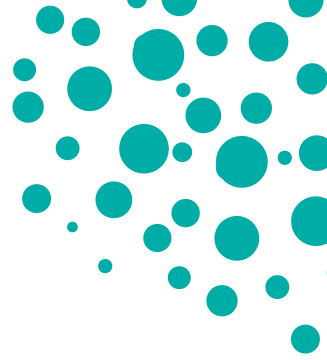


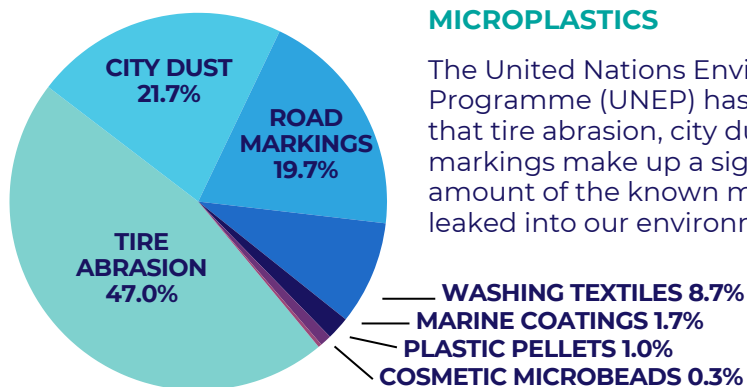
# AN OVERVIEW OF MICROPLASTICS & WHAT IT MEANS FOR PET BOTTLES



## WHAT ARE MICROPLASTICS?

- Microplastics are tiny plastic particles smaller than 5mm in size<sup>1</sup>
- *Primary Microplastics* are originally manufactured to be that size (e.g., cosmetic microbeads)
- *Secondary Microplastics* come from the breakdown of larger plastics (e.g., tire abrasion)

## PLASTIC IN THE ENVIRONMENT: GLOBAL DATA



### MICROPLASTICS

The United Nations Environment Programme (UNEP) has identified that tire abrasion, city dust, & road markings make up a significant amount of the known microplastics leaked into our environment.<sup>1</sup>

### MACROPLASTICS

Macroplastics include any plastic *larger* than 5mm. The UNEP found litter, mismanaged waste, & fishing gear to be large contributors to this plastic in our environment.<sup>1</sup>

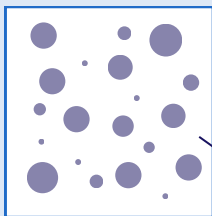
We must work to clean up existing waste, improve waste management infrastructure, and address key points of leakage into the environment.

Moving to a circular economy and crafting policy that encourages material recovery can help reduce all sources of leakage and keep plastic in the economy and out of the environment.

## DETECTING & QUANTIFYING MICROPLASTICS

### MICROSCOPY

E.g., Nile Red dye, SEM, AFM, TEM

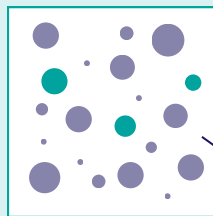


Several studies use this method for detection, but it cannot distinguish plastic particles from other non-plastic particles.<sup>2</sup>

**20 particles total**  
*Assumes all are microplastics*

### SPECTROSCOPY

E.g., Micro-Raman, Micro-FTIR



Can identify polymers and particle size, but is very sensitive to sample preparation.<sup>2</sup>

**20 particles total**  
**3 Microplastics**

Identifying the methods used to collect, detect, and quantify particles in microplastics studies is critical to understanding the quality of the results. Due to the challenges and inconsistencies in research methods, the current state of microplastic research is of limited use.<sup>3</sup>

Standardized analysis methods are needed to build reliable and comparable data.

“[...] many of the scientific studies have used methods of variable, questionable, and/or limited accuracy and specificity.”

“Current scientific evidence does not demonstrate that levels of microplastics or nanoplastics detected in foods pose a risk to human health.”

