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Sean Smith
Department of Ecology
P.O. Box 330316
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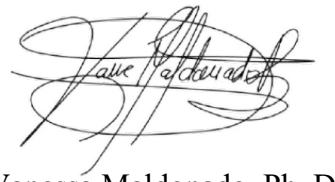
Subject: Comments on Aqueous Film-Forming Foam (AFFF) Collection and Disposal Program: Draft Programmatic Environmental Impact Statement (DEIS)

Dear Mr. Smith:

Thank you for the opportunity to provide comments on the *AFFF Collection and Disposal Program: DEIS* prepared by the Hazardous Waste and Toxics Reduction Program, Washington State Department of Ecology (Ecology).

Our comments on the draft guidance are provided on the following pages. If you have any questions, please do not hesitate to reach out.

Sincerely,



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COMMENTS ON THE AFFF COLLECTION AND DISPOSAL PROGRAM: DEIS

CHAPTER 2. Project Description and Alternatives

Subsection 2.2.1: Alternative 1 Approved Hold in Place, page 2-20

It is mentioned that AFFF would be held in place at participating fire stations until acceptable advanced treatment technology becomes available.

- What is the anticipated or expected timeline for advanced treatment technologies to become available?
- Who will Ecology be relying on to determine the availability and qualification of advanced treatment technologies approved for use?

We recommend adding an expected timeline and guiding documents (e.g., Guidance on Destruction and Disposal of Per and Polyfluoroalkyl Substances [PFAS]) The only guidance document we are aware of is the Environmental Protection Agency (EPA)'s Interim Guidance on the Destruction and Disposal of PFAS. The EPA's guidance document was expected to be finalized by the end of 2023 and should be finalized soon. Will Ecology consider this document as a basis for decision-making regarding technologies available to treat AFFF held in place? The criteria for decision-making should be included in the DEIS.

Also, Alternative 1 is not legally supported for large quantity generators (LQGs). If Alternative 1 is selected, a policy change to allow LQGs to hold AFFF in place would be required. How will the Department of Ecology address this issue? What is the strategy to overcome this challenge?

Subsection 2.2.2: Alternative 2 Incineration, page 2-21

Although incineration has shown to destroy 99.9999% of legacy PFAS, the incineration of PFAS requires reaching a temperature of approximately 1100 °C. If the required temperature is not met, multiple PFAS can be converted to other PFAS at lower temperatures, resulting in high destruction efficiencies (e.g., 99.9999%) without full mineralization and the potential release of the remaining fluorocarbon portions to the environment. Further, although working temperatures below 1000 °C produce high destruction efficiencies for quantifiable PFAS, several nonpolar PFAS are emitted as products of incomplete combustion (Shields et al., 2023). Thus, the destruction efficiency alone is not the best indicator of total PFAS destruction. With this preamble, the following should be clarified in the DEIS:

1. How is the complete destruction of PFAS warranted with incineration without relying on the destruction efficiency?
2. How will the required operating conditions (e.g., temperature of at least 1100 °C) in approved incineration facilities be warranted and proven to comply?
3. How are the potential emissions of PFAS byproducts (e.g., products of incomplete combustion) going to be captured and monitored? What is the strategy to control air emissions in approved facilities? EPA's OTM-50 sampling technique for quantification of

volatile fluorinated compounds is now available. The combination of OTM-50 and OTM-45 would provide a more complete analysis of the potential PFAS in emission byproducts. The DEIS should clarify the intent to monitor/control these air byproducts if this Alternative 2 is selected.

4. If Alternative 2 is selected, does Ecology intend to cover 100% of the costs for incinerating thousands of gallons of AFFF? How is the cost feasibility considered?

Subsection 2.2.3: Alternative 3 Solidification and Landfilling, page 2-22

Solidification and landfilling should not be considered as an alternative for AFFF foam disposal/treatment for the following reasons:

1. There is currently little to no research investigating the rates at which PFAS may leach from concrete into surrounding environmental matrices (Douglas et al., 2023) and potentially impact the receiving landfill(s).
2. Leachability studies have shown the presence of multiple PFAS (e.g., 6:2 FTS, PFBA, PFPeA) in the leachate that results from solidification/stabilization (Sörengård et al., 2019). We understand that generated leachate could be collected, treated, and disposed of in a landfill, however, as of today there are no treatment technologies that have been demonstrated to fully destroy PFAS in such complex matrix as landfill leachates (Berg et al, 2022).
3. It has been shown that the stabilization efficiency depends on the PFAS chain length, and it is less effective for perfluorocarboxylates (e.g., PFOA) and short-chain PFAS (Sörengård et al., 2019).
4. Stabilization/solidification studies have been conducted and even field-tested to treat soil and sediments with carbon-based amendments. While this stabilization/solidification has been employed to treat soils, sediments, and liquid waste (e.g., groundwater with low PFAS concentrations) containing a variety of chemical pollutants, the process applied to AFFF mixtures (liquid matrices with high concentrations of PFAS, [e.g., 3% PFOS]) has not been evaluated. The applicability of a technology does not necessarily translate between matrices and concentration ranges. Further research is necessary to prove the solidification/stabilization of PFAS would be feasible to stabilize pure AFFF foams.
5. The description of this alternative does not consider the real and negative implications of landfilling PFAS even if solidified in a neutral matrix such as concrete. Leachates containing landfill leachates emit volatile PFAS (e.g., 6:2 FTOH) which have negative environmental impacts. Thus, landfilling solidified PFAS is not just a leachate issue. The

potential for emitting volatile PFAS should be included in the draft EIS and should be considered as a high-risk factor for the selection of such an alternative.

6. Although this alternative captures a high percentage of PFAS, it transfers part of the problem (PFAS) from one place to another. It does not seem to be solving it since not destructive and could create additional problems (e.g., volatilization, leaching).

Subsection 2.2.4: Alternative 4 Deep Well Injection, page 2-23

Although this is a relatively simple alternative, the potential for future groundwater contamination should be considered in this alternative evaluation, including future migration of PFAS from the depth injected to other aquifers. Although the selected locations for deep well injection are remote and planned beneath current drinking water aquifers, there is always a potential for migration and eventual contamination of other aquifers. Deeper aquifers are becoming more important for future water supplies in the face of climate change and the depletion of aquifers. Potential risks such as the risk of seismic effects from injection also should be accounted for and considered in the alternative description and selection.

General Comments/Questions:

- Although airports, military sites, and industrial sites are not within the scope of the EIS, will the collection and disposal program be limited to municipal fire departments or expanded to more participants with AFFF inventory (e.g., airports) once approved?
- Will Ecology accept rinse water from municipal fire departments who are cleaning their systems when transitioning for fluorine free products? If not, how should this be disposed of?
- The potential issues associated with transportation of AFFF (e.g., potential for spills and emissions during the transportation process) should be considered in the selection of the alternatives, as it is for non-vehicle transport (Section 2.2.6.2)
- The Alternatives Assessment in Section 2.2 does not appear to address technology costs. It is important to consider the economic feasibility of alternatives due to significant differences. For instance, the cost for incineration of PFAS is significantly higher when compared to any of the other alternatives selected.

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