Water Quality Standards Human Health Criteria

Public Workshop

Alaska Department of Environmental Conservation
Division of Water: Water Quality Standards

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Division of Water

Mission Statement: **Improve and Protect Alaska's Water Quality**

How?

- **Establishes standards for water cleanliness**
- Regulates discharges to waters and wetlands
- Provides financial assistance for water and wastewater facility construction and waterbody assessment and remediation
- Trains, certifies, and assists water and wastewater facility system operators
- Monitors and reports on water quality

The department protects water in a lot of ways- I have listed 5 of them here.

Human Health Criteria

- Human Health Criteria "101"
- History of Regulation(s) and Purpose of Updates
- What DEC is hoping to achieve with this Workshop

Outline of this Workshop: Day 1

- Ground Rules and Expectations
- Introduction to human health criteria (HHC) issue
- Current issues from a National Perspective
- Relationship to Fish Consumption Advisories
  - Lunch
- Introduction to HHC formula
- Introduction to Dietary Surveys
- State experience: Idaho and Washington
  - Panel Discussion

Note- depending on how our conversations go- we may finish early or we may table the Regional Concept for another time.

Outline for this Workshop: Day 2

- DEC Efforts to date
  - Fish Consumption Research Literature Review
- Tribal Efforts to Quantify Fish Consumption: Tribal Village of Seldovia
- ADF&G Efforts to collect fish harvest data and relevance to FCR
  - Break
- Implementation of new HHC: Existing and Potential options
- Lunch
- Tribal Panel Discussion
- Break-out Groups- feedback on specific issues of concern

Ground Rules for the Public Workshop

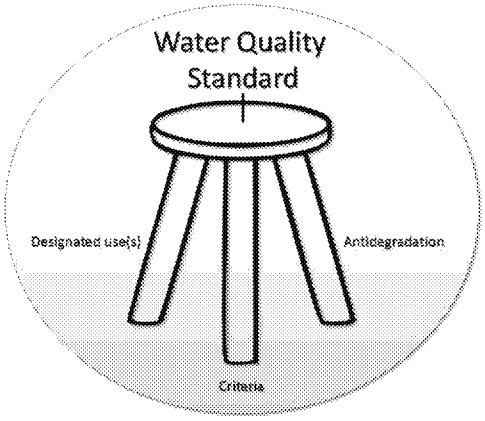
- DEC understands that many different interests will be represented, and that it might not be possible to come to consensus on different issues
- Regardless of the degree of consensus attained, all information and recommendations will be of value to DEC in the process.
- Be Respectful of all participants at all times- this is an issue of importance to all of us for different reasons

Refer to the Groundrules page in the notebook.

Rather than go over the whole document- this is a summary of the content there.

Please be respectful, helpful, and mindful that this is a process with many different points of view to be taken into account. The more you're engaged, the more you'll get out of this process.

Foundation of a Water Quality Standard



-Defined-

1. **Designated Uses** – how water is used (*e.g.* recreational, industrial, aquatic life)
2. **Criteria** - are numeric or narrative values. Consider how much and how long you may be exposed to a substance or condition
3. **Antidegradation** –process for protecting high quality waters

If you wanted to visualize a WQS- it could look like a three legged stool

All three need to be considered or the regulation will be "out of balance"

Most designated uses are general enough to be able to incorporate numerous activities under one heading
Criteria is based on dose and duration

Other policies affecting application and implementation are also noted in regulations (i.e., mixing zones and site specific criteria

What are Water Quality Standards (WQS)

- Identified at 18 AAC 70 in Regulation
- The foundation of state/tribal water quality-based pollution control programs under the Clean Water Act (CWA)
- Are designed to protect public health or welfare (*designated use*)
- Provide maximum (generally) concentration of a particular pollutant in the water (*criteria*)
- Help identify polluted waters; clean-up polluted water, and make sure our waters don't get more polluted

used for:
Benchmarks for monitoring/assessment
Water quality based limits in permits
Goals for waterbody restoration/recovery plans- TMDLs

Derived by rigorous scientific procedures
Are designed to protect public health or welfare

Provide maximum (generally) concentration of a particular pollutant in the water

Where do Water Quality Standards (and discharge limits) apply?

