BACKGROUNDER: OZONE LAYER CONVENTION

1. Scientific Aspects: The stratospheric ozone layer, which lies between approximately 15 and 45 km above the earth's surface, acts as a giant filter for the sun's damaging ultraviolet radiation by absorbing this radiation in photochemical processes. A depletion of the ozone layer as small as 1% could result in a 2% increase in ultraviolet radiation and a 4% increase in skin cancer rates. Many of the world's food crops, including wheat, rice, corn and soybeans are also sensitive to ultraviolet radiation. While quantitative estimates cannot be made, it is safe to say that a 10% increase in ultraviolet radiation would have significant and highly undesirable effects on world food production.

Concern about the ozone layer first surfaced in the mid-1970's with regard to aircraft emissions of NO_x by supersonic transports. However, these concerns were replaced by the depleting effects which chlorine (as one of the constituents of chlorofluorocarbons broken down by the intense ultraviolet radiation in the stratosphere) was predicted to have on the stratosphere. These predictions, based on constant CFC production levels typical of the late 1970's, showed that depletions of the total ozone column in the long term would lie between 5% and 20%. Models accounting for CO_2 and methane have recently shown that there will likely be a compensating production of ozone in the lower stratosphere which would all but offset the depletion of the ozone in the upper stratosphere caused by chlorofluorocarbons.

While this compensating effect would mean little change in the amount of ultraviolet radiation reaching the earth's surface, the profile of ozone in the stratosphere would change drastically. This in turn would affect temperatures and the circulation in the stratosphere. While climatic changes in the troposphere could be expected, the magnitude of such changes is unknown.

The assumption of constant CFC production has recently been challenged. Chlorofluorocarbons are essential for many industrial purposes and usage rates in non-aerosol areas have typically grown at 5-6% per year. Recent studies have indicated that CFC production/use is expected to rise globally at growth rates between 1.4 and 4.1% per year (average 2.5%).

When such growth rates in CFC emissions are included in the existing photochemical models, precipitous and essentially irreversible ozone layer depletions are shown to occur within 50-100 years. The fact that CFC's remain in the atmospheric system for 80-120 years means that the CFC concentrations are essentially cumulative. Thus use of CFC's today, for which economic alternatives exist, may mean that draconian measures in the future will be necessary to achieve the appropriate level of control.

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