Idaho Human Health Criteria Update—Fact Sheet

Summary

On May 10, 2012, the United States Environmental Protection Agency (EPA) disapproved the July 7, 2006, Idaho Department of Environmental Quality (DEQ) water quality standard rule submittal.

The disapproval affected 167 revised human health criteria for 88 toxic pollutants. Among other things, DEQ's 2006 rule changed the fish consumption basis for determining the toxic standard from 6.5 grams (g) per day to 17.5 g/day (which was EPA's nationally recommended fish consumption rate). EPA disapproved the proposed criteria because it believed the derivation of the criteria did not protect Idaho's beneficial uses. EPA was unable to ensure that the 17.5 g/day fish consumption rate was consistent with 40 CFR 131.11(a). EPA identified several sources of information on local and regional fish consumption, claiming that Idaho did not consider these sources before using the national default fish consumption rate. According to EPA, the information suggested that fish consumption among some Idaho population groups is greater than 17.5 g/day.

In June 2015, EPA released its final 304(a) recommended human health criteria for 94 chemical pollutants, which included updated toxicity, bioaccumulation, and other chemical-specific information.

DEQ has prepared a draft rule revising 208 human health criteria for 104 pollutants, and an additional fish-plus-water criterion for copper, which is based on the drinking water maximum contaminant level (MCL).

With the exception of the MCL-based copper criterion, these criteria were calculated using Idaho-specific exposure factors—such as fish consumption rates and body weight distributions—and applying recently updated chemical-specific factors such as toxicity and bioaccumulation factors.

Background

Calculating human health criteria involves inputs on chemical-specific factors of toxicity, bioaccumulation, and relative source contribution. It also takes into account population-specific exposure factors of body weight, drinking water intake, and fish intake (also referred to as fish consumption rate).

Toxicity Values

Idaho has primarily used EPA’s 2015 recommended values for toxicity. For some chemicals, EPA did not update criteria in 2015 and so did not provide recommended toxicity values. In

these cases, Idaho used current Integrated Risk Information System (IRIS) toxicity values. For thallium, Idaho used an EPA Provisional Peer Reviewed Toxicity Value (PPRTV). PPRTVs are one of eight sources in addition to IRIS that EPA uses in developing ambient water quality criteria. For benzene, where EPA provided a high and low toxicity value, Idaho calculated criteria using both values and then averaged the resulting criteria for its proposal.

Bioaccumulation Factors

Idaho used EPA's 2015 recommended bioaccumulation factor (BAF) values when they were available. When BAF's were not available, Idaho used EPA's older bioconcentration factors.

DEQ created a single, average BAF for criteria development by calculating a weighted average by the trophic level proportions evident in the local fish consumption data used.

Relative Source Contribution

The relative source contribution (RSC) is used to account for other routes of exposure besides fish and water. Idaho used EPA's recommended 2015 RSC values, largely the default value of 0.2.

Exposure Inputs

Body Weight

Idaho used the body weight distribution from a survey of Idaho's general population. The mean of this distribution is 80 kilograms (kg) (Table 1). These were self-reported results, but they closely matched EPA's Exposure Factors Handbook and were considered reliable.

Table 1. Selected statistics for body weight distribution used in calculating criteria.

Source and Population	No. of Participants	Body Weight							
		Mean (kg)	Min (kg)	Max (kg)	Percentile				
					25th	50th	75th	90th	95th
General population in Idaho (from survey data)	4,168	80	27	181	66	77	91	107	115

Fish Consumption Survey

Idaho performed a statewide survey of fish consumption for the Idaho general and angler populations. In addition, the Shoshone-Bannock Tribes and Nez Perce Tribe performed surveys of their memberships' fish consumption. All of these surveys were considered for criteria development, with the Idaho survey providing the fish consumption data for the Idaho general population and the Nez Perce Tribe survey providing the fish consumption data for high-risk subpopulation because they had the highest fish consumption of the higher risk groups (Table 2).

The fish consumption rates used for development of criteria was limited to resident, freshwater species that can be caught in Idaho waters.

