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March 3, 2023

Mark Gordon, PE
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RE: Ecology's MTCA PFAS Cleanup Guidance

Dear Mr. Gordon:

Thank you for the opportunity to comment on Ecology's "DRAFT Guidance for Investigating and Remediating PFAS Contamination in Washington State." These comments were prepared by King County staff within the Department of Natural Resources and Parks, Water and Land Resources Division and the Wastewater Treatment Division, as well as Public Health – Seattle & King County. Several of us have participated in Ecology's Stakeholder and Tribal Advisory Group to revise Model Toxics Control Act rules, and work improve public participation in King County, and utilize local information and best available science in the cleanup program. We are also active with Ecology's efforts to reduce PFAS in commerce through the PFAS Chemical Action Plan and the Safer Products for Washington Act.

Scientific advances and our understanding of the uses, environmental distribution, health impacts, and cleanup options for per- and polyfluoroalkyl substances (PFAS) are evolving at a rapid pace as are regulatory activities at the Federal level, and this is our major concern with the PFAS cleanup guidance as outlined in our comments below:

No plan defined in the guidance to incorporate new science, federal regulations, test methods, cleanup standards, and cleanup technologies. Throughout the document, there are no provisions or clear expectations for site managers, responsible parties, or others to seek out the latest fate and transport or toxicological information about PFAS. As a current example, EPA's draft reference doses for PFOA and PFOS have both been reviewed by the science advisory board for the development of drinking water maximum contaminant limits. It's our understanding that these reference doses (RfDs) are close to adoption in the Integrated Risk Information System (IRIS). Will these RfDs supersede

Washington Department of Health (DOH) developed toxicity values? At what point is it prudent for Ecology and responsible parties to anticipate these changes as our understanding of PFAS toxicity changes? We recommend that Ecology build into the guidance a regular schedule to accommodate improved scientific understandings of PFAS fate and toxicity. Ideally, Ecology resources would be dedicated towards biennial updates to this PFAS guidance like Ecology's the sediment cleanup user's manual (SCUM) update schedule.

We did not have sufficient time and resources to review the levels Ecology is proposing for ecological receptors. At minimum, we recommend Ecology add language that states once EPA establishes water quality for protection of aquatic life, those supersede what is in this guidance document.

More clarity on when drinking water SALs are likely to apply as ARARs is needed. Ecology's Method B and C published groundwater cleanup levels in Table 3 (page 17) are considerably higher than the State Action Levels (SALs) for drinking water developed by DOH. It is not clear under what circumstances the SAL becomes an 'applicable or relevant and appropriate requirement' (ARAR) or not. Please elaborate on when drinking water SALs are likely to apply as ARARs. Our public health staff gets many questions about PFAS in private wells. Improved transparency about the extent of known or suspected PFAS plumes in groundwater and coordination between Ecology, public health, water utilities, and responsible parties would be most helpful. We recommend this guidance discuss how a site manager would inform and communicate groundwater results to other public health agencies for their input and expertise as groundwater cleanup levels are chosen.

More guidance on how to develop bioaccumulation models. We are concerned that Ecology is proposing to develop bioconcentration factors (BCFs) for the protection of fish tissues for human consumption. In our decades of experience throughout Washington, BCFs are a primitive tool which rarely align with the site and food-web specific bioaccumulation and bioconcentration. We recommend that Ecology avoid generic or default BCFs for cleanup decision making. We recommend that Ecology provide additional guidance and recommendations on how site managers and responsible parties can develop robust and defensible bioaccumulation models or species-specific BCFs to support cleanup decisions.

More guidance on laboratory performance and data validation. The guidance document does not discuss data validation. Laboratory or field contamination and laboratory performance can be significant challenges for PFAS, especially in complex matrices or low-level analysis needed to characterize site boundaries. We recommend Ecology add sections related to data validation and usability.

