

Draft Guidance for Implementing the January 2001 Methylmercury Water Quality Criterion

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5 Other Water Quality Standards Issues

5.1 How does this criterion relate to the criteria published as part of the Great Lakes Initiative?

As stated in the January 8, 2001, *Federal Register* notice, EPA encourages states and authorized tribes to adopt the fish tissue residue water quality criterion for methylmercury into their water quality standards to protect CWA section 101(a) designated uses related to human consumption of fish. With respect to waterbodies within the Great Lakes basin, a state or authorized tribe must also follow the requirements promulgated on March 23, 1995, at 40 CFR Part 132. Under these regulations, if a state or authorized tribe adopts the new methylmercury criterion, EPA, in its review of the new state or tribal criterion, must determine if it is as protective as the mercury criterion for human health protection published in Table 3 at 40 CFR 132.5(g)(1) or on the basis of improved science (40 CFR 132.4(h)).

The human health criterion for mercury established by the methodology contained at Part 132 and adopted by the Great Lakes states is 3.1 ng/L. This water column criterion for mercury is equivalent to a fish tissue residue value of 0.35 µg methylmercury/g fish tissue using the Great Lakes-specific BAFs for mercury of 27,900 L/kg for trophic level 3 and 140,000 L/kg for trophic level 4 as well as other Great Lakes-specific information (USEPA 1995c). Therefore, a state or authorized tribe would apply the site-specific modification procedures of Part 132 to show that the current, local BAF is lower than the one used to develop the criterion in Part 132 before it could adopt the new fish tissue-based criterion and methodology.

Also, EPA believes that if a state or authorized tribe adopts the new tissue-based criterion for protection of human health in the Great Lakes, this action may not always result in a change to TMDLs or NPDES permits. Part 132 also includes a 1.3 ng/L criterion for the protection of wildlife, and in some instances, this criterion may drive the calculation of TMDLs or NPDES permit limits.

5.2 What is the applicable flow for a water column-based criterion?

If a state or authorized tribe adopts new or revised methylmercury criteria based on a water column value rather than a fish tissue value, it should consider the dilution flow specified in a state's or tribe's water quality standards when applying the new mercury criterion. Where a state's or authorized tribe's water quality standards do not specify the appropriate flow for use with the mercury criterion, EPA recommends using a harmonic mean flow. EPA used this flow for application of the human health criteria for mercury in the Great Lakes (40 CFR Part 132). EPA also used this flow for application to the human health criteria in the California Toxics Rule (CTR) (40 CFR 131.38) and the National Toxics Rule (40 CFR 131.36). The Agency considers this flow to better reflect the exposure of fish to mercury. The technical means for calculating a harmonic mean is described in section 4.6.2.2.a of the *Technical Support Document for Water Quality-based Toxics Control* (USEPA 1991).

5.3 How are mixing zones used for mercury?

5.3.1 What is a mixing zone?

A mixing zone is the area beyond a point source outfall (e.g., a pipe) in which concentrations of a pollutant from a wastewater discharge mix with receiving waters. Under 40 CFR 131.13, states and authorized tribes may, at their discretion, include mixing zones in their water quality standards. Within a mixing zone, the water is allowed to exceed the concentration-based water quality criterion for a given pollutant. The theory of allowing mixing zones is based on the belief that by mixing with the receiving waters within the zone, the concentration of the pollutant being discharged will become sufficiently diluted to meet applicable water quality criteria beyond the borders of that zone. More information on mixing zones is available in the *Technical Support Document for Water Quality-based Toxics Control* (USEPA 1991) and the *Water Quality Standards Handbook* (USEPA 1994). States and authorized tribes often authorize mixing zone provisions and methodologies for calculating mixing zones in their water quality standards plans for later application to NPDES point sources discharge points.