(AS 46.03.900) "Waters" include lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, straits, passages, canals, the Pacific Ocean, Gulf of Alaska, Bering Sea, and Arctic Ocean, in the territorial limits of the state, and all other bodies of surface or underground water, natural or artificial, public or private, inland or coastal, fresh or salt, which are wholly or partially in or bordering the state or under the jurisdiction of the state.

(18 AAC 70.020(b)): [t]he water quality standards regulate human activities that result in alterations to **waters** within the state's jurisdiction.

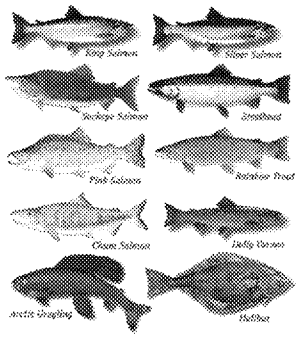
Apply to all waters within Alaska's geographic boundaries (e.g., within three nautical miles of shore
May not necessarily apply to certain types of sources (e.g., atmospheric)
Need to be approved of by EPA

It is important to note these definitions because Alaska does not have the authority to regulate water quality outside of its territorial waters. Essentially-if it's not state property, Alaska has no jurisdiction to develop rules/regulations

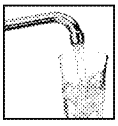
Human Health Criteria

Presentation #1: An introduction to the issue

Human Health Criteria (HHC)



- A human health criterion is the highest concentration of a pollutant in surface water that is not expected to pose a significant risk to human health
  - designed to **minimize the risk** of adverse effects from exposure to different contaminates
  - Based on a **chronic (lifetime) exposure** to contaminants
  - Includes **the ingestion of drinking water** from surface water sources and/or
  - The **consumption of aquatic life** obtained from surface waters.



Essentially, the criteria are designed to protect people who consume fish.

Oregon has completed revisions to their criteria, Idaho and Washington are in the process. Alaska is evaluating what has taken place in other states. It's a dynamic rather than a static process with lots of stakeholders to consider.

Human Health Criteria (HHC) are set at a level that enables residents to safely consume the amount of fish they want to consume.

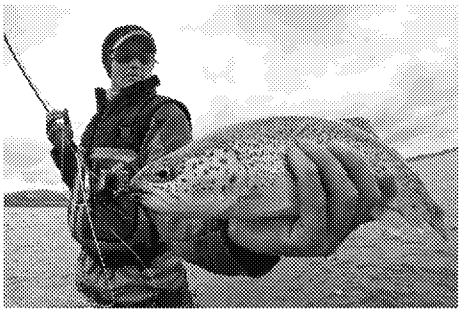
What are HHC (cont.)

- Human Health Criteria consider two different exposure scenarios
  - Marine Waters (Consumption of aquatic organisms only)
  - Freshwaters (Consumption of aquatic organisms & ingestion of surface water)

- Several factors to consider…
  - Population of concern
  - Mode of effect of the contaminant (acute v. chronic, carcinogenic, etc.)
  - Definition of "aquatic life" and where does your meal come from?
  - Other exposure issues and sources of contaminants (e.g. air)

Need to consider recreational, commercial, traditional, and aquaculture when determining where the fish come from.

When does HHC apply- Designated Use?