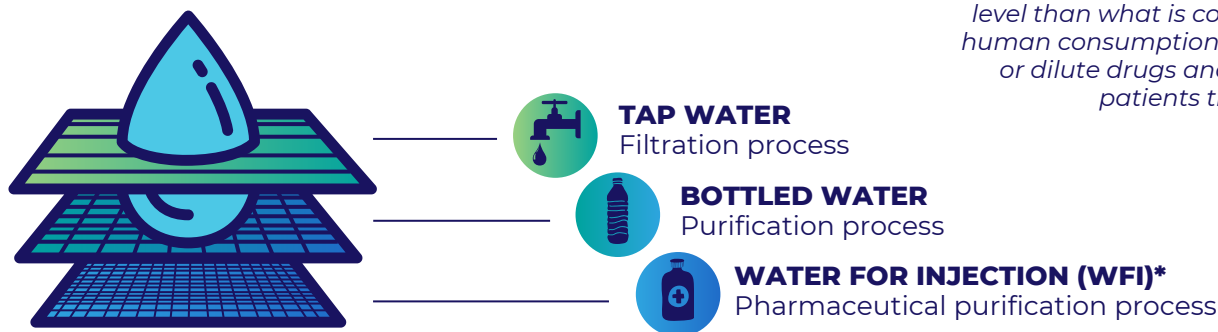
U.S. FDA,  
July 2024<sup>4</sup>

1. “Mapping of Global Plastics Value Chain and Plastics Losses to the Environment: With a Particular Focus on Marine Environment,” *United Nations Environment Programme*, <https://www.unep.org/resources/report/mapping-global-plastics-value-chain-and-plastics-losses-environment-particular>.

2. “Identification methods in microplastic analysis: a review,” *Analytical Methods*, <https://pubs.rsc.org/en/content/articlelanding/2017/ay/c6ay02558g>.

3. “Microplastics in drinking-water,” *World Health Organization*, <https://www.who.int/publications/i/item/9789241516198>; “Dietary and inhalation exposure to nano- and microplastic particles and potential implications for human health,” *World Health Organization*, <https://www.who.int/publications/i/item/9789240054608>.

## WATER PREPARATION



*\*Water For Injection (WFI) is a form of water sterilized and purified to a higher level than what is considered safe for human consumption, used to dissolve or dilute drugs and deliver them to patients through injection.*

## ✓ SAFETY REGULATIONS FOR FOOD & BEVERAGE

Food safety agencies, like the FDA (US) and EFSA (EU), require any food or beverage contact material to have suitable purity for its intended use, ensuring it does not pose any risk to human health.

Bottled water and WFI both undergo additional purification & filtration processes compared to tap water, resulting in water that is ready to drink or inject for medical use.<sup>5</sup>

They are also both packaged in PET plastic.

“There is not sufficient scientific evidence to show that microplastics and nanoplastics from plastic food packaging migrate into foods and beverages.”

U.S. FDA,  
July 2024<sup>4</sup>

## PET PLASTIC ⚠



### A SAFE & VERSATILE POLYMER

Alongside water and soft drinks bottles, PET (polyethylene terephthalate) is used for a number of other consumer goods and medical products and packaging, from mayonnaise jars to surgical mesh. The value of PET in delivering essentials such as food, water, and health is immeasurable.

### WHY USE PET?

PET is chosen for its food-grade, medical-grade, and biostable properties. PET is also fully recyclable and a circular material, meaning future items can be made with up to 100% recycled PET. There are also no intentionally added BPA, phthalates, or PFAS used in the production\* of PET bottles.<sup>6</sup>

## EVALUATING MICROPLASTIC RESEARCH

**RECOMMENDATION:** Standardization in analysis methodology is needed to build reliable and comparable data and to determine the source of contamination.

**COMMON METHODOLOGY FLAWS:** Commonly cited microplastic studies are questionable in quality because of the following methodology flaws:

- Source Flaw – Not identifying source of contamination
- Sampling/Preparing – Labware and environment are not sterile; no appropriate controls
- Detection/Quantification Flaw – Misidentifying particles and claiming them as plastic without the proper equipment to identify what kind of particulates were actually found

4. “Microplastics and Nanoplastics in Foods,” U.S. Food & Drug Administration, <https://www.fda.gov/food/environmental-contaminants-food/microplastics-and-nanoplastics-foods>.

5. “Annex 2 WHO good manufacturing practices: water for pharmaceutical use,” World Health Organization, [https://www.who.int/docs/default-source/medicines/norms-and-standards/guidelines/production/trs970-annex2-gmp-wate-pharmaceutical-use.pdf?sfvrsn=39eb16b8\\_0](https://www.who.int/docs/default-source/medicines/norms-and-standards/guidelines/production/trs970-annex2-gmp-wate-pharmaceutical-use.pdf?sfvrsn=39eb16b8_0).

6. “Sources of Low Concentrations of Bisphenol A in Canned Beverage Products,” Journal of Food Protection, <https://www.sciencedirect.com/science/article/pii/S0362028X23058192>.

\*Production refers to the manufacturing of PET material and its conversion into bottles through injection molding and blow molding processes.