

Department of Environmental Conservation
Division of Water
2021-2023 Triennial Review Issue Summary
November 2020



Summary

This document summarizes state water quality standards (WQS) issues and projects that may result in rulemaking or guidance development. These projects may be continuations of existing efforts or proposed during the 2021-2023 Triennial Review cycle.

Background

Every three years the Department of Environmental Conservation (DEC) is required to review Alaska's WQS. This comprehensive evaluation is referred to as the *Triennial Review*. The Triennial Review (TR) is required by Code of Federal Regulations (CFR) §131.20; regulations applicable to the federal Clean Water Act. The TR helps to ensure pollution limits for Alaska's surface waters are up-to-date by integrating new science, policy, technology, and federal requirements into the state WQS regulations at 18 AAC 70.

The TR process occurs in three phases. Phase I is a widespread call for information on potential issues and projects DEC has identified as being of interest to the state. In Phase II, DEC prioritizes the issues, conducts research, and drafts WQS regulations or guidance. Phase III is the public outreach and WQS regulation adoption process.

The following is the list of issues and projects that DEC has identified as being of interest to DEC. Other issues may be proposed during Phase I of the TR cycle and acted on at the department's discretion.

2021-2023 Triennial Review Summary

- I. **High Priority Issues for Rulemaking: The following issues and projects reflect prior commitments or current DEC high priorities already under review.**
 1. **Toxic Manual Update**
 - a. Human Health Criteria
 - i. Carcinogens and Non-carcinogens
 - b. Ammonia – Aquatic Life Criteria
 - c. Cadmium – Aquatic Life Criteria
 2. **Water Quality Criteria Clarifications**
 - a. Frequency and duration components for conventional pollutants
 - b. Definition of freshwater/marine waters and implementation methodology
 - c. Standard Analytical Methods (routine technical update)
 - d. Protection of downstream designated uses

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Department of Environmental Conservation
Division of Water
2021-2023 Triennial Review Issue Summary
November 2020



II. Information Gathering and Analysis. These issues and projects may or may not be ready for rule making during the 2021-2023 Triennial Review.

1. Aluminum – Aquatic Life Criteria
2. Copper – Aquatic Life Criteria
3. Manganese - Human Health Criteria
4. Methylmercury - Human Health Criteria
5. Mixing Zones and Zones of Initial Dilution
6. Temperature – Performance-based approach
7. Recreational Water Quality Criteria for Microcystins and Cylindrospermopsin
8. Selenium – Aquatic Life Criteria
9. Turbidity Criteria

III. Issues for Tracking and Monitoring: The following issues and projects are suggested for tracking and monitoring for changes in scientific research and emerging science policy.

1. Acrolein – Aquatic life criteria
2. Benthic Sediment Criteria
3. Biocriteria
4. Carbaryl – Aquatic life criteria
5. Dissolved Inorganic Substances for Total Dissolved Solids
6. Groundwater Standards
7. Nutrient Criteria: Cook Inlet Ecoregion
8. Pharmaceuticals and Personal Care Products
9. Temperature Criteria
10. Petroleum Hydrocarbons – Aquatic Life Criteria

Issues and Project Descriptions

I. High Priority

1. Toxic Manual Update. Periodically, Alaska updates its “Water Quality Criteria for Toxics and Other Deleterious Substances” applicable to 18 AAC 70.020(b) and noted in the *Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances* (2008).

a. Human Health Criteria for Carcinogens and Non-carcinogenic pollutants

Human health criteria (HHC) are established to minimize health risks to humans through the consumption of aquatic organisms (e.g. fish, shellfish) and surface water over the course of a lifetime. EPA issued updated methods for deriving HHC in 2015. DEC proposes to continue review and application in Alaska during the 2021 – 2023 TR cycle.

In 1992, EPA promulgated human health criteria for carcinogens for the State of Alaska under the National Toxics Rule (NTR). Consideration of adoption of carcinogenic criteria

Department of Environmental Conservation
Division of Water
2021-2023 Triennial Review Issue Summary
November 2020



will take place in conjunction with general updates to the human health criteria proposed during the 2021 - 2023 TR cycle. A potential outcome of this update will be EPA withdrawal of Alaska from the 1992 NTR federal criteria. This would reduce confusion regarding which standards (state or federal) apply in Alaska.

b. Ammonia – Aquatic Life Criteria.

