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Ms. Cheryl Niemi
Washington State Department of Ecology
Water Quality Program
P.O. Box 47600
Olympia, WA 98504-7600

SUBJECT: COMMENTS ON ECOLOGY'S PROPOSED REVISION TO CHAPTER 173-201A WAC: WATER QUALITY STANDARDS FOR SURFACE WATERS OF THE STATE OF WASHINGTON

Dear Ms. Niemi:

The following comments are being submitted on the Washington State Department of Ecology's (Ecology's) draft updated water quality standards (draft WQS) for the protection of human health, which were released for public comment on January 12, 2015. This letter will address two fundamentally different aspects of the proposed rule language: first, the derivation of human health criteria (HHC) and chemicals for which HHC are proposed; and second, the proposed rule language concerning implementation tools and variance. Both of these areas are closely tied to an overarching concern that Ecology continues to pass-up key opportunities to streamline cleanup, compliance, and permitting – all of which are directly impacted by this rule change.

We strongly recommend the following:

1. Revise the rule to include HHC for only those chemicals that are currently identified in the Sediment Cleanup User's Manual (SCUM II) or Ecology's Persistent, Bioaccumulative Toxics (PBT) list. This leverages the work done by the other Ecology programs and adds critical consistency among the programs. Consider making the list part of guidance, rather than the rule, to make it easier to adjust as experience and evolving science indicate that changes are needed.
2. Incorporate a mechanism, such as that used in Washington Administrative Code (WAC) 173-340-708, allowing for the incorporation of new science, especially updated toxicological and partitioning parameters, without requiring a rule revision.
3. Incorporate further mechanisms for evaluating site-specific protection or risk, for example by allowing for site-specific partitioning coefficients and species-specific uptake parameters (referred to as bioconcentration factors in the current rule proposal).
4. Make it clear in the rule and to Ecology staff that empirical data (measured data collected under appropriate experimental design) are more predictive of true exposures and can be used to demonstrate compliance. This is critical since the models used to calculate the

HCCs are screening level models that have not been calibrated to regional or site-specific conditions and which do not consider the large uncertainty and variability in the partitioning coefficients.[1] SCUM II already uses this approach (of favoring empirical data over modeled estimates) for the same pathways and receptors. Again, this leverages existing work by Ecology and increases consistency between the programs.

5. Abandon the provision in the Governor's proposal that chooses the National Toxics Rule (NTR) value when it is lower, and incorporates the full list of the NTR chemicals. The NTR is an outdated law passed by Congress more than 20 years ago, relying on preliminary studies and estimated values from even older studies. Because of its structure, revision of the NTR criteria to incorporate the thousands of studies completed since then requires Congress to pass a new environmental law. The inability of Congress to pass new environmental laws should not result in incorporation of outdated technical information into Washington's programs.

GENERAL CONCERNS REGARDING HUMAN HEALTH CRITERIA

Selection of Chemicals

Previously, HHC were incorporated into WAC 173-201A by reference within the regulation to existing federal criteria as required by the Clean Water Act (CWA):

> *"WAC 173-201A-240 (5) ... Human health-based water quality criteria used by the state are contained in 40 CFR 131.36 (known as the National Toxics Rule)."*

According to your draft Environmental Impact Statement (Ecology 2015) for the Rule Revision:

> *"In 2000 the U.S. Environmental Protection Agency (EPA) published updated nationally recommended criteria for states. Rather than update the NTR, EPA has encouraged Washington to <u>use new science and information</u> to adopt updated human health criteria into our state's surface Water Quality Standards that make use of Washington state-specific information on consumption of fish and shellfish in addition to other updated information."*

Thus, there were two goals: to update the NTR values based on new science and information and to include consideration for Washington-specific information on fish/shellfish consumption (which is higher than was used in the NTR development). EPA indicated that *"States may meet the requirements of CWA section 303(c)(2)(B) by choosing one ...:*

> 1. *Adopt statewide numeric criteria in state water quality standards for all section 307(a) toxic pollutants for which EPA has developed criteria guidance, <u>regardless of whether the pollutants are known to be present</u>;*

[1] One of the clearest discussions of the limitations on the use of these models is from "An Overview of Exposure Assessment Models Used by the US Environmental Protection Agency" by Pamela Williams, et al. in *Modelling of Pollutants in Complex Environmental Systems*, Volume II. Edited by Grady Hanrahan, published by ILM Publishing in 2010.

