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To Whom it May Concern:

I am writing this letter in strong support of designating Soap Lake as an Outstanding Resource Water (ORW).

I am a Professor of Chemical and Biological Engineering at Montana State University. I am affiliated with the Center for Biofilm Engineering and the Thermal Biology Institute, both world-renown centers of excellence for the study of extremophilic microorganisms and the development of biotechnology. My research on biofilms and extremophilic organisms focusing on biocement as well as algal-biofuel and -bioproduct generation has brought me to places like Yellowstone National Park and Soap Lake (WA). Soap Lake has proven to be a unique environment, which has yielded algae and associated microbiomes, which are not only unique but are also involved in carbon capture. High pH/high alkalinity environments like Soap Lake have been identified as the most productive ecosystems in the world (Melack 1981), and my group is studying the unique organisms in the Soap Lake area.

For instance, algal growth can capture carbon dioxide, which in the case of Soap Lake can lead to net carbon capture because algae are often sinking into the hypolimnion where the photosynthetically fixed carbon remains for extended periods of time. Not protecting the meromictic character of Soap Lake could indeed result in a release of large amounts of carbon, and a significant degradation of the lake's quality.

In specific, my group has published, so far, one paper on the enrichment of unique organisms enriched from the Soap Lake area with ureolytic capabilities (Skorupa, Akyel et al. 2019). Ureolysis can contribute to the production of cement-like materials without the need of high energy, high temperature and thus high carbon intensity production of transitional Portland cement (Phillips, Gerlach et al. 2013, Heveran, Liang et al. 2019, Feder, Akyel et al. 2020, Akyel, Coburn et al. 2022).

My group is also currently supported by the US National Science Foundation and the Department of Energy to study organisms from Soap Lake for algal-biofuel and -bioproduct generation. The high pH and high alkalinity conditions at Soap Lake have resulted in the enrichment and possibly evolution of organisms adapted to these conditions (Vadlamani, Viamajala et al. 2017, Vadlamani, Pendyala et al. 2019, Gao, Pittman et al. 2023). High pH indeed enhances the dissolution of CO2 into water and the high alkalinity provides a pH buffer for stable growth conditions and a large reservoir of inorganic carbon ("CO2") for fast algal growth (Pendyala, Vadlamani et al. 2017).

We currently have approximately 30 enrichments of photosynthetic cultures from Soap Lake, Lake Lenore and Alkali Lake, which are being studied for their microbiome and their ability to produce algal-biofuels and -bioproducts. Soap Lake is expected to continue yielding insights that will further our ability

to develop more sustainable technologies as well as unique organisms that might or might not yield advances in other areas, such as the production of pharmaceuticals.

Hence, I am urging the Washington DOE to designate Soap Lake as an Outstanding Resource Water (ORW).

Yours sincerely,

Robin Gerlach (Ph.D.)

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