HHC are tied to the designated uses

- ***Drinking water***
- ***Growth and propagation of fish,*** *shellfish, other aquatic life and wildlife*
- ***Harvesting for consumption*** *of raw mollusks or other raw aquatic life*
- Removal or modification of uses and/or criteria may be subject to a high level of scrutiny when 303(c) fishable/swimmable uses

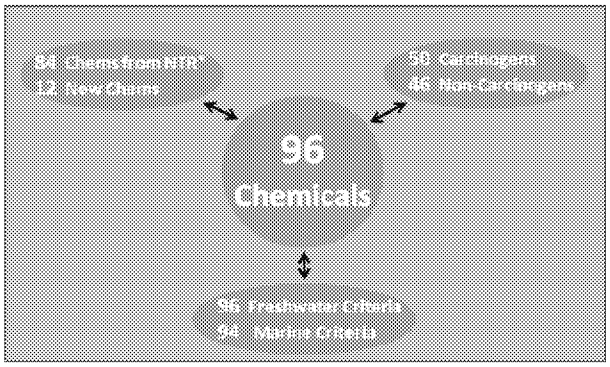
For contextual purposes- Essentially, HHC are on the same footing as aquatic life and any changes (SSC or Reclassification) will require a significant amount of resources on the part of the applicant as well as the state. Think of it as the highest burden of proof.

Historical Context: National

- 1980 – EPA derived 64 recommended HHC. Criteria were based on national dietary information (where 6.5 g/day comes from)
- 1992 - National Toxics Rule promulgated carcinogens for Alaska
- 2000 - New HHC methodology was published.
  - Updated FCR to 17.5 g/d
  - Subsistence user value of 142.4 g/d
- 2002 – 2015 Updated HHC based on 2000 methodology
  - Includes updated toxicity values for 122 different pollutants
- 2015 - Updates to exposure rates including FCR to 22.0 g/day

How do the 2015-recommended HHC compare with existing HHC?

- There are revised criteria for 96 chemical pollutants
  - 70% of the 2015 HHC are lower concentrations than 1980 criteria
  - 30% of the 2015 HHC are equal in concentration to 1980 criteria
  - Numerous pollutants were not updated at this time (e.g., PCBs, metals)



Note that when you look at the EPA Fact Sheets you will see that EPA states that there are new criteria for 94 Chemicals- the difference occurs because several updates have occurred since 1992 Toxics Rule was promulgated.

Today there are toxicity values for 122 different pollutants- This rulemaking will only be focused on a select group of them- Criteria for Arsenic and Mercury are not currently being considered at this time but may be in the future.

Arsenic was withdrawn from the applicability of Alaska's waters to the federal HHC on April 1, 1998.

HHC in the Inorganic Toxics Criteria Worksheet

Enter the appropriate **Hardness** value for the water you are interested in: 30 mg/L as CaCO3 ****

Calculation of Hardness
adapted from Standard Methods, Method 2340B — units in mg/L
input calcium and magnesium concentrations.

Calcium:	3.28		
Magnesium:	10.4	Resulting Hardness=	51.0

color key: orange highlighting: the most stringent criterion
yellow highlighting: the criterion depends on the hardness

all units in micrograms per liter (ug/L) — all units in micrograms per liter (ug/L)

Parameter	Drinking Water	Stockwater	Irrigation Water	Aquatic Life-Fresh Water											Human Health Criteria for NonCarcinogens	
				Acute					Chronic							
				the criterion is	as	[illegible]	the criterion is	as	the criterion is	as	[illegible]	the criterion is	as		Water + Aquatic Organisms	Aquatic Organisms Only
alkalinity									20,000 minimum							
aluminum			5,000	750	TR				87	TR						
antimony	6														14	4,300
arsenic	10	50	100	340	TR	[illegible]	340	D	150	TR	[illegible]	150	D			
barium	2,000															
beryllium	4		100													
boron			750													
cadmium	5	10	10	0.63	TR	[illegible]	0.62	D	0.11	TR	[illegible]	0.11	D			
chloride				860,000					230,000							
chlorine (total residual)				19					11							
chromium (total)	100		100													
chromium III				672.82	TR	[illegible]	212.55	D	42.16	TR	[illegible]	27.46	D			
chromium VI		50		16	D				11	D						
cobalt			50													
copper			200	4.50	TR	[illegible]	4.52	D	3.33	TR	[illegible]	3.26	D		1,300	
cyanide (as free CN)	200 *			22 **					5.2 **						700	220,000

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Note that carcinogen criteria are found in the (2008) Water Quality Manual for Toxics. DEC currently regulates 94 different carcinogenic pollutants based on 1992 NTR- refer to your packet for the different chemicals of concerns- Inc. pesticides

