(c) The representation of diffusion and deposition in the model may introduce unrealistic conditions which affect the chemistry in ways which are not representative of the real atmosphere.

4.5 Implications and Conclusions

At this time, there are growing indications that, generally in the northeast U.S., the gas-phase reaction pathway accounts for about 25% and the aqueous-phase reaction pathway about 75% of H_2SO_4 formation in the atmosphere which is dry and wet deposited. The gas-phase oxidation of SO_2 is due to reactions with the photochemically generated radicals HO, HO_2, and RO_2. On the regional scale, this H_2SO_4 formation pathway suggests the following implications:

1. The reaction rates are non-linear with regard to SO_2 because the free radical concentrations are not constant over time and space. The LRT models, therefore, may not correctly predict the quantity and the deposition patterns of H_2SO_4 formed through the gas-phase reactions;

2. Since the gas-phase rates are first order in SO_2, a reduction in SO_2 concentration will result in a direct reduction in H_2SO_4 formed in the gas phase if the free radicals' temporal-spatial concentrations remain constant;

3. The rates are first order in free radical concentrations. If a reduction in free radical concentration (through oxidant precursor control) can be obtained, then this will result in a direct reduction in H_2SO_4 formed in the gas phase;

4. Reduction in both SO_2 and free radical concentrations will result in a compounded reduction of H_2SO_4 formation in the gas phase; and