Ammonia is found in a variety of discharges. In August 2013, EPA published final water quality criteria for acute and chronic levels of ammonia found in freshwater. EPA is recommending that final acute ambient water quality criterion be 17 mg/L of total ammonia nitrogen (TAN) and the final chronic water quality criterion for the compound be 1.9 mg/L TAN at a pH of 7 and a temperature of 20 degrees Celsius (°C). This change amounts to a 2.4-fold decrease from the 1999 criteria currently applied in state discharge permits. At water temperatures greater than 15.7°C, the 2013 acute criterion magnitude is determined primarily by effects on freshwater unionid mussels. At lower temperatures the acute criterion magnitude is based primarily on effects on salmonids and other fish. EPA is recommending a single national acute and chronic criterion be applied to all waters regardless of the presence or absence of mussels. DEC will consider adoption and implementation issues associated with this issue during the 2021-2023 TR cycle.

c. Cadmium – Aquatic Life Criteria.

In 2016 EPA issued new recommended freshwater and marine criteria for the metal cadmium. The recommended freshwater acute criteria are slightly more stringent (2.0 micrograms per liter) than previously recommended. The recommended freshwater chronic criteria are slightly less stringent (0.25 micrograms per liter) than previously recommended. Both the marine acute and chronic criteria are slightly more stringent than DEC's current WQS. DEC will consider implementation issues that may result from adoption of these criteria.

2. Water Quality Criteria Clarifications. There are multiple instances where existing language at 18 AAC 70 is either ambiguous or outdated. DEC is proposing clarifying language to increase transparency on select state policies and facilitate the implementation of water pollution control programs.

a. Establish explicit duration and frequency values for select conventional pollutants.

Water quality criteria are typically expressed using three components:

- *Magnitude* refers to the allowable numeric or narrative value that is protective of the designated use from short term (acute) or long term effects from exposure.
- *Duration* refers to the allowable length of time of exposure to a pollutant can occur before a deleterious effect may be determined.

Department of Environmental Conservation
Division of Water
2021-2023 Triennial Review Issue Summary
November 2020



- *Frequency* refers to the allowable number of times exposure can occur in excess of the magnitude and duration value before a deleterious effect may be determined.

DEC proposes to clarify the duration and frequency values for petroleum hydrocarbons and temperature based on available scientific recommendations and state policy needs.

- b. 18 AAC 70.990 (Definitions) does not contain a definition of freshwater or marine waters. DEC would consider the implications of adoption of a formal definition and scientifically defensible approaches to differentiating between freshwater and marine waters.
- c. Standard laboratory analytical methods that have been approved of by EPA are required in order to measure compliance with state WQS. DEC proposes to review and adopt EPA's most recent approved methods to determine compliance with WQS and other state regulations pertaining to water pollution control programs.

II. Information Gathering and Analysis. These issues have received higher prioritization by the department due to their relevance to DEC's water pollution control programs and the state of the science behind their development. Rulemaking pertaining to these issues may or may not occur during the 2021-2023 TR cycle.

1. Aluminum – Aquatic Life Criteria. EPA has issued draft recommended aluminum criteria for freshwater aquatic life. The criteria a modeling approach similar to the biotic ligand model (BLM) and is most sensitive of pH and hardness. The proposed approach considered to be a more accurate means of determining the degree of toxicity a particular metal has to aquatic life based on multiple water quality characteristics. The draft model results indicate that criteria will be significantly less conservative than those currently adopted by Alaska. DEC will be considering how the recommended criteria can be implemented as part of the 2021-2023 TR cycle.
2. Copper - Aquatic Life Criteria. EPA approved use of the biotic ligand model (BLM) for derivation of copper criteria in 2007. The BLM is more predictive of lethal and nonlethal effects to aquatic life due to its ability to assess multiple parameters (e.g. hardness, multiple chemicals) against bioavailability. DEC will consider adoption of guidance pertaining to use of the BLM for copper on a site-specific basis during the 2021-2023 TR cycle.
3. Manganese - Human Health Criteria. The current human health criterion for manganese is based on EPA recommendations originally published in 1976. The document indicates that manganese at levels over 0.05 mg/L may cause taste, staining and other primarily aesthetic problems. This potential TR issue would consider revising the human health criterion for manganese based on EPA's 2000

Department of Environmental Conservation
Division of Water
2021-2023 Triennial Review Issue Summary
November 2020



guidance that established a lifetime health advisory criterion for manganese at 0.3 mg/L.

