

either major point sources, areas comprising large metropolitan centres, or significant geographic portions of provinces.

Seasonal variations data for use in detailed air quality analysis have been developed for both SO_2 and NO_x emissions for all contributing sectors (3). In summary, emissions are found to vary considerably from season to season for the fuel combustion sectors, the winter (December - February) emissions being about 85% greater than the summer (June - August) emissions. The other categories show little variation; for example, the overall winter emissions from industrial processes are about 15% greater than the summer emissions. The national summary is presented in Table D.2.4

Nationwide inventories of natural emissions of sulphur and nitrogen compounds into the atmosphere and an evaluation of their contribution to the overall sulphur and nitrogen burden of ambient air have been carried out for Canada (4,5). Data on estimates of natural emissions were obtained through a literature review of sulphur and nitrogen release mechanisms normally associated with biological and other natural processes. Such data are relatively sparse and in some cases contradictory, making some reported estimates of source emissions quite speculative. The emission estimates are likely to be accurate only to within an order of magnitude.

The principal sulphur compound emitted by biological processes into the atmosphere is hydrogen sulphide. Others that have been identified include: carbon disulphide, carbonyl sulphide, dimethyl disulphide and methyl mercaptan. Biogenic sources include soils, water bodies, and vegetation. Forest fires emit sulphur dioxide while sea and lake sprays release sulphates. The total emissions of sulphur from natural sources in Canada are estimated at about 500 000 tonnes per year, (i.e., about 20% of total anthropogenic emissions of sulphur dioxide). The greatest natural sulphur emissions occur on the Atlantic and Pacific coasts and in Ontario and Quebec. Table D.2.5 summarizes this information.

Included in the more important nitrogenous compounds emitted to the atmosphere from natural sources are N_2O , NO_x , NH_3 , and aliphatic amines. Principal emitting sources are soils and marine waters for N_2O , soils and lightning for NO_x , soils and animal wastes for NH_3 , and animal wastes for aliphatic amines. Nitrogen oxides emitted from forest fires are less important. The total emissions of nitrogen from natural sources in Canada are estimated at about 2 100 000 tonnes per year, (i.e., roughly three and one half times the total anthropogenic emissions of nitrogen oxides (expressed as NO_2)). Table D.2.6 summarizes the information on emissions of natural nitrogen compounds in Canada.