July 21, 2023

Department of Toxic Substances Control (DTSC)
Safer Consumer Products Program
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Re: Proposed inclusion of microplastics to the Candidate Chemical List

The Environmental Working Group (EWG) is a nonprofit public health and environmental research and advocacy organization with offices in Sacramento, Calif., Minneapolis and Washington, D.C. We focus our research on potential health risks from chemical contamination of water, food, consumer products and the environment.

EWG strongly supports the proposed addition of microplastics to California's Candidate Chemical List, which would allow the Department of Toxic Substances Control Safer Consumer Products Program to consider regulation under the Safer Consumer Product Program. Inclusion on the Candidate Chemical List, once finalized, would represent an important step forward in protecting all Californians, especially children, from exposures to microplastics, as well as from the adverse health effects of chemical additives that are frequently associated with and leach from microplastics.

The Candidate Chemical Listing of microplastics is supported by their:

1. Environmental persistence.
2. Ubiquitous occurrence due to a variety of sources.
3. Potential for toxicity due to leaching of chemical additives from microplastics.

Details and additional information in support of Candidate Chemical Listing for microplastics are presented below.

1. The environmental persistence of microplastics poses a concern for ecosystems and human health

The California Department of Toxic Substances Control and the State Water Resources Control Board define microplastics as "solid polymeric materials to which chemical additives or other substances may have been added, which are particles which have at least three dimensions that are less than 5,000 micrometers."[1] The polymeric nature of these materials, as well as the overall composition of microplastics and the stability of their chemical bonds, makes all plastics resistant

[1] State Water Resources Control Board. 2020. https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/docs/dfntn_jun3.pdf

to biodegradation and thus highly persistent in the environment. Under the effect of physical forces, larger-size plastic products can fragment into smaller pieces, including those that are invisible to the human eye. In contrast, microplastics of various sizes are both stable and mobile in various environmental media, spanning the size spectrum from nanoplastics (1 nm to 100 nm) to sub-micron plastics, small microplastics (1 μm to 0.1 mm) and large microplastics (0.1 mm to 5 mm).

The persistence of microplastics poses a threat to aquatic and terrestrial ecosystems, potentially affecting biodiversity, as well as national and international efforts on behalf of endangered species conservation. Microplastics are harmful to aquatic and terrestrial life because of the physical damage they can inflict after they are ingested. They can also cause further harm by acting as a carrier for toxic chemical additives. Further, an analysis published by European scientists in 2022 concluded that agricultural soils in many regions could be contaminated with vast quantities of microplastics because of their urban wastewater and the subsequent application of wastewater sludge on agricultural fields.[2]

2. Microplastics get into the environment and the human body from a variety of sources

Microplastics are the most prevalent type of debris in oceans, lakes and rivers. They are found on beaches, in protected areas, in sea ice in the Arctic, and on the ocean floor. They have been found in the stomachs of many different types of wildlife, from plankton to whales. Microplastics have also been found in the air, tap water, bottled water and food products.

Microplastics of various sizes are produced by the physical disintegration of plastic-based products. However, microplastics that are intentionally added to a wide range of product categories – including personal care, detergents, paints/coatings/inks, industrial abrasives, and agriculture products – are also a source. And the use of microplastics in consumer products has increased significantly over the past decade. We are concerned about the potential for growing human exposure to microplastics from these sources.

In personal care products, microplastics ingredients are used in color cosmetics (makeup, nail polish), skincare (face, hand, body cream and lotion, lip salve and sun preparations), hair care (hair color and hairspray), and other toiletries (toothpaste, deodorant, shaving soap, mouthwash and insect repellent). Microplastics have been reportedly used for functions such as scrubbing, cleansing, exfoliating and skin conditioning. They can serve as viscosity regulators, emulsifiers, film formers, opacifying agents, liquid absorbent binders, bulking agents, abrasives and gellants, as well as agents associated with timed release.

