

Induced Environmental Contamination Monitor (IECM) Space Shuttle Payload

As a result of concern for possible contamination induced by the Space Shuttle, which might place limits on its experiment measurements, goals were established for amounts of particles and gases that the Shuttle would emit. That was done by the Contamination Requirements Definition Group (CRDG) and the Particles and Gases Working Group (PGWG). The IECM was designed to provide measurements of particles and gases during the pre-launch, ascent, in-orbit, descent, and post-landing mission phases, to determine the actual Shuttle environment. Those data would then be compared with the established goals.

The IECM was in a desk-sized “box” that contained 10 instruments: (1) Humidity Monitor; (2) Dew Point Hygrometer; (3) Air Sampler; (4) Cascade Impactor; (5) Passive Sample Array; (6) Optical Effects Module; (7) Temperature-Controlled Quartz Crystal Microbalance (TQCM); (8) Cryogenic Quartz Crystal Microbalance (CQCM); (9) Camera/Photometer; and (10) Mass Spectrometer.

When the Shuttle was in orbit, the IECM was lifted by the Canadarm and exposed to the space environment near the Shuttle. It measured contaminants in the cargo bay and near the Shuttle.

The IECM was operated in three Shuttle missions: STS-2 (November 1981), STS-3 (March 1982), and STS-4 (late June and early July 1982). Based on the IECM measurements during those missions, it was concluded that the Shuttle met the CRDG and PGWG goals for its in-orbit amounts of induced particulates and gases. Measurements during other mission phases revealed no problems, except during pre-flight ground operations, when dustfall was identified as contributing to airborne particulates during ascent. Dustfall was also noted during the Shuttle ferry flights and when it was returned to the Orbiter Processing Facility (OPF) for refurbishing.