Market/Marine and Estuarine Fish

The proposed rule excludes most market fish from the fish consumption rate used to calculate ambient water quality criteria. Market fish is a surrogate for marine and estuarine fish, species that do not inhabit Idaho waters. Approximately 90% of seafood consumed in the United States is imported from foreign countries (i.e., not regulated under the Clean Water Act). The top 10 seafood species consumed in the United States are largely marine or estuarine fish imported from Asia. Furthermore, there is not a commercial fishery in Idaho.

Therefore, it is reasonable to conclude that nearly all fish purchased in the market are marine fish or estuarine fish from outside of Idaho and that Idaho water quality standards will have little or no effect on their contaminant burden and risks to health in Idaho.

Anadromous Fish

Anadromous fish are considered marine fish and were therefore excluded from Idaho's fish consumption rate used for developing criteria. Even though these fish spend part of their lives in freshwater, virtually all of their body weight and body burden of contaminants are from the marine environment.

Compared to other anadromous salmonids, steelhead trout life histories are highly complex. It is difficult or impossible to generalize what fraction of their time is spent in saltwater as opposed to freshwater. The anadromous and resident forms often inhabit the same waters, where they often interbreed. Furthermore, offspring may develop either migratory life history strategy, regardless of the life history strategy of their parents. Because of the complexity of life history strategies exhibited by steelhead, and because we are not able to accurately distinguish between anadromous steelhead and resident Rainbow Trout, steelhead are included as Idaho fish in our regulatory fish consumption rate.

Table 2. Selected statistics for fish consumption rate from the Idaho general population and the Nez Perce Tribe.

Population	No. of Individuals	Fish Consumption Rate							
		Mean (g/day)	Percentile						
			10th	25th	50th	75th	90th	95th	99th
Idaho General population	2,959	2.3	0.00077	0.0079	0.093	0.84	4.7	11.2	40.5
Nez Perce Tribe Translated Rate[1] (*Idaho Fish*)	446	16.1	1.6	3.7	8.7	19.8	38.6	56.6	nr

[1]Nez Perce Tribe reported all freshwater and estuarine fish. A translation was necessary to estimate rates of consumption for Idaho Fish similar to those reported for the Idaho general population.

Drinking Water Intake

The distribution of drinking water intake used for criteria development comes from EPA's 2011 Exposure Factors Handbook for per capita adult intake from community water supplies (Table 3).

Table 3. Selected statistics for drinking water intake for individuals over 21 years of age.

Type	Unit	Drinking Water Intake Rate							
		Mean	Percentile						
			10th	25th	50th	75th	90th	95th	99th
Total daily rate	mL/day	1,043	0	227	787	1,577	2,414	2,958	4,405

Data source: National Health and Nutrition Examination Survey

Probabilistic Risk Assessment

Idaho has used probabilistic risk assessment (PRA) to calculate its criteria. PRA accounts for different risk levels in the population (variability) and provides the ability to quantitatively characterize uncertainty in risk estimates. In the PRA approach, inputs to the risk equation are described by a probability distribution rather than a single-point estimate.

The most commonly used numerical technique for PRA is Monte Carlo simulation. In this method, one or more of the variables in the exposure equation are represented by distributions rather than point estimates. A computer selects a value for each exposure variable at random from a specified population distribution and calculates the corresponding risk. This process is repeated many times (5,000 in this case), and each calculation is called an iteration. Each iteration can be thought of as representing a virtual individual, and the set of all iterations can be thought of as a virtual population. In PRA, the distributions used as inputs to the risk equations characterize the inter-individual variability inherent in each of the exposure assumptions, and the output from the Monte Carlo simulation is a distribution of risks representing the actual risks that occur in the population.

For Idaho's proposed human health criteria, DEQ used Idaho-specific distributions for fish consumption and body weight and a national distribution for drinking water intake.

We calculated two sets of criteria using PRA: one based on the consumption of Idaho fish for the Idaho general population and one based on the consumption of Idaho fish for the Nez Perce Tribe. Criteria were calculated using the same risk levels for both populations but applied at different fractions of the population: 95th percentile for the general population and mean of the tribal population, in accordance with EPA guidance.

For each criterion, we will be adopting the more stringent of these calculated criteria.