2. *Adopt specific numeric criteria in state water quality standards for section 307(a) toxic pollutants as necessary to support designated uses <u>where such pollutants are discharged or are present in the affected waters and could reasonably be expected to interfere with designated uses</u>;"*

Ecology (*"Washington State Water Quality Standards: Human Health Criteria and Implementation Tools: Overview of key decisions in the rule amendment," Water Quality Program, Ecology, January 2015, Publication no. 14-10-058, page 8*) states:

> *"Option 1 is consistent with state authority to establish water quality standards and meets the requirements of the CWA. Option 2 most directly reflects the CWA requirements and is the option recommended by EPA, but is relatively more labor intensive to implement than Option 1."*

The only way that Option 1 is less work than Option 2 is if (a) Ecology does not do the research needed to update underlying toxicological and partitioning coefficients used to develop the outdated NTR values, and (b) ignores the extensive work performed by other groups at the Agencies to identify those chemicals that are detected in fish and shellfish tissue in Washington state. Essentially, Option 1 results in a "rubber-stamping" or pass-through of outdated numerical criteria, the vast majority of which do not actually pose a bioaccumulation risk in Washington State.

We recognize and appreciate the work Ecology has done in recent years to identify PBTs and to develop chemical action plans to reduce concentrations of these chemicals in the environment (Ecology 2015). Likewise, we recognize and appreciate the work that Ecology has done related to the evaluation of bioaccumulative chemicals in sediments as discussed in SCUM II (revised March 2015). These two initiatives have resulted in two very similar lists of chemicals of concern due to their persistent nature in the environment and their tendency to accumulate in fish and/or shellfish tissues, resulting in human health exposure. The SCUM II work has also developed general guidelines for making site-specific decisions regarding the presence and risk of the specific chemicals of concern.

We support the addition of new HHC to protect designated uses for chemicals that are known to be persistent and to bioaccumulate. However, many of the CWA 307(a) priority toxic pollutants for which EPA has developed national recommended numeric criteria and for which Ecology proposes to add numeric HHC, do not bioaccumulate and have proven to be insignificant with respect to consumption of fish/shellfish tissue. We realize that this needs to be fixed at the National level by revising the NTR; however, Congress's inability to revise critical environmental laws should not be used by Ecology to waste resources and ignore more than 20 years of environmental research.

Inclusion of HHC for all chemicals currently proposed will divert state and private resources away from chemicals that are deleterious to water quality, without providing measureable benefit to either aquatic life or human health. This directly drains state resources by requiring Ecology staff

to review and regulate chemicals that are not a human health concern for Washington State. Further, because many of these chemicals will be regulated in municipal stormwater, state resources will be drained indirectly when state and federal stormwater grants require cleanups and source control to be completed for chemicals that do not pose a risk to human health in Washington State.

The NTR criteria were originally developed more than 20 years ago and were based on scientific data published in the late 1970s; since then, new information has become available both with respect to the prevalence of these chemicals in surface water, tissue, and sediment and with respect to their toxicity to aquatic life and to human health. To ignore these recent data does a disservice to the scientific process and focuses critical Ecology resources on outdated issues. It also contradict EPA's Federal guidelines regarding preferential use of empirical field or laboratory data when available: "Measured BAFs [the partitioning parameter used]…reported in the literature should be used when available" (EPA 2014). This is most evident with respect to chemicals that do not bioaccumulate, chemicals with high variability in their predicted or demonstrated ability to bioaccumulate, and chemicals with recently revised toxicity data. Because of EPA's guidelines, EPA rarely uses the old NTR values when they contradict either site-specific demonstration or new science, here defined as new toxicity factors incorporated in their Integrated Risk Information System (IRIS) or in separate studies on bioconcentration factors. It is critical to stay focused on those chemicals that accumulate in tissue and reach human receptors at unacceptable levels.

