Department of Environmental Conservation
Division of Water
Proposed Updates to Human Health Criteria

BACKGROUND

The Alaska Department of Environmental Conservation (DEC) is committed to protecting human health and the environment through regular updates to our water quality standards (WQS). DEC has been engaged in the revision to Human Health Criteria (HHC) WQS since 2013 and recently committed to finalizing that rulemaking.

HHC is the maximum concentration of a pollutant in a waterbody considered to be protective of human health. DEC HHC are adopted via the *Alaska Water Quality Criteria Manual for Toxic or Other Deleterious Organic or Inorganic Substances (2022)* or based on values promulgated by U.S. Environmental Protection Agency (EPA) for several states, including Alaska, in 1992 as part of the National Toxics Rule (NTR).

HHC can be derived using EPA-recommended equations with general and pollutant-specific inputs. There are approximately 116 pollutants that are being considered as part of this HHC rulemaking. These pollutants are classified as inorganic pollutants (e.g., methylmercury), pesticides (e.g., chlordane, DDT), and volatile organic carbons (components of petroleum fuels, hydraulic fluids, paint thinners, and dry-cleaning agents). Revising these HHC WQS may impact wastewater dischargers by requiring more rigorous sampling methods and potentially require treatment.

Final WQS rulemaking on HHC involves a combination of science and science policy. DEC is initiating a public scoping effort on February 10, 2023, to collect and evaluate information and hear from stakeholders to determine what revisions are most appropriate. This will ultimately lead to a more informed rulemaking.

HHC EQUATION INPUTS

- **BAF – Bioaccumulation Factor:** The BAF measures the amount a pollutant accumulated into tissues of aquatic organisms through exposure to different forms of media (i.e., water, diet, sediment). BAFs are expressed as a ratio (in L/kg) between the concentration of a chemical in water compared to the expected concentration in commonly consumed aquatic organisms in a specified trophic level (TL). TL is the position in the food web of an individual species. EPA published pollutant-specific BAF values in 2015 that represent TL 2, 3, and 4. Data collected by ADF&G Division of Subsistence indicates that the majority of aquatic organisms consumed by Alaskans are upper TL 3 (e.g., whitefish) or TL 4 species (e.g., salmonids).
- **BW – Body Weight:** BW represents the average adult body weight derived from national population statistics. The 1992 NTR formula applied 70 kg (~154 lb) as the average BW. In 2015 EPA updated the recommended default BW for HHC calculation to 80 kg (~176 lb) based on National Health and Nutrition Examination Survey (NHANES) data from 1999 to 2006. This represents the average BW for adults ages 20 and older. EPA also recommended a BW of 80 kg in the EPA 2011 Exposure Factor Handbook based on adults ages 21-78. DEC's Spill Prevention and Response – Contaminated Sites Program adopted a BW of 80 kg in the 2018 Risk Assessment Procedures Manual.

- **CRL – Cancer Risk Level:** The CRL represents the potential of being diagnosed with cancer following exposure to a particular pollutant from the ingestion of surface water and/or consumption of fish and shellfish. DEC adopted a CRL of 1 to 100,000 (10^{-5}) in 1997 (18 AAC 70.025).
- **CSF – Cancer Slope Factor:** CSFs are used to estimate the risk of cancer associated with exposure to a particular pollutant. EPA publishes recommended values.
- **DI – Drinking Water Intake:** This is the amount of drinking water consumed from untreated surface water daily. The original NTR formula utilized a DI of 2.0 liters per day (L/day). In 2015 EPA recommended a default drinking water consumption rate from 2.0 to 2.4 L/day based on NHANES data from 2003 to 2006. EPA also provided an updated DI of 2.5 L/day in the 2011 Exposure Factor Handbook. DEC's Spill Prevention and Response – Contaminated Sites Program adopted a DI of 2.5 L/day in the 2018 Risk Assessment Procedures Manual.
- **FCR – Fish Consumption Rate:** The FCR reflects the amount of aquatic life a person consumes on an annual basis (e.g., grams per day, pounds per year). This can be further broken down according to trophic level. EPA places an emphasis on the use of local or regional data when deriving a FCR for the derivation of HHC. States are encouraged to ensure that the criteria protect highly exposed populations, with the understanding that the level of consumption and therefore the level of risk will differ among populations.[1] DEC's 1992 NTR formula utilizes an FCR value of 6.5 grams per day and does not include marine/estuarine fish or marine mammals in the value. In 2015 EPA updated national FCR recommendations to 22 grams per day for the general population and 142.4 grams per day for subsistence populations. ADF&G's 2019 *Regional Analysis of Fish Consumption Rate Estimates for Rural Alaska Populations* and other FCR studies specific to Alaska have demonstrated the EPA values underestimate consumption in Alaska. FCR studies indicate that anadromous and non-anadromous local fish make up a significant portion of fish consumption by Alaskans.
- **RfD – Reference Dose:** RfD describes the estimated total amount of daily exposure to a pollutant that is not likely to result in harmful effects. This factor only applies to non-carcinogens. EPA publishes recommended values.
- **RSC – Relative Source Contribution:** RSC is the fraction of the RfD for a pollutant from drinking water and fish consumption in comparison to other exposure sources (e.g., diet, air, drinking water). This factor only applies to non-carcinogens. If exposures from other sources are determined to be minimal (or accounted for in the FCR), then more exposure can be allowed for through the RSC. EPA cautions that when including certain marine species, States should adjust the RSC component, so that marine species are not double counted in both FCR and RSC.[2]