In detergents, microplastics ingredients are used in hard surface cleaners, such as those for ceramics, toilets, stainless steel, and other uses, including ovens, and laundry stains. Microplastic

[2] Lofty J, Muhawenimana V, Wilson CAME, Ouro P. 2022. Microplastics removal from a primary settler tank in a wastewater treatment plant and estimations of contamination onto European agricultural land via sewage sludge recycling. Environmental Pollution 304:119198.

ingredients are used in marine paint coatings and anti-skid powder, printer toner and a variety of industrial abrasives.

This large diversity of microplastics use makes it particularly difficult to track various pathways to microplastics pollution. Yet such oversight is essential – it must be done to protect human health. As a result of uncontrolled microplastics use and discharges into the environment, microplastics have been found in the human body, including human blood[3], placenta[4] and lungs[5], as well as in testis and semen[6].

3. Microplastics can cause both direct harm and toxicity due to leaching of chemical additives

For aquatic life, ingestion of microplastics is known to be associated with direct harmful impacts on the digestive system and the animal's ability to feed and to obtain nutrition. For humans, direct impacts of ingestion and inhalation of microplastics are not yet understood. Yet the scope of direct exposure is staggering, which causes reason for concern. A study by Canadian researchers published in 2019 estimated that for the North American population, annual per-person ingestion of microplastic particles can reach 52,000 particles just from food and drink, with equal or greater additional quantity of microplastics particles from inhalation.[7]

More research on the potential direct impacts of microplastics on human health is urgently needed. Published studies suggest that direct effects may include increase in inflammation, oxidative stress, apoptosis and changes in metabolic homeostasis.[8] In parallel, extensive studies show that microplastics can act as a reservoir for chemicals associated with toxicity and can also leach chemical additives used in the production of the original plastic products. These additives, such as bisphenols and phthalates, can be associated with significant harm to the endocrine system.

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[3] Leslie HA, van Velzen MJM, Brandsma SH, Vethaak AD, Garcia-Vallejo JJ, Lamoree MH. Discovery and quantification of plastic particle pollution in human blood. Environ Int. 2022;163:107199. doi:10.1016/j.envint.2022.107199

[4] Ragusa A, Svelato A, Santacroce C, Catalano P, Notarstefano V, Carnevali O, Papa F, Rongioletti MCA, Baiocco F, Draghi S, D'Amore E, Rinaldo D, Matta M, Giorgini E. Plasticenta: First evidence of microplastics in human placenta. Environ Int. 2021;146:106274. doi: 10.1016/j.envint.2020.106274

[5] Jenner LC, Rotchell JM, Bennett RT, Cowen M, Tentzeris V, Sadofsky LR. Detection of microplastics in human lung tissue using μFTIR spectroscopy. Sci Total Environ. 2022;831:154907. doi:10.1016/j.scitotenv.2022.154907

[6] Zhao Q, Zhu L, Weng J, Jin Z, Cao Y, Jiang H, Zhang Z. Detection and characterization of microplastics in the human testis and semen. Sci Total Environ. 2023;877:162713. doi:10.1016/j.scitotenv.2023.162713

[7] Cox KD, Covernton GA, Davies HL, Dower JF, Juanes F, Dudas SE. 2019. Human consumption of microplastics. Environmental Science & Technology 53:7068-7074.

[8] Yee MS, Hii LW, Looi CK, Lim WM, Wong SF, Kok YY, Tan BK, Wong CY, Leong CO. Impact of Microplastics and Nanoplastics on Human Health. Nanomaterials (Basel). 2021;11(2):496. doi:10.3390/nano11020496.

In conclusion, we note that up to now, registration and risk assessment of polymers and plastics by various authoritative national and international agencies have not considered the potential harm of leaching plastics additives on human health and the environment. This lack of oversight has contributed extensively to the microplastic pollution of the global environment. Inclusion of microplastics on California's Candidate Chemicals List is an important step toward remedying this long-standing problem and protecting the health and the environment for all Californians.

Submitted on behalf of the Environmental Working Group,

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