In addition to the need for careful revision of many of the toxicological factors in the NTR tables, significant revision is needed for partitioning values (bioconcentration factors [BCFs] and bioaccumulation factors [BAFs]). To do this right is a time-consuming process. Therefore, it is critical to focus on those chemicals that are reaching levels in fish/shellfish that pose health concerns. Fortunately, Ecology has already identified these chemicals and listed them as persistent, bioaccumulate chemicals in the Sediment Management and PBT programs. Focusing on only these chemicals will allow Ecology to direct resources where they are needed most.

SPECIFIC CONCERNS WITH CALCULATED HHC

Non-Bioaccumulative Chemicals

Abundant field studies and laboratory studies have demonstrated that many volatile and less hydrophobic chemicals, including vinyl chloride, do not bioaccumulate in fish tissue (Kelly et al. 2007, Conder et al. 2012), and are not present at detectible levels in fish tissue even in cases where significant loading to the surface water body is present (Wang et al. 1985 and Gossett et al. 1983). In many cases, such as vinyl chloride, the inclusion of the organism consumption pathway is simply not justifiable. In others, the decades-old, outdated bioaccumulation and bioconcentration values (many of which were calculated rather than measured) have been found to greatly over-estimate tissue concentrations. For these, this pathway (through tissue to human) should either be eliminated or calibrated and validated with site-specific data.

Generally speaking, the ability of a chemical to bioaccumulate is strongly linked to its environmental stability (e.g., a low volatilization and/or photodegradation rate in surface water), a low rate of metabolism, and a high octanol-water partitioning coefficient (K_{ow}; Lu et al. 1977, Freitag et al. 1985). Rapid volatilization and/or photodegradation rates limit the persistence of many organic chemicals to a timeframe of hours or days in surface water. The amount of time the chemical persists in surface water represents the timeframe over which bioaccumulation can occur. A chemical's preference for an environmental media (soil, air, and groundwater) can be estimated based on its partitioning coefficient – even a simple one such as partitioning between water and the organic solvent octonol, K_{ow}. Chemicals with a low K_{ow} (log K_{ow} values less than 4) are hydrophilic and are less likely to persist in fish and other aquatic organisms (EPA 2000, Arnot and Gobas 2006, Conder et al. 2012). Finally, once uptake of a chemical occurs, bioaccumulation will only occur if the chemical is not metabolized or eliminated by the environmental receptor. Laboratory studies demonstrate that many of the organic chemicals that Ecology would propose new HHC for are rapidly metabolized in many species of fish and shellfish. The use of outdated BCF values that do not take into account the considerable advances in bioaccumulation science made during the last two decades and overestimates the accumulation of many of the chemicals for which Ecology has calculated HHC.

Ecology should also set up a procedure to track evolving science by chemical. The chemical nitrobenezene is an excellent example of how the numerical criteria can become disconnected from science. How many studies (either site-specific or peer-reviewed research) will need to be done to demonstrate that the equations and parameters consistently overestimate tissue concentrations for a specific chemical, before that fact is accepted by Ecology? Ecology is proposing a HCC for nitrobenzene that is lower than the NTR value, even though (1) nitrobenzene is not on Ecology, EPA, or the Stockholm Accord's PBT lists, (2) nitrobenzene has been sampled in over 600 tissue samples in Washington State (Ecology's EIM data) and has never been detected in tissue, (3) the existing ATSDR Toxicological Profile for Nitrobenzene indicates that nitrobenzene does not accumulate in soil or sediment and does not bioaccumulate in tissue, and (4) the primary nitrobenzene sources to the environment are a few industrial processes that do not exist in the Pacific Northwest. This is a good example where there is sufficient data to show the human health exposure pathway used for HHC does not apply to nitrobenzene. Yet, Ecology's current rule proposed establishing a new criterion that is even lower than the old NTR value.

Therefore, we recommend that Ecology revise the proposed rule to limit the numeric HHC to known bioaccumulative chemicals, with a narrative statement that allows for the Director of Ecology to add chemicals to the list through a focused public process.

