text{ CR}) \cdot 1000 =$ $(80 \cdot 0.00001) / (0.73 \cdot 2.4) = 0.046$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Indeno[1,2,3-cd]pyrene CASRN 193-39-5 IRIS US EPA, ORD 1990
930-55-2	N-Nitrosopyrrolidine	NA	Carcinogen: $(BW \cdot Risk) / (OCSF \cdot DWS \text{ CR}) \cdot 1000 =$ $(80 \cdot 0.00001) / (2.1 \cdot 2.4) \cdot 1000 = 0.01587$		Nitrosopyrrolidine CASRN 930-55-2 IRIS US EPA, ORD 1987	
7440-02-0	Nickel	NA	Non-Carcinogen: $((RfD \cdot BW \cdot RSC) / DWS \text{ CR}) \cdot 1000 =$ $((0.02 \cdot 80 \cdot 0.2) / 2.4) \cdot 1000 = 133$	Nickel, soluble salts CASRN Various IRIS US EPA, ORD 1991		Nickel, soluble salts CASRN Various IRIS US EPA, ORD 1991
98-95-3	Nitrobenzene	NA	Non-Carcinogen: $((RfD \cdot BW \cdot RSC) / DWS \text{ CR}) \cdot 1000 =$ $((0.002 \cdot 80 \cdot 0.2) / 2.4) \cdot 1000 = 13.3$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Toxicological Profile for Nitrobenzene ATSDR 2022
924-16-3	Nitrosodibutylamine	NA	Carcinogen: $(BW \cdot Risk) / (OCSF \cdot DWS \text{ CR}) \cdot 1000 =$ $(80 \cdot 0.00001) / (5.4 \cdot 2.4) \cdot 1000 = 0.00617$		Nitroso-di-n-butylamine CASRN 924-16-3 IRIS US EPA, ORD 1987	
55-18-5	Nitrosodiethylamine	NA	Carcinogen: $(BW \cdot Risk) / (OCSF \cdot DWS \text{ CR}) \cdot 1000 =$ $(80 \cdot 0.00001) / (150 \cdot 2.4) \cdot 1000 = 0.0002$		Nitrosodiethylamine CASRN 55-18-5 IRIS US EPA, ORD 1987	
56-38-2	Parathion	NA	Non-Carcinogen: $((RfD \cdot BW \cdot RSC) / DWS \text{ CR}) \cdot 1000 =$ $((0.006 \cdot 80 \cdot 0.2) / 2.4) \cdot 1000 = 40$	Parathion EPA 2000		Parathion CASRN 56-38-2 IRIS US EPA, ORD 1988

608-93-5	Pentachlorobenzene	NA	Non-Carcinogen: $\left(\frac{RfD \cdot BW \cdot RSC}{DWS \cdot CR}\right) \cdot 1000 =$ $\left(\frac{0.0008 \cdot 80 \cdot 0.2}{2.4}\right) \cdot 1000 = 5.33$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Pentachlorobenzene CASRN 608-93-5 IRIS US EPA, ORD 1987
----------	--------------------	----	---	---	--	---

C2. Methodologies for Deriving Criteria for the Fish Consumption (FC) Designated Use

Numeric water quality criteria for the FC designated use were derived using the following equations:

- For carcinogens using BCF:

$$(BW \cdot RISK) / (OCSF \cdot FCR \cdot BCF)$$
- For carcinogens using BAF:

$$\left(\frac{Risk}{OCSF}\right) \cdot BW / (FC \cdot TL_2 \cdot TL_2 \cdot BAF) + (FC \cdot TL_3 \cdot TL_3 \cdot BAF) + (FC \cdot TL_4 \cdot TL_4 \cdot BAF)$$
- For non-carcinogens using BCF:

$$(RfD \cdot RSC \cdot BW) / (FCR \cdot BCF)$$
- Non-carcinogen using BAF:

$$(RfD \cdot RSC \cdot BW) / ((FC \cdot TL_2 \cdot TL_2 \cdot BAF) + (FC \cdot TL_3 \cdot TL_3 \cdot BAF) + (FC \cdot TL_4 \cdot TL_4 \cdot BAF))$$

In the equations above:

- BW equals the EPA recommended average weight of a human male in kilograms, which is 80kg.
- RISK equals the excess cancer risk of 10^{-6} .
- OCSF is the oral cancer slope factor, which is an estimate of the cancer risk from oral exposure to a pollutant dose of 1 mg/kg-day over an average life expectancy.
- FCR equals the EPA recommended average fish consumption rate, which is 22 grams per day.
- BCF equals bioconcentration factor, which estimates the intake and retention of a substance in an organism entirely by respiration from water in aquatic ecosystems.
- BAF equals bioaccumulation factor, which estimates the intake of a chemical and its concentration in the organism by all possible means, including contact, respiration and ingestion.
- TL equals the trophic level an organism occupies in a food web, which directly affects its BAF.
 - TL1: Producer, makes its own food.
 - TL2: Primary consumer, consumes producers
 - TL3: Secondary consumer, consumes primary consumers
 - TL4: Tertiary consumer, consumes secondary consumers

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 ADEQ did not have a bioconcentration factor for a pollutant, a FC criterion was not calculated.
5. If there were insufficient reliable data for any TLs to develop a BAF, the BCF method was used.

The following table provides information regarding the FC criteria reviewed for this TR and NPRM. The table includes the formula used to derive the numeric value and citations to where ADEQ sourced variables to calculate the value. The purpose of this table is to provide the public with the methodology behind ADEQ's data collection and analysis portion of this TR. Absolute values for these pollutants are addressed in the State Water Quality Standards section of this preamble.

Table 2. Fish Consumption Data Collection and Assessment Information.

Cas#	Pollutant	Formula (µg/L)	Calculation	Toxicity Criteria Source	Carcinogenicity
71-55-6	1,1,1-Trichloroethane	Non-carcinogen using BAF: $(RfD * RSC * BW) / ((FC * TL2 * TL2 * BAF) + (FC * TL3 * TL3 * BAF) + (FC * TL4 * TL4 * BAF)) * 1000$	$(2 * 0.2 * 80) / ((0.0076 * 6.9) + (0.0086 * 9) + (0.0051 * 10)) * 1000 = 176,952$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Trichloroethane CASRN 71-55-6 IRIS US EPA. ORD 2007
79-34-5	1,1,2,2-Tetrachloroethane	Carcinogen using BAF: $((Risk / OCSF) * BW) / ((FC * TL2 * TL2 * BAF) + (FC * TL3 * TL3 * BAF) + (FC * TL4 * TL4 * BAF)) * 1000$	$((0.000001 / 0.2) * 80) / ((0.0076 * 5.7) + (0.0086 * 7.4) + (0.0051 * 8.4)) * 1000 = 2.67$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Tetrachloroethane CASRN 79-34-5 IRIS US EPA, ORD 2010
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	Carcinogen using BCF: $(BW * Risk) / (OCSF * FC * BCF) * 1000$	$(80 * 0.000001) / (1500 * 0.022 * 5000) * 1000 = 4.8E-9$	2,3,7,8-Tetrachlorodibenzo-p-Dioxin (2,3,7,8-TCDD) EPA 2000	
534-52-1	4,6-Dinitro-o-cresol	Non-carcinogen using BAF: $(RfD * RSC * BW) / ((FC * TL2 * TL2 * BAF) + (FC * TL3 * TL3 * BAF) + (FC * TL4 * TL4 * BAF)) * 1000$	$(0.0003 * 0.2 * 80) / ((0.0076 * 6.8) + (0.0086 * 8.9) + (0.0051 * 10)) * 1000 = 26.78$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Provisional Peer-Reviewed Toxicity Values for 4,6-Dinitro-o-cresol 2010

Cas#	Pollutant	Formula (µg/L)	Calculation	Toxicity Criteria Source	Carcinogenicity
71-43-2	Benzene	Carcinogen using BAF: (((Risk/OCSF)*BW)/(FC TL2*TL2 BAF)+(FC TL3*TL3 BAF)+(FC TL4*TL4 BAF))*1000	Upper Limit: (((0.000001/0.015)*8 0)/(0.0076*3.6)+(0.0 086*4.5)+(0.0051*5)) *1000 = 58.25 µg/L Lower Limit: (((0.000001/0.055)*8 0)/(0.0076*3.6)+(0.0 086*4.5)+(0.0051*5)) *1000 = 15.89 µg/L	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Benzene CASRN 71-43-2 IRIS US EPA. ORD 2003
50-32-8	Benzo(a)pyrene	Carcinogen using BAF: (((Risk/OCSF)*BW)/(FC TL2*TL2 BAF)+(FC TL3*TL3 BAF)+(FC TL4*TL4 BAF))*1000	(((0.000001/7.3)*80)/ (0.0076*3900)+(0.00 86*3900)+(0.0051*3 900))*1000 = 0.000132	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Benzof[a]pyrene (BaP) CASRN 50-32-8 IRIS US EPA. ORD 2017
91-58-7	2-Chloronaphthalene	Non-carcinogen using BAF: (RfD*RSC*BW)/((FC TL2*TL2 BAF)+(FC TL3*TL3 BAF)+(FC TL4*TL4 BAF))*1000"	(0.08*0.8*80)/((0.007 6*150)+(0.0086*210) +(0.0051*240))*1000 = 1227.82	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	https://comptox.epa.gov/dashboard/chemical/executive-summary/DTXSID8023971 2023
56-23-5	Carbon tetrachloride	Carcinogen using BAF: (((Risk/OCSF)*BW)/(FC TL2*TL2 BAF)+(FC TL3*TL3 BAF)+(FC TL4*TL4 BAF))*1000	(((0.000001/0.07)*80)/(0.0076*9.3)+(0.00 86*12)+(0.0051*14))* 1000 = 4.67	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Carbon tetrachloride CASRN 56-23-5 IRIS US EPA. ORD 2010
67-66-3	Chloroform	Non-carcinogen using BAF: (RfD*RSC*BW)/((FC TL2*TL2 BAF)+(FC TL3*TL3 BAF)+(FC TL4*TL4 BAF))*1000	(0.01*0.2*80)/((0.007 6*2.8)+(0.0086*3.4)+ (0.0051*3.8))*1000 = 2,288.98	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Chloroform CASRN 67-66-3 IRIS US EPA. ORD 2001
57-12-5	Cyanide (as free cyanide)	Non-carcinogen using BCF: ((RfD*RSC*BW)/(FCR*BCF))*1000	(((0.0006*0.2*80)/(0.0 22*1))*1000= 436.36	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Cyanide, free CASRN 57-12-5 IRIS US EPA. ORD 2010
50-29-3	p,p'-Dichlorodiphenyltri chloroethane (DDT)	Carcinogen using BAF: (((Risk/OCSF)*BW)/(FC TL2*TL2 BAF)+(FC TL3*TL3 BAF)+(FC TL4*TL4 BAF))*1000	(((0.000001/0.34)*80)/(0.0076*35,000)+(0 .0086*240,000)+(0.0 051*1,100,000))*100 0= 0.0000296	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Dichlorodiphenyltrichloroethane (DDT) CASRN 50-29-3 IRIS US EPA. ORD 1987
75-09-2	Dichloromethane	Carcinogen using BAF: (((Risk/OCSF)*BW)/(FC TL2*TL2 BAF)+(FC TL3*TL3 BAF)+(FC TL4*TL4 BAF))*1000	(((0.000001/0.002)*8 0)/(0.0076*1.4)+(0.0 086*1.5)+(0.0051*1. 6))*1000= 1261.83	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Dichloromethane CASRN 75-09-2 IRIS US EPA. ORD 2011
7421-93-3	Endrin aldehyde	Non-carcinogen using BAF: (RfD*RSC*BW)/((FC TL2*TL2 BAF)+(FC TL3*TL3 BAF)+(FC TL4*TL4 BAF))*1000	(0.0003*0.8*80)/((0.0 076*440)+(0.0086*9 20)+(0.0051*850))*1 000= 1.23	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Toxicological Profile for Endrin ATSDR 2021
		Correct Cas # 7421-93-4			

