Division of Water
2015-2017 Triennial Review
Water Quality Standards Issues Summary
January 2015

Summary

This document summarizes pending and potential future Alaska Water Quality Standard (WQS) issues that may result in proposed regulation revisions, guidance, or technical assistance projects. These issues and associated projects are either continuations of past projects or proposed to be conducted during the 2015-2017 Triennial Review Period. The Department of Environmental Conservation (DEC) is not proposing any regulatory changes at this time.

Department of Environmental Conservation

Division of Water
Standards Section
410 Willoughby Ave
Suite 303
Juneau, Alaska 99801
Phone: (907) 465-5185
Fax: (907) 465-5274

DEC Triennial Review Website:
http://www.dec.state.ak.us/water/wqsar/trireview/index.htm

Background

Every three years, DEC reviews Alaska's WQS in accordance with 40 Code of Federal Regulations (CFR) §131.13. This comprehensive evaluation, called the *Triennial Review,* is required by the federal Clean Water Act (CWA) and is an essential process that keeps Alaska's waters swimmable, fishable, and drinkable. This review helps to keep the pollution limits for Alaska's waters up-to-date by integrating new science, policy, technology, and federal requirements into the state WQS regulations.

The Triennial Review process is carried out in three phases. Phase I is a widespread call for information on potential issues for the Triennial Review. In Phase II, DEC prioritizes the issues, researches, and works on the highest priority issues and drafts proposed WQS regulations revisions if appropriate. Phase III is the formal rulemaking process including public notice and comment on proposed changes as amendments to the State's WQS regulations (18 AAC 70).

I. Potential Triennial Review Issues

A. High Priority Issues for Rulemaking: The following potential Triennial Review issues are projects that reflect prior commitments or current DEC high priorities already under review.

1. Antidegradation Implementation (currently underway)
   - Public notice of draft regulations, compilation of public comments, final edits of draft regulations, and promulgation of regulations
   - Submission and approval of regulations to EPA
2. Human Health Criteria – revisions to reflect Alaska specific consumption of fish and water to align with nationally recommended criteria
3. Standard Analytical Methods (routine and technical update)

B. **Issues for Information Gathering and Analysis:** The following issues are suggested for information gathering and analysis for potential future updates to high priority WQS. These issues may or may not be ready for rule making during the 2015-2017 Triennial Review.

1. Bacteria Criteria for recreational use (marine and fresh water)
2. Benthic Sediment Criteria
3. Copper – Aquatic life criteria
4. Human Health Criteria
5. Carcinogens - Human Health Criteria
6. Manganese - Human Health Criteria
7. Methylmercury - Human Health Criteria
8. Natural Conditions
9. Turbidity Criteria
10. Variances to WQS

C. Issues for Tracking and Monitoring: The following issues are suggested for tracking and monitoring for changes in scientific research and emerging issues. These issues are not anticipated to involve significant analysis or rule making during the 2015-2017 Triennial Review, but there is a possibility that circumstances could change.

1. Ammonia – Aquatic Life Criteria
2. Biocriteria
3. Dissolved Inorganic Substances for Total Dissolved Solids
4. Groundwater Standards
5. Nutrient Criteria: Cook Inlet Ecoregion
6. Pharmaceuticals and Personal Care Products
7. Temperature Criteria
8. Petroleum Hydrocarbons – Aquatic Life Criteria

II. Issues Descriptions

A. High Priority Issues:

1. Antidegradation Implementation Regulations. While the State has an established antidegradation policy set out in 18 AAC 70.015, the CWA also requires procedures for implementing the policy. In December 2009, DEC hosted a conference to share information about antidegradation policy implementation programs in other states and discuss approaches that might work best in Alaska. In July 2010, DEC established interim implementation methods, which were reviewed by EPA and found to be consistent with the CWA. DEC established a work group of representatives of key interests and in January 2013 produced a report with the work group's recommendations. The work group was advisory in nature, providing DEC with various perspectives and informing the department's development of draft regulations for public review. DEC issued a public notice of proposed regulations in

early 2014. In 2014, DEC reviewed public comments and considered additional changes. DEC currently plans one or more workshops for tribal and local governments, permittees, and the public prior to public noticing a revised draft for additional public comment.

2. Human Health Criteria for Consumption of Fish and Water. Human health criteria are water quality criteria that are established to minimize health risks to humans through consumption of aquatic organisms (e.g. fish, shellfish) and water over the course of a lifetime. Numerous factors including acceptable degree of risk, consumption of aquatic life and water, contribution of sources other than water or aquatic life, human body weight, and bioaccumulation rates are all factored into the human health criteria equation.

Addressing human health criteria will consist of examining available data and assumptions associated with the human health criteria equation, exploring options for revising human health criteria, identifying potential outcomes of adoption of revised criteria, and examining tools and processes, including those used by other states, for implementing revised criteria.

