Division of Water
Human Health Criteria (HHC) Technical Workgroup
Meeting #6 Notes
February 24, 2016

Time of Meeting: 9 AM – 11 AM

Location of Meeting: via GoToMeeting

Technical Workgroup for Water Quality Standards HHC Members present:

- Larry Duffy, University Alaska Fairbanks
- Jim Fall, Alaska Department of Fish & Game/Division of Subsistence (DF&G/Subsistence); Marylynne Kostick, DF&G/Subsistence
- Bob Gerlach, DEC Division of Environmental Health (DEC/EH)
- Ali Hamade, Alaska Department of Health & Social Services/Division of Public Health (DHSS/DPH)
- Alison Kelley, NANA Regional Corporation (NANA)
- Michael Opheim, Seldovia Village Tribe (Seldovia); Tracie Merrill, Seldovia
- Nancy Sonafrank, DEC Division of Water (DEC/DOW)
- Lori Verbrugge, US Fish and Wildlife Service (USFWS)
- Ted Wu, DEC Division of Contaminated Sites (DEC/CS)
- Kendra Zamzow, Center for Science in Public Participation (CSP2)

Technical Advisor:

- Lon Kissinger, USEPA R10

Interested Parties present:

- Molly Reeves, HDR
- Jackie Rose, BlueCrest
- Mike Riser, Donlin Gold
- Robert Napier, Teck Alaska
- Ron Rimmelman, NovaGold
- Matt Szelag, USEPA R10
- Jessica Fisher, HilCorp
- Guy Archibald

Meeting Facilitator: Brock Tabor, ADEC/DOW

Meeting Notetaker: Gina Shirey, ADEC/DOW

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Agenda for Water Quality Standards HHC Technical Workgroup (HHC Workgroup)

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- **Recap of Meeting #5**
  - Relative Source Contribution concerns
- **Introduce Bioaccumulation/Bioconcentration**
- **Introduce Cancer Risk Level issue**
- **Status of Regional Sub-group**
- **Public Comment**

Meeting Documents

1. 2015 Development of National Bioaccumulation Factors: Supplemental Information for EPA's 2015 Human Health Criteria Update

Brock started out the meeting by reminding everyone about the purpose of the Technical Workgroup:

- Provide technical feedback on issues associated with the development of human health criteria and develop a summary report of recommendations
- Identify key sources of information that may be applicable to the process
- Ensure that a variety of stakeholder views are heard.

Brock reviewed the questions to be considered by the workgroup:

- Issue #1: What information about fish consumption and fish consumption rates is available to inform the HHC process?
- Issue #2: What options does DEC have for developing criteria on a statewide/regional/site specific basis?
  - Issue #2a: What modeling approach(es) should DEC consider (Determinstic v. Probabilistic)?
  - This will be a topic in a future meeting
- Issue #3: What is the appropriate level of protection for Alaska and its residents?
  - Issue #3a: How should DEC apply bioconcentration v. bioaccumulation factors?
  - Issue #3b: How should DEC address concerns about its carcinogenic risk value?

Other questions that the workgroup has/will consider:

  - Issue #4a: What species should Alaska include for deriving a fish consumption rate? Marine fish (i.e., salmon?;)? If we include salmon, can we adjust FCR values based on lipid content? Marine mammals (AK would be the only state that considers this issue)?

  - Issue #4b: What is the role of Relative Source Contribution (RSC) in relation to other exposure issues and what are Alaska's options?

- Issue #5: What are Alaska's options for implementing the proposed criteria?
  - Existing tools (compliance schedules) and new tools (variances, intake credits)
  - This issue will be discussed in the future

For today's meeting, the focus will be on bioaccumulation, bioconcentration, and carcinogenic risk value.

Recap of Meeting #5

At the last meeting, there was a conversation about the workgroup report. A second draft will be available in the future. The consensus seemed to be that the group needed to get through all the issues first before drafting recommendations. There were no comments or questions or additional thoughts on any questions previously raised. There were also no more comments or thoughts on the previous discussion about Relative Source Contribution.

Introduce Bioaccumulation/Bioconcentration

Brock showed the group the HHC equation(s). Cancer risk level is in the numerator for carcinogens. The bioaccumulation factor is in the denominator for both equations (carcinogens and non-carcinogens). Brock said he distributed the *2015 Development of National Bioaccumulation Factors: Supplemental Information for EPA's 2015 Human Health Criteria Update* for the technical workgroup to review. He said that he also has the technical support document from 2003 available upon request.