Cas#	Pollutant	Formula (µg/L)	Calculation	Toxicity Criteria Source	Carcinogenicity
58-89-9	Hexachlorocyclohexane gamma	Non-carcinogen using BAF: (RfD*RSC*BW)/((FC TL2*TL2 BAF)+(FC TL3*TL3 BAF)+(FC TL4*TL4 BAF))*1000	$(0.0047*0.5*80)/((0.0076*1200)+(0.0086*2400)+(0.0051*2500))*1000 = 4.42$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	https://comptox.epa.gov/dashboard/chemical/executive-summary/DTXSID2020686 2022
77-47-4	Hexachlorocyclopentadiene	Non-carcinogen using BAF: (RfD*RSC*BW)/((FC TL2*TL2 BAF)+(FC TL3*TL3 BAF)+(FC TL4*TL4 BAF))*1000	$(0.006*0.2*80)/((0.0076*620)+(0.0086*1500)+(0.0051*1300))*1000 = 3.96$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	https://www.atsdr.cdc.gov/ToxProfiles/tp112.pdf ATSDR 1999
67-72-1	Hexachloroethane	Carcinogen using BAF: (((Risk/OCSF)*BW)/(FC TL2*TL2 BAF)+(FC TL3*TL3 BAF)+(FC TL4*TL4 BAF))*1000	$((0.000001/0.04)*80)/((0.0076*1200)+(0.0086*280)+(0.0051*600))*1000 = 0.137$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Hexachloroethane CASRN 67-72-1 IRIS US EPA, ORD 2011
193-39-5	Indeno (1,2,3-cd) pyrene	Carcinogen using BAF: (((Risk/OCSF)*BW)/(FC TL2*TL2 BAF)+(FC TL3*TL3 BAF)+(FC TL4*TL4 BAF))*1000	$((0.000001/0.73)*80)/((0.0076*3900)+(0.0086*3900)+(0.0051*3900))*1000 = 0.0013$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Indeno[1,2,3-cd]pyrene CASRN 193-39-5 IRIS US EPA, ORD 1990
98-95-3	Nitrobenzene	Non-carcinogen using BAF: (RfD*RSC*BW)/((FC TL2*TL2 BAF)+(FC TL3*TL3 BAF)+(FC TL4*TL4 BAF))*1000	$(0.002*0.2*80)/((0.0076*2.3)+(0.0086*2.8)+(0.0051*3.1))*1000 = 557.78$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Nitrobenzene (CASRN 98-95-3) IRIS US EPA 2009
924-16-3	Nitrosodibutylamine	Carcinogen using BCF: (BW*Risk)/(OCSF*FC*BCF)*1000	$(80*0.000001)/(5.4*0.022*3.38)*1000 = 0.199$	https://comptox.epa.gov/dashboard/chemical/executive-summary/DTXSID2021026 2022	Nitroso-di-n-butylamine CASRN 924-16-3 IRIS US EPA, ORD 1987
55-18-5	Nitrosodiethylamine	Carcinogen using BCF: (BW*Risk)/(OCSF*FC*BCF)*1000	$(80*0.000001)/(150*0.022*3)*1000 = 0.008$	N-Nitrosodiethylamine C4H10N2O CID 5921 - PubChem 2023	
930-55-2	N-nitrosopyrrolidine	Carcinogen using BCF: (BW*Risk)/(OCSF*FC*BCF)*1000	$(80*0.000001)/(2.1*0.022*0.055)*1000 = 31.48$	Nitrosopyrrolidine CASRN 930-55-2 IRIS US EPA, ORD 1987	
87-86-5	Pentachlorophenol	Carcinogen using BAF: (((Risk/OCSF)*BW)/(FC TL2*TL2 BAF)+(FC TL3*TL3 BAF)+(FC TL4*TL4 BAF))*1000	$((0.000001/0.4)*80)/((0.0076*44)+(0.0086*290)+(0.0051*520))*1000 = 0.0365$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Pentachlorophenol (CASRN 87-86-5) IRIS US EPA 2010
127-18-4	Tetrachloroethylene	Carcinogen using BAF: (((Risk/OCSF)*BW)/(FC TL2*TL2 BAF)+(FC TL3*TL3 BAF)+(FC TL4*TL4 BAF))*1000	$((0.000001/0.0021)*80)/((0.0076*49)+(0.0086*66)+(0.0051*76))*1000 = 28.695$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Tetrachloroethylene Cl2C=CCl2 CID 31373 - PubChem 2023
7440-28-0	Thallium	Non-carcinogen using BCF: ((RfD*RSC*BW)/(FCR*BCF))*1000	$((0.00001*0.2*80)/(0.022*119))*1000 = 0.06$	AZ HHC Numeric Changes draft for sharing ADEQ.xlsx	https://comptox.epa.gov/dashboard/chemical/executive-summary/DTXSID2036035 2022

Cas#	Pollutant	Formula (µg/L)	Calculation	Toxicity Criteria Source	Carcinogenicity
108-88-3	Toluene	Non-carcinogen using BAF: (RfD*RSC*BW)/((FC TL2*TL2 BAF)+(FC TL3*TL3 BAF)+(FC TL4*TL4 BAF))*1000	$(0.0097*0.2*80)/(0.0076*11)+(0.0086*15)+(0.0051*17))*1000=518.54$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Toluene CASRN 108-88-3 IRIS US EPA. ORD 2005
79-01-6	Trichloroethylene	Carcinogen using BAF: (((Risk/OCSF)*BW)/(FC TL2*TL2 BAF)+(FC TL3*TL3 BAF)+(FC TL4*TL4 BAF))*1000	$((((0.000001/0.05)*80)/(0.0076*8.7)+(0.0086*12)+(0.0051*13))*1000 = 6.79$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Trichloroethylene ClCH=CCl2 CID 6575 - PubChem 2023

C3. Methodologies for Deriving Numeric Criteria for the Full Body Contact (FBC) and Partial Body Contact (PBC) Designated Uses

ADEQ has derived the numeric water quality criteria for the FBC designated use using the following equations:

- For carcinogens:
 $(BW * RISK) / (OCSF * IR)$
- For non-carcinogens:
 $(RfD * RSC * BW) / IR$

In the equations above:

- BW equals the EPA recommended average weight of a human male in kilograms, which is 80 kg.
- RISK equals the excess cancer risk of 10^{-6} .
- OCSF is the oral cancer slope factor, which is an estimate of the cancer risk from oral exposure to a pollutant dose of 1 mg/kg-day over an average life expectancy.
- IR equals the EPA recommended incidental ingestion rate, which is 15 millimeters per day. of 15 millimeters per day.
- RfD equals the reference dose.
- RSC equals the relative source contribution factor.

This rulemaking adopts numeric criteria for the FBC 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 FBC standard was more stringent than the DWS standard for the same pollutant, the DWS value was used in place of the calculated FBC value. It is unlikely that an individual will be more at risk from incidental ingestion during recreational activities than through direct consumption.

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

$$(RfD * RSC * BW) / IR$$

In the equation above:

- RfD equals the reference dose.
- RSC equals the relative source contribution factor.
- BW equals the EPA recommended average weight of a human male in kilograms, which is 80kg.
- IR equals the EPA recommended incidental ingestion rate, which is 15 millimeters per day.

The rulemaking adopts numeric criteria for the PBC 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.
2. A criterion for the PBC 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 higher¹, ADEQ may use the OCSF to calculate a PBC standard where no RfD or MRL is available rather than publish no standard for the PBC designated use.

The following table provides information regarding the FBC and PBC criteria reviewed for this TR and NPRM. The table includes the formula used to derive the numeric value and citations to where ADEQ sourced variables to calculate the value. The purpose of this table is to provide the

¹ Chemicals in the environment are classified into five groups based on the existing scientific evidence for carcinogenicity.

Group A: "Human Carcinogen" - There is enough evidence to conclude that it can cause cancer in humans.

Group B1: "Probable Human Carcinogen" - There is limited evidence that it can cause cancer in humans, but at present, it is not conclusive.

Group B2: "Probable Human Carcinogen" - There is inadequate evidence that it can cause cancer in humans but at present, it is far from conclusive.

Group C: "Possible Human Carcinogen" - There is limited evidence that it can cause cancer in animals in the absence of human data, but at present, it is not conclusive.

Group D: "Not Classifiable as to Human Carcinogenicity" - There is no evidence at present that it causes cancer in humans.

Group E: "Evidence of Non-Carcinogenicity for Humans" - There is strong evidence that it does not cause cancer in humans.

public with the methodology behind ADEQ's data collection and analysis portion of this TR. Absolute values for these pollutants are addressed in the State Water Quality Standards section of this preamble.