Revising Alaska's HHC to reflect the latest science and policy preferences is a priority for DEC. DEC initiated the revision process in 2015 by convening a technical workgroup (2018 Workgroup) to review EPA recommended technical and policy guidance and HHC-related data

[1] Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000), United States Environmental Protection Agency, EPA-822-B-00-004, October 2000., p. 4-25

[2] EPA. 2013. Human Health Ambient Water Quality Criteria and Fish Consumption Rates Frequently Asked Questions. Accessed online at: http://water.epa.gov/scitech/swguidance/standards/criteria/health/methodology/upload/hhfaqs.pdf

specific to Alaska. The findings of the Workgroup are published on the DEC website.[3] DEC has not taken a position on the best approach to complete updates to HHC. EPA's recommended formulas and the 2018 Workgroup recommendations are provided for informational purposes.

EPA RECOMMENDED EQUATIONS FOR HUMAN HEALTH CRITERIA

	Consumption of Organisms and Water	Consumption of Organisms Only
Criteria for Carcinogens	$\frac{CRL \times BW}{CSF \times [(FCR \times BAF) + DI]}$	$\frac{CRL \times BW}{CSF \times FCR \times BAF}$
Criteria for Non-Carcinogens	$\frac{RfD \times RSC \times BW}{(FCR \times BAF) + DI}$	$\frac{RfD \times RSC \times BW}{FCR \times BAF}$

INPUT OPTIONS AND 2018 WORKGROUP RECOMMENDATIONS

- **BAF – Bioaccumulation Factor**: DEC can choose to either adopt the 2015 BAF for one of the three TLs **or** apply TL 4 value alone. *The 2018 Workgroup recommended DEC apply only TL 4 as that most accurately represents the predominate trophic level of consumed species identified in the ADF&G FCR data.*
- **BW – Body Weight**: DEC can retain the current value (70kg) or change this value. *The 2018 Workgroup recommended DEC change this number to EPA's 2015 value of 80 kg (~176 lb).*
- **CRL – Cancer Risk Level:** DEC can retain the current value (1 in 100,000) or change this value. *The majority of the 2018 Workgroup recommended that DEC retain the current value.*
- **CSF – Cancer Slope Factor:** DEC can choose to apply EPA values or develop state values. *The 2018 Workgroup recommended that DEC apply the EPA developed CSFs.*
- **DI – Drinking Water Intake:** DEC can retain the current value (2.0 L/day) or change this value. *The 2018 Workgroup recommended that DEC change this number to 2.5 L/day.*
- **FCR – Fish Consumption Rate:** DEC can retain the current value (6.5 g/d) or change this value. In addition to freshwater and nearshore species, DEC can also elect to include certain marine species. DEC may make state-specific determinations regarding the target population and associated consumption rate. *The majority of the 2018 Workgroup recommended DEC include the consumption of anadromous and non-anadromous local fish, including salmon, marine invertebrates, shellfish, in the development of a statewide FCR. The majority of the 2018 Workgroup also recommended DEC consider rural Alaskan consumers as the target population for protection although there should be consideration of regional differences.*
- **RfD – Reference Dose:** DEC can choose to apply EPA values or develop state values. *The 2018 Workgroup recommended that DEC apply the EPA developed RfDs.*
- **RSC – Relative Source Contribution:** DEC can choose to retain the pollutant-specific default values or adjust RSC values from 0.2 to 0.5 to account for the inclusion of marine species in the FCR. *The 2018 Workgroup recommended DEC apply the EPA 2015 RSC*

[3] Department of Environmental Conservation. 2018. *Evaluation of Key Elements and Options for the Development of Human Health Criteria; Technical Workgroup Report.* Division of Water. Juneau, Alaska. Download available at https://dec.alaska.gov/water/water-quality/human-health-criteria/.

values. The workgroup did not deliberate on the adjustment of RSCs to account for inclusion of marine species as that option was not identified at the time.

PROPOSED HHC RULEMAKING TIMELINE

Spring 2023	Public scoping and comment solicitation; various presentations
Summer 2023	Develop draft rulemaking and guidance
Fall 2023	Agency review of draft rulemaking and guidance (Law, EPA, etc.)
Spring 2024	Public notice, meeting notice, and comment solicitation for rulemaking
Fall 2024	State adoption of rulemaking; submission to EPA