- Q: It looks like there are 94 separate documents for each chemical. I'm curious about mercury. Would the workgroup benefit from that particular supplement? How does EPA deal with mercury since it is site-specific? A: The 2015 supplemental didn't include mercury. Other documents have information about mercury. Brock has implementation guidance that he will distribute. If you are interested, send Brock an email, and he will forward instead of sending to entire workgroup.
- Nancy: The criteria has been around for a while, but Alaska hasn't been able to adopt for a couple of reasons. First, Alaska needs to determine a fish consumption rate. Second, mercury levels are determined by looking at fish tissue and not water quality. In addition, mercury has special implementation issues.
- Nancy: The EPA tool deals with 94 contaminates. There are more than the 94 contaminants in the HHC but we are only looking at a subset at this point

Brock continued the presentation on bioaccumulation (BAF) versus bioconcentration (BCF). BAF reflects update from all sources and pathways including water, food, and sediment. BAF is reported as liters per kilogram of lipid in both organism and water. BCF reflects absorption of chemicals

through respiratory and dermal surfaces and is a subset of BAF. For fish and shellfish, the uptake is through exposure to water. BCF is generally easier to measure.

There are several things to consider with BAF. BAF is exposure to a pollutant through diet, water contact, and trophic position in the food chain. Low bioaccumulation is exposure from drinking water. High bioaccumulation is typically based on the diet of a particular species. EPA currently recommends a BAF based on trophic levels 2-4.

Previously, EPA and states have used BCF values for human health criteria. The 2000 Methodology recommends BAF based on locally appropriate information.

In 2015 EPA provided supplemental information for their human health criteria update. This update was provided to workgroup members. It describes how national BAF values were developed for 94 updated chemicals and calculates trophic levels 1-4. If the BAF method didn't produce reliable values, BCF is used. On PowerPoint Slide 14, Brock showed a decision tree with the different methods for calculating BAF including field and laboratory. Once you pick a model, you need to consider food chain multipliers.

- Q: Do models include marine mammals? EPA: No, but we could develop models that include marine mammals. BAF values are measured in the field. If we want to use the modeling approach, it could be done. EPA is working with the developers of the BAF trophic values (Gobis) EPA will ask him about marine mammals.

Brock talked about some conclusions for Alaska:

- The national dataset may not have accounted for Alaska.
- BAF considers both tissue of consumed organisms and water column
    - In Alaska, we have limited water column datasets.
    - There are some site-specific water column data.
    - We don't have a comprehensive set of data.
- The food web modeling didn't consider marine mammal consumption
- While there are some recommendations on allowable grams per day, that's not the case for all 94 chemicals. We will have to work through how BAF/BCF works for each chemical.

Brock reviewed how other states or tribes have addressed BCF/BAF. Oregon used BCF since Oregon-specific BAF values weren't available. Washington State proposed to use BCF in their 2016 rulemaking. Idaho proposed using EPA's 2015 BAF and using BCF where BAF wasn't available. Idaho created a weighted factor based on trophic level proportions in local fish. And Florida used BCF in 2014 but is now reviewing 2015 BAF values for application.

In EPA's response to Washington State, EPA indicated that WA is missing biomagnification in the food chain by using BCFs because BAFs account for this. If WA chooses not to use the latest scientific information, WA needs to provide the rationale to EPA.

Brock concluded this portion of the presentation on BAF/BCF by opening up the discussion using the sample questions on PowerPoint slide 19.

- It seems like using BAF values is closer than using BCF values. Excluding marine mammals, if we are just talking about fish, we can categorize our exposure based on fish consumption patterns. It is a lot closer than not considering the food chain at all.
- This is not my area of expertise. I'm confused by one thing in the 2015 EPA document. I'm struggling with field data and what they actually were. Duration of exposure known, etc. How much BCF data available? DEC: Brock can't answer question. EPA: We need to go back and look at criteria documents. The BCF values were evaluated at steady state. EPA can also inquire about stability of BAF values across different food systems. This came up when we were looking at national approaches. The national approach doesn't take into consideration cold water.
- Q: Is there anything done in Canada that can be looked at? EPA: There is a lab in Minnesota that may have cold water information.
- Q: For BAF, is it possible to look at Alaska marine mammal studies and modify values accordingly? DEC: This came up in a conversation with EPA last week. EPA: It will take consulting with experts. The biggest concern is that if have marine mammals in trophic level 5, are they really included in the data? The other option is to figure out which species should be included in trophic levels 3 or 4 and account for them via FCR.
- DEC (Nancy): Marine mammals are getting more complicated based on what they consume. Some chemicals bioaccumulate in the liver. Others in lipids. Are they accumulating the contamination in waters under state jurisdiction? If they are outside of state jurisdictional waters, the state can have advisories, but the state, through water quality criteria, can't affect the contamination. If they are in state jurisdictional waters, then we can have some impact. For marine water, the state can issue advisories. For coastal waters, the state can have criteria. Pollution can be controlled by water quality criteria for state waters.
- ADF&G data is telling about how much marine mammal consumption happens in the Arctic.
- Water quality criteria are preventative in nature, but you can only prevent what you can control.
- Q: Is there a backup to methods? In the figure you showed, are the methods hierarchical? A: Those are the methods that apply to the procedure. They seem to be more of a recommendation than requirement.
- For WA, does that mean the table is not as valuable? DEC: I have no idea how to answer that question. It is something to consider. A lot of what Alaska does will be based on EPA's comments to WA. As soon as the EPA's comments to WA are available, Brock will distribute them to the group. He will check in with WA to see when EPA's comments may be available.

