July 27, 2023

Dr. Meredith Williams, Director
Department of Toxic Substances Control
California Environmental Protection Agency
1001 “I” Street, P.O. Box 806
Sacramento, CA 95812-0806

Re: DTSC’s proposal to add microplastics to the Candidate Chemicals of Concern List - Support

Dear Dr. Williams:

The following undersigned organizations support DTSC’s proposal to add microplastics to the Candidate Chemicals of Concern List in order to protect our communities, water, and other resources from plastic pollution.

DTSC has defined microplastics based on the polymeric structure and size distribution of less than 5,000 micrometers. Microplastics, as defined in this way, meet the California Code definition of chemicals provided in California Code Regs. tit. 22, section 69501.1(a)(20)(A)(1), which reads that “(A) Chemical" means… An organic or inorganic substance of a particular molecular identity, including any combination of such substances occurring, in whole or in part, as a result of a chemical reaction or occurring in nature, and any element, ion or uncombined radical, and any degradate, metabolite, or reaction product of a substance with a particular molecular identity” and further that “molecular identity” may be defined in terms of a substance’s particle size, size distribution, and surface area.

Further, according to the regulation, chemicals may be listed on the Candidate Chemicals List if they exhibit a "hazard trait and/or an environmental or toxicological endpoint". In the background document DTSC has outlined evidence demonstrating that microplastics in fact meet this definition.[1] Here, we reiterate and briefly elaborate upon those points.

Microplastics are ubiquitous in the environment, being detected in freshwater, sea water, soil, sediments, and air.[2] Unfortunately the breakdown of plastic polymers in the environment is very slow and depends upon the chemical composition of the plastic polymer, and numerous environmental conditions such as UV radiation, oxidation, temperature, and mechanical stress.[3] Our continued and growing use of plastic polymers for numerous industrial and consumer products ensures that there will be an ongoing input of microplastics into the environment for the foreseeable future.

Microplastics are persistent, meaning that they stay in the environment for long periods of time. In an aquatic environment, Zhu and colleagues estimated that several microplastic polymers may persist for many years in surface seawater, only very slowly losing their carbon and mass to the environment.[4] In soil, even bioplastic polymers that are designed to biodegrade can last for years if environmental conditions such as soil temperature are not optimal.[5]

Microplastics are also mobile in the environment, meaning that they can readily move throughout the environment once they are released. Whether in the air or in water, their low

[1] Department of Toxic Substances Control. "Proposal to Add Microplastics to the Candidate Chemicals List," May 27, 2023. https://dtsc.ca.gov/wp-content/uploads/sites/31/2023/04/Background-Document-Proposal-to-Add-Microplastics-to-the-Candidate-Chemical-List_May272023.pdf.

[2] Kye, Homin, Jiyoon Kim, Seonghyeon Ju, Junho Lee, Chaehwi Lim, and Yeojoon Yoon. "Microplastics in Water Systems: A Review of Their Impacts on the Environment and Their Potential Hazards." *Heliyon* 9, no. 3 (March 1, 2023): e14359. https://doi.org/10.1016/j.heliyon.2023.e14359; Monkul, Mehmet Murat, and Hakkı O. Özhan. "Microplastic Contamination in Soils: A Review from Geotechnical Engineering View." *Polymers* 13, no. 23 (November 26, 2021): 4129. https://doi.org/10.3390/polym13234129; Yao, Piao, Bin Zhou, YueHan Lu, Yong Yin, YongQiang Zong, Min-Te Chen, and Zachary O'Donnell. "A Review of Microplastics in Sediments: Spatial and Temporal Occurrences, Biological Effects, and Analytic Methods." *Quaternary International*, The 3rd ASQUA Conference (Part II), 519 (June 10, 2019): 274–81. https://doi.org/10.1016/j.quaint.2019.03.028; Xie, Yichun, Yan Li, Yan Feng, Wei Cheng, and Yan Wang. "Inhalable Microplastics Prevails in Air: Exploring the Size Detection Limit." *Environment International* 162 (April 1, 2022): 107151. https://doi.org/10.1016/j.envint.2022.107151.

[3] Chamas, Ali, Hyunjin Moon, Jiajia Zheng, Yang Qiu, Tarnuma Tabassum, Jun Hee Jang, Mahdi Abu-Omar, Susannah L. Scott, and Sangwon Suh. "Degradation Rates of Plastics in the Environment." *ACS Sustainable Chemistry & Engineering* 8, no. 9 (March 9, 2020): 3494–3511. https://doi.org/10.1021/acssuschemeng.9b06635.

[4] Zhu, Lixin, Shiye Zhao, Thais B. Bittar, Aron Stubbins, and Daoji Li. "Photochemical Dissolution of Buoyant Microplastics to Dissolved Organic Carbon: Rates and Microbial Impacts." *Journal of Hazardous Materials* 383 (February 2020): 121065. https://doi.org/10.1016/j.jhazmat.2019.121065.

[5] Monkul, Mehmet Murat, and Hakkı O. Özhan. "Microplastic Contamination in Soils: A Review from Geotechnical Engineering View." *Polymers* 13, no. 23 (November 26, 2021): 4129. https://doi.org/10.3390/polym13234129.

density and large surface area to-volume ratio allows microplastics to travel long distances.[6] For example, microplastics have been found to travel in the atmosphere over 95 km to remote mountain locations and to be deposited in the Arctic in snowfall.[7]

These three findings - that microplastics are ubiquitous, persistent, and mobile in the environment - means there are increased opportunities for human exposure to microplastics to occur. Already, there is evidence that widespread human exposure to microplastics is occuring. For example, microplastics have been detected in human blood, lung, vascular, and placental samples and have been recovered from breast milk and stool samples as well.[8]

The evidence for health effects related to microplastics exposure is also growing. The California Legislature recently commissioned a review of the health and toxicological literature associated with microplastics exposure.[9] Using a systematic review framework, the authors of the report concluded that exposure to microplastics is suspected to adversely affect human digestive and reproductive systems based on the available studies in experimental animals. There is also

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[6] Brahney, Janice, Margaret Hallerud, Eric Heim, Maura Hahnenberger, and Suja Sukumaran. "Plastic Rain in Protected Areas of the United States." *Science* 368, no. 6496 (June 12, 2020): 1257–60. https://doi.org/10.1126/science.aaz5819.

