

and a planning category that feeds into Apollo Applications in some cases and in some cases in other categories?

Dr. MUELLER. That is correct. In fact, the major part of the money that we spent in the last year was in the area of supporting Apollo Applications work.

Mr. RUMSFELD. How many studies were undertaken with the \$6.2 million in fiscal year 1967? How many different areas were explored and how many do you anticipate with this \$8 million?

Dr. MUELLER. The average cost of a study, Mr. Rumsfeld, that is, the money spent outside of NASA, which does not include the people inside NASA that are also working on advance studies is around \$200,000. Therefore, there were a number of actual studies carried out. There were some 37 studies in 1966, and we are planning some 18 in 1967.

Mr. DADDARIO. Would you like those listed for the record?

Mr. RUMSFELD. I think it would be useful.

Dr. MUELLER. I would be pleased to.

ADVANCED MANNED MISSIONS STUDIES FOR FISCAL YEARS 1966, 1967, AND 1968

The FY 66-67-68 studies in the Advanced Manned Missions program are a progressive set of phased studies directed at providing in-depth technical and fiscal data required for major program decisions that are anticipated in connection with the FY 69 and 70 budget submissions.

FISCAL YEAR 1966

The 37 FY 66 studies were aimed at defining later flights in the Apollo Applications program, the requirements for an earth orbiting space station, a preliminary investigation of manned planetary missions, and studies of launch vehicle improvements.

Seventeen studies primarily cover activities in earth orbit and the definition of experiments in earth orbit. These include studies on satellite recovery, refurbishable spacecraft, artificial gravity, extravehicular activity, orbital astronomy support facilities, subsystem definition, spent stage utilization, space stations and observatories, emergency and rescue concepts, and economic benefits.

In the lunar area six studies cover experiment activities on the lunar surface and advanced concepts for delivery to the lunar surface.

Seven manned planetary studies cover electric propulsion, mission modes, and the use of Saturn/Apollo systems and their modifications.

Seven vehicle studies cover possible Saturn upgradings and facility requirements, large solid rocket motors, and advanced logistics systems.

FISCAL YEAR 1967

The FY 67 program totals 18 studies in the four areas of earth orbital missions, lunar exploration, planetary reconnaissance, and vehicle systems.

Six studies in the earth orbit area include the preliminary definition of a long duration space station, definition and integration of space station experiment modules for conducting experiments in astronomy, biosciences, and earth resources, and for studies of earth orbit emergencies, reentry and rescue systems.

Two lunar mission studies continue the effort in defining the objectives for continued lunar missions and includes studies on integrating lunar orbit missions with work stations on the lunar surface.

In the planetary area six studies of reconnaissance flights to Mars and Venus cover alternative mission modes, mission integration, contingency planning, spacecraft and several modules and probes for landing, orbiting, experiments, and sample return.

Four studies in the vehicle area encompass facilities and operational concepts for future programs, facilities and equipment for improved launch control, logistic systems for earth orbital missions, and orbital launch vehicles