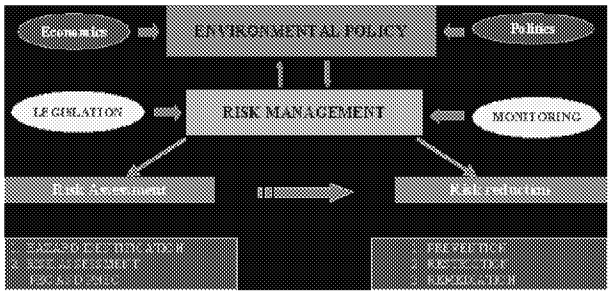
Why is Alaska interested in the HHC issue?

- Clean Water Act requires states to adopt updated criteria when new information is available
- Alaska is subject to the promulgated National Toxics Rule
  - Not based on Alaska-specific or even Northwest data
- Criteria must be scientifically defensible

Alaska adopted its HHC in 2003 and recognizes that it was based on limited data
Identified as part of the 2013 Triennial Review process and in Triennial Review comments previously. Oregon has completed revisions to their criteria, Idaho and Washington are in the process. Alaska is trying to learn by evaluating what has taken place in other states. It's a dynamic rather than a static process with lots of stakeholders to consider.

What has DEC heard or learned to date?

- Comments submitted in Triennial Review process call of a revision
  - Existing values are outdated
  - Desire for the state to adopt Alaska-specific values
- Litigation in Northwest



- Concerns from the regulated community that potential revisions may be very difficult to meet in the short term
  - May not be the right mechanism for reducing toxics in the environment
  - $$$$$

Goals of this rule-making?

- **Ensure water quality standards are protective of human health** so our fish, shellfish, and drinking waters (surface) remain clean and healthy to consume;
- **Apply a regulatory process based on a realistic timeframes** to allow dischargers to reduce pollutants and still be in compliance while they are doing their work; and
- **Acknowledge that there are technology limitations** and give recognition that non-permitted sources may be a significant part of the problem with being able to meet the criteria.

Special thx to WA staff for supplying this language

Who else is working on this issue?

- Florida: Started this process in 2003. Awaiting EPA response on 2015 package
- Washington: Began work in 2011. Working on draft package…
- Idaho: Began work in 2011. Working on a draft package…
- Maine: HHC were disapproved of in 2015 for not being protective of tribal populations Currently being litigated (Maine v. EPA)
- EPA-Region 10: May promulgate criteria for WA if state doesn't meet a September deadline
- Numerous tribes…both in Alaska and Northwest

Issuance of the 2015 criteria will require ALL states to consider their criteria (especially those who are currently applying a 6.5 FCR) but these are the states that DEC has been monitoring

Oregon: Began work in 2008 as result of consent decree. Approved in 2011. Still working on issues with implementation

Break

- Questions?

4 Equations to Calculate Human Health Criteria

Input Variables (2015 recommended)

BW = Human Body Weight (adult = 80 kg = 176 lbs)

DI = Drinking Water Rate (2.4 liters/day)

CSF = Cancer Slope Factor (mg/Kg-day) AKA (RSD)

FCR = Fish Intake Rate (? grams/day)

BCF/BAF = Bioconcentration v. Bioaccumulation factor (L/Kg- chemical specific

RfD = Reference Dose, Non-Carcinogens (mg/Kg-day)

RL = Risk Level ($10^{-?}$) in Alaska (EPA uses 10^{-6})

RSC = Relative Source Contribution

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

Slide Images and Inspiration courtesy of Washington Ecology

Note that the formula is slightly different depending on whether you are describing a carcinogenic or non-carcinogenic substance.

Relative Source Contribution can be a difficult factor to determine- considers ALL of the sources a person may be exposed to. In the new HHC guidance states are encouraged to use a 80/20 ratio in which only 20% of the total contribution is attributed to water and FC unless states can prove a higher amount is warranted.

This is a point of contention between states and federal agents