

RECOMMENDATIONS OF THE PANELS

Panel on In-Flight Measurements

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The panel on in-flight measurements reviewed the past and current NASA measurement program with regard to data utilization and investigated possible future measurement needs in which NASA's expertise would be utilized. The purpose of future measurements would be similar to that for the current NASA program and data would be obtained in the following areas: aircraft attenuation of ozone levels from ambient to cabin, evaluation of aircraft ozone "fixes", ambient ozone levels for data base statistics and correlation factors between ozone levels and complaints. Data could be obtained by a modified continuation of the current NASA Global Air Sampling Program (GASP) with limited measurements extended to other aircraft types.

The specific panel recommendations are the following:

1. A definite need exists to obtain the attenuation factor for aircraft other than the B-747 in reducing the ambient ozone concentrations which enter the cabin. This data is required by engineers in designing optimum ozone removal equipment for individual aircraft. A compact version of the GASP instrumentation package with outside air obtained through a pitot tube would have to be developed to obtain this data. Relatively few flights, preferably during high ambient ozone concentrations, would be necessary to obtain the attenuation factor for any one aircraft type. It is desirable to obtain these data during the next ozone season with initial measurements on the following aircraft; DC-10, L-1011 (and L-1011-500 when operational), DC-8 (standard and stretched), A-300 and B727. Possible additional measurements may be required on other commercial aircraft and on some high performance general aviation aircraft.

2. A need to continue "GASP type" measurements was expressed for three main purposes; testing new filters, correlation of complaints with ozone levels, and ambient ozone data. The need in the first two areas is self-evident. Additional ambient ozone statistical data has been stated as a need by groups investigating flight planning to avoid high ozone concentrations and those designing ozone reduction devices. Of the three airplanes presently flying as part of GASP (with program termination scheduled at the end of February, 1979), the first priority is to continue the Pan American (PA) B-747SP (#533) data acquisition. This data is needed to satisfy requirements in all three areas. Present plans by industry are to have a catalytic filter installed in this aircraft for testing during the next ozone season. These plans include NASA ambient and cabin ozone data as an integral part of the test procedure. Continued measurements would also provide information for complaint correlation and ozone statistics. The secondary priority is to continue data acquisition on the other two GASP airplanes. The United Airlines (UA) B-747-100 (#4711) measures both ambient and cabin ozone levels and the data would provide complaint correlation information and ozone statistics. The PA B-747-100 (#655) would only contribute to the ozone statistics as ambient ozone levels alone are measured.

3. The panel indicated a need to continue cooperation between NASA and industry. Specifically, transfer of ozone measurement technology, including instrumentation and operation, is desirable.

4. Since NASA's measurements indicate that the ozone attenuation factor is highly sensitive to the cabin loading in small-volume general aviation aircraft, it is desirable to determine the extent to which commercial aircraft cabin load factors influence the attenuation. Load factors on past GASP flights would be difficult to obtain, but consistency of the attenuation factor on the non-filtered UA B-747-100 should indicate if this is important.

5. Concern was expressed with regard to the correlation of ozone levels and complaints. Two carriers represented on the panel have had negligible success in obtaining consistent correlation. It is suggested that a correlation between ozone levels and reported complaints be attempted for all GASP data flights. This concern raises the possibility that all complaints are not ozone related and measurements other than ozone may be required in the future. For the present, it was recommended that the GASP water vapor instrument should be used to measure the relative humidity in the cabin of the PA B-747SP.

6. The need to measure the variability of ozone within the aircraft cabin was investigated. While there were some reports of the ozone level being variable, both Pan American and United Airlines have used their own portable ozone monitors on the GASP airplanes and feel that the single GASP ozone acquisition point is representative of their measurements. The consensus is that no NASA involvement in measuring the ozone variability in the cabin is required at this time. If measurements are needed in the future, they can be obtained by portable ozone monitors.

7. The last item discussed was the requirement for an onboard ozone monitor on all aircraft. It was felt that interpretation of the data from such a monitor for use in ozone avoidance is uncertain at this time. At present, no NASA involvement in this area is seen as the requirements are not known. If a requirement would arise in the future, the instrument manufacturers were considered capable of satisfying developmental needs.