the $NO-O_3$ reaction is fast relative to that of dilution of the plume, the rate of conversion of NO to NO_2 is controlled by the rate at which ambient O_3 is entrained into the plume by turbulent mixing.[41-44] There is some nitric acid produced in power plant plumes during the daylight hours through the oxidation of nitric oxide (reaction 6-1) and the subsequent photodissociation of NO_2 (reaction 6-2), then followed by the combination of NO_2 with NO_3 and H_2O (reactions 6-10 and 6-8). The generation of nitrous acid is also probable since the stack gases will contain NO, NO_2, and H_2O (reaction 6-13). Since nitrous acid will photodissociate to give hydroxyl radicals (reaction 6-17), more nitric acid can be produced by reaction 6-18. Thus, although the free radical concentration is expected to be low in power plant plumes, some NO_x will be converted to nitric acid. In addition, after sufficiently long travel times during which ambient hydrocarbons have been mixed with the plume constituents, the usual free radical reactions described earlier occur, possibly leading to O_3 production.

There are several studies in which measurements have been made of the concentrations of pollutants in power plant plumes.[43,45,46] The most difficult current problem is predicting the rate at which NO is converted to NO_2 in such a plume.