DIOXIN PQL ISSUES

Before addressing the issue of the proposed application of TEF values to PQL in an attempt to define a PQL for Dioxin congeners' I would like to point to the National Toxics Rule Preamble which clearly indicates that the use of measuring techniques (PQL) for setting standards is not scientifically acceptable.

> *EPA is aware that the criteria promulgated today for some of the priority toxic pollutants are at concentrations less than EPA's current analytical detection limits. Analytical detection limits have never been an acceptable basis for setting standards since they are not related to actual environmental impacts. The environmental impact of a pollutant is based on a scientific determination, not a measuring technique which is subject to change. Setting the criteria at levels that reflect adequate protection tends to be a forcing mechanism to improve analytical detection methods. As the methods improve, limits closer to the actual criteria necessary to protect aquatic life and human health become measurable. The Agency does not believe it is appropriate to promulgate criteria that are not sufficiently protective.*[1]

That having been said we would like to further explain why the proposed method of setting a PQL for dioxin/furans seems to be both inappropriate scientifically and ineffective in protecting human health and aquatic species.

Based on the information in the memorandum to file from Joyce Mercuri and Teresa Michelsen dated 4/12/12 referring to establishing practical quantitation limits (PQL) for dioxin mixtures, the proposal indicates that the 17 individual dioxin/furan congeners PQLs and MDLs were multiplied by their respective TEF and added together to develop a dioxin mixture value for the PQLs and MDLs. In this they neglected one step in the equations usage, comparing the results to the benchmark (2,3,7,8,TCDD) which has a PQL of .5ppt and order of magnitude lower than the proposed 5ppt.

Referring the 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds;

Where there was a concern expressed about the application of the TEF/TEQ approach to abiotic environmental matrices such as soil, sediment, etc. The present TEF scheme and TEQ methodology is primarily meant for estimating exposure via dietary intake situations because present TEFs are based largely on oral uptake studies often through diet. Application of these 'intake or ingestion' TEFs for calculating the TEQ in abiotic environmental matrices has limited toxicological relevance and use for risk assessment, unless the aspect of reduced bioavailability and environmental fate and transport of the various dioxin-like compounds are taken into

account. If human risk assessment is done for abiotic matrices it is recommended that congener-specific equations be used throughout the whole model, instead of using a total TEQ-basis, because fate and transport properties differ widely between congeners.[2]

This indicates that the attempted application of TEF modifiers to a PQL standard addressing sediments or any other media is not an appropriate use of the methodology and would lead to an inaccurate conclusion as to risk, they therefore recommend if abiotic matrices are attempted only congener specific equations be used instead of using the TEQ-basis. Congener specific equations do not include the use of TEF modifiers.

Using the TEF values outside of the equation is unreliable because TEF estimates represent a low-confidence interim approach to characterizing the highly variable toxicities of dioxin compound mixtures. TEF values are not precise. Individual estimates may range over several factors of ten. Moreover, the research upon which they are based is of variable quality and quantity. The values are frequently set using single compound studies that result in ignoring important interactions that may add or subtract from their toxicities.[3]

All TEF values are assumed to vary in uncertainty by at least one order of magnitude, depending on the congener and its REP distribution. Consequently, a TEF of 0.1 infers a degree of uncertainty bounded by 0.03 and 0.3. For a TEF value of 0.3, a degree of uncertainty bounded by 0.1 and 1 was used. Thus, the TEF is a central value with a degree of uncertainty assumed to be at least +/- half a log, which is one order of magnitude.[2]

Furthermore many of the TEF values are not the result of studies but are based upon the best judgments of experts and the location of the chlorine atoms in the molecular structure of the particular congener. This being the case there is no consensus of confidence in the individual values. The consensus is that though the knowledge of the individual potency of the congeners is limited and that their synergistic or antagonistic effects are not completely known the total TEQ when compared to an equal amount of 2,3,7,8 TCDD has equal predictive effects. The point being that the end result of the TEF/TEQ method is the 2,3,7,8 TCDD toxicity model.[4]

