

7. SIMULATION MODELING

7.1 Introduction

Previous chapters describe the mechanisms of transport, dispersion, transformation, and deposition of the major pollutants associated with acidic deposition. Some of these mechanisms have been formulated mathematically in long range transport models to allow preliminary estimates of the deposition on sensitive receptors resulting from emissions from source areas. This chapter will discuss the attributes of some of these models and their evaluation against measured data.

It is not possible (due to practical modeling considerations as well as our incomplete understanding of the phenomena) to provide models for all the pollutants of interest or to incorporate all the processes mathematically into operational regional models. For example, deficiencies in both emission inventories and in our understanding of the transformation and deposition processes preclude the development of quantitative models for acid nitrate deposition. Nor is it possible to incorporate the detailed atmospheric chemical interactions between SO_2 , NO_x , VOC, oxidants, and their acidic reaction products (see Chapter 4). Models described here, therefore, contain simplifying assumptions which are based upon our current understanding of the phenomena of long range transport.

Eight models for sulfur oxides have been selected by Work Group 2 based on criteria set in the earlier phases of the program. They represent the types of operational models currently available. The models are "linear" in the sense that chemical transformations and scavenging are expressed as first order processes where the rate