- Q: Since it looks like the other states are using the BCF approach, does that mean they don't have the field data to use BAF? EPA: BAF was recently introduced so some states haven't had the opportunity to incorporate them.

Nancy took over the presentation to talk about Incremental Cancer Risk Level. The HHC formula determines the degree of risk to humans from exposure to certain pollutants suing the formula:

Risk = Toxicity * Exposure * Uncertainty

The purpose of the cancer risk level is to try to control cancer from water and fish. Risk is controlled by looking at toxicity, risk, and exposure. Toxicity is the cancer risk factor and exposure is the fish consumption rate and drinking water compared to body weight and uncertainty. The Cancer Slope Factor is set by EPA and published in the IRIS catalogue. It doesn't consider a toxicity threshold or point of departure. The Cancer Risk Factor is a risk management decision for exposure. This factor is used in different regulatory programs including air quality, food quality, drinking water, and contaminated sites.

On Nancy's PowerPoint Slide 6, she had a diagram of two overlapping circles. One was for risk assessment, and the other one was for risk management. Cancer Slope Factor is used in risk assessment and considers existing studies, relationship to humans, and uncertainty factors. Cancer Risk Level is used in risk management and considers a broad range of influences and outcomes.

For Cancer Risk Level, states are allowed to choose from a range of 10^{-5} to 10^{-6} as long as 10^{-4} is not exceeded for those who are high consumers of fish. Many years ago, Alaska chose 10^{-5} for the Cancer Risk Level. The Cancer Risk Level is the risk of incident (not of death) over a 70 year lifetime. On PowerPoint Slide 8, Nancy showed a table of Cancer Risk Factors. This is a national table (not Alaska-specific) and shows that environmental pollution is a relatively small component of overall cancer risk. Environmental pollution may not be the driver except in certain site-specific situations. In most cases, there are a lot of other things driving cancer. This, however, doesn't negate the value of reducing the extent of involuntary exposure pathways.

Nancy next looked at the incidence rate of cancer in Alaska from all sources. In Alaska, according to figures from DHSS, the annual cancer incidence rate from 1996-2012 is 472 per 100,000 in Alaska. The rate is higher for Alaska Natives at 496 per 100,000 according to figures from ANTHC. Looking at total cancer risk in Alaska, about 33% of the people in Alaska can be expected to develop some type of cancer during a 70 year period. The nationwide percentage is 40%. Given the background information on cancer risk in Alaska, a decrease in the cancer risk level from 10^{-5} to 10^{-6} in the HHC would give a very marginal increase in protection. Very few carcinogens are found in actual wastewater discharges in Alaska. Municipal discharges are regulated for carcinogens since they get their wastewater from various sources. Oil and gas discharges are tested for benzene. For oil and gas, there are both point and non-point source discharges (i.e., oil from cars in parking lots and driveways draining into storm water drains). An increase in the cancer risk rate would provide no significant decline in the total cancer incidence rate.

Nancy finished by highlighting key points to take away from her presentation. Setting HHC is complex. There are many decisions to be made using a mix of science (risk assessment) and policy (risk management). Given that few carcinogens are found in Alaska's wastewater discharges, it seems like focusing on BAF/BCF may provide more protection. Nancy also noted that BAFs apply in some carcinogens as well as in some non-carcinogens. Risk assessment is done by EPA and is driven by the cancer slope factor, reference dose, and BAF. Risk management is done by the state and is driven by cancer risk level, relative source contribution, and fish consumption rates.

