

of acid precursors, in that in spite of the shutdown, the precipitation in the area continued to be highly acidic. One can only surmise as to how much more acidic the precipitation would have been at distant locations downwind of the smelter, with the plant in operation, because of the insufficient density of monitoring stations in those areas.

2.2 Plumes from Urban and Area Sources

(a) Sulfates and Nitrates

The study of near-source effects from urban and area sources is complicated by many factors. Among these are the multitude of many sources emitting different pollutants at different heights which interact chemically to form secondary pollutants, the large spatial extent and dispersed nature of the urban/area source, and the effect of an urban area upon the local meteorology, such as increased vertical dispersion due to increased surface roughness and possible modification of precipitation patterns due to the injection of condensation nuclei.

As is the case with plumes from single point sources, there appears to be conflicting evidence in the literature about the magnitude of near-source effects from urban/area sources. Some authors have found that little of the sulfur or nitrogen emitted by an area source is deposited within the first 100 km or so of travel. For example, Rodhe (1970) examined total sulfur content in snow samples in February 1969, around Uppsala, Sweden, and came to the conclusion that only about 3% of the sulfur emitted in the town during a 12-day period was deposited within 3 km, and less than 5% within 15 km. However, because of the low background values, the deposition within 5 km of the town was three or four times the regional levels. Rodhe *et al.* (1972), examined daily concentrations of soot and sulfate aerosols in the vicinity of 10 towns in southern Sweden during a four-month period and found that, during that period, only 5% of the emitted SO_2 had been oxidized to aerosol sulfate within the town (i.e., during a few tens of minutes of travel). They estimated that locally produced sulfate accounted for less than 50% of the total sulfate measured in the towns.