Chemicals with High Variability in Bioaccumulation Rates

Ecology states in its *Washington Water Quality Standards: Human health criteria and implementation tools* document that "BCFs are generally laboratory derived or modeled values" and notes that EPA's NTR BCF values are "in many cases older values (developed in the late 1970's), and in many cases are based on laboratory testing of only one species" (2014). This

presents considerable cause for concern, as BCFs can vary significantly by species and genus (EPA 2000). Many polycyclic aromatic hydrocarbons (PAHs) have been well-studied in a variety of fish and shellfish species, and have been found to have bioconcentration factors spanning several orders of magnitude depending on the level of sophistication of their excretion and metabolism mechanisms. In its 2002 guidance, EPA recognized the validity of this point and committed to consider these elimination mechanisms when developing BCFs for future use.[2]

Thus, for certain compounds, use of a generic or model-derived BCF may predict that bioaccumulation will occur in the study area, driving the HHC lower than is appropriate given available data for the species present in the area. It is important to allow empirical data to be used when it is available, rather than to rely solely on the use of BCF values developed in the 1970s with limited empirical data. This could be done through the addition of specific rule language allowing empirical determinations of BCF values or tissue data demonstrations of accumulation in the section of the rule concerning implementation tools and variances.

Out of Date Toxicity Factors

Several of the toxicity values used by Ecology to derive HHC are out of date. For example, toxicity data in IRIS were revised for 1,1-dichloroethene (DCE) in 2002 to: modify the oral reference dose (RfD_o) from 0.009 to 0.05 mg/kg-day; determine a new inhalation reference concentration (RFC_i) of 0.2 mg/m^3; and, most significantly, to determine that there is not sufficient evidence that 1,1-DCE is a carcinogen. This conclusion differed from USEPA's previous assessment, made in 1987, which relied on suggestive evidence from a single study to assign an oral slope factor. Accordingly, the current toxicological profile for 1,1-DCE does not contain an oral slope factor. The federal Ambient Water Quality Criteria (AWQC) was subsequently revised in 2003 to incorporate the revised toxicity information.[3] The current federal AWQC is more than two orders of magnitude greater than the federal NTR. The values that Ecology calculated for "Scenario 3" uses the updated toxicity data and the revised body weight and consumption rate data; calculated HHC for the water only and water-plus-organism pathways are several orders of magnitude greater than the NTR values, and are on the same order of magnitude as the AWQC values for these pathways. <u>However, the Governor's Proposal defaults to use of the NTR value as the current HHC for each pathway, because Ecology made a "risk management" decision that the Governor's Proposal could not be "less protective" than the NTR. It is inappropriate to base HHC on withdrawn toxicity factors</u>; the use of withdrawn toxicity factors in development of criteria is also prohibited in MTCA, which states that toxicity factors shall be derived from the IRIS database, which is the primary source of toxicity factors, including updated factors (WAC 173-340-708(7)(d) and WAC 173-340-708(8)(a)). This situation also applies to isophorone. If Ecology retains HCC for

[2] Federal Register /Vol. 68, No. 250 /, December 31, 2003:
"...if a contaminant is readily metabolized in fish, the actual BCF might be less than estimated using the KLEDow method. EPA thanks the submitter for the information and will consider it when the Agency comprehensively updates the vinyl chloride criterion document to incorporate the BAF derivation procedures described in the 2000 Human Health Methodology."

[3] The EPA Regional Screening Level and the Model Toxics Control Act (MTCA) Cleanup Levels also rely on the current (2002) toxicity information and do not consider the withdrawn 1987 information.

these chemicals (neither are persistent nor bioaccumulative), then, at the least, it should revise the HHC for 1,1-DCE and isophorone to the "Scenario 3" HHC value for each of the two pathways.

Incorrect Toxicity Factors

The IRIS database was used as a source of toxicity data for a majority of the chemicals for which HHC have been developed. During our review of the cancer slope factors and oral reference doses, it was noted that either toxicity values reported in the support document prepared by Ecology do not match the toxicity values in IRIS for certain chemicals, or the footnote indicating whether the high or low end of the range of factors provided in IRIS was used in Ecology calculation is missing or incorrect. These chemicals include: benzene, 1,3-dichloropropene, dichlorobromomethane, and vinyl chloride. Ecology should carefully review the IRIS toxicity factors for these and other chemicals, and correct any discrepancies in toxicity value or documentation.