Table 3. Full and Partial Body Data Collection and Assessment Information

Cas#	Pollutant	Formula (µg/L)	RSC/RfD	OCSF	Carcinogenicity
79-34-5	1,1,2,2-Tetrachloroethane	FBC - Carcinogen: $((BW * Risk) / (OCSF * IR)) * 1000$ $((80 * 0.000001) / (0.2 * 0.015)) * 1000 = 26.67$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Tetrachloroethane CASRN 79-34-5 IRIS US EPA, ORD 2010
79-34-5	1,1,2,2-Tetrachloroethane	PBC - $((RfD * RSC * BW) / IR) * 1000$ $((0.02 * 0.2 * 80) / 0.015) * 1000 = 21333.33$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Tetrachloroethane CASRN 79-34-5 IRIS US EPA, ORD 2010
79-00-5	1,1,2-Trichloroethane	FBC - Carcinogen: $((BW * Risk) / (OCSF * IR)) * 1000$ $((80 * 0.000001) / (0.057 * 0.015)) * 1000 = 93.57 \mu\text{g/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Trichloroethane CASRN 79-00-5 IRIS US EPA, ORD 1988
122-66-7	1,2-Diphenylhydrazine	Both - Carcinogen: $((BW * Risk) / (OCSF * IR)) * 1000$ $((80 * 0.000001) / (0.8 * 0.015)) * 1000 = 6.67$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Diphenylhydrazine CASRN 122-66-7 IRIS US EPA, ORD 1987
95-94-3	1,2,4,5-Tetrachlorobenzene	Both - Non-Carcinogen: $((RfD * RSC * BW) / IR) * 1000$ $((0.0003 * 0.2 * 80) / 0.015) * 1000 = 320$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Provisional Peer-Reviewed Toxicity Values for 1,2,4,5-Tetrachlorobenzene (CASRN 95-94-3) 2013
542-75-6	1,3-Dichloropropene	FBC - Carcinogen: $((BW * Risk) / (OCSF * IR)) * 1000$ $((80 * 0.000001) / (0.122 * 0.015)) * 1000 = 43.72$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Dichloropropene CASRN 542-75-6 IRIS US EPA, ORD 2000
1746-01-06	2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8- TCDD)	FBC - Carcinogen: $((BW * Risk) / (OCSF * IR)) * 1000$ $((80 * 0.000001) / (150000 * 0.015)) = 3.56E-5$		Tetrachlorodibenzo-p-dioxin CASRN 1746-01-6 IRIS US EPA, ORD 2012	2,3,7,8-Tetrachlorodibenzo-p-Dioxin (2,3,7,8.-TCDD) 2000

Cas#	Pollutant	Formula (µg/L)	RSC/RfD	OCSF	Carcinogenicity
1746-01-06	2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8- TCDD)	PBC - $((RfD * RSC * BW) / IR) * 1000$ $((7.00E-10 * 0.2 * 80) / 0.015) * 1000 = 7.47E-4$	Tetrachlorodibenzo-p-dioxin CASRN 1746-01-6 IRIS US EPA, ORD 2012		2,3,7,8-Tetrachlorodibenzo-p-Dioxin (2,3,7,8.-TCDD) 2000
95-95-4	2,4,5- Trichlorophenol	Both - Non-Carcinogen: $((RfD * RSC * BW) / IR) * 1000$ $((0.1 * 0.2 * 80) / 0.015) * 1000 = 106666.67$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		2,4,5-Trichlorophenol EPA 2000
93-72-1	2,4,5-Trichlorophenoxy propionic acid (2,4,5-TP)	Both - Non-Carcinogen: $((RfD * RSC * BW) / IR) * 1000$ $((0.008 * 0.8 * 80) / 0.015) * 1000 = 34133.33$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Trichlorophenoxy) propionic acid (2,4,5-TP) CASRN 93-72-1 IRIS US EPA, ORD 1988
88-06-2	2,4,6-Trichlorophenol	FBC - Carcinogen: $((BW * Risk) / (OCSF * IR)) * 1000$ $((80 * 0.000001) / (0.011 * 0.015)) * 1000 = 484.85$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Trichlorophenol CASRN 88-06-2 IRIS US EPA, ORD 1990
88-06-2	2,4,6-Trichlorophenol	PBC: $((RfD * RSC * BW) / IR) * 1000$ $((0.001 * 0.2 * 80) / 0.015) * 1000 = 1066.67$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Trichlorophenol CASRN 88-06-2 IRIS US EPA, ORD 1990
606-20-2	2,6-Dinitrotoluene	FBC - Carcinogen: $((BW * Risk) / (OCSF * IR)) * 1000$ $((80 * 0.000001) / (0.68 * 0.015)) * 1000 = 7.84$		https://comptox.epa.gov/dashboard/chemical/executive-summary/DTXSID5020528 2022	Dinitrotoluene mixture CASRN Various IRIS US EPA, ORD 1990
606-20-2	2,6-Dinitrotoluene	PBC: $((RfD * RSC * BW) / IR) * 1000$ $((0.0003 * 0.2 * 80) / 0.015) * 1000 = 320$	https://comptox.epa.gov/dashboard/chemical/executive-summary/DTXSID5020528 2022		Dinitrotoluene mixture CASRN Various IRIS US EPA, ORD 1990
91-94-1	3,3'-Dichlorobenzidine	Both - Carcinogens: $((BW * Risk) / (OCSF * IR)) * 1000$ $((80 * 0.000001) / (0.45 * 0.015)) * 1000 = 11.85 \mu\text{g/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Dichlorobenzidine CASRN 91-94-1 IRIS US EPA, ORD 1991

Cas#	Pollutant	Formula (µg/L)	RSC/RfD	OCSF	Carcinogenicity
205-99-2	3,4 Benz(a)anthracene	Both - Carcinogen: $((BW \cdot Risk) / (OCSF \cdot IR)) \cdot 1000$ $((80 \cdot 0.000001) / (0.73 \cdot 0.015)) \cdot 1000 = 7.31$ µg/L		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Benzo[b]fluoranthene CASRN 205-99-2 IRIS US EPA, ORD 1990
534-52-1	4,6-Dinitro-o-cresol	Both - Non-Carcinogens: $((RfD \cdot RSC \cdot BW) / IR) \cdot 1000$ $((0.0003 \cdot 0.2 \cdot 80) / 0.015) \cdot 1000 = 320$ µg/L	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		https://comptox.epa.gov/dashboard/chemical/executive-summary/DTXSID1022053 2022
107-13-1	Acrylonitrile	FBC - Carcinogens: $((BW \cdot Risk) / (OCSF \cdot IR)) \cdot 1000$ $((80 \cdot 0.000005) / (0.54 \cdot 0.015)) \cdot 1000 = 9.88$ µg/L		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Acrylonitrile CASRN 107-13-1 IRIS US EPA, ORD 1991
309-00-2	Aldrin	FBC - Carcinogens: $((BW \cdot Risk) / (OCSF \cdot IR)) \cdot 1000$ $((80 \cdot 0.000001) / (17 \cdot 0.015)) \cdot 1000 = 0.3137$ µg/L		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Aldrin CASRN 309-00-2 IRIS US EPA, ORD 1987
7440-39-3	Barium	Both: $((RfD \cdot RSC \cdot BW) / IR) \cdot 1000$ $((0.2 \cdot 0.2 \cdot 80) / 0.015) \cdot 1000 = 213333.33$ µg/L	Barium and Compounds CASRN 7440-39-3 IRIS US EPA, ORD 2005		Barium and Compounds (CASRN 7440-39-3) IRIS US EPA 2005
56-55-3	Benz(a)anthracene	Both - Carcinogen: $((BW \cdot Risk) / (OCSF \cdot IR)) \cdot 1000$ $((80 \cdot 0.000001) / (0.73 \cdot 0.015)) \cdot 1000 = 7.31$ µg/L		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Benz[a]anthracene CASRN 56-55-3 IRIS US EPA, ORD 1990
71-43-2	Benzene	FBC - Carcinogen: $((BW \cdot Risk) / (OCSF \cdot IR)) \cdot 1000$ $((80 \cdot 0.000001) / (0.035 \cdot 0.015)) \cdot 1000 = 152.38$ µg/L		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Benzene (CASRN 71-43-2) IRIS US EPA 2003
92-87-5	Benzidine	FBC - Carcinogen: $((BW \cdot Risk) / (OCSF \cdot IR)) \cdot 1000$ $((80 \cdot 0.000001) / (230 \cdot 0.015)) \cdot 1000 = 0.0232$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Benzidine CASRN 92-87-5 IRIS US EPA, ORD 1989

Cas#	Pollutant	Formula (µg/L)	RSC/RfD	OCSF	Carcinogenicity
50-32-8	Benzo(a)pyrene	FBC - Carcinogen: $((BW \cdot Risk) / (OCSF \cdot IR)) \cdot 1000$ $((80 \cdot 0.000001) / (1 \cdot 0.015)) \cdot 1000 = 5.3 \mu\text{g/L}$		Benzo[a]pyrene (BaP) CASRN 50-32-8 IRIS US EPA, ORD 2017	
50-32-8	Benzo(a)pyrene	PBC - Carcinogen: $((RfD \cdot RSC \cdot BW) / IR) \cdot 1000$ $((0.0003 \cdot 0.2 \cdot 80) / 0.015) \cdot 1000 = 320 \mu\text{g/L}$	Toxicological Review of Benzo[a]pyrene (Final Report) 2017		Benzo[a]pyrene (BaP) CASRN 50-32-8 IRIS US EPA, ORD 2017
207-08-09	Benzo(k)fluoranthene	Both - Carcinogen: $((BW \cdot Risk) / (OCSF \cdot IR)) \cdot 1000$ $((80 \cdot 0.000001) / (0.073 \cdot 0.015)) \cdot 1000 = 73.06 \mu\text{g/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Benzo[k]fluoranthene CASRN 207-08-9 IRIS US EPA, ORD 1990
91-58-7	2-Chloronaphthalene (2016)	Both - Non-Carcinogen: $((RfD \cdot RSC \cdot BW) / IR) \cdot 1000$ $((0.08 \cdot 0.8 \cdot 80) / 0.015) \cdot 1000 = 341333.33 \mu\text{g/L}$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		https://comptox.epa.gov/dashboard/chemical/executive-summary/DTXSID8023971 2022
111-91-1	Bis(2-chloroethoxy) methane	Both - Non-Carcinogen: $((RfD \cdot RSC \cdot BW) / IR) \cdot 1000$ $((0.003 \cdot 0.2 \cdot 80) / 0.015) \cdot 1000 = 3200 \mu\text{g/L}$	Provisional Peer Reviewed Toxicity Values for Bis(2-chloroethoxy)methane (CASRN 111-91-1) 2006		Bis(2-chloroethoxy)methane CASRN 111-91-1 IRIS US EPA, ORD 1991
111-44-4	Bis(2-chloroethyl) ether	Both - Carcinogen: $((BW \cdot Risk) / (OCSF \cdot IR)) \cdot 1000$ $((80 \cdot 0.000001) / (1.1 \cdot 0.015)) \cdot 1000 = 4.85 \mu\text{g/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Bis(chloroethyl)ether (BCEE) CASRN 111-44-4 IRIS US EPA, ORD 1987
542-88-1	Bis(chloromethyl) ether	FBC - Carcinogen: $((BW \cdot Risk) / (OCSF \cdot IR)) \cdot 1000$ $((80 \cdot 0.000001) / (220 \cdot 0.015)) \cdot 1000 = 0.024 \mu\text{g/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Bis(chloromethyl)ether (BCME) CASRN 542-88-1 IRIS US EPA, ORD 1988
75-25-2	Bromoform	FBC - Carcinogen: $((BW \cdot Risk) / (OCSF \cdot IR)) \cdot 1000$ $((80 \cdot 0.000001) / (0.0045 \cdot 0.015)) \cdot 1000 = 1185.2 \mu\text{g/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Bromoform CASRN 75-25-2 IRIS US EPA, ORD 1990
7440-43-9	Cadmium (T)	FBC - Non-Carcinogens:	Cadmium CASRN		Cadmium CASRN 7440-43-9 IRIS US EPA, ORD