[7] Allen, Steve, Deonie Allen, Vernon R. Phoenix, Gaël Le Roux, Pilar Durántez Jiménez, Anaëlle Simonneau, Stéphane Binet, and Didier Galop. "Atmospheric Transport and Deposition of Microplastics in a Remote Mountain Catchment." *Nature Geoscience* 12, no. 5 (May 2019): 339–44. https://doi.org/10.1038/s41561-019-0335-5; Bergmann, Melanie, Sophia Mützel, Sebastian Primpke, Mine B. Tekman, Jürg Trachsel, and Gunnar Gerdts. "White and Wonderful? Microplastics Prevail in Snow from the Alps to the Arctic." *Science Advances* 5, no. 8 (August 14, 2019). https://doi.org/10.1126/sciadv.aax1157.

[8] Leslie, Heather A., Martin J. M. van Velzen, Sicco H. Brandsma, A. Dick Vethaak, Juan J. Garcia-Vallejo, and Marja H. Lamoree. "Discovery and Quantification of Plastic Particle Pollution in Human Blood." *Environment International* 163 (May 1, 2022): 107199. https://doi.org/10.1016/j.envint.2022.107199; Jenner, Lauren C., Jeanette M. Rotchell, Robert T. Bennett, Michael Cowen, Vasileios Tentzeris, and Laura R. Sadofsky. "Detection of Microplastics in Human Lung Tissue Using MFTIR Spectroscopy." *Science of The Total Environment* 831 (July 2022): 154907. https://doi.org/10.1016/j.scitotenv.2022.154907; Rotchell, Jeanette M., Lauren C. Jenner, Emma Chapman, Robert T. Bennett, Israel Olapeju Bolanle, Mahmoud Loubani, Laura Sadofsky, and Timothy M. Palmer. "Detection of Microplastics in Human Saphenous Vein Tissue Using MFTIR: A Pilot Study." *PLOS ONE* 18, no. 2 (February 1, 2023): e0280594. https://doi.org/10.1371/journal.pone.0280594; Ragusa, Antonio, Alessandro Svelato, Criselda Santacroce, Piera Catalano, Valentina Notarstefano, Oliana Carnevali, Fabrizio Papa, et al. "Plasticenta: First Evidence of Microplastics in Human Placenta." *Environment International* 146 (January 1, 2021): 106274. https://doi.org/10.1016/j.envint.2020.106274; Ragusa, Antonio, Valentina Notarstefano, Alessandro Svelato, Alessia Belloni, Giorgia Gioacchini, Christine Blondeel, Emma Zucchelli, et al. "Raman Microspectroscopy Detection and Characterisation of Microplastics in Human Breastmilk." *Polymers* 14, no. 13 (June 30, 2022): 2700. https://doi.org/10.3390/polym14132700;Schwabl, Philipp, Sebastian Köppel, Philipp Königshofer, Theresa Bucsics, Michael Trauner, Thomas Reiberger, and Bettina Liebmann. "Detection of Various Microplastics in Human Stool." *Annals of Internal Medicine* 171, no. 7 (October 2019): 453–57. https://doi.org/10.7326/M19-0618.

[9] California State Policy Evidence Consortium (CalSPEC). "Microplastics Occurrence, Health Effects, and Mitigation Policies: An Evidence Review for the California State Legislature," January 2023. https://uccs.ucdavis.edu/sites/g/files/dgvnsk12071/files/media/documents/CalSPEC-Report-Microplastics-Occurrence-Health%20Effects-and-Mitigation-Policies.pdf.

growing evidence that microplastics are transferred through ecological food webs and are associated with a variety of ecotoxicological effects.[10]

Together, these hazard characteristics, mobility, persistence, and toxicity support the listing of microplastics on the Chemicals of Concern List.

Thank you for the opportunity to provide feedback on DTSC's proposal to add microplastics to the Chemicals of Concern List. We urge DTSC to rapidly approve this listing, as it is an important first step in providing a solution to address the threats associated with microplastic pollution.

Sincerely,

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Andria Ventura **Clean Water Action**	Yvette Arellano **Fenceline Watch**	LeVonne Stone **Fort Ord Environmental Justice Network**
Jessica Roff **Global Alliance for Incinerator Alternatives (GAIA)**	Arlene Blum **Green Science Policy Institute**	Emily Parker **Heal the Bay**
Cynthia Robertson **Micah Six Eight Mission**	Katie Pelch, PhD **Natural Resources Defense Council**	Jessica Robinson **Northern California Recycling Association**
Dave Henson **Occidental Arts and Ecology Center**	Melissa Morris **Oceana**	Julie Andersen **Plastic Oceans International**

[10] Castro-Castellon, Ana T., Alice A. Horton, Jocelyne M. R. Hughes, Cordelia Rampley, Elizabeth S. Jeffers, Gianbattista Bussi, and Paul Whitehead. "Ecotoxicity of Microplastics to Freshwater Biota: Considering Exposure and Hazard across Trophic Levels." *Science of The Total Environment* 816 (April 10, 2022): 151638. https://doi.org/10.1016/j.scitotenv.2021.151638.

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