References

For more information, please refer to the following:

Buckman, D.W., R. Parsons and L. Kahle. 2015. *NCI Method Estimates of Usual Intake Distributions for Fish Consumption in Idaho*. Calverton, MD: Information Management Services, Inc.

DEQ (Idaho Department of Environmental Quality). 2015. *Considerations in Deciding Which Fish to Include in Idaho's Fish Consumption Rate: Policy Summary*. Boise, ID: DEQ Water Quality Division. Accessed October 2015. http://www.deq.idaho.gov/media/60177030/58-0102-1201-policy-discussion-paper-0815.pdf.

DEQ (Idaho Department of Environmental Quality). 2015. *Idaho Human Health Criteria: Technical Support Document*. Boise, ID: DEQ Water Quality Division.

DEQ (Idaho Department of Environmental Quality). 2015. *Water Quality: Docket No. 58-0102-1201 -Negotiated Rulemaking*. Accessed October 2015. http://www.deq.idaho.gov/laws-rules-etc/deq-rulemakings/docket-no-58-0102-1201/.

EPA (United States Environmental Protection Agency). 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000)*. Washington, DC: EPA, Office of Water, Office of Science and Technology. EPA-822-B-00-004. Accessed February 2015. http://water.epa.gov/scitech/swguidance/standards/upload/2005_05_06_criteria_humanhealth_method_complete.pdf.

EPA (United States Environmental Protection Agency). 2003. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000), Technical Support Document. Vol. 2, Development of National Bioaccumulation Factors*. Washington, DC: EPA, Office of Water, Office of Science and Technology. EPA-822-R-03-030. Accessed March 2015. http://www.epa.gov/scipoly/sap/meetings/2008/october/methodology.pdf.

EPA (United States Environmental Protection Agency). 2011. *Exposure Factors Handbook: 2011 Edition*. Washington, DC: EPA, Office of Research and Development. EPA-600-R-09-052F. Accessed February 2015. http://www.epa.gov/ncea/efh/pdfs/efh-complete.pdf.

EPA (United States Environmental Protection Agency). 2014. *Estimated Fish Consumption Rates for the U.S. Population and Selected Subpopulations (NHANES 2003-2010)*. Washington, DC: EPA, Office of Water. EPA-600-R-09-052F. Accessed February 2015. http://water.epa.gov/scitech/swguidance/fishshellfish/fishadvisories/upload/Estimated-Fish-Consumption-Rates-for-the-U-S-Population-and-Selected-Subpopulations-NHANES-2003-2010.pdf.

EPA (United States Environmental Protection Agency). 2015. *Human Health Ambient Water Quality Criteria: 2015 Update.* Washington, DC: EPA, Office of Water. EPA 820-F-15-001. Accessed October 2015. http://water.epa.gov/scitech/swguidance/standards/criteria/current/loader.cfm?csModule=security/getfile&PageID=717763.

NWRG (Northwest Research Group). 2015. *Idaho Fish Consumption Survey*. Seattle, WA: Northwest Research Group LLC.

Polissar, N.L., A. Salisbury, C. Ridolfi, K. Callahan, M. Neradilek, D.S. Hippe, and W.H. Beckley. 2015. *A Fish Consumption Survey of the Shoshone-Bannock Tribes*. Seattle, WA: The Mountain-Whisper-Light Statistics. Accessed October 6, 2015. http://www.deq.idaho.gov/media/60177352/58-0102-1201-fish-consumption-survey-shoshone-bannock-tribes.pdf.

Polissar, N.L., A. Salisbury, C. Ridolfi, K. Callahan, M. Neradilek, D.S. Hippe, and W.H. Beckley. 2015. *A Fish Consumption Survey of the Nez Perce Tribe*. Seattle, WA: The Mountain-Whisper-Light Statistics. Accessed October 6, 2015. http://www.deq.idaho.gov/media/60177353/58-0102-1201-fish-consumption-survey-nez-perce-tribe.pdf.

Windward Environmental. 2015. *Development of Human Health Water Quality Criteria for the State of Idaho.* Seattle, WA: Windward Environmental, LLC.