4. **Methylmercury - Human Health Criteria.** In January 2001, EPA published a water quality criterion of 0.3 mg/kg for methylmercury. This criterion describes the concentration of methylmercury in freshwater and estuarine fish and shellfish tissue that should not be exceeded in order to protect consumers of fish and shellfish. This project will consider implementation issues that may result from adoption. This project may be conducted in conjunction with general updates to Alaska's human health criteria.
5. **Mixing Zones and Zones of Initial Dilution.** A mixing zone is defined as a limited area or volume of water where the incomplete mixing of effluent from a discharge and the receiving water takes place and where certain numeric water quality criteria may be exceeded. Such actions are subject to requirements defined at 18 AAC 70.230. In certain cases the mixing of effluent and ambient waters may occur in a "rapid and complete" manner such that aquatic life will not be exposed to pollutants in a temporally or spatially limiting manner. EPA permitting guidance indicates that discharges with complete mixing may be expressed at the Zone of Initial Discharge (ZID) in the form of a dilution allowance. DEC proposes to review federal and state guidance pertaining to application of dilution allowances, ZIDs, and whether DEC should revise 18 AAC 70.230 or the 2009 Mixing Zone Guidance to explicitly note when dilution allowances are allowable and under what conditions.
6. **Temperature- Performance-based approach.** EPA has issued guidance to states noting that states may establish site-specific temperature criteria when a formal scientific process is formally adopted by states and approved of by EPA. DEC is exploring policy frameworks and potential means of implementing such an approach in a manner consistent with the Clean Water Act.
7. **Recreational Ambient Water Quality Criteria.** In 2016 EPA issued new recommended criteria and/or swimming advisories for Microcystins and Cylindrospermopsin. The federal Beach Act requires states to adopt such criteria in a timely manner. DEC will explore the implementation issues associated with adoption of these criteria as part of the 2021-2023 TR cycle.
8. **Selenium – Aquatic Life Criteria.** In 2016 EPA recommended a new chronic criterion for protection of freshwater aquatic life the selenium. The new criterion is primarily based on organisms consuming selenium-contaminated food rather than only being exposed to selenium dissolved in water. The criterion is expressed as both fish tissue and water column values. DEC will be considering how this criterion would be implemented in water pollution control programs prior to engaging in rulemaking.

Department of Environmental Conservation
Division of Water
2021-2023 Triennial Review Issue Summary
November 2020



9. Turbidity. Certain studies have demonstrated that behavioral responses in fish may be more likely to occur at changes to very low concentrations (0-10 NTU) than higher levels (e.g. 100-110 NTU). Establishment of background water quality based on natural conditions may be complicated by the presence of historical anthropogenic activity and variations in watershed geology and hydrology (e.g. glacial watershed verses clear water systems). This potential issue will review those performance-based tools being used to develop natural conditions-based criteria in other states and how they could be adapted for use in Alaska.

III. Tracking and Monitoring. These issues are of relevance to DEC but additional scientific research and policy development is required before rulemaking will be considered.

1. Acrolein – Aquatic Life Criteria. Acrolein criteria was promulgated for Alaska as part of the 1992 National Toxics Rule. Acrolein is a pollutant (biocide) primarily used for irrigation ditch weed control and algal management. Alaska is working on adoption of Acrolein criteria for the protection of human health during this Triennial Review cycle but does not anticipate adoption of criteria for the protection of aquatic life at this time. DEC may revise this decision should additional information warrant.
2. Benthic Sediment Criteria. Alaska’s WQS protect surface waters and “bottom substrates” but do not provide guidance on what criteria to use in bottom substrates. Maintaining the quality of sediments can be important for maintaining water quality and protecting designated or existing water uses. This potential 2021-2023 Triennial Review issue consists of examining the need and value of the State to develop and adopt numeric sediment quality criteria and/or guidance on the development of site-specific sediment quality criteria.
3. Biocriteria. Alaska’s WQS are predominantly derived from physical and chemical water quality criteria. This potential issue consists of looking at the development and use of biological criteria, or “biocriteria,” as the basis for establishing WQS. Because the necessary knowledge base to establish numeric biocriteria generally requires ten years of monitoring data, this effort will not result in statewide numeric values. However, there is potential to adopt general narrative biocriteria for those regions of Alaska where data is available.
4. Carbaryl – Aquatic Life Criteria. Carbaryl is a non-priority pollutant (pesticide) used for pest control and fruit thinning. Alaska has not previously adopted criteria for this pollutant. Carbaryl is not considered to be a pollutant of public concern in Alaska at this time and DEC is not anticipating adoption of 2012 EPA recommended criteria during the 2021-2023 TR cycle. DEC may revise this decision should additional information warrant.

