Launch vehicle effluent measurements (tropospheric) were made in conjunction with the STS-5 launch at Cape Canaveral on November 11, 1982. These airborne measurements were made within the Shuttle exhaust cloud.

The LaRC air sampling aircraft (Cessna 402) carried on-board four scientific instrumentation systems as follows: a gas filter correlation (GFC) instrument for measuring gaseous HCl; a chemiluminescent (Geomet) detector for measuring total HCl; An Optical Array Cloud Droplet Spectrometer Probe (PMS Model OAP-200X) for measuring particulates in the 28-600 micron size range; and an integrating nephelometer which records the scattering coefficient of the cloud particles. In addition, air speed, temperature, dewpoint, heading altitude and position were recorded.

The aircraft intercepted the launch cloud column at time \( L + 4 \) min. 57 sec. at an altitude of 2,500 ft. and made 28 passes over the next 1 hr. 28 min. as shown in the attached table. Approximate cloud position on the 28th pass was 11 miles east of Orlando, FL. Data was recorded on strip chart recorders and printers for "quick look" evaluation and was collected simultaneously on magnetic tape for further data reduction later.

Preliminary indications show the cloud concentrations of total HCl to be 76-60 ppm in the early passes and 12-2 ppm in the latter passes. If these preliminary values prove to be true these will be the largest launch cloud concentrations ever measured by the launch vehicle effluent measurement team.

Large particulate counts of approximately 50 counts per pass were noted during the first few passes (mean size \( \approx 100 \mu m \)) by the spectrometer probe. The integrating nephelometer showed the mass loading of the small particles (0.2 to 10 \( \mu m \)) to range from 150 \( \mu g/m^3 \) up to a maximum of 200 \( \mu g/m^3 \).

All results are being studied and are to be considered preliminary at this time.

NOTE:

Page 3 is a preliminary "Quick Look Assessment" made and published November 12th (the day after launch) by KSC Environmental Sciences Branch personnel.

November 29, 1982
George L. Maddrea, Jr.