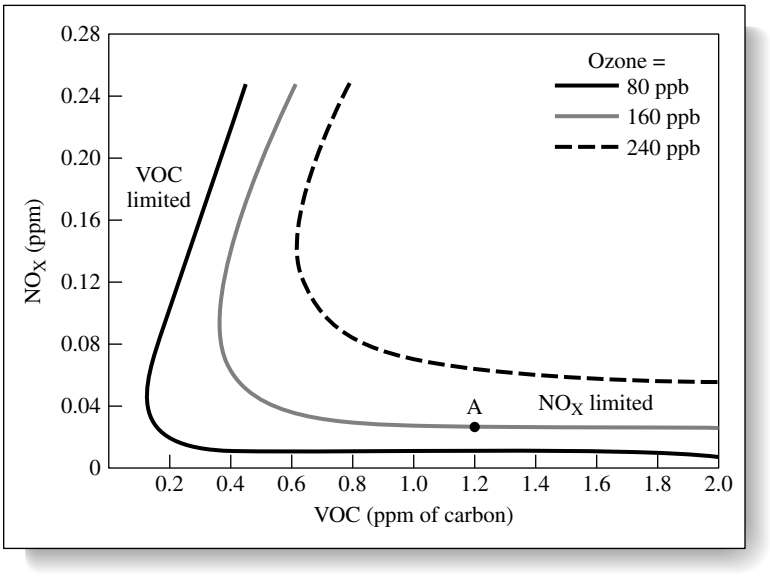

Figure 3-2
The relationship between NO_x and VOC concentrations in air and the resulting concentrations of ozone produced by their reaction. Point A represents a typical set of conditions under which ozone production is NO_x-limited. (Source: Redrawn from the National Research Council Report. Rethinking the Ozone Problem in Urban and Regional Pollution. National Academy Press, 1991.)

hydrocarbons. This happens because usually there is initially an overabundance of hydrocarbons relative to the amount of nitrogen oxides, and the hydrocarbon reduction simply reduces the excess without slowing down the reactions significantly. In other words, it is usually the nitrogen oxides, rather than the C═C containing hydrocarbons, that are the species that determine the overall rate of the reaction; this is especially true for rural areas which lie downwind of polluted urban centers.

Because of the large number of reactions that occur in polluted air, the functional dependence of smog production upon reactant concentration is complicated, and the net consequence of making moderate decreases in primary pollutants is difficult to deduce without computer simulation. A 1997 computer modeling study indicated that NO_x reduction, rather than VOC reduction, would be much more effective in reducing ozone in almost all of the eastern U.S. An example of the results predicted by computer modeling studies is shown in Figure 3-2. The relationships between the NO_x and the VOC concentrations that produce three different values for the concentration of ozone are shown. Point A represents a typical set of conditions in