5.3.2 How does a mixing zone apply for the fish tissue-based methylmercury criterion?

The question of mixing zones is not relevant when applying the fish tissue-based criterion, which refers to the level of mercury found in fish flesh. The criterion is fish tissue-based, not water column-based. The criterion reflects the exposure of the fish to mercury in both the water column and food over the life of the fish and, thus, reflects an integration of the exposure over time and over spatially varying water column concentrations. The total load of mercury in the waterbody, taking into account the methylation rate and bioaccumulation of mercury in fish, affects the level of methylmercury in the fish tissue.

However, some states and authorized tribes may choose to adopt a water column criterion based on the fish tissue criterion and, thus, have a criterion where a mixing zone may apply. In this situation, a state or authorized tribe should follow its existing procedures for mixing zones.

5.3.3 Does the guidance for the fish tissue-based criterion change the Great Lakes Initiative approach to mixing zones for bioaccumulative pollutants?

To reduce the adverse effects from bioaccumulative chemicals of concern (BCCs) in the Great Lakes, on November 13, 2000, EPA promulgated an amendment to the Final Water Quality Guidance for the Great Lakes System (40 CFR Part 132, Appendix F, Procedure 3). This regulation requires prohibition of mixing zones for bioaccumulative pollutants from existing discharges in the Great Lakes to the greatest extent technically and economically feasible. Specifically, existing discharges of BCCs are not eligible for a mixing zone after November 10, 2010 (although under certain circumstances, mixing zones may be authorized). For new BCC discharges, the rule essentially prohibits mixing zones of bioaccumulatives immediately upon commencing discharge. This means that NPDES permit limitations for mercury discharged to the Great Lakes system must not

exceed the water quality criterion. This also limits the flexibility that states and authorized tribes would otherwise have to adjust point source controls on the basis of nonpoint source contributions through the phased approach to TMDL development.

EPA reiterates that the new methylmercury criterion, and EPA's recommendations on its implementation, does not supersede the requirements applicable to the Great Lakes at 40 CFR Part 132. The criteria for the Great Lakes are water column-based and, thus, can be applied as an effluent requirement at the end of a pipe. EPA continues to view the prohibition of a mixing zone for mercury and other bioaccumulative pollutants for the Great Lakes as appropriately protective for water column-based water quality criteria applied to these waters.

If a state or authorized tribe adopts the new fish tissue-based criterion for a Great Lake or tributary to the Great Lake, the state or tribe would do this using the site-specific modification procedures of Part 132 (see section 5.1. of this document). The state or authorized tribe would have determined a site-specific BAF in this process and, thus, have the means for calculating a water column-based criterion. Under the Part 132 regulations, EPA in its review of the new state or tribal implementation procedures would determine if they are as protective as the Great Lakes procedures for human health protection (40 CFR 132.5(g)(3)). Specifically, EPA would determine if the implementation procedures are as protective as applying the Table 3 (in 40 CFR Part 132) criterion for protection of human health without a mixing zone, consistent with the prohibition on mixing zones for BCCs (40 CFR 132, Appendix F.3.c.). In addition, if the state's or authorized tribe's implementation procedures involve converting the fish tissue-based criterion into an equivalent water column-based number, the mixing zone prohibition requirements of 40 CFR Part 132 still apply.

5.4 How are fish consumption advisories and water quality standards harmonized?

5.4.1 What is the role of the Fish Advisory Program?

States and authorized tribes have the primary responsibility of estimating the human health risks from the consumption of chemically contaminated, noncommercially caught finfish and shellfish (e.g., where water quality standards are not attained). They do this by issuing consumption advisories for the general population, including recreational and subsistence fishers, and sensitive subpopulations (such as pregnant women, nursing mothers and their infants, and children). These advisories are nonregulatory and inform the public that high concentrations of chemical contaminants, such as mercury, have been found in local fish. The advisories recommend either limiting or avoiding consumption of certain fish from specific waterbodies or, in some cases, from specific waterbody types (e.g., all lakes). In the case of mercury, many states and authorized tribes have calculated a consumption limit to determine the maximum number of fish meals per unit of time that the target population can safely eat from a defined area.