More guidance on background concentrations and practical quantitation limits (PQLs) for PFAS and compliance. The guidance document does not include discussion of background PFAS levels. We recommend Ecology clarify how background levels and PQLs would be considered in site assessment and cleanup decisions. We also recommend that Ecology outline a prescribed methodology for the regulated community to obtain data and calculate background PFAS levels. Or, if Ecology is working on providing its own guidance (similar to the guidance on background arsenic levels in soil and groundwater), provide its work strategy and timeline to collect the necessary data to determine background PFAS levels.

Assessing PFAS precursors and compounds not currently included in the existing accredited methods. The guidance document left us with many questions about PFAS precursors and other currently unregulated PFAS how they might be addressed in cleanups. We understand this is another area that presents challenges for assessment based on current science and is likely to evolve in the coming years. In the meantime, we would appreciate discussion about how site managers and responsible parties would handle PFAS precursors in their current or pending site investigations – if at all. This is especially important because established methods do not exist for many PFAS compounds. Cleanups conducted on a limited number of analytical target PFAS may leave residual unidentified PFAS and significant uncertainty. Current science suggests that PFAS be addressed as classes of chemicals based on chemical structures that produce the toxicity, which is contrary to most other MTCA contaminants. How this would happen in practice at a site is very challenging to understand. There are analytical preparations such as the "total oxidizable precursor" (TOP) assay, which is one way to account for some precursors, although this method is unaccredited and is challenging to relate to site-specific conditions. There are also other non-specific PFAS methods incorporating time-of-flight mass spectrometry. This is another area where the scientific future is difficult to predict. Still, test methods such as the TOP assay are already being examined for use in remediation strategies, such as the Compartmental Retention Framework for PFAS sites proposed by Newell et al. (2021) to assess monitored natural attenuation. From a public health perspective, the availability of test methods like the TOP assay provide a conservative approach to understanding the scope of PFAS contamination and can be useful for informing approaches needed, especially given the unknown toxicities within these classes of chemicals and the rapidly evolving advancements in this field.

In addition to the TOP assay, other non-specific analytical options such as Total Organic Fluorine, Extractable/Adsorbable Organic Fluorine are not noted in the guidance and may be relevant analytical tools in remedial investigations.

Clarity on regulation versus guidance and updating. We appreciate Ecology's citation and use of the Interstate Technology and Regulatory Council (ITRC) information on PFAS. We recommend that Ecology more explicitly state what parts of this guidance document are Ecology's scientific or technical recommendations, compared to those Ecology believes are required by law or rule. We also reiterate our recommendation that Ecology dedicate resources to regular, scheduled, biennial guidance updates with public comment opportunities comparable to SCUM updates. PFAS science is an enormous field which is rapidly evolving. It would be difficult and lead to inconsistent outcomes if individual site managers and responsible parties attempted to incorporate best available science from EPA, ITRC, and hundreds of other PFAS resources published almost daily.

We offer more specific comments to the guidance on the following page.

Reference:

Charles J. Newell, David T. Adamson, Poonam R. Kulkarni, Blossom N. Nzeribe, John A. Connor, Jovan Popovic, Hans F. Stroo. 2021. Monitored Natural Attenuation to Manage PFAS Impacts to Groundwater: Scientific Basis. National Groundwater Association, Groundwater Monitoring and Remediation 41(4): 76-89. Accessed March 1, 2023. https://doi.org/10.1111/gwmr.12486

King County comments on specific sections of Ecology "DRAFT Guidance for Investigating and Remediating PFAS Contamination in Washington State" (December 2022)