2,3,7,8,TCDD being the equivalency standard the PQL would logically be that for 2,3,7,8 TCDD not a new number resulting from the various congener TEF modified PQL values. Ecology's proposed method could unduly credit those dioxins with lower toxicity with more value in the mixture thus affecting the potential residual risk. Ecology's rule requires that the TEQ methodology is used in a specific way that being adding the Tef modified congeners and ***comparing the results to an equal amount of 2,3,7,8 TCDD.*** This in and of itself precludes the proposed method from use.

An additional issue that can arise in a cleanup is that when the PCBs are addressed via the TEQ method as is suggested in MTCA , the result is a situation where there are two separate cleanup values for 2,3,7,8 TCDD one based upon dioxins and the other on dioxin like PCBs. This is because Ecology failed to include the addition of the PCBs to the TEQ for Dioxins as is

commonly done and is the accepted standard methodology. Dioxin like PCBs c should be assessed through their TEQ and the resultant number should be added to the dioxin TEQ result to create one risk number.

Reasonable PQL Standard

The next issue is the establishing "reasonable" a PQL standard based upon the EPA methods 1613B and 8290 as proposed using a rounded median value of the mid-range Dioxin TEQ/PQLs sets a president of average (reasonable) PQL standard that does not give testing labs any motivation to improve their technological standards and lower the PQL. Based upon the Table 1 values for the method 1613B the exclusion of the (4) 11.4ppt PQLs seems appropriate as it is clearly stated that even those labs indicated that it is feasible to reach lower a PQL, and have chosen not to. This supports the theory that without motivation many labs will only meet the minimum standard and not improve their technology and will result in stagnate cleanup standards. This indicates that use of analytical detection levels is inappropriate as a standard as it is highly variable among labs.

Your exclusion of the (3) lower values of 2.3ppt appears to be penalizing those labs that are lowering the analytical detection levels resulting in the omission of 41% of the lower detection limit values which results in a Median value of 5.2ppt which is higher that the dredged material management standard of 4 ppt. and the Bold Puget Sound background value of 2ppt being used at the Duwamish CERCLA site by EPA.. This would result in a Department of Ecology accepted standard that is mediocre at best, leaving no motivation for labs to improve their technology. As Ecology requires a choice of three labs for cleanups this is met by having the three lower PQL labs, as is suggested in MTCA, it further rewards those labs that make the effort to drive analytic technology to improve.

Recognizing that the remediation level is never as low as the cleanup standard in sediments due to expense and cost analysis and can in fact result in a remediation standard that is an order of magnitude higher, this is clearly not protective of human health or marine mammals. Without further studies identifying the correlation of toxicity of dioxins in sediments and ingestion toxicity levels used in the TEQ methodology this proposed method couldn't be considered protective with any degree of certainty, and is not supported by the bench mark 2005 WHO re-evaluation of human and mammalian toxic equivalency factors for dioxins and dioxin-like compounds.

This proposed solution isn't considering the new information that indicates toxicity magnifications resulting from interactions of certain PCBs with certain PBDEs. "Mixtures of each PBDE congener with PCB-126 showed additive effects at threshold concentrations, and

synergistic effects at higher concentrations. These results emphasize the concept that the toxicity of xenobiotics may be affected by possible interactions, which may be of significance given the common co-exposures to multiple contaminants".[5] Ecology's rule doesn't add the Dioxin like PCBs to the Dioxin TEQ formula and doesn't address PBDEs, which results in a potentially less protective human health standard.

These proposed changes are not protective.

In closing I would like to remind Ecology:

Analytical detection limits have never been an acceptable basis for setting environmental standards since they are not related to actual environmental impacts. The environmental impact of a pollutant is based on a scientific determination, not a measuring technique which is subject to change.[1]

REFERENCES

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