San Francisco Water Power Sewer
Services of the San Francisco Public Utilities Commission

Microplastics and Drinking Water

WHAT ARE MICROPLASTICS?

There is no standard definition of microplastics, however, they are generally understood to be plastic particles smaller than 5 millimeters (mm) in size. While there is no minimum size, microplastics are differentiated from nanomaterials in that microplastics are by definition made of plastics such as polyethylene, polypropylene, and polystyrene, whereas nanomaterials can be composed of metals or other carbon-based materials. Nanomaterials are also at least 1000 times smaller than microplastics. As required by California Senate Bill No. 1422, the State Water Resources Control Board (SWRCB) will formally adopt a definition of microplastics in drinking water by July 1, 2020.

WHAT ARE THE SOURCES OF MICROPLASTICS IN WATER?

Known sources of microplastics in water include: microfibers from synthetic fabrics, such as, fleece jackets, microbeads in household cleaning products, microfibers from car tires, paint dust, and breakdown of larger plastic debris. Microfibers from synthetic fabrics slough off during machine washing and pass through wastewater treatment plants unchanged, consequently entering water supplies that are located downstream of wastewater discharges. Microbeads in household cleaning products may be washed down drains to wastewater plant discharges, and wear and tear from car tires can be carried by stormwater runoff from streets into a water source. Paint dust, and larger plastic debris (e.g., plastic bags, foam packaging, and other disposable plastic) may break down into micro-sized particles over time when exposed to the sun and water and may be carried in the air to be deposited to water sources or may be introduced directly into water from runoff or improper solid waste disposal.

Consumer products that contain plastic

CAN I HAVE MY WATER TESTED?

Not currently. California Senate Bill No. 1422 (SB 1422) was approved by the Governor on September 28, 2018, and requires the State Water Resources Control Board (SWRCB) to adopt a standard method to test drinking water for microplastics on or before July 1, 2021. The SWRCB is also developing requirements for utilities to test for microplastics in drinking water, including public disclosure of the findings.

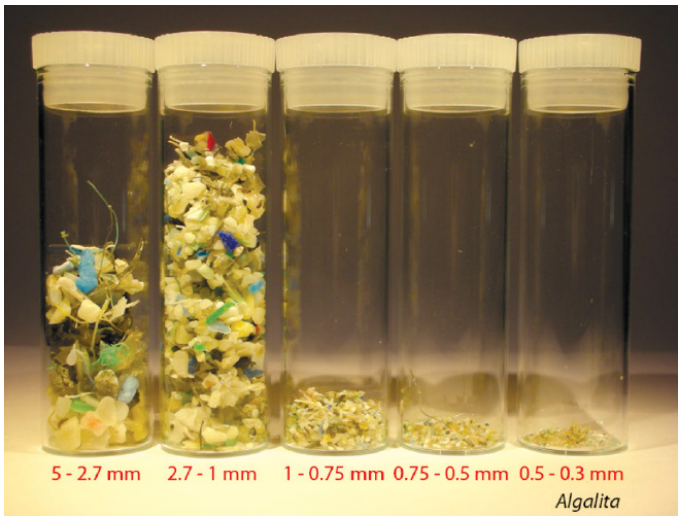
Municipal wastewater treatment plants are a significant source of microplastics into water bodies in the United States (Pivokonsky et al 2019; Koelmans et al 2019). The removal of microplastics from water depends on the particle size. Over 90% of microplastics are removed during wastewater treatment; however, removal efficiency of smaller particles is lower (Browne et al., 2011).

IS OUR DRINKING WATER AT RISK OF CONTAMINATION FROM MICROPLASTICS?

SFPUC's protected watersheds are at a significantly lower risk of contamination by microplastics compared to waters that are impacted by wastewater discharges or urban runoff and for this reason the SFPUC does not expect high levels of microplastics in its source waters or treated drinking waters. Because the methods for monitoring microplastics in drinking water have not been standardized, there are few studies of their presence in drinking water (Koelmans et al 2019). The San Francisco Public Utilities Commission (SFPUC) has not monitored its source waters or treated waters for microplastics. However, the SFPUC will conduct microplastic monitoring when standard analytical methods are approved by SWRCB.

HEALTH CONSIDERATIONS

It is unknown whether there are any human health effects from exposure to microplastics in drinking water. There is some evidence that microplastics behave like natural particles and adsorb and transport contaminants, however, more research is needed to determine the effects of ingestion of microplastic particles and whether there are additional effects from contaminants contained within plastics. The health effects from microplastics are likely to be different from those of nanoparticles, which are much smaller particles compared to microplastics. Much work remains to be done to characterize and understand the human health effects of microplastics specific to ingestion in drinking water (Lehner et al 2019, Koelmans et al 2017). Recognizing the need for a better understanding of microplastics, the World Health Organization (WHO) included a study of microplastics occurrence and health effects in drinking water in their 2020-2021 budget. WHO's preliminary assessment (August 2019) is that microplastics in drinking water don't appear to pose a health risk at current levels. However, WHO acknowledged that more research is needed.



Size distribution of plastics from Manta trawl (sample from water surface with net). Microplastics measured between 0.5 to 0.3 mm could pass through a modern-day filtration treatment plant (WRF, 2018).

CONSUMER RESOURCES: REGULATION/HEALTH

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