1. Page 6 of 64: The hyperlink for Ecology's PFAS Chemical Action Plan is broken.
2. Section 3: Tables containing State Action Levels (SALs) and MTCA cleanup levels should include columns for PQLs (Practical Quantitation Limits) or similar detection limit metrics and their analytical methods to help readers understand current state of the art in detecting and quantifying PFAS in relation to regulatory criteria. Disclaimers or qualifying language can be added on detection limits as caveats to applying the criteria. In particular, Table 2 needs PQLs and/or necessary detection limits because Section 3.1.2 states that "Water systems that detect PFAS will be required to continue monitoring on a more frequent schedule."
3. Section 3.2.4 Surface water cleanup levels and 3.2.5 soil cleanup levels: a discussion on bioassays for compliance monitoring may be useful.
4. Page 21 of 64, Table 5; units in parts per trillion (ppt) would be easier to read and consistent with cleanup level tables with similar low orders of magnitude.
5. Page 20 of 64: if we assume that the Kd and Koc parameters are based on saturated conditions (solid and liquid phases only), then the tendency for PFAS to sorb preferentially to air-water and NAPL-water interfaces would affect principally the vadose zone calculations. We recommend Ecology highlight this discussion and efforts to incorporate partitioning behavior best available science. The statement: "Studies have shown that air-water interfaces can account for up to 100% of the PFOS and PFOA retained in soil." Please clarify if this statement is vadose zone soil only or if it includes the water table interface. Preferential partitioning of PFAS in low permeability units like clays is also not covered. This may be important in assessing secondary matrix diffusion, retardation, and back diffusion (rebound) effects.
6. Section 3.2 Establishing MTCA cleanup levels: Under MTCA, the PQL or background concentrations are considered when developing cleanup levels. We recommend a discussion be added to this section regarding role of PQLs and background in developing cleanup levels.
7. Section 3.4 might better be placed as an appendix, because it is superseded.
8. Section 4.3.2 We recommend non-specific test methods: other non-specific methods like TOF (Total Organic Fluorine), total EOF (Extractable Organic Fluorine) be mentioned and their potential uses in remedial investigation.
9. Section 5.1 Surface Water: it is not clear where the terms "no adverse effect" and "no significant adverse effect" are derived from.
10. Chapter 6 Treatment Technologies: As a cleanup guidance, limiting the topic of remediation to just treatment technologies seems incomplete. We recommend other MTCA remedies (ex situ or otherwise) like containment (capping and/or subsurface barrier walls), hydraulic control, permeable reactive barriers, institutional controls, and monitored natural attenuation be discussed as they relate to PFAS.
11. Sections 6.1 (Liquid treatment technologies) and 6.2 (Treatment technologies for solid matrices) seem to lack supporting literature source citations.
12. Section 6.1.1.4 Liquid Colloidal Activated Carbon (CAC): We recommend mentioning that CAC can be used as a form of permeable reactive barrier wall to treat PFAS plumes near or downgradient from the source.

13. 6.2.1 Sorption and stabilization (immobilization) does not appear to discuss sorption at all.
14. 6.2.2 Excavation and off-site management: If possible, please clarify or provide more specificity on source excavation. To what extent (i.e., remediation or cleanup level) will PFAS contaminated soil be excavated? How will confirmation samples be taken? What constitutes effective source removal from a regulatory and exposure path standpoint?
15. Section 6.2.3 Thermal treatment. Please clarify or specify temperatures needed instead of just saying "high heat" (ITRC website says it may be temperatures upwards of 1,000^{o}C for soil). Potential adverse effects not mentioned include breakdown into other toxic, volatile chemicals (carbon tetrafluoride, hexafluoroethane, trifluoroacetic acid, and hydrogen fluoride), formation of smaller PFAS, greenhouse gases, and the limited available incinerators approved to completely destroy PFAS.
16. Under Glossary: the definition of contaminated site should follow MTCA language (similar to Facility), being an area where hazardous substances have come to be located. Please check that the definition of sediment sites is consistent with Sediment Management Standards. Additionally, why are lakes are not included?
17. Under Glossary: The term "upland site" is not previously used in WAC 173-340. It is not clear why this guidance is trying to use this rather limited definition here in the glossary. To us, an upland site is a contaminated site located in an upland and/or inland location or setting. Upland sites may or may not include incidental surface water bodies that are not the main focus of cleanup or a cleanup unit (unlike aquatic sites).

Thank you once again for the opportunity to comment and participate in the MTCA guidance development process. Please do not hesitate to contact Richard Jack (richard.jack@kingcounty.gov) or Shirlee Tan (shirlee.tan@kingcounty.gov) for clarification or questions.

Respectfully,

(Via email)
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