Microplastics Sampling Guide

Microplastics are defined 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 (µm). Polymers that are derived in nature that have not been chemically modified (other than by hydrolysis) are excluded.

Primary microplastics consist of manufactured raw plastic material, such as plastic pellets used to manufacture parts and micro-beads which have application in a wide range of products such as cleaning agents. Secondary microplastics originate from larger plastic products or macro plastic fragments that have broken down due to mechanical, UV radiation or chemical means producing particles less than five millimeters.

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Water samples may be collected in pre-cleaned 500 ml or 1 liter glass containers with non-plastic lid liners (PTFE is acceptable). Containers should be packaged to avoid breakage during shipment. The use of plastic packing peanuts should be avoided if possible. Shipping samples on ice (<6°) is preferred, but samples may be shipped at room temperature. Freezing of samples shall be avoided. A 28-day holding time from sample collection to the analysis is allowed.

Soil and similar solids may be collected by shovel or applicable device and placed into rinsed glass containers or jars. Whenever possible submit a minimum sample of approximately one liter in volume; however smaller amounts can also be analyzed when sample volume is limited. Beach sand is typically collected along the wrack line which is the point of high tide where sticks and other debris accumulate. This is also the point where the highest concentration of Micro-plastics is usually found.

Air samples may be collected using 0.1µm or 0.4µm polycarbonate filter cassettes. Flow rates may vary but a total volume exceeding 1000 liters is recommended for area samples. Personnel monitoring samples are typically run at 1.5 to 2.5 liters per minute for the intended test duration and are not subject to the volumes suggested for area sampling.

Food and beverages may be submitted in glass jars or, in the case of unopened food or beverages, in their original containers. Food and beverage samples should be shipped on ice (ice packs) in appropriate coolers for maintaining a cool environment during shipping.

Microplastics Analysis

Multiple reporting styles are available starting with the Basic Microplastics Analysis which includes total microplastics count and sizing information obtained by sieve and fluorescent microscopy to Full Microplastics Analysis which includes the polymer identification with size separation based upon the types of plastics observed. This process is performed by sieve and analysis by Raman Spectrometry. Macroplastics (size >5mm), if found, are also reported for informational purposes but not included in the sizing data.

Example of a Basic Microplastics Report

Upon request the reporting format can be tailored to meet your needs as well as the size ranges and additional data.

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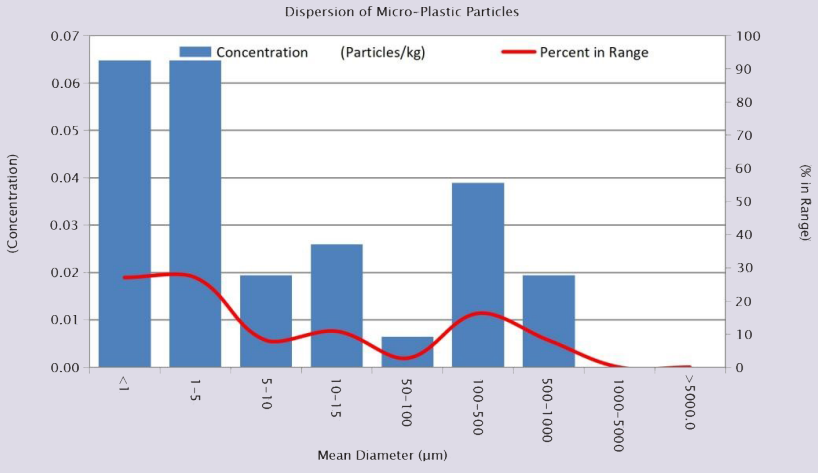
Table X: Microplastic particle results for sample #1.			
EMSL ID:	3621xxxxx-0001		
Sample ID:	#1		
Description:	Sand Sample 1		
Amount Analyzed:	1000kg	LOQ (Particles/kg):	0.01
Preparation Parameters	**Value**	**Units**	**Comments**
Sub-sample (prepared):	1000	kg	A
Effective Filter Area:	1070	(mm2)	
Field Area:	1.651	(mm2)	
No. Fields Analyzed:	100	(No.)	
Area Analyzed:	165.1	(mm2)	
Limit of Quantitation:	0.01	P/kg	
Particle Size Range (µm)	**Concentration (Particles/kg)**	**Percent in Range**	**Comments**
<1	0.0648	27.0	B
1 - 5	0.0648	27.0	B
5 - 10	0.0194	8.1	B
10 - 50	0.0259	10.8	B
50 - 100	0.0065	2.7	B
100 - 500	0.0389	16.2	B
500 - 1000	0.0194	8.1	B,C
1000 - 5000	<LOQ	0.0	C
>5000.0	<LOQ	0.0	C, D
Total Microplastics	0.2398	Min. Diam. = 0.5um	Max. Diam. = 750um

Comments: LOQ = Limit of Quantitation
A) Parameters used in the preparation of the sample.
B) Particles observed by microscopic analysis.
C) Particles observed by sieve separation and stereo microscopic analysis.
D) Particles larger than the generally accepted definition of microplastics.
Sample volume based upon filtration rate and suspended particle concentration.