Cas#	Pollutant	Formula (µg/L)	RSC/RfD	OCSF	Carcinogenicity
		$((RfD \cdot RSC \cdot BW) / IR) \cdot 1000$ $((0.0005 \cdot 0.2 \cdot 80) / 0.015) \cdot 1000 = 533.33$ µg/L	7440-43-9 IRIS US EPA, ORD 1989		1989
7440-43-9	Cadmium (T)	PBC - Non-carcinogen: $((RfD \cdot RSC \cdot BW) / IR) \cdot 1000$ $((0.0005 \cdot 0.25 \cdot 80) / 0.015) \cdot 1000 = 666.67$ µg/L	Cadmium Compounds (A) EPA 2000		Cadmium CASRN 7440-43-9 IRIS US EPA, ORD 1989
56-23-5	Carbon tetrachloride	FBC - Carcinogen: $((BW \cdot Risk) / (OCSF \cdot IR)) \cdot 1000$ $((80 \cdot 0.000001) / (0.07 \cdot 0.015)) \cdot 1000 = 76.19$ µg/L		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	ATSDR Carbon Tetrachloride Tox Profile 2005
56-23-5	Carbon tetrachloride	PBC - Carcinogen: $((RfD \cdot RSC \cdot BW) / IR) \cdot 1000$ $((0.004 \cdot 0.2 \cdot 80) / 0.015) \cdot 1000 = 4266.67$ µg/L	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		ATSDR Carbon Tetrachloride Tox Profile 2005
57-74-9	Chlordane	FBC - Carcinogen: $((BW \cdot Risk) / (OCSF \cdot IR)) \cdot 1000$ $((80 \cdot 0.000001) / (0.35 \cdot 0.015)) \cdot 1000 = 15.24$ µg/L		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Toxicological Profile for Chlordane 2018
75-00-3	Chloroethane	Both - Non-Carcinogen: $((RfD \cdot RSC \cdot BW) / IR) \cdot 1000$ $((0.1 \cdot 0.2 \cdot 80) / 0.015) \cdot 1000 = 106666.67$ µg/L	Provisional Peer Reviewed Toxicity Values for Chloroethane (CASRN 75-00-3) 2007		Provisional Peer Reviewed Toxicity Values for Chloroethane (CASRN 75-00-3) 2007
67-66-3	Chloroform	FBC - Non-Carcinogens: $((RfD \cdot RSC \cdot BW) / IR) \cdot 1000$ $((0.01 \cdot 0.2 \cdot 80) / 0.015) \cdot 1000 = 10666.67$ µg/L	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Chloroform CASRN 67-66-3 IRIS US EPA, ORD 2001
218-01-9	Chrysene	Both - Carcinogen: $((BW \cdot Risk) / (OCSF \cdot IR)) \cdot 1000$ $((80 \cdot 0.000001) / (0.0073 \cdot 0.015)) \cdot 1000 = 730.59$ µg/L		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Chrysene CASRN 218-01-9 IRIS US EPA, ORD 1990

Cas#	Pollutant	Formula (µg/L)	RSC/RfD	OCSF	Carcinogenicity
57-12-5	Cyanide (as free cyanide)	Both - Non-carcinogen: $((RfD * RSC * BW) / IR) * 1000$ $((0.0006 * 0.2 * 80) / 0.015) * 1000 = 640 \mu\text{g/L}$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Cyanide, free CASRN 57-12-5 IRIS US EPA, ORD 2010
50-29-3	p,p'-Dichlorodiphenyltrichloroethane (DDT)	FBC - Carcinogen: $((BW * Risk) / (OCSF * IR)) * 1000$ $((80 * 0.000001) / (0.34 * 0.015)) * 1000 = 15.69 \mu\text{g/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Dichlorodiphenyltrichloroethane (DDT) CASRN 50-29-3 IRIS US EPA, ORD 1988
50-29-3	p,p'-Dichlorodiphenyltrichloroethane (DDT)	PBC - Carcinogen: $((RfD * RSC * BW) / IR) * 1000$ $((0.0005 * 0.2 * 80) / 0.015) * 1000 = 533.33 \mu\text{g/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Dichlorodiphenyltrichloroethane (DDT) CASRN 50-29-3 IRIS US EPA, ORD 1988
103-23-1	Di (2-ethylhexyl) adipate	FBC - Carcinogen: $((BW * Risk) / (OCSF * IR)) * 1000$ $((80 * 0.000001) / (0.0013 * 0.015)) * 1000 = 4102.56 \mu\text{g/L}$	Di(2-ethylhexyl) adipate CASRN 103-23-1 IRIS US EPA, ORD 1992		Di(2-ethylhexyl) adipate CASRN 103-23-1 IRIS US EPA, ORD 1992
117-81-7	Di (2-ethylhexyl) phthalate	FBC - Carcinogen: $((BW * Risk) / (OCSF * IR)) * 1000$ $(80 * 0.000001) / (0.014 * 0.015) * 1000 = 380.95 \mu\text{g/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Di (2-ethylhexyl) phthalate (DEHP) CASRN 117-81-7 IRIS US EPA, ORD 1988
53-70-3	Dibenz (a,h) anthracene	Both - Carcinogen: $((BW * Risk) / (OCSF * IR)) * 1000$ $((80 * 0.000001) / (7.3 * 0.015)) * 1000 = 0.73 \mu\text{g/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Dibenz[a,h]anthracene CASRN 53-70-3 IRIS US EPA, ORD 1990
75-09-2	Dichloromethane	FBC - Carcinogen: $((BW * Risk) / (OCSF * IR)) * 1000$ $((80 * 0.000001) / (0.002 * 0.015)) * 1000 = 2666.67 \mu\text{g/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Dichloromethane CASRN 75-09-2 DTXSID0020868 IRIS US EPA, ORD 2011
75-09-3	Dichloromethane	PBC - Carcinogen: $((RfD * RSC * BW) / IR) * 1000$ $((0.06 * 0.2 * 80) / 0.015) * 1000 = 64000 \mu\text{g/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Dichloromethane CASRN 75-09-2 DTXSID0020868 IRIS US EPA, ORD 2011

Cas#	Pollutant	Formula (µg/L)	RSC/RfD	OCSF	Carcinogenicity
60-57-1	Dieldrin	FBC - Carcinogen: $\frac{((BW \cdot Risk))}{(OCSF \cdot IR)} \cdot 1000$ $\frac{((80 \cdot 0.000001))}{(16 \cdot 0.015)} \cdot 1000 = 0.333 \text{ µg/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Dieldrin CASRN 60-57-1 IRIS US EPA, ORD 1988
72-20-8	Endrin	Both - Non-Carcinogen: $\frac{((RfD \cdot RSC \cdot BW))}{IR} \cdot 1000$ $\frac{((0.0003 \cdot 0.8 \cdot 80))}{0.015} = 1280 \text{ µg/L}$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Endrin CASRN 72-20-8 IRIS US EPA, ORD 1989
7421-93-3 (correction)	Endrin aldehyde	Both - Non-Carcinogen: $\frac{((RfD \cdot RSC \cdot BW))}{IR} \cdot 1000$ $\frac{((0.0003 \cdot 0.8 \cdot 80))}{0.015} \cdot 1000 = 1280 \text{ µg/L}$ Correct Cas # 7421-93-4 for all Endrin aldehyde	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Provisional Peer Reviewed Toxicity Values for Endrin aldehyde 2008
76-44-8	Heptachlor	FBC - Carcinogen: $\frac{((BW \cdot Risk))}{(OCSF \cdot IR)} \cdot 1000$ $\frac{((80 \cdot 0.000001))}{(4.1 \cdot 0.015)} \cdot 1000 = 1.3 \text{ µg/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Heptachlor CASRN 76-44-8 IRIS US EPA, ORD 1987
1024-57-3	Heptachlor epoxide	FBC - Carcinogen: $\frac{((BW \cdot Risk))}{(OCSF \cdot IR)} \cdot 1000$ $\frac{((80 \cdot 0.000001))}{(5.5 \cdot 0.015)} \cdot 1000 = 0.97 \text{ µg/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Heptachlor epoxide CASRN 1024-57-3 IRIS US EPA, ORD 1987
118-74-1	Hexachlorobenzene	FBC - Carcinogen: $\frac{((BW \cdot Risk))}{(OCSF \cdot IR)} \cdot 1000$ $\frac{((80 \cdot 0.000001))}{(1.02 \cdot 0.015)} \cdot 1000 = 5.23 \text{ µg/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Hexachlorobenzene CASRN 118-74-1 IRIS US EPA, ORD 1991
87-68-3	Hexachlorobutadiene	FBC - Carcinogen: $\frac{((BW \cdot Risk))}{(OCSF \cdot IR)} \cdot 1000$ $\frac{((80 \cdot 0.000001))}{(0.04 \cdot 0.015)} \cdot 1000 = 133.33 \text{ µg/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Hexachlorobutadiene CASRN 87-68-3 IRIS US EPA, ORD 1993
319-84-6	Hexachlorocyclohexane alpha	FBC - Carcinogen: $\frac{((BW \cdot Risk))}{(OCSF \cdot IR)} \cdot 1000$		Chemical-specific Inputs for EPA's 2015	Hexachlorocyclohexane (alpha-HCH) CASRN

Cas#	Pollutant	Formula (µg/L)	RSC/RfD	OCSF	Carcinogenicity
		$((80 \times 0.000001) / (6.3 \times 0.015)) \times 1000 = 0.846 \text{ µg/L}$		Final Updated Human Health Ambient Water Quality Criteria	319-84-6 IRIS US EPA, ORD 1987
319-85-7	Hexachlorocyclohexane beta	FBC - Carcinogen: $((\text{BW} \times \text{Risk}) / (\text{OCSF} \times \text{IR})) \times 1000$ $((80 \times 0.000001) / (1.8 \times 0.015)) \times 1000 = 2.96 \text{ µg/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Hexachlorocyclohexane (beta-HCH) CASRN 319-85-7 IRIS US EPA, ORD 1987
58-89-9	Hexachlorocyclohexane gamma	FBC - Non-Carcinogens: $((\text{RfD} \times \text{RSC} \times \text{BW}) / \text{IR}) \times 1000$ $((0.0047 \times 0.5 \times 80) / 0.015) \times 1000 = 12,533.33 \text{ µg/L}$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		https://comptox.epa.gov/dashboard/chemical/executive-summary/DTXSID2020686 2022
77-47-4	Hexachlorocyclopentadiene	FBC - Non-Carcinogen: $((\text{RfD} \times \text{RSC} \times \text{BW}) / \text{IR}) \times 1000$ $((0.006 \times 0.2 \times 80) / 0.015) \times 1000 = 6400 \text{ µg/L}$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Hexachlorocyclopentadiene (HCCPD) CASRN 77-47-4 IRIS US EPA, ORD 2001
67-72-1	Hexachloroethane	FBC - Carcinogen: $((\text{BW} \times \text{Risk}) / (\text{OCSF} \times \text{IR})) \times 1000$ $((80 \times 0.000001) / (0.04 \times 0.015)) \times 1000 = 133.33 \text{ µg/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Hexachloroethane CASRN 67-72-1 IRIS US EPA, ORD 2011
67-72-1	Hexachloroethane	PBC - Carcinogen: $((\text{RfD} \times \text{RSC} \times \text{BW}) / \text{IR}) \times 1000$ $((0.0007 \times 0.2 \times 80) / 0.015) \times 1000 = 746.67 \text{ µg/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Hexachloroethane CASRN 67-72-1 IRIS US EPA, ORD 2011
193-39-5	Indeno (1,2,3-cd) pyrene	Both - Carcinogen: $((\text{BW} \times \text{Risk}) / (\text{OCSF} \times \text{IR})) \times 1000$ $((80 \times 0.000001) / (0.73 \times 0.015)) \times 1000 = 7.31 \text{ µg/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Indeno[1,2,3-cd]pyrene CASRN 193-39-5 IRIS US EPA, ORD 1990
78-59-1	Isophorone	FBC - Carcinogen: $((\text{BW} \times \text{Risk}) / (\text{OCSF} \times \text{IR})) \times 1000$ $((80 \times 0.000001) / (0.0095 \times 0.015)) \times 1000 = 5614.04 \text{ µg/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Isophorone CASRN 78-59-1 IRIS US EPA, ORD 1992
72-43-5	Methoxychlor	Both - Non-Carcinogens: $((\text{RfD} \times \text{RSC} \times \text{BW}) / \text{IR}) \times 1000$	Chemical-specific Inputs for EPA's 2015		Methoxychlor CASRN 72-43-5 IRIS US EPA, ORD 1990

