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| **Target analysis** | **Type of environment that is sampled** | **Sampling equipment** | **Flow rates** | **Aerodynamic diameters (*d*a) collected** | **Sampling media** | **Detection level (# of target genes or cells)** | **Major challenges** |
| Size resolved (8 sizes) samples for quantitative PCR or PCR amplification/ amplicon sequencing. | This protocol is for indoor, human-occupied settings. | Anderson nonviable eight- stage cascade impactors (New Star Environmental, Roswell, GA) | 28.3 L/min. or ~3.5 L/min. for each stage | Stage 1: 0.4-0.7  Stage 2: 7-1.1  Stage 3: 1.1-2.1  Stage 4: 2.1-3.3  Stage 5: 3.3-4.7  Stage 6: 4.7-5.8 Stage 7: 5.8-9.0  Stage 8: >9.0 μm | Polycarbonate track etched filters, 0.2 m pore size, 81 mm diameter, or  Glass fiber filters, 81 mm diameter. | 2,000 to 3,000 bacterial cells and 10 to 25 fungal cells. (fully accounting for filter extraction and DNA extraction efficiencies). | The major barrier is nondetect samples due to the low flow rate and limitations on sampling times in some environments. |

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| Respirable or fine particulate matter (PM) for quantitative PCR or PCR amplification/ amplicon sequencing. | This protocol is for indoor, human-occupied settings. | SKC, Personal Environmental Monitors (PM10 or PM2.5) (SKC, Eighty Four, PA) | 10.0 L/min for PM10  4 L/min. for PM2.5 | Respirable PM:  *d*a ≤ 10 m  Fine PM:  *d*a ≤ 2.5 m | Polycarbonate track etched filters , 0.2 m pore size, 37 mm diameter | 2,000 to 3,000 bacterial cells and 10 to 25 fungal cells. (fully accounting for filter extraction and DNA extraction efficiencies). | The major barrier is nondetect samples due to the low flow rate and limitations on sampling times in some environments. |

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| Respirable particulate matter (PM) for quantitative PCR or PCR amplification/ amplicon sequencing. | This protocol is for outdoor settings only (due to noise of the high volume samplers). | ECO-HVS3000 with PM10 inlet (Ecotech, Ltd, Knoxfield, VIC, Australia) | ~1,000 L/min. | Respirable PM:  *d*a ≤ 10 m | Pretreated (450oC) 20.3 cm x 25.4 cm Whatman quartz fiber filters) | 2,000 to 3,000 bacterial cells and 10 to 25 fungal cells. (fully accounting for filter extraction and DNA extraction efficiencies). | The major barriers are the noise generated and the large size of the sampler , which do not allow for placement in occupied settings. |

**Important references:**

Hospodsky, D. N. Yamamoto, et al. (2010). “Accuracy, Precision, and Method Detection Limits of Quantitative PCR for Airborne Bacteria and Fungi.” Applied and Environmental Microbiology **76**: 7004-7012.

Peccia, J. and M. Hernandez (2006). “Incorporating polymerase chain reaction-based identification, population characterization, and quantification of microorganism into aerosol science: a review.” Atmospheric Environment **40**:3941-3961.