Department of Environmental Conservation
Division of Water
2021-2023 Triennial Review Issue Summary
November 2020



5. Dissolved Inorganic Substances, Total Dissolved Solids (TDS). The current criteria were adopted in 1999. TDS is a measure of inorganic salts, organic matter, and other dissolved materials in water (US EPA 1986). The current TDS criterion for drinking water supply and aquatic life is 500 mg/L. A demonstration of “no adverse effect” is allowed for the 500-1000 mg/L TDS range for aquatic life criteria under Note 12 of the criteria table in 18 AAC 70.020(b). In some studies, adverse effects as low as 250 mg/L calcium-based TDS were found during fertilization of salmonids. In April 2002, EPA approved Alaska’s current TDS criteria. However, the approval letter indicated that the specific outcomes of applying the narrative standard in Note 12 would require a case-by-case EPA review until sufficiently detailed implementation procedures were developed by DEC and approved by EPA. In 2006 DEC reviewed research literature on TDS and its effect on fish and other aquatic life and found toxicity values to be less than the current standard of 500 mg/L. Given the literature review findings, DEC may consider revising the current criteria.
6. Groundwater Standards. Under current regulations, groundwater is protected using the same aquatic life criteria as surface waters. While there is not necessarily aquatic life in the groundwater itself, aquaculture facilities (e.g. hatcheries) may use groundwater to raise aquatic organisms. The more common use of groundwater is for drinking water. Water quality criteria to protect humans for the drinking water use are less stringent for many substances than the criteria to protect aquatic life. Therefore, protecting all groundwater for an aquatic life use, when that use is rare or non-existent, may not be necessary. DEC may consider alternatives that ensure protection of aquatic life where groundwater discharges to surface waters.
7. Nutrient Criteria - Cook Inlet Ecoregion. The regulation of nutrients is a major concern for EPA and many states. Preliminary nutrient studies have been undertaken on several lakes in the Cook Inlet ecoregion, including the Anchorage area, the Matanuska-Susitna valley, and the western half of the Kenai Peninsula. This ecoregion is the most likely area for impact by nutrients from urban and agricultural runoff due to the concentrations of the state population in these areas. More study will be necessary before there is sufficient data to characterize lakes in the area and adopt numeric nutrient criteria in Alaska. Narrative criteria to address nutrient problems were adopted as part of the 2003 amendments to the WQS regulations. This potential 2021-2023 Triennial Review issue consists of collecting and assessing data on nutrient levels in lakes located in the Cook Inlet region, determining whether there is sufficient information and need to amend the 2003 criteria, and proposing amendments to the WQS regulations, if warranted.
8. Petroleum Hydrocarbons – Aquatic Life Criteria. Alaska’s numeric aquatic life criteria for petroleum hydrocarbons were adopted in 1979, were last reviewed in 2010, and continue to be the most stringent in the nation at approximately two to

Department of Environmental Conservation
Division of Water
2021-2023 Triennial Review Issue Summary
November 2020



three orders of magnitude lower than other state's criteria. Petroleum characteristics have led to unique challenges in implementing this standard in Alaska. Obtaining representative samples is challenging due to the volatility of the pollutants, intermittent and seasonal sources (e.g. motorized watercraft during three-week salmon fishery periods), and chronic exposure averaging periods. DEC will continue to monitor new scientific literature on the toxicity and regulation of petroleum hydrocarbons.

- 9.** Pharmaceutical and Personal Care Products (PPCPs). National water quality monitoring efforts have demonstrated that pharmaceutical and personal care products regularly enter wastewater systems through our homes and businesses and may be found in low concentrations in certain surface waters. Some examples of PPCPs include prescription and over-the-counter therapeutic drugs, veterinary drugs, Nutraceuticals (e.g., vitamins) and cosmetics. To date, scientists have found no evidence of adverse human health effects from PPCPs in the environment. However, PPCPs contain a diverse set of chemical compounds that may be under-regulated that have the potential to cause harm to aquatic life. This potential Triennial Review topic will consist of monitoring national efforts to address this issue including monitoring, risk assessment, and rule making efforts in other states or by EPA.
- 10.** Temperature – Aquatic Life Criteria. Studies have indicated that increases in stream temperatures, shifts in annual temperatures, and loss of cold water refuges can negatively affect salmon mortality, increase competition with non-native species, and increase the risk and severity of disease. This potential 2021-2023 TR issue consists of examining the growing body of knowledge on the effects of increasing temperatures on aquatic life, particularly salmonids, and potential amendments to the existing WQS regulations.