Cas#	Pollutant	Formula (µg/L)	RSC/RfD	OCSF	Carcinogenicity
		1000 ((0.00002*0.80*80)/0.015)*1000 = 85.33 µg/L	Final Updated Human Health Ambient Water Quality Criteria		
621-64-7	N-nitrosodi-n-propylamine	FBC - Carcinogen: ((BW*Risk)/(OCSF*IR))*1000 ((80*0.000001)/(7*0.015))*1000 = 0.762 µg/L			Nitrosodi-N-propylamine CASRN 621-64-7 IRIS US EPA, ORD 1987
62-75-9	N-nitrosodimethylamine	FBC - Carcinogen: ((BW*Risk)/(OCSF*IR))*1000 ((80*0.000001)/(51*0.015))*1000 = 0.10 µg/L			Nitrosodimethylamine CASRN 62-75-9 IRIS US EPA, ORD 1987
62-75-9	N-nitrosodimethylamine	PBC - Carcinogen: ((RfD*RSC*BW)/IR)*1000 ((0.000008*0.2*80)/0.015)*1000 = 8.53 µg/L	n-Nitrosodimethylamine Provisional Peer-Reviewed Toxicity Values (PPRTV) US EPA 2007		Nitrosodimethylamine CASRN 62-75-9 IRIS US EPA, ORD 1987
86-30-6	N-Nitrosodiphenylamine	Both - Carcinogen: ((BW*Risk)/(OCSF*IR))*1000 ((80*0.000001)/(0.0049*0.015))*1000 = 1088.44 µg/L			Nitrosodiphenylamine CASRN 86-30-6 IRIS US EPA, ORD 1987
930-55-2	N-nitrosopyrrolidine	FBC - Carcinogen: ((BW*Risk)/(OCSF*IR))*1000 ((80*0.000001)/(2.1*0.015))*1000 = 2.54 µg/L			Nitrosopyrrolidine CASRN 930-55-2 IRIS US EPA, ORD 1987
98-95-3	Nitrobenzene	Both - Non-Carcinogen: ((RfD*RSC*BW)/IR)*1000 ((0.002*0.2*80)/0.015)*1000 = 2133.33 µg/L	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Nitrobenzene CASRN 98-95-3 IRIS US EPA, ORD 2009
924-16-3	Nitrosodibutylamine	FBC - Carcinogen: ((BW*Risk)/(OCSF*IR))*1000 ((80*0.000001)/(5.4*0.015))*1000 = 0.988 µg/L			Nitroso-di-n-butylamine CASRN 924-16-3 IRIS US EPA, ORD 1987
55-18-5	Nitrosodiethylamine	FBC - Carcinogen: ((BW*Risk)/(OCSF*IR))*1000 ((80*0.000001)/(150*0.015))*1000 = 0.0356 µg/L			Nitrosodiethylamine CASRN 55-18-5 IRIS US EPA, ORD 1987

Cas#	Pollutant	Formula (µg/L)	RSC/RfD	OCSF	Carcinogenicity
56-38-2	Parathion	Both- Non-carcinogen: $((RfD \cdot RSC \cdot BW) / IR) \cdot 1000$ $((0.006 \cdot 0.2 \cdot 80) / 0.015) \cdot 1000 = 6400 \mu\text{g/L}$	https://comptox.epa.gov/dashboard/chemical/executive-summary/DTXSID7021100 2022		Parathion CASRN 56-38-2 IRIS US EPA, ORD 1988
608-93-5	Pentachlorobenzene	Both - Non-Carcinogens: $((RfD \cdot RSC \cdot BW) / IR) \cdot 1000$ $((0.0008 \cdot 0.2 \cdot 80) / 0.015) \cdot 1000 = 853.33 \mu\text{g/L}$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Pentachlorobenzene CASRN 608-93-5 IRIS US EPA, ORD 1992
87-86-5	Pentachlorophenol	PBC - Carcinogen: $((RfD \cdot RSC \cdot BW) / IR) \cdot 1000$ $((0.005 \cdot 0.2 \cdot 80) / 0.015) \cdot 1000 = 5333.33 \mu\text{g/L}$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Pentachlorophenol CASRN 87-86-5 IRIS US EPA, ORD 2010
1336-36-3	Polychlorinatedbiphenyls (PCB)	FBC - Carcinogen: $((BW \cdot Risk) / (OCSF \cdot IR)) \cdot 1000$ $((80 \cdot 0.000001) / (2 \cdot 0.015)) \cdot 1000 = 2.67 \mu\text{g/L}$			Polychlorinated Biphenyls (PCBs) CASRN 1336-36-3 IRIS US EPA, ORD 1996
127-18-4	Tetrachloroethylene	FBC - Carcinogen: $((BW \cdot Risk) / (OCSF \cdot IR)) \cdot 1000$ $((80 \cdot 0.000001) / (0.021 \cdot 0.015)) \cdot 1000 = 2539.68 \mu\text{g/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Tetrachloroethylene (Perchloroethylene) CASRN 127-18-4 IRIS US EPA, ORD 2012
127-18-4	Tetrachloroethylene	PBC - Carcinogen: $((RfD \cdot RSC \cdot BW) / IR) \cdot 1000$ $((0.006 \cdot 0.2 \cdot 80) / 0.015) \cdot 1000 = 6400 \mu\text{g/L}$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Tetrachloroethylene (Perchloroethylene) CASRN 127-18-4 IRIS US EPA, ORD 2012
7440-28-0	Thallium	Both - Non-Carcinogen: $((RfD \cdot RSC \cdot BW) / IR) \cdot 1000$ $((0.0001 \cdot 0.2 \cdot 80) / 0.015) \cdot 1000 = 10.67 \mu\text{g/L}$	Provisional Peer-Reviewed Toxicity Values for Thallium and Compounds US EPA 2012		https://comptox.epa.gov/dashboard/chemical/executive-summary/DTXSID2036035 2022
108-88-3	Toluene	Both - Non-Carcinogen: $((RfD \cdot RSC \cdot BW) / IR) \cdot 1000$ $((0.0097 \cdot 0.2 \cdot 80) / 0.015) \cdot 1000 = 10346.67 \mu\text{g/L}$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Toluene CASRN 108-88-3 IRIS US EPA, ORD 2005

Cas#	Pollutant	Formula (µg/L)	RSC/RfD	OCSF	Carcinogenicity
8001-35-2	Toxaphene	FBC - Carcinogens: $\frac{((BW * Risk) / (OCSF * IR)) * 1000}{((80 * 0.000001) / (1.1 * 0.015)) * 1000} = 4.85 \mu\text{g/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Toxaphene CASRN 8001-35-2 IRIS US EPA, ORD 1988
8001-35-2	Toxaphene	PBC - Carcinogen: $\frac{((RfD * RSC * BW) / IR) * 1000}{((0.00035 * 0.2 * 80) / 0.015) * 1000} = 373.33 \mu\text{g/L}$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Toxaphene CASRN 8001-35-2 IRIS US EPA, ORD 1988
79-01-6	Trichloroethylene	FBC - Carcinogen: $\frac{((BW * Risk) / (OCSF * IR)) * 1000}{((80 * 0.000001) / (0.05 * 0.015)) * 1000} = 106.67 \mu\text{g/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Trichloroethylene CASRN 79-01-6 IRIS US EPA, ORD 2011
79-01-6	Trichloroethylene	PBC - Carcinogen: $\frac{((RfD * RSC * BW) / IR) * 1000}{((0.0005 * 0.2 * 80) / 0.015) * 1000} = 533.33 \mu\text{g/L}$	Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria		Trichloroethylene CASRN 79-01-6 IRIS US EPA, ORD 2011
75-01-4	Vinyl chloride	FBC - Carcinogen: $\frac{((BW * Risk) / (OCSF * IR)) * 1000}{((80 * 0.000001) / (1.5 * 0.015)) * 1000} = 3.56 \mu\text{g/L}$		Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria	Vinyl chloride CASRN 75-01-4 IRIS US EPA, ORD 2000

D. Notification

To meet the requirements of the CWA during the TR, ADEQ provides notice of the TR and holds a public hearing to allow for comments and input. ADEQ includes the results of this public process in the agency's submission to the EPA.

If a state rulemaking is conducted updating WQS criteria as part of a TR, ADEQ will also submit the completed rulemaking to the EPA for review and approval. The purpose of this process is to ensure that the public is aware of any changes that may affect their water quality and to provide opportunities for public input and review.

ADEQ is proactively releasing this draft NPRM for public consumption in preparation to meet both the requirements for TR notification and public input for the TR and state rulemaking. ADEQ welcomes comments on both the substantive and procedural portions on this draft

NPRM. Once finalized, the NPRM will be published in the Arizona Administrative Register and formal input for the TR and rulemaking will be documented.

E. State Water Quality Standards

ADEQ has used the information from the Data Collection and Analysis step to calculate numeric criteria for individual pollutants. The importance of updated numeric criteria for individual pollutants in a CWA program cannot be overstated. These criteria serve as the basis for regulating the discharge of pollutants into water bodies, and they help to ensure that WQS are being met.

As scientific knowledge and understanding of the impacts of pollutants on water quality and human health evolve, it is important to update the numeric criteria for individual pollutants accordingly. By doing so, ADEQ can ensure that the regulations and permits put in place are based on the most up-to-date information, leading to better protection of water resources and public health.

In the tables below and for purposes of the TR, ADEQ included the results of the calculations for Human Health and Safety criteria even if the calculation showed no change. This inclusion is to assure stakeholders that ADEQ conducted a full review of these Human Health and Safety Uses. ADEQ also notes that this draft NPRM is under EPA and public review. Some of the proposed standards updates may change in the final version of the NPRM once EPA and public input is incorporated, as necessary.

Additionally, ADEQ applies the EPA recommended rounding methodology², which directs that calculations are rounded to “the number of significant figures at the end of the criterion calculation to the same number of significant figures in the least precise parameter.” In the Comments column for the following tables, ADEQ noted the calculated result but utilized the rounding methodology to propose the criteria to be adopted in the 2023 column. For pollutants with CWA 304(a) criteria³, ADEQ found that there were some notable differences between the 304(a) criteria and the results of the ADEQ rounded calculations. In those cases, ADEQ is proposing to adopt the more stringent criteria as it is based on the best available information (i.e. more recent toxicological studies).

