The Secret Lives of Filters

Jeff Siegel
Associate Professor
Department of Civil Engineering
University of Toronto

Filters in forced air heating, ventilation, and air conditioning (HVAC) systems serve as passive sampling devices for airborne particles. By analysing the dust that deposits on a filter, we can achieve better estimates of human exposure to particle-bound contaminants. We have extracted and sequenced fungal and bacterial DNA from a wide variety of filters and see differences based on human occupancy patterns, building location, season, building type/use, and building age and history. Additional results for heavy metals, phthalates, flame retardants, and other compounds suggest the value of this approach for a wide variety of particle-bound contaminants. Combining dust extractions with assessments of the system run-time, air flow rate through the filter, and the filter efficiency reveals a spatially and temporally integrated indoor concentration over the filter lifetime, which in turn provides a more robust picture of human exposure than traditional short-term air or settled-dust samples. This filter forensics approach has further value for exploring contaminant hot-spots and the spread of particle plumes.

April 3, 2013, 3 - 4 pm
Wallberg Building, 200 College Street, Room 407