

## Particulate Chemistry and Morphology in snow and snow pack within the Sudbury Smelter Footprint.

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Mining and smelting in Sudbury over the past century have contributed a significant amount of sulphur dioxide to the environment. Along with SO<sub>2</sub>, hundreds of tonnes of particulate have been emitted annually. These minute iron-silica-rich spherules, specific to each industrial process, contain intergrowths of Ni, Cu and other trace metals. Previous studies have shown that Cu, Ni and Fe are the main metallic contaminants in the Sudbury area, however recent studies have demonstrated that As, Cr, Mn, Pb, Se and Zn also contribute a significant amount of contamination.

Previous research is limited investigating metal particulate in snow and snow pack in the Sudbury area. Approximately 250 cm of snow can fall in one season and sampling this snow allows for the collection of both wet and dry deposition of atmospheric metals and other particulate for a known period of time, with minimal input from local construction or landscaping activities usually associated with summer.

This preliminary study initiated in the winter of 2002 collected snow fall from 57 sites and continued with the collection of snowfall and snow pack from 27 additional sites in 2003. This research will focus on the concentration and distribution, compositional chemistry, morphology and mineralogy of particulates found associated with snow in the Sudbury Smelter Footprint.

As expected, elemental concentrations of preliminary energy dispersive miniprobe microanalysis (EMMA) of filtered particulate indicate the level of contamination decreases with distance from Sudbury. Further research will investigate the mineral phases giving rise to these heavy metal concentrations and will examine particulate morphology to distinguish between anthropogenic particulate arising from different industrial processes and particulate from natural sources (SEM-EDS and XRD analyses) for all sites from the 2002 and 2003 collection periods.

Table 1: Results of **preliminary** XRF analysis of filtered particulate in **ug/g**.

	<b>Fe</b>	<b>Ni</b>	<b>Cu</b>	<b>Zn</b>	<b>As</b>	<b>Pb</b>
<b>Val d'Or</b>	2800	6	55	8	nd	16
<b>Belleterre</b>	1300	nd	30	33	7	5
<b>Temagami</b>	1300	2	23	14	nd	10
<b>Skead</b>	1700	175	44	10	3	14
<b>Falconbridge</b>	3500	1600	300	28	6	22
<b>Nolin</b>	8336	1894	617	8	19	32
<b>Copper Cliff</b>	17000	3700	1500	36	40	69
<b>Manitoulin</b>	2500	43	47	8	nd	12