5.4.2 How are consumption limits for consumption advisories determined?

EPA has published guidance for states and authorized tribes to use in deriving their recommended fish consumption limits, titled *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories*, Volume 1 and 2 (USEPA 2000c, 2000d). This guidance describes the two main equations necessary to derive meal consumption limits on the basis of the methylmercury RfD. Basically, a first equation is used to calculate the daily consumption limits of grams of edible fish (in grams per day (gd)); a second equation is used to convert daily consumption limits to meal consumption limits over a specified period of time. Variables used to calculate the advisory consumption limits include fish meal size and frequency, consumer body weight, contaminant concentration in the fish tissue, the time-averaging period selected, and the reference dose for methylmercury health endpoints.

As a default screening-level approach, EPA recommends basing fish consumption advisories on a consumption rate of 17.5 grams/day of fish (uncooked) eaten from the local water. This consumption rate equates to approximately two 8-ounce meals per month. Using this consumption rate, and assuming a 70 kg body weight (the same assumption used to derive the methylmercury criterion), the concentration of methylmercury in locally caught fish that would result in exposures that do not exceed the RfD (0.0001 mg/kg-day) is about 0.4 mg/kg and lower ($[0.0001 \text{ mg/kg-day} \times 70 \text{ kg bw}] / 0.0175 \text{ kg fish/day}$).

Advisory limits can differ from one state or tribe to another. This inconsistency is due to a host of reasons, some of which speak to the flexibility states and authorized tribes have to use different assumptions (i.e., chemical concentrations, exposure scenarios and assumptions) to determine the necessity for issuing an advisory. The nonregulatory nature of fish advisories allows such agencies to choose the risk level deemed appropriate to more accurately reflect local fishing habits or to safely protect certain subpopulations (e.g., subsistence fishers).

5.4.3 How does the criterion differ from the advisory level?

Although EPA derived its recommended screening value for a fish advisory limit for mercury and human health methylmercury criterion from virtually identical methodologies, it is important to clarify the distinctions between the two values. They are consistently derived, but because each value differs in purpose and scope, they diverge at the risk management level. Fish advisories are intended to inform the public about how much consumers should limit their intake of individual fish species from certain waterbodies. Alternatively, the Agency uses its methylmercury criterion, like other CWA section 304(a) criteria, as a basis for both nonregulatory and regulatory decisions. The criterion can serve as guidance to states and authorized tribes for use in establishing water quality standards, which, in turn, serve as a benchmark for attainment, compliance, and enforcement purposes.

The main risk management difference between EPA's recommended methylmercury water quality criterion and fish consumption limit for mercury is that the criterion

includes an RSC¹⁸ and EPA's recommended tissue value for a fish advisory does not. In deriving the criterion, EPA assumed an RSC value of 2.7×10^{-5} mg/kg-day to account for exposure from marine fish and shellfish. The guidance for setting fish consumption limits also discusses using an RSC to account for exposures other than noncommercially caught fish, but the guidance can be applied without using an RSC. The RSC guidance in the 2000 Human Health Methodology (USEPA 2000e) provides more detail and specific quantitative procedures to account for other exposure pathways. EPA's advisory guidance recommends that states and authorized tribes consider using an RSC to account for exposure from other sources of pollutants (such as mercury) when deriving a fish consumption limit and setting a fish advisory for mercury.

5.4.4 What if there is a difference between the attainment of a criterion and issuance of a fish consumption advisory?

In many states and authorized tribes, numeric water quality criteria and fish and shellfish consumption limits differ due to inherent differences in the technical and risk assumptions used to their development. As discussed in section 4.2, EPA considers a fish consumption advisory to demonstrate nonattainment of water quality standards when the advisory is based on tissue data, the data are from the specific waterbody in question, and the risk assessment parameters of the advisory or classification are cumulatively equal to or less protective than those in the water quality standards. Two situations where the presence of an advisory may not imply an exceedence of the water quality standard (USEPA 2000g) are as follows:

Statewide or regional advisory—States have issued statewide or regional warnings regarding fish tissue contaminated with mercury, on the basis of data from a subset of waterbodies as a precautionary measure. In these cases, fish consumption advisories may not demonstrate that a CWA section 101(a) “fishable” use is not being attained in an individual waterbody and may not be appropriate for determining attainment based on exceedence of water quality criteria.

