spatial and temporal variations of deposition velocities of sulfate particles across North America. Their analysis of sulfur dioxide deposition utilized the equivalent concept of stomatal resistance. In retrospect, their assumption of a constant value for sulfate surface resistance appears somewhat bold. In particular, it now appears likely that substantially larger values for residual surface resistance will be appropriate for non-vegetated surfaces, especially to snow, in which case values are more likely to be approximately 15 s/cm. At this time, an exceedingly limited quantity of field information is available; however, it appears that in North American conditions the surface resistance to uptake of sulfate particles is likely to take values in the range of 1.5 to 15 s/cm.

While sulfate particles have received most of the recent emphasis, the general question of acid deposition requires that equal attention be paid to nitrate and ammonium particles. There is no information regarding the deposition velocity of these particles, but likewise there is no strong indication that they are different from the case of sulfate.

Regarding trace gas uptake, sulfur dioxide has received the majority of recent attention. The ordered set of results produced by Hill (1971) provides a means for comparing the deposition velocities of a range of trace gases. Some of the quantities considered by Hill have also been investigated in recent field studies (e.g., Wesely et al., 1981). Some recent wind tunnel studies are also relevant in this regard. These results are combined in Table 1, where it is seen that highly reactive materials such as hydrogen fluoride (and presumably iodine vapor, nitric acid vapor, etc.) are readily taken up by a vegetative surface. A second set of pollutants, including SO_2, NO_2, and O_3 (also taken up through stomates), also seems to be easily transferred (presumably via stomates); and a third category of relatively unreactive trace gases are poorly taken up by vegetation.

Transfer to water surfaces presents special problems, especially when the surface concerned is snow. As mentioned above, surface resistances to particle uptake by snow are likely to be of the order 15 s/cm. Soluble gases will be readily absorbed by all water surfaces, and so equivalence with transfer of water vapor might be expected. An important exception occurs in