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THE PROBLEM

Climatological data available at this time strongly indicates that a large majority of flights today are accomplished at latitudes, altitudes, and seasons such that ozone exposure is not a problem. The panel has therefore limited its recommendations to those flights planned or accomplished during certain months of the year at the higher latitudes and altitudes at or above the tropopause.

PRESENT CAPABILITY AND IMPROVEMENT NEEDED

The panel recognizes that presently available data are sufficient to qualitatively define areas of high and negligible risk of exposure to potentially hazardous amounts of ozone. If cabin ozone level limitations are established, additional information is required for more accurate and quantitative forecasting and design data base for operational utilization. The following information and parameters are needed:

A. Better tropopause heights. Reported tropopause heights as analyzed and transmitted by NMC are too inaccurate for quantitative ozone forecasts. A better definition of forecast tropopause height and type is needed.

B. Ozone concentration and corresponding meteorological data along selected flight routes. The Global Atmospheric Sampling Program (GASP) at NASA Lewis has established a unique measurement program along major flight routes which has proven invaluable for initially defining the cabin ozone problem. It is essential that these measurements be continued and expanded to cover such critical areas as polar flight routes.

C. Meteorological data

1. NMC hemispheric meteorological data at all available levels including vertical motion fields in the stratosphere.
2. Tropopause heights and types.
3. Satellite total ozone data.

OPERATIONAL OZONE FORECASTS

Using the above data, NASA should support the development of an operational ozone forecast model by a group of specialists. The panel feels that any future operational forecast should be provided by the National Weather Service.

It is noted that most of the basic ozone and meteorological information, adequate for a preliminary study, is already available at some active centers. Additionally, total ozone satellite data may be available on an operational basis in the near future. Models must be developed, however, to relate these data to quantitative ozone forecasts at flight levels. These forecasts will depend heavily on a more precise definition of tropopause heights than is now given.

VERIFICATION OF OZONE FORECAST MODELS

Forecast models must be validated on a frequent basis. The panel recognizes that the GASP data should be the primary data base for that purpose. Supplementary aircraft measurements are highly desirable.

UNITS STANDARDIZATION

The airline members on the panel suggest that a consistent set of units be used for ozone measurements. Regulations are generally stated in parts per million, but airline operational personnel prefer parts per billion. Medical effects on the body are a function of mass concentration rather than number concentration. This matter was not resolved.