Local advisory—States have issued local advisories using a higher fish consumption value than they use in establishing water quality criteria for protection of human health. Again, in this case the fish consumption advisories may not demonstrate that a section 101(a) “fishable” use is not being attained in an individual waterbody and may not as appropriate as water quality criteria as a basis for determining attainment.

For example, consider a state or authorized tribe that adopts EPA's methylmercury criterion of 0.3 mg/kg, which is based on eating approximately two fish meals a month. If the state or authorized tribe finds that a waterbody has fish with a mercury level of 0.2 mg/kg, this water would not be exceeding the water quality criterion. Yet, this mercury concentration is sufficient for the state or authorized tribe to issue a fish consumption advisory recommending that people eat no more than eight meals a month. In this case,

¹⁸ See discussion on the RSC in section 3.1.2.2.

because the fish consumption advisory uses a higher fish consumption value than was used to develop the water quality criterion (and the fish tissue concentration does not exceed the criterion), consistent with EPA's 2000 guidance, the waterbody is not necessarily impaired (USEPA 2000g).

In the case where a local advisory is based on a higher fish consumption value, the state or authorized tribe should consider whether it should adopt a site-specific criterion for the waterbody. A local advisory generally reflects actual contaminant monitoring data, local fish consumption patterns, and may identify more representative fish species. The information gathered in developing the advisory may provide valid grounds for revising the level of a numeric water quality criterion to match that of the advisory.

5.4.5 *Should existing advisories be revised to reflect the new criterion?*

Although EPA's screening value for a fish consumption limit and 304(a) criterion for mercury are based on similar methodologies and are intended to protect human health from consumption of mercury-contaminated fish, they do not necessarily have to be the same value. As explained above, each limit is predicated on different risk-management decisions and thus incorporates different assumptions. A state or tribe may choose to revise existing advisories to mirror the methylmercury criterion. Likewise, there is merit in adopting a site-specific methylmercury criterion on the basis of a local fish advisory, if that advisory is supported by sufficient data that are representative and of acceptable quality.

5.4.6 *How is the criterion related to FDA action levels?*

The Food and Drug Administration's (FDA's) mission is to protect the public health with respect to levels of chemical contaminants in all foods, including fish and shellfish, sold in interstate commerce. To address the levels of contamination in foods, FDA has developed both action levels and tolerances. An action level is an administrative guideline that defines the extent of contamination at which FDA may regard food as adulterated and represents the limit at or above which FDA may take legal action to remove products from the marketplace. It is important to emphasize that FDA's jurisdiction in setting action levels is limited to contaminants in food shipped and marketed in interstate commerce, not food that is caught locally by recreational or subsistence fishers

The current FDA action level for mercury in fish is 1 mg/kg. Generally, an action level is different from a fish advisory limit—and even more different from a CWA section 304(a) criterion. FDA action levels are intended for the general population who consume fish and shellfish typically purchased in supermarkets or fish markets that sell products that are harvested from a wide geographic area. The underlying assumptions used in the FDA methodology were never intended, as local fish advisories are, to be protective of recreational, tribal, ethnic, and subsistence fishers who typically consume fish and shellfish from the same local waterbodies repeatedly over many years. EPA and FDA have agreed that the use of FDA action levels for the purposes of making local advisory determinations is inappropriate. Furthermore, it is EPA's belief that FDA action levels

and tolerances should not be used as a basis for establishing a state's methylmercury criterion.

5.5 What public participation is recommended for implementing the methylmercury criterion?

By applicable regulations, water quality standards, TMDL, and NPDES permit decisions require public notice and the opportunity for the public to comment on tentative decisions. Some public interest groups might have an interest in decisions related to mercury, especially in areas where local citizens are more reliant upon locally caught fish as a food source. EPA recommends that organizations with an interest in environmental justice issues be included in the public notice.