- I agree with Nancy completely. Having studied this issue in depth, I had a similar take on what you talked about. One other thing, for some mechanism to cause cancer, the linear consumption is a conservative consumption and may not be accurate for some types of cancer. There is conservativism built into EPA numbers.
- EPA: Yes, there is some conservativism built in there. I do think that EPA is acknowledging that there are different ways that cancer occurs.
- I agree with the other speakers. I have experience in trying to get funding for cancer research in Alaska. The population in Alaska too small to say anything about cancer in Alaska. It is hard to pin numbers when you don't have enough numbers to do good statistics.
- Q: I understand that WA was increasing their fish consumption rate and decreasing cancer risk rate. EPA said no. Is it true? Would EPA say the same to Alaska? DEC (Brock): Yes, EPA said that to WA. Alaska has had their value in place for many years. EPA: We did write a strongly worded letter to WA. WA had a previous rate in place for years. In addition, there are tribal treaty rights to consider. As noted, ID's HHC coming to EPA soon. ID may be changing level of risk as well.
- Nancy: I have had some conversations with EPA. There are some significant differences. AK has had the cancer risk rate for several years but we haven't formally adopted carcinogen values-just used the EPA 1992 values. EPA uses 10^{-5} for AK in EPA's regulations. If we can come up with HHC specific to AK, AK will probably adopt carcinogen values into our criteria. Contaminated sites uses 10^{-5}. AK doesn't have a lot of downstream neighbors. Some of the reasons EPA used in WA don't apply to AK. EPA has acknowledged that AK is different.
- The cancer risk rate of 10^{-5} is not unreasonable for a state with a population of about 700,000. Not everyone will be exposed to the same concentration level with different waterbodies. With traditional foods health assessments, we aim for 10^{-5}.
- 10-5 is already conservative.
- From the State's perspective, the State wants to focus on areas where they can have an effect like BAF/BCF. BAF can drive levels lower than cancer risk level.
- Comment: We can use 10^{-5} or 10^{-6} as long as we are protecting high consumers at 10-4, right? Yes. We have to set the fish consumption rate high enough to meet that cancer risk level rate.

- Comment: It seems like it would be reasonable to go with 95th percentile for general population, then.
- EPA: We need to also consider exposure to non-carcinogens as well.
- Even with carcinogens, we might end up with issues of marine mammals higher than 10^{-4}.
- That is where relative source contribution comes in, I guess.

Brock closed the meeting by discussing some loose ends and next steps. For loose ends, Brock said that there was a meeting of a regional sub-workgroup. The sub-workgroup consisted of Marylynne, Lori, Ali, Bob, and Nancy and met once on 2/17. In addition, Jim has a paper coming out in March in *Arctic*.

- Jim: I gave presentation at the public workshop in October where I talked about regional patterns of subsistence patterns. This is a more detailed discussion of those points.

There was a general consensus that reviewing Jim's paper would be beneficial to the work of the sub-workgroup. This topic will be discussed more after the paper is out.

Brock said that he also looked at Dr. Knobmann's approach to developing regional consumption rates. He created a summary of that work and will share with the group.

- DEC (Nancy): When I looked at maps that Jim sent out and the maps that we generally work on, Jim's maps are fairly congruent with subsistence regions. A few regions are consolidated. When we regulate water quality criteria, we have to do by waterbodies (HUC watersheds). We would need to pick boundaries that are congruent to watersheds. (This has to do with implementation.)
- A better approach might be to not use other breakdowns? Use watershed approach? Jim's boundaries seem to be political boundaries. Jim: One was political boundaries and the other one was watersheds.
- ADF&G (Jim): The map from the *Arctic* article used political boundaries to calculate harvest levels. One reason for the political boundaries is that they use census calculations. I don't think there's a whole lot of difference between watershed boundaries and political boundaries. In the *Arctic* article, the map of the Bethel census area is basically the Kuskokwim watershed boundary area. They are largely congruent to watershed boundaries.
- DEC (Nancy): It sounds like the boundaries would be pretty close.
- A key issue is that if use a political boundary, we don't want two fish consumption rates that apply to the same watershed.
- DEC (Nancy): There is an analysis for downstream water quality during the permitting process. There would be an additional workload associated with boundaries. Boundaries are important.
- Q: With the talk about the boundaries and downstream, what about boundaries between AK & Canada? There is pollution coming from Canada. DEC: We are working on this issue. AK is downstream from Canada. We can't set regulations for Canada, but they are talking with

us about this issue. We are trying to get more information and then make reasonable decisions. In this case, we're not the regulator; we are the recipient.

- If we can't control something, would it go in relative source contribution? Generally, yes. It would be a downstream implementation issue. It is not something that we can do at this level.

Brock offered to get together with the DEC GIS specialist and look at maps of watersheds and political boundaries. There was agreement from the workgroup to do this since the workgroup will have to look at if we get into a regional scheme. It could be an easy analysis to see how well the boundaries lines up. Brock will talk to DEC's GIS specialist and see if they can put together a simple map.

For next steps, Brock said that DEC is trying to capture the workgroup's thoughts in the meeting notes. The options right now for the report seem to be 1) circle back to previously discussed issues and start writing recommendations or 2) address all issues first. Brock said that he understands most members of the workgroup want to address all issues first. DEC is holding off on a date for the next meeting so the DEC can have some internal conversations about where we are going and what next steps might be most beneficial. DEC might need to re-think some of the questions. We want to make sure the report will be useful to the State. Brock encouraged the workgroup to take the notes from today and go back to make sure we are accurately capturing comments and let us know if we miss anything.

- EPA: EPA has compared standards using BAFs versus BCFs. They will get that information to DEC.

Public comments

- There were no public comments.