Air Monitoring Size Fractions

Why did we Sample Different "Size Fractions" in Sudbury Air?

We measured particulate matter of three different size fractions at the air monitoring sites.
At 5 sites, we measured:

1. Total suspended particulate matter (TSP; dust particles less than 44 microns in diameter),
2. Inhalable particulate matter (PM_{10}; dust particles less than 10 microns in size) and
3. Respirable particulate matter ($PM_{2.5}$; dust particles less than 2.5 microns in size).

We measured inhalable particulate matter (PM_{10}) only at the remaining 5 sites, because we could apply what we learned about size fraction proportions from the other 5 sites to these sites.

How big is a micron?

0.0001cm, or 1 millionth of a metre

Why measure different "sizes" of air particles?

Previous health studies have shown that humans retain particulate matter in the TSP range in the mouth, PM_{10} in the upper lung, and $PM_{2.5}$ in the lower lung. Human health risk assessments generally consider particles in the upper lung (PM_{10}) to have the greatest potential health effects. Therefore, we measured PM_{10} at all 10 sites throughout the Greater Sudbury area.

$PM_{2.5}$ is the smallest particulate matter, and generally results from process and combustion sources, vented from a chimney. Windblown dust from piles and open areas can be made up of particles in the TSP to $PM_{2.5}$ size range, depending on the material in the pile.

The TSP sampler can collect the greatest sample (highest concentration) because it collects all size fractions, while the $PM_{2.5}$ sampler will usually collect the least (only collecting the smaller fraction), resulting in the lowest concentration.

We determined metal levels in the three size fractions for each sample collected. Nickel is provided as an example below. This information will be used in the human health risk assessment.