During this Triennial Review cycle, DEC will consider proposing an initial fish consumption rate for statewide application and development of additional site-specific permitting mechanisms for protection of downstream areas with high fish consumption rates. This stepped approach will be complemented by additional information gathering and analysis on efforts to develop human health criteria in other states and potential implementation tools.

3. Standard Analytical Methods. Standard laboratory analytical methods approved by EPA are required in order to measure compliance with Alaska WQS. The approved methods were last updated in 2006. The 2015-2017 Triennial Review issue will review and adopt the most current EPA-approved standard analytical methods. This will ensure that the most current scientific applications are used to determine compliance with WQS.

B. Issues for Information Gathering and Analysis:

1. Bacteria Criteria. EPA released new Recreational Water Quality Criteria (RWQC) and guidance in 2012 for protecting human health in waters designated for primary contact recreation use (swimming). Several aspects of the new criteria have the potential to affect the Alaska Beach Environmental Assessment and Coastal Health (BEACH) monitoring and APDES programs. EPA recommends that states adopt criteria for *enterococcus* bacteria for all waters-fresh and marine. EPA has determined that fecal coliforms as a group are a poor indicator of the risk of digestive system illness. EPA also recommends adoption of new bacteria criteria that represent the 90th percentile of the population "at risk" rather than the 75th percentile DEC currently applies in WQS. Finally, EPA recommends adoption of new methods for application of quantitative polymerase chain reaction (qPCR) technology for the

detection and quantification of *enterococci*. Conventional membrane filtration and most probable number methods continue to be approved methods for bacteria analysis.

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. The State's policy is to use screening levels developed by NOAA that apply to toxic substances and petroleum contamination in sediments. Maintaining the quality of sediments can be important for maintaining water quality and protecting designated or existing water uses. Many states have adopted more specific guidance and/or numeric sediment quality criteria in addition to, or in conjunction with, water quality criteria for ambient water. This potential 2015-2017 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. Copper - Aquatic Life Criteria. Recent studies (2003 – Present) conducted in the Pacific Northwest by researchers from the NOAA, Oregon State University, and EPA concluded that copper may have adverse effects on Pacific Salmon behavior (avoidance) at very low concentrations (< 5 μg/L). However, behavior endpoints were not considered by EPA to be more sensitive to copper than are reproductive and growth effects when establishing acute and chronic criteria recommendations. Peer reviewed studies of the effects of dissolved copper on fish in Alaska do not exist, and very little is known about natural background levels of copper in Alaska's waters.

Freshwater studies on salmonids indicate that copper is not lethal and growth is not reduced for salmonids at concentrations at or below the current acute or chronic criteria. However, copper was demonstrated to affect the salmonid olfactory system at lower concentrations, which may affect their survival or reproduction. The studies were inconclusive as to the actual threshold for olfactory effects on salmonids in part because toxicity is affected by other constituents in the water. Most of the studies conducted by NOAA did not investigate whether dissolved organic carbon or other naturally occurring substances interact with copper to reduce the olfactory effects on salmonids.

An issue of concern associated with the derivation of the copper criteria is the EPA-recommended adoption of the biotic ligand model. EPA approved use of the model in 2007 and considers it to be more predictive of effects upon olfactory behavior due to its ability to assess multiple parameters (e.g. hardness, multiple chemicals) against bioavailability. Use of the biotic ligand model may also be appropriate for deriving criteria for zinc and potentially supplement use of the Water Effects Ratio for use when deriving site-specific criteria. Studies conducted by EPA and private organizations have demonstrated that use of the biotic ligand model have been more protective of olfactory-based responses than hardness-based copper criteria in waters with varying chemistry. A number of states have adopted this model as a method for site-specific criteria development.

During the 2015-2017 Triennial Review, DEC will review current scientific literature and collaborate with other agencies to track research on factors affecting copper toxicity in aquatic life and the response to naturally elevated levels of copper in some waters. DEC will also research policy implications associated with the adoption of the biotic ligand model.

4. Human Health Criteria. Human health criteria are numeric values in water quality standards for toxic substances (e.g., metals, pesticides). These values are established to protect surface water uses for aquatic life and to allow Alaskans to consume fish and shellfish and to use state waters for drinking water supply over the course of a lifetime without adverse health effects. Several factors are used to develop human health criteria including human body weight, drinking water intake, bioaccumulation rates of pollutants in different aquatic species, and the amount and type of fish eaten on a daily basis (fish consumption rate). In concert with efforts to develop initial human health criteria implementation mechanisms during the 2015-2017 Triennial Review cycle, DEC will be researching different approaches used by other states, monitor national and local research efforts, and assess information unique to Alaska. This issue will include further consideration of implementation tools for use in the regulatory process.