Table 4. Updated Numeric Criteria for the DWS Designated Use

Cas#	Pollutant	2016	2023	Comments	Name Update	2016/2023
50-29-3	p,p'-Dichlorodiphenyltrichloroethane (DDT) and metabolites (DDD) and (DDE)	0.1 µg/L	0.1 µg/L	Name correction only, no recalculation needed	DDT and its Breakdown Products	No change

²[Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health \(2000\)](#)

³ <https://www.epa.gov/wqc/national-recommended-water-quality-criteria-tables>

Cas#	Pollutant	2016	2023	Comments	Name Update	2016/2023
106-93-4	1,2-Dibromoethane	0.05 µg/L	0.05 µg/L	Calculated result was 0.0167 µg/L. The MCL set by EPA for Ethylene dibromide, a synonym for 1,2, Dibromoethane, is 0.05 µg/L.		No change
95-94-3	1,2,4,5-Tetrachlorobenzene	NA	2 µg/L	Calculated result was 2.0 µg/L. Pollutant was introduced to Appendix A in 2019, with no previous standard. Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		New
95-95-4	2,4,5-Trichlorophenol	NA	700 µg/L	Calculated result was 667 µg/L. Pollutant was introduced in 2019, with no previous standard. Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		New
534-52-1	4,6-Dinitro-o-cresol	28 µg/L	2 µg/L	Calculated result was 2.0 µg/L. Reference Dose criteria was obtained from EPA Provisional Peer Reviewed Toxicity Values.	2-Methyl-4,6-Dinitrophenol	More stringent
107-13-1	Acrylonitrile	0.06 µg/L	0.06 µg/L	Calculated result was 0.0617 µg/L. Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		No change
91-58-7	beta-Chloronaphthalene	560 µg/L	2,000 µg/L	Calculated result was 2,133 µg/L. Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	2-Chloronaphthalene	Less stringent
111-91-1	Bis(2-chloroethoxy)methane	NA	20 µg/L	Calculated result was 20 µg/L. This pollutant was removed from ADEQ's list in 2009 due to the lack of toxicity data. Reference Dose criteria was obtained from current EPA Provisional Peer Reviewed Toxicity Values.		New
542-88-1	Bis(chloromethyl) ether	NA	0.0002 µg/L	Calculated result was 0.00015 µg/L. Pollutant was introduced in 2019, no previous standard. Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		New
75-00-3	Chloroethane	NA	700 µg/L	Calculated result was 666.67 µg/L. This pollutant was removed from ADEQ's list in 2009 due to the lack of toxicity data. Reference Dose criteria was obtained from current EPA Provisional Peer Reviewed Toxicity Values.	Ethyl Chloride	New
16065-83-1	Chromium III	NA	100 µg/L	Calculated result was 10,000 µg/L. This pollutant was removed from ADEQ's list in 2009 due to the lack of toxicity data. Recommend adopting the EPA MCL of 100 µg/L.		New
117-84-0	Di-n-octyl phthalate	2,800 µg/L	70 µg/L	Calculated result was 66.67 µg/L. Toxicity data obtained from the EPA Provisional Peer-Reviewed Toxicity Values.		More stringent
53-70-3	Dibenz (ah) anthracene	0.005 µg/L	0.005 µg/L	Calculated result was 0.00456 µg/L. Derived using EPA's 2015 Final		No change

Cas#	Pollutant	2016	2023	Comments	Name Update	2016/2023
				Updated Human Health Ambient Water Quality Criteria.		
7421-93-3	Endrin aldehyde	NA	8 µg/L	Calculated result was 8.0 µg/L. Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	Correct CAS# to 7421-93-4	More stringent
67-72-1	Hexachloroethane	2.5 µg/L	0.8 µg/L	Calculated result was 0.83 µg/L. Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More stringent
193-39-5	Indeno(1,2,3-cd)pyrene	0.05 µg/L	0.05 µg/L	Calculated result was 0.046 µg/L. Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		No change
930-55-2	N-Nitrosopyrrolidine	NA	0.02 µg/L	Calculated result was 0.01587. Pollutant was introduced in 2019, no previous standard. Derived from toxicology data from EPA's Integrated Risk Information System	Nitrosopyrrolidine	New
7440-02-0	Nickel	140 T	100 T	Calculated result was 133. Derived from toxicology data from EPA's Integrated Risk Information System.	Nickel, soluble salts	More stringent
98-95-3	Nitrobenzene	3.5 µg/L	10 µg/L	Calculated result was 13.3. While classified as a possible human carcinogen, no toxicity data (OCSF) is available so the non-carcinogen calculation was used. Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less stringent
924-16-3	Nitrosodibutylamine	NA	0.006 µg/L	Calculated result was 0.00617. Derived from toxicology data from EPA's Integrated Risk Information System.		New
55-18-5	Nitrosodiethylamine	NA	0.0002 µg/L	Calculated result was 0.0002. Pollutant was introduced in 2019, no previous standard. Derived from toxicology data from EPA's Integrated Risk Information System		New
56-38-2	Parathion	NA	40 µg/L	Calculated result was 40. Pollutant was introduced in 2019, no previous standard. While classified as a possible human carcinogen, no toxicity data (OCSF) is available so the non-carcinogen calculation was used. Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		New
608-93-5	Pentachlorobenzene	NA	5 µg/L	Calculated result was 5.33. Pollutant was introduced in 2019, no previous standard. Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		New

Table 5. Updated Numeric Criteria for the Fish Consumption (FC) Use.

Cas#	Pollutant	2016	2023	304(a)	Comments	Name Update	2016/2023
71-55-6	1,1,1-Trichloroethane	428,571 µg/L	200,000 µg/L	200,000 µg/L	Calculated result was 176,952. Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
79-34-5	1,1,2,2-Tetrachloroethane	4 µg/L	3 µg/L	3 µg/L	Calculated result was 2.67 µg/L. Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	5.1E-9 µg/L	5.0E ⁻⁹ µg/L	5.1E ⁻⁹ µg/L	Calculated result was 4.8E ⁻⁹ . Derived using toxicology information from EPA's 2,3,7,8 - TCDD fact sheet.	2,3,7,8-TCCD (Dioxin)	Less Stringent
534-52-1	4,6-Dinitro-o-cresol	582 µg/L	30 µg/L	30 µg/L	Calculated result was 26.78. Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	2-Methyl-4,6-Dinitrophenol	More Stringent
71-43-2	Benzene	140 µg/L	16 µg/L	16-58 µg/L	Calculated result for the lower range was 15.89 µg/L. Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
50-32-8	Benzo(a)pyrene	0.02 µg/L	0.0001 µg/L	0.00013 µg/L	Calculated result was 0.000132. Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
91-58-7	2-Chloronaphthalene	317 µg/L	1,000 µg/L	1,000 µg/L	Calculated result was 1,227.82 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	beta-Chloronaphthalene	Less Stringent
56-23-5	Carbon tetrachloride	2 µg/L	5 µg/L	5 µg/L	Calculated result was 4.67 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
67-66-3	Chloroform	470 µg/L	2,000 µg/L	2,000 µg/L	Calculated result was 2,288.98 Derived using EPA's 2015		Less Stringent

Cas#	Pollutant	2016	2023	304(a)	Comments	Name Update	2016/2023
					Final Updated Human Health Ambient Water Quality Criteria.		
57-12-5	Cyanide (as free cyanide)	16,000 T µg/L	400 T µg/L	400 T µg/L	Calculated result was 436.36 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
50-29-3	p,p'-Dichlorodiphenyltrichloroethane (DDT)	0.0002 µg/L	0.00003 µg/L	0.00003 µg/L	Calculated result was 0.0000296 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	DDT and its breakdown products	More Stringent
75-09-2	Dichloromethane	593 µg/L	1,000 µg/L	1,000 µg/L	Calculated result was 1,261.83 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	Methylene Chloride	Less Stringent
7421-93-3	Endrin aldehyde	NA	1.2 µg/L	1 µg/L	Calculated result was 1.23 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	Correct CAS# is 7421-93-4.	More Stringent
58-89-9	Hexachlorocyclohexane gamma	1.8 µg/L	4 µg/L	4.4 µg/L	Calculated result was 4.42 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	gamma-Hexachlorocyclohexane (gamma-HCH)	Less Stringent
77-47-4	Hexachlorocyclopentadiene	580 µg/L	4 µg/L	4 µg/L	Calculated result was 3.96 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
67-72-1	Hexachloroethane	3.3 µg/L	0.1 µg/L	0.1 µg/L	Calculated result was 0.137 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
193-39-5	Indeno (1,2,3-cd) pyrene	0.49 µg/L	0.001 µg/L	0.0013 µg/L	Calculated result was 0.0013 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria. Calculated result was 0.0013		More Stringent
98-95-3	Nitrobenzene	138 µg/L	600 µg/L	600 µg/L	Calculated result was 557.78 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent

Cas#	Pollutant	2016	2023	304(a)	Comments	Name Update	2016/2023
924-16-3	Nitrosodibutylamine	NA	0.2 µg/L	0.22 µg/L	Calculated result was 0.199 Calculated using EPA updated body weight and fish consumption rates and toxicology from IRIS.		New
55-18-5	Nitrosodiethylamine	NA	1.24 µg/L	1.24 µg/L	Calculated result was 0.008 Calculated using EPA updated body weight and fish consumption rates but BCF toxicology from an EPA site was not found. Recommend adopting the EPA standard.		New
930-55-2	N-nitrosopyrrolidine	NA	30 µg/L	34 µg/L	Calculated result was 31.48 Calculated using EPA updated body weight and fish consumption rates and toxicology from IRIS.		New
87-86-5	Pentachlorophenol	1,000 µg/L	0.04 µg/L	0.04 µg/L	Calculated result was 0.0365 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
127-18-4	Tetrachloroethylene	261 µg/L	30 µg/L	29 µg/L	Calculated result was 28.695 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
7440-28-0	Thallium	7.2 T µg/L	0.06 T µg/L	0.47 µg/L	Calculated result was 0.06 Calculated using EPA updated body weight and fish consumption rates and COMPTOX.		More Stringent
108-88-3	Toluene	201,000 µg/L	500 µg/L	520 µg/L	Calculated result was 518.54 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
79-01-6	Trichloroethylene	29 µg/L	7 µg/L	7 µg/L	Calculated result was 6.79 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	Trichloroethylene (TCE)	More Stringent