Typical histogram showing the micro-plastic concentration by size range.



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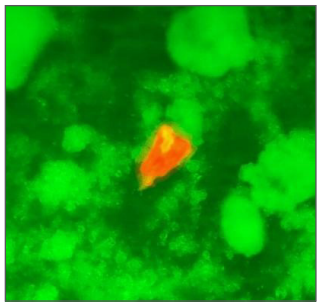
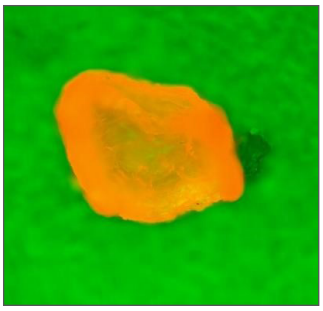
Basic Microplastics Reports also include images of key microplastics particles observed in each sample.





Full Microplastics Analysis also includes the following.

Additional histograms showing the size ranges and sample composition by common plastic types is available as part of the Full Micro-plastic Analysis.

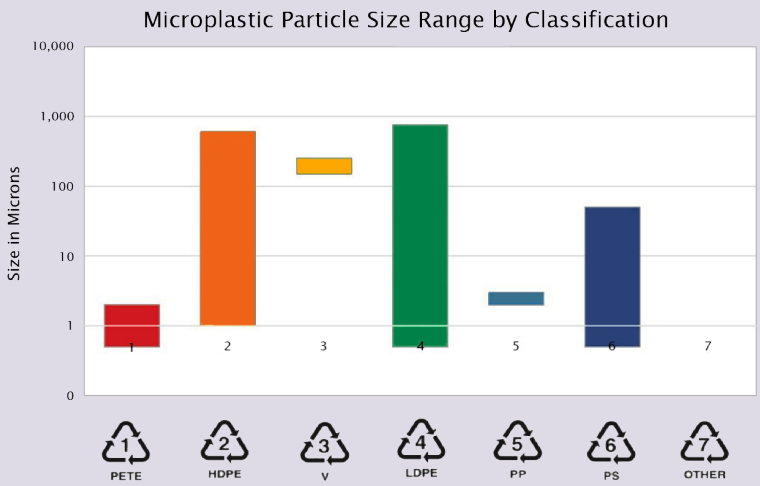


Figure 1: Histogram of #1 showing the particle size by plastic classification.

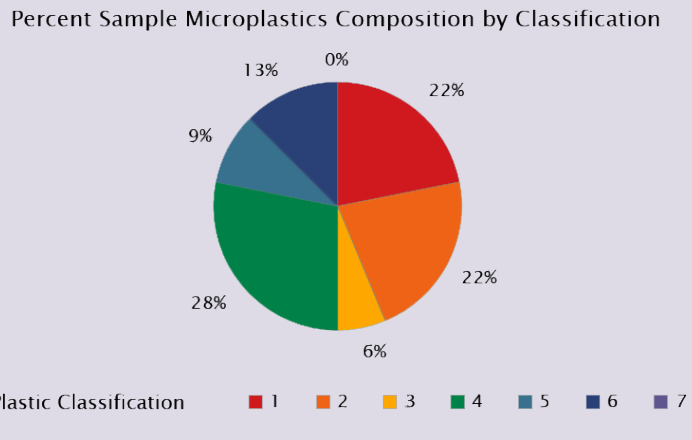


Figure 2: Microplastics composition of sample #1 by plastic classification.

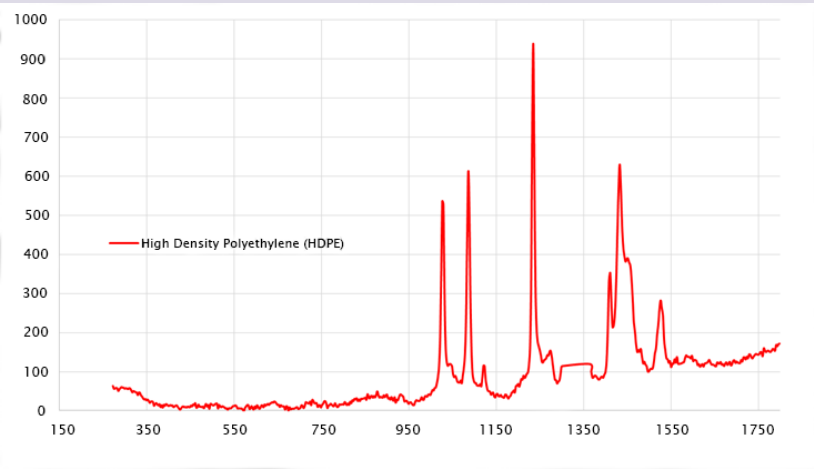


Figure 3: Raman spectrum of high density polyethylene observed in sample #1.