5. Carcinogens - Human Health Criteria. In 1992, EPA promulgated human health criteria for carcinogens for the State of Alaska under the National Toxics Rule (NTR). This potential 2015-2017 Triennial Review issue consists of reviewing the latest information, guidelines and rules for establishing water quality criteria for carcinogens and proposing amendments to the WQS regulations. Review will take place in conjunction with general updates to the human health criteria. A potential outcome of this update would be to withdraw Alaska from the 1992 NTR federal criteria, which would reduce confusion regarding which standards (State or federal) apply in Alaska.

6. Manganese - Human Health Criteria. The current human health criteria 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. Manganese is considered a secondary (aesthetic) drinking water contaminant by EPA and has no direct health effects at the level of the currently adopted human health criteria for consumption of water and aquatic organisms. This potential Triennial Review issue would consider updating the human health criteria for manganese based on more recent information and EPA's guidance published in 2000 that established a lifetime health advisory for manganese at 0.3 mg/L. Updates associated with this parameter will take place in conjunction with general updates to the human health criteria.

7. Methylmercury - Human Health Criteria. In January 2001, EPA published water quality criteria for methylmercury and for the first time based the human health criteria on fish and shellfish tissue concentration rather than on a concentration in the water column. At

that time 0.3 mg methylmercury/kg fish tissue wet weight was established as EPA's criteria. This criteria 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 among the general population. Methylmercury is the toxic form of mercury in water that can enter fish and humans. This potential 2015-2017 Triennial Review issue would consist of examining the fish tissue-based methylmercury criteria for application in Alaska along with available methods to translate the criteria from a fish tissue concentration to a concentration in water. The effort could result in proposed regulations. EPA guidance is available to assist states in developing criteria and establishing water concentration-bioaccumulation limits on a site-specific basis, as well as default approaches for use in APDES permits. Updates to this criterion could take place in conjunction with general updates to the human health criteria.

8. Natural Conditions. DEC does not have an EPA-approved method for determining natural conditions. EPA disapproved DEC's proposed regulations in 2009 but allows DEC to use previous site-specific criteria regulations for natural conditions (in 2003 version of WQS). The 2003 regulations do not include implementation procedures. Recent decisions by EPA regarding implementation of natural conditions criteria may further reduce Alaska's ability to account for naturally elevated levels of pollutants that are not anthropogenic in nature. There is interest among the regulated community to revisit this issue. It is important that the state develop an acceptable performance-based model to reduce the burden of developing site-specific criteria. EPA is currently working on development of an agency policy position on this particular issue. DEC will be actively monitoring this issue as EPA completes its recommendations to states.

9. Turbidity Criteria. Alaska's turbidity WQS have come into question in regards to how and when the criteria are applied. 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. In addition to difficulties in quantifying natural background, the effects of turbidity on aquatic life may be more difficult to quantify because of wide natural variations in watershed geology and hydrology (e.g. glacial watershed verses clear water systems). This potential Triennial Review issue will review how performance-based tools being used to develop natural conditions-based criteria in other states could be adapted for use in Alaska.

10. WQS Variances. WQS variances are permitting tools used to provide temporary relief from a designated use and its associated criteria identified in the Alaska WQS. The use of variances in the application of WQS is supported by the EPA as demonstrated in proposed changes to the CWA. EPA has suggested that states make greater use of variances. Exploring an expansion to applicable projects under 18 AAC 70.200 may be appropriate and consistent with national trends. This potential Triennial Review issue consists of examining the need to

expand the definition of projects that may benefit from WQS variances, the requirements for obtaining such a variance, and the implementation concerns that may result from such a change.

C. Issues for Tracking and Monitoring

1. Ammonia – Aquatic Life Criteria. Ammonia is a constituent listed by EPA as a non-priority toxic pollutant. 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. 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. This proposed 2015-2017 Triennial Review issue, will consist of considering permit implementation issues associated with adopting this criteria.

2. Biocriteria. The CWA allows WQS to be based on chemical, physical and biological criteria. Currently, Alaska's WQS are predominantly derived from physical and chemical water quality criteria. This potential Triennial Review 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 is estimated to be generally unavailable for at least ten years due to a lack of monitoring data, this effort will not yield amendments to add numeric biocriteria to the WQS during this Triennial Review cycle. However, the effort could lead to adopting general narrative biocriteria into the WQS regulations.

3. 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 is considering revising the current standards.

4. 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.

5. 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 2015-2017 Triennial Review issue consists of collecting and assessing data on nutrient levels 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.

6. 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.

7. Temperature 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 2015-2017 Triennial Review issue consists of examining the growing body of knowledge on the effects of increasing temperatures on aquatic life, particularly salmonids, and proposing amendments to the WQS regulations, if found necessary. Changes

could include consideration of 7-day rolling average or a similar metric for measuring temperature.

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 three orders of magnitude lower than other state's criteria. DEC will continue to monitor new scientific literature on the toxicity of petroleum hydrocarbons. In addition, DEC plans to develop implementation guidance for Clean Water Act Section 303(d) listing to address the unique characteristics of petroleum hydrocarbons and their effects on aquatic species. 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.