3   SURVEY OF LOCAL AND MESOSCALE MODELS

The Phase II report of Work Group 2 of the U.S.-Canada Transboundary Team includes a detailed investigation of long-range transport models. The investigation includes a survey of models thought to be appropriate for estimating transport, diffusion, transformation, and deposition of air pollutants over long distances. In addition, these models were used to generate transfer matrices for the purpose of determining source-receptor relationships in the United States and Canada.

As emphasized in the introduction of this report, estimates made with these long-range transport models have not demonstrated good agreement with measurements in or near the vicinity of the sources. A comparison of the various model estimates also indicates disagreements amongst the model predictions. Possible reasons for these variations are: (1) inadequate spatial resolution to accommodate near-source region contributions to air pollution concentrations; (2) differences in interpretation of the emissions inventory; (3) differences in vertical resolution and treatment of vertical diffusion; (4) inability of the models to simulate detailed chemistry close to the sources; and (5) variations in treating deposition processes.

Therefore, an attempt is made to include in this report a survey of local and mesoscale models that may be applicable to distances of the order of 300 km. The following discussion will be divided into two parts: a) local (less than 50 km); and b) mesoscale (50 to 300 km).

3.1   Local Models

Numerous publications are available in the literature that survey and review various types of models that may be appropriate out to distances less than 50 km. The majority of these models, especially the simpler Gaussian models, do not include provisions for simulating chemical transformation, dry deposition, wet deposition, and non-steady state meteorological conditions. Because many references are available in the literature concerning these models, only a brief discussion of recent publications is provided in this report. This should not be interpreted to