Table 6. Updated Numeric Criteria for the FBC and PBC Designated Uses

Cas#	Pollutant	FBC/PBC/Both	2016	2023	Comments	Name Update	2016/2023
79-34-5	1,1,2,2-Tetrachloroethane	FBC	7 µg/L	30 µg/L	Calculated result was 26.67 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
79-34-5	1,1,2,2-Tetrachloroethane	PBC	56,000 µg/L	20,000 µg/L	Calculated result was 21,333.33 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
79-00-5	1,1,2-Trichloroethane	FBC	25 µg/L	90 µg/L	Calculated result was 93.57 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
156-59-2	1,2-cis-Dichloroethylene	FBC/PBC	70 µg/L	2,000 µg/L	Calculated result was 2,133.33 Non-Carcinogenic FBC & PBC use the same formula. Calculated using EPA updated body weight and fish consumption rates and toxicology from IRIS.	cis-1,2-Dichloroethylene	Less Stringent
106-93-4	1,2-Dibromoethane	FBC	8,400 µg/L	3 µg/L	Calculated result was 2.67 Criteria was calculated using updated EPA body weight and drinking water consumption rates and toxicology from IRIS.		More Stringent
122-66-7	1,2-Diphenylhydrazine	FBC/PBC	1.8 µg/L	7 µg/L	Calculated result was 6.67 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
95-94-3	1,2,4,5-Tetrachlorobenzene	FBC/PBC	NS	300 µg/L	Calculated result was 320 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		New
542-75-6	1,3-Dichloropropane	FBC	420 µg/L	40 µg/L	Calculated result was 43.72 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
1746-01-06	2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)	FBC	0.00003 µg/L	0.00004 µg/L	Calculated result was 0.0000356 Criteria was calculated using updated EPA body weight and drinking water consumption rates and toxicology from IRIS.	2,3,7,8-Tetrachlorodibenzo-p-dioxin	Less Stringent
1746-01-06	2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)	PBC	0.0009 µg/L	0.0007 µg/L	Calculated result was 0.000747 Criteria was calculated using updated	2,3,7,8-Tetrachlorodibenzo-p-dioxin	More Stringent

Cas#	Pollutant	FBC/PBC/ Both	2016	2023	Comments	Name Update	2016/2023
					EPA body weight and drinking water consumption rates and toxicology from IRIS.		
95-95-4	2,4,5-Trichlorophenol	FBC/PBC	NS	100,000 µg/L	Calculated result was 106,666.667 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		New
93-72-1	2,4,5-Trichlorophenoxy propionic acid (2,4,5-TP)	FBC/PBC	7,467 µg/L	30,000 µg/L	Calculated result was 34,133.333 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	Chlorophenoxy Herbicide (2,4,5-TP) [Silvex]	Less Stringent
88-06-2	2,4,6-Trichlorophenol	FBC	130 µg/L	500 µg/L	Calculated result was 484.85 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
88-06-2	2,4,6-Trichlorophenol	PBC	130 µg/L	1,000 µg/L	Calculated result was 1,066.667 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
606-20-2	2,6-Dinitrotoluene	FBC	2 µg/L	8 µg/L	Calculated result was 7.84 Criteria was calculated using updated EPA body weight and drinking water consumption rates and toxicology from COMPTOX.		Less Stringent
606-20-2	2,6-Dinitrotoluene	PBC	3,733 µg/L	300 µg/L	Calculated result was 320 Criteria was calculated using updated EPA body weight and drinking water consumption rates and toxicology from COMPTOX.		More Stringent
91-94-1	3,3'-Dichlorobenzidine	FBC/PBC	3 µg/L	10 µg/L	Calculated result was 11.85 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
205-99-2	3,4-Benz(a)anthracene	FBC/PBC	1.9 µg/L	7 µg/L	Calculated result was 7.31 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	Benzo[b]fluoranthene	Less Stringent
534-52-1	4,6-Dinitro-o-cresol	FBC/PBC	3,733 µg/L	300 µg/L	Calculated result was 320 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	2-Methyl-4,6-dinitrophenol	More Stringent

Cas#	Pollutant	FBC/PBC/Both	2016	2023	Comments	Name Update	2016/2023
107-13-1	Acrylonitrile	FBC	3 µg/L	10 µg/L	Calculated result was 9.88 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
309-00-2	Aldrin	FBC	0.08 µg/L	0.3 µg/L	Calculated result was 0.3137 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
7440-39-3	Barium	FBC/PBC	98,000 µg/L	200,000 µg/L	Calculated result was 213,333.33 Criteria was calculated using updated EPA body weight and drinking water consumption rates and toxicology from IRIS.		Less Stringent
56-55-3	Benz(a)anthracene	FBC/PBC	0.2 µg/L	7 µg/L	Calculated result was 7.31 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
71-43-2	Benzene	FBC	93 µg/L	200 µg/L	Calculated result was 152.38 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
92-87-5	Benzidine	FBC/PBC	0.01 µg/L	0.02 µg/L	Calculated result was 0.0232 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
50-32-8	Benzo(a)pyrene	FBC	0.2 µg/L	5 µg/L	Calculated result was 5.3 Criteria was calculated using updated EPA body weight and drinking water consumption rates and toxicology from IRIS.	Benzo(a)pyrene (BaP)	Less Stringent
50-32-8	Benzo(a)pyrene	PBC	0.2 µg/L	300 µg/L	Calculated result was 320 Criteria was calculated using updated EPA body weight and drinking water consumption rates and toxicology from IRIS.	Benzo(a)pyrene (BaP)	Less Stringent
207-08-09	Benzo(k)fluoranthene	FBC/PBC	1.9 µg/L	70 µg/L	Calculated result was 73.06 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
91-58-7	2-Chloronaphthalene (2016)	FBC/PBC	74,667 µg/L	300,000 µg/L	Calculated result was 341,333.33 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	beta-Chloronaphthalene	Less Stringent

Cas#	Pollutant	FBC/PBC/Both	2016	2023	Comments	Name Update	2016/2023
111-91-1	Bis(2-chloroethoxy) methane	FBC/PBC	NA	3,000 µg/L	Calculated result was 3,200 The standard was removed in 2009 and repropose in 2019. Criteria was calculated using updated EPA body weight and drinking water consumption rates and toxicology from PPRTV.		New
111-44-4	Bis(2-chloroethyl) ether	FBC/PBC	1.0 µg/L	5 µg/L	Calculated result was 4.85 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	Bis(chloroethyl) ether (BCEE)	Less Stringent
542-88-1	Bis(chloromethyl) ether	FBC	NA	0.02 µg/L	Calculated criteria was 0.024 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		New
75-25-2	Bromoform	FBC	180 µg/L	1,000 µg/L	Calculated result was 1,185.2 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
7440-43-9	Cadmium (T)	FBC	700 µg/L	500 µg/L	Calculated result was 533.33 Criteria was calculated using updated EPA body weight and drinking water consumption rates. Cadmium Compounds (A) EPA		More Stringent
7440-43-9	Cadmium (T)	PBC	700 µg/L	700 µg/L	Calculated result was 666.67 Criteria was calculated using updated EPA body weight and drinking water consumption rates. Cadmium Compounds (A) EPA		No Change
56-23-5	Carbon tetrachloride	FBC	11 µg/L	77 µg/L	Calculated result was 76.19 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
56-23-5	Carbon tetrachloride	PBC	980 µg/L	4,000 µg/L	Calculated result was 4,266.67 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
57-74-9	Chlordane	FBC	4 µg/L	20 µg/L	Calculated result was 15.24 Derived using EPA's 2015 Final Updated		Less Stringent

Cas#	Pollutant	FBC/PBC/Both	2016	2023	Comments	Name Update	2016/2023
					Human Health Ambient Water Quality Criteria.		
75-00-3	Chloroethane	FBC/PBC	NNS	100,000 µg/L	Calculated result was 15.24 Criteria was calculated using updated EPA body weight and drinking water consumption rates and toxicology from PPRTV.		
67-66-3	Chloroform	FBC	230 µg/L	10,000 µg/L	Calculated result was 10,666.67 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
218-01-9	Chrysene	FBC/PBC	19 µg/L	700 µg/L	Calculated result was 730.59 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
57-12-5	Cyanide (as free cyanide)	FBC/PBC	18,667 µg/L	600 µg/L	Calculated result was 640 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	Cyanide, free	More Stringent
50-29-3	p,p'-Dichlorodiphenyltrichloroethane (DDT)	FBC	4 µg/L	16 µg/L	Calculated result was 15.69 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	DDT and its breakdown products	Less Stringent
50-29-3	p,p'-Dichlorodiphenyltrichloroethane (DDT)	PBC	467 µg/L	500 µg/L	Calculated result was 533.33 µg/L Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	DDT and its breakdown products	Less Stringent
103-23-1	Di (2-ethylhexyl) adipate	FBC	560,000 µg/L	4,000 µg/L	Calculated result was 4,102.56 Criteria was calculated using updated EPA body weight and drinking water consumption rates and toxicology from IRIS.		More Stringent
117-81-7	Di (2-ethylhexyl) phthalate	FBC	100 µg/L	400 µg/L	Calculated result was 380.95 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	Bis(2-Ethylhexyl) Phthalate	Less Stringent
53-70-3	Dibenz (a,h) anthracene	FBC/PBC	1.9 µg/L	0.7 µg/L	Calculated result was 0.73 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	Dibenzo(a,h)anthracene	More Stringent
75-09-2	Dichloromethane	FBC	190 µg/L	3,000 µg/L	Calculated result was 2,666.67 Derived using		Less Stringent

Cas#	Pollutant	FBC/PBC/Both	2016	2023	Comments	Name Update	2016/2023
					EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		
75-09-3	Dichloromethane	PBC	56,000 µg/L	60,000 µg/L	Calculated result was 64,000 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
60-57-1	Dieldrin	FBC	0.09 µg/L	0.3 µg/L	Calculated criteria was 0.333 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
72-20-8	Endrin	FBC/PBC	280 µg/L	1,000 µg/L	Calculated result was 1,280 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
7421-93-3	Endrin aldehyde	FBC/PBC	NNS	1,000 µg/L	Calculated result was 1,280 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	Correct CAS# is 7421-93-4.	New
76-44-8	Heptachlor	FBC	0.4 µg/L	1 µg/L	Calculated result was 1.3 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
1024-57-3	Heptachlor epoxide	FBC	0.2 µg/L	1 µg/L	Calculated result was 0.97 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
118-74-1	Hexachlorobenzene	FBC	1.0 µg/L	5 µg/L	Calculated result was 5.23 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
87-68-3	Hexachlorobutadiene	FBC	18 µg/L	100 µg/L	Calculated result was 133.33 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
319-84-6	Hexachlorocyclohexane alpha	FBC	.22 µg/L	1 µg/L	Calculated result was 0.846 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	alpha-Hexachlorocyclohexane (alpha-HCH)	Less Stringent
319-85-7	Hexachlorocyclohexane beta	FBC	0.78 µg/L	3.0 µg/L	Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria. Calculated	beta-Hexachlorocyclohexane (beta-HCH)	Less Stringent