Improperly Documented Toxicity Factors

As noted in the support document prepared by Ecology, several chemicals (including some PAHs, thallium, and pentachlorophenol) do not use IRIS toxicity factors as the source of their oral reference doses or cancer slope factor values. The source of these toxicity factors is unclear, as is the justification for selection of alternative toxicity factors. As methods for determining toxicity factors can vary widely, it is important to provide the source of the toxicity factor selected for use to enable public review and comment on the proposed toxicity values. Ecology should use the IRIS toxicity factors for all chemicals or provide a thorough justification, including source material and explicit identification of how the values were derived and/or selected, for any toxicity factors for which it proposes an alternative source.

VARIANCE LANGUAGE

Bioaccumulation Off-Ramp

EPA and Ecology guidance documents indicate that actual field and laboratory-measured data should supersede modeled values. This is especially important for the HCC where the calculated values are based on uncalibrated, screening-level models. Ecology should add clear language that would enable those subject to the HHC to provide empirical evidence that bioaccumulation does not occur or does not occur at levels that would impact human health in the waterbody of interest. For areas where the waterbody is large and contains multiple sites, this may be more appropriate for subsections of the waterbody rather than the waterbody as a whole.

It needs to be clear to Ecology staff that this is not a situation where risk is expected to occur and that somehow the regulated party is "getting away with something;" but rather where the estimation used to develop the HCC has sufficient uncertainty that measured results are preferable.

A simple tool that Ecology could develop outside of the rule, but to support it, would be a three part table as follows:

- Part 1: Chemicals Known to Accumulate in Fish/Shellfish Tissue at Unhealthy Levels
- Part 2: Chemicals with the Potential to Accumulate in Fish/Shellfish Tissues
- Part 3: Chemicals Not Expected to Accumulate in Fish/Shellfish Tissue

Language in the rule should then allow a process similar to that used in the State's Sediment Management Standards (173-204-560(6)(b)) and supported by water quality guidance similar to the language provided in the recently revised Sediment Management Standards' Sediment Cleanup Users' Manual II (SCUM II) allowing screening of bioaccumulative chemicals as contaminants of concern (COCs) at a site dependent on whether they are detected in fish tissue. This process allows screening of bioaccumulative COCs through comparison of site data to risk-based concentrations in tissues and/or to natural background concentrations in tissues.

Tissue data can be compared against calculated human health risk-based concentrations, with worksheets presented in SCUM II to assist in human health risk calculations only including the PBT list (Page H-3 of SCUM II). Tissue data can also be compared against target tissue levels presented in Table 2-2 of SCUM II (for ecological receptors) or Table 9-4 of SCUM II (for human receptors). Target tissue levels are available for limited chemicals identified as bioaccumulatives, including: some metals, tributyltin, several pesticides, and carcinogenic polycyclic aromatic hydrocarbons (cPAHs), three individual PAHs, dioxins, hexachlorobenzene, and pentachlorophenol. WAC 173-204-564(2)(c)(iii) requires only the chemicals that are on the PBT list or that have log K_{ow} values greater than 3.5 to be considered bioaccumulative. Notably absent from these lists are volatile organic chemicals, for example, which are not known to affect benthic communities or result in human health risks via bioaccumulation.

Regional background studies recently conducted by Ecology (Bellingham Bay, Port Gardner, Port Angeles) also support targeting only a limited list of chemicals as bioaccumulatives of concern. These studies have only analyzed for arsenic, cadmium, lead, mercury, cPAHs, dioxins/furans, and PCBs in sediments. Ecology, therefore, acknowledges that these are the primary chemicals in sediment expected to be of concern for the fish tissue exposure pathway; it is incongruent to assume that other chemicals would bioaccumulate to a significant degree when present in surface water.

Consistency across Aquatic Programs

Each of the programs at Ecology has a unique mission; nevertheless, it is wasteful of staff time and resources and very confusing to the regulated communities when the programs with strong overlap such as Sediment Management Standards and Water Quality take such different approaches to address the same receptor from the same pathway. The programs should learn from each other and not invent different and often contradictory tools.

We appreciate the opportunity to comment on the proposed changes to the Water Quality Standards for Surface Waters of the State of Washington. Should you have any questions, please do not hesitate to contact us.

Sincerely yours,
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Teri A. Floyd, PhD
Principal

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