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Characterization and potential influence of laboratory airborne particle fallout on microplastics analysis

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ABSTRACT

Attenuating background contamination is essential in analytical methods, particularly for analysis of microplastics (MPs). While measures to mitigate airborne particle interference exist, long-term laboratory fallout remains understudied. We conducted a 28-month monitoring study in a trace organics laboratory where a background contamination control protocol was implemented at the outset. Airborne particles were passively collected on polycarbonate track etch (PCTE) membrane filters at six locations over periods ranging from one to several months. Deposition rates decreased significantly from 82.3 ± 47.6–6.2 ± 5.5 (count / h / 8-inch sieve) within the first eight months and stabilized at a low level (4.21 ± 3.74) with sustained protocol adherence. Estimated intrusion of airborne particles into sample containers during MP sample preparation ranged from 14.1 to 0.2 particles, representing only 2–8 % of the lowest procedural blank, indicating minimal contamination potential. Polyvinyl chloride (PVC) and polytetrafluoroethylene (PTFE) were the most frequently detected MPs. The particle size ≥ 6 µm (counts ≥ 2) was well characterized by log-normal and linear log-log distributions. These findings demonstrate effective contamination control, providing a robust framework for laboratories engaged in MP analysis.