Cas#	Pollutant	FBC/PBC/Both	2016	2023	Comments	Name Update	2016/2023
					result was 2.96 rounded to 3.0		
58-89-9	Hexachlorocyclohexane gamma	FBC/PBC	280 µg/L	10,000 µg/L	Calculated result was 12,533.33 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.	gamma-Hexachlorocyclohexane (gamma-HCH)	Less Stringent
77-47-4	Hexachlorocyclopentadiene	FBC/PBC	9,800 µg/L	6,000 µg/L	Calculated result was 6,400 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
67-72-1	Hexachloroethane	FBC	100 µg/L	100 µg/L	Calculated result was 133.33 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		No change
67-72-1	Hexachloroethane	PBC	933 µg/L	700 µg/L	Calculated result was 746.67 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
193-39-5	Indeno (1,2,3-cd) pyrene	FBC/PBC	1.9 µg/L	7 µg/L	Calculated result was 7.31 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
78-59-1	Isophorone	FBC	1,500 µg/L	5,000 µg/L	Calculated result was 5,614.04 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
72-43-5	Methoxychlor	FBC/PBC	4,667 µg/L	90 µg/L	Calculated result was 85.33 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
621-64-7	N-nitrosodi-n-propylamine	FBC	0.2 µg/L	0.8 µg/L	Calculated result was 0.762 Criteria was calculated using updated EPA body weight and drinking water consumption rates and toxicology from IRIS.		Less Stringent
62-75-9	N-nitrosodimethylamine	FBC	0.03 µg/L	0.1 µg/L	Calculated result was 0.1 Criteria was calculated using updated EPA body weight and drinking water consumption rates and toxicology from IRIS.		Less Stringent
62-75-9	N-nitrosodimethylamine	PBC	0.03 µg/L	9 µg/L	Calculated result was 8.53 Criteria was calculated using updated EPA body		Less Stringent

Cas#	Pollutant	FBC/PBC/Both	2016	2023	Comments	Name Update	2016/2023
					weight and drinking water consumption rates and toxicology from IRIS.		
86-30-6	N-Nitrosodiphenylamine	FBC/PBC	290 µg/L	1,000 µg/L	Calculated result was 1,088.44 Criteria was calculated using updated EPA body weight and drinking water consumption rates and toxicology from IRIS.		Less Stringent
930-55-2	N-nitrosopyrrolidine	FBC	NA	3 µg/L	Calculated result was 2.54 Criteria was calculated using updated EPA body weight and drinking water consumption rates and toxicology from IRIS.		New
98-95-3	Nitrobenzene	FBC/PBC	467 µg/L	2,000 µg/L	Calculated result was 2,133.33 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
924-16-3	Nitrosodibutylamine	FBC	NA	1 µg/L	Calculated result was 0.988 Criteria was calculated using updated EPA body weight and drinking water consumption rates and toxicology from IRIS.		New
55-18-5	Nitrosodiethylamine	FBC	NA	0.04 µg/L	Calculated result was 0.0356 Criteria was calculated using updated EPA body weight and drinking water consumption rates and toxicology from IRIS.		New
608-93-5	Pentachlorobenzene	FBC/PBC	NA	900 µg/L	Calculated result was 853.33 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		New
87-86-5	Pentachlorophenol	PBC	28,000 µg/L	5,000 µg/L	Calculated result was 5,333.33 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
1336-36-3	Polychlorinated biphenyls (PCB)	FBC	19 µg/L	3 µg/L	Calculated result was 2.67 Criteria was calculated using updated EPA body weight and drinking water consumption rates and toxicology from IRIS.	Polychlorinated Biphenyls (PCBs)	More Stringent
127-18-4	Tetrachloroethylene	FBC	9,333 µg/L	3,000 µg/L	Calculated result was 2,539.68 Derived using EPA's 2015 Final Updated		More Stringent

Cas#	Pollutant	FBC/PBC/Both	2016	2023	Comments	Name Update	2016/2023
					Human Health Ambient Water Quality Criteria.		
127-18-4	Tetrachloroethylene	PBC	9,333 µg/L	6,000 µg/L	Calculated result was 6,400 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
7440-28-0	Thallium	FBC/PBC	75T µg/L	11T µg/L	Calculated result was 10.67 Criteria was calculated using updated EPA body weight and drinking water consumption rates and Provisional Peer-Reviewed Toxicity Values for Thallium and Compounds		More Stringent
108-88-3	Toluene	FBC/PBC	280,000 µg/L	10,000 µg/L	Calculated result was 10,346.67 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
8001-35-2	Toxaphene	FBC	1.3 µg/L	5 µg/L	Calculated result was 4.85 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
8001-35-2	Toxaphene	PBC	933 µg/L	400 µg/L	Calculated result was 373.33 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
79-01-6	Trichloroethylene	FBC	280,000 µg/L	100 µg/L	Calculated result was 106.67 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		More Stringent
79-01-6	Trichloroethylene	PBC	280 µg/L	500 µg/L	Calculated result was 533.33 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent
75-01-4	Vinyl chloride	FBC	2 µg/L	4 µg/L	Calculated result was 3.56 Derived using EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria.		Less Stringent

E1.

E2. Technical edits to Appendix B to ensure waterbody descriptions are accurate

As part of the TR, ADEQ also reviews the water bodies listed in Appendix B that on which EPA approved WQS apply. The revisions in Tables 7 and 8 reflect the ADEQ withdrawals from the 2019 TR and revert back to the 2016 name or descriptions. Other than the changes below, ADEQ is not recommending any other updates to Appendix B in the 2023 TR. However, note that some waters were removed from Appendix B as part of a 2022 rulemaking conducted by ADEQ. Those changes are pending EPA approval.

Table 7. Technical Edits in Appendix B to Waterbody Names

<u>Watershed</u>	<u>Waterbody Name</u>	<u>Revised Name</u>	<u>Reason</u>
MG	Yavapai Lake (EDW)	Mountain Valley Park Ponds (EDW)	Name to revert back to 2016 version

Table 8. Technical Edits in Appendix B to Waterbody Descriptions

<u>Watershed</u>	<u>Waterbody Name</u>	<u>Original Description</u>	<u>Revised Description</u>	<u>Reason</u>
SP	Blacktail Pond	Fort Huachuca Military Reservation at 31°31'04"/110°24'47", headwater lake in Blacktail Canyon	Fort Huachuca Military Reservation at 31°24'13"/110°17'23"	Description to revert back to 2016 version
VR	Del Monte Gulch (EDW)	City of Cottonwood WWTP outfall 002 at 34°43'57"/112°02'46" to confluence with Blowout Creek	City of Cottonwood WWTP outfall 002 at 34°43'57"/112°02'46" to confluence with Verde River	Description to revert back to 2016 version
SC	Greene Wash	Santa Cruz River to the Tohono O'odham Reservation boundary	Greene Reservoir at 32°37'09"/111°41'12" to the Tohono O'odham Indian Reservation boundary	Description to revert back to 2016 version
SC	Palisade Canyon	Headwaters to confluence with unnamed tributary at 32°22'33"/110°45'31"	Headwaters to confluence with unnamed tributary at 32°21'59"/110°46'16"	Description to revert back to 2016 version
SC	Palisade Canyon	Below 32°22'33"/110°45'31" to unnamed tributary of Sabino Canyon	Below unnamed tributary to confluence with Sabino Canyon Creek	Description to revert back to 2016 version
SC	Santa Rosa Wash (EDW)	Palo Verde Utilities CO-WRF outfall at 33°04'20"/112°01'47" to the Chin Indian Reservation	Palo Verde Utilities WWTP outfall at 33°04'20"/112°01'47" to the Gila River Indian Reservation	Description to revert back to 2016 version
LC	Little Colorado River	Below Puerco River confluence to the Colorado River, excluding segments on Native American Lands	Below confluence with the Puerco River to the Navajo Nation Reservation boundary	Description to revert back to 2016 version
MG	Unnamed	Luke Air Force Base WWTP	Luke Air Force Base WWTP	Description to

	Wash (EDW)	outfall at 33°32'21"/112°19'15" to confluence with the Agua Fria River	outfall at 33°32'00"/112°19'03" to confluence with the Agua Fria River	revert back to 2016 version
VR	Verde River	From headwaters at confluence of Chino Wash and Granite Creek to Bartlett Lake Dam	From confluence of Chino Wash and Granite Creek to Bartlett Lake Dam	Description to revert back to 2016 version
MG	Weaver Creek	Headwaters to confluence with Antelope Creek, tributary to Martinez Wash	Headwaters to confluence with Antelope Creek	Description to revert back to 2016 version

F. Public Comment

An important element of the TR is the involvement of those who may be affected by WQS decisions. Section 303(c) of the CWA requires that ADEQ hold at least one public hearing during the TR to consider changes to WQS. Arizona Revised Statutes (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.

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 WQS decisions; and federal, state, and local agencies and governments, including Indian tribes, who may have a stake in the outcome of the WQS TR and state rulemaking. ADEQ will engage in a robust public participation process during this rulemaking. We will be working with an internal engagement team and reaching out to you soon to gather information on how ADEQ can best engage with stakeholders during the formal rulemaking process.

ADEQ is in the process of reviewing the effect the WQS changes proposed in this NPRM will have on individual AZPDES and eventually the effect that they will have on impaired waters in the state. That analysis will be complete before the publication of the formal NPRM.

In the meantime, if stakeholders have questions about specific numeric criteria that protect Human Health and Safety Uses, please email waterqualitystandards@azdeq.gov.

G. EPA Review and Approval

After the state level rulemaking to update Article 1 is complete, ADEQ must submit all changes to the EPA. ADEQ staff has worked closely with EPA staff throughout the TR to verify that the standards we have calculated are approvable for implementation.

ADEQ must submit final surface water quality standards rules to the EPA Region 9 Administrator within 30 days of the date of the filing of the final rules with the Office of the Secretary of State and publication in the Arizona Administrative Register. At that time, EPA

Region 9 staff will review the rules to determine whether they are consistent with the requirements of the CWA.

Pursuant to CWA 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 WQS 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 40 C.F.R. § 101(a)(2) 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 Region 9 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) for more information. If EPA approves (in whole or in part) ADEQ's submitted WQS, the EPA must do so by notifying the state within 60 days of receiving a complete submittal of the WQS, rules and supporting documentation. If EPA disapproves (in whole or in part) Arizona's surface WQS, it must do so within 90 days of receiving the complete submittal of the surface WQS rules.

If the Region 9 Administrator disapproves a specific 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.

6. 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 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 surface WQS that were not changed in this rulemaking.

7. 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.

8. The preliminary summary of the economic, small business, and consumer impact:

ADEQ has completed a preliminary analysis of the impact the changes explained in this draft preamble would have on existing AZPDES permittees. ADEQ reviewed 93 individual discharge permits as part of this preliminary analysis and determined that none of those permittees would need to change existing limits or treatments in order to comply with changes proposed in this draft preamble.

During the course of this rulemaking, ADEQ will extend this analysis to determine the net impact of these draft changes on impaired waters decisions in the State. ADEQ has not completed that analysis at the time of release of this draft preamble.

9. The agency's contact person who can answer questions about the economic, small business and consumer impact statement:

Name: Jonathan Quinsey
Address: 1110 W. Washington St.
Phoenix, AZ 85007

Telephone: (602) 771-8193
E-mail: quinsey.jonathan@azdeq.gov
Web site: azdeq.gov

10. The time, place, and nature of the proceedings to make, amend, repeal, or renumber the rule, or if no proceeding is scheduled, where, when, and how persons may request an oral proceeding on the proposed rule:

This Draft Notice of Proposed Rulemaking includes a proposed stakeholder process in Section 5. This proposed stakeholder process will proceed the formal rulemaking that is required in Arizona. ADEQ will schedule an oral hearing when the agency is prepared to file a finalized Notice of Proposed Rulemaking with the Secretary of State.

11. 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.

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.

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

Not applicable.

13. The full text of the rules follows:

DRAFT