

both the Apollo unmanned and manned flights. This analysis will be completed subsequent to the final report of the AS-204 Accident Review Board.

Question 5. What is the estimated cost of investigation of the Apollo 204 accident in dollars and man-hours?

Answer 5. There are about 1,500 people now engaged in one aspect or another of investigating the accident who will have worked about 2 months, 3,000 man-months, or 250 man-years. At \$17,000 per man-year, the cost is estimated to be about \$4 million. (Better estimates will be available when the Board has completed its report.)

Question 6. Does NASA expect to alter its manufacturing techniques in fabricating the tank walls of the S-II stage? If so, when?

Answer 6. We do not anticipate any further changes in the manufacturing techniques for the S-II stage tank walls. As a result of the liquid hydrogen tank cracking that was experienced in mid-1966, a number of small changes were made in the manufacturing of the tank wall panels, and in the handling and assembly procedures of these panels to form the actual tank. These changes included such items as welding techniques, tooling, and handling fixtures and handling procedures.

Since the implementation of these improved and refined fabricating methods the LH₂ tank cracking problem is now considered to be under control.

The manufacture and assembly of the S-II stage has presented new development problems. These problems have been due mainly to the very large structural components involved as well as the use of the 2014 aluminum alloy material for the pressurized portion of the stage. Although this material was successfully used for the S-IV and S-IVB stages, it had never before been used in the large size sections required for the S-II. The use of the 2014 material was dictated in order to achieve the optimum thrust to weight ratio required for the entire Saturn V launch vehicle.

Regarding the tank wall insulation, we are evaluating a spray-on foam to replace the present bonded honeycomb material. If tests presently underway are successful, this foam material will be applied to the liquid hydrogen tank walls of S-II-8 in late 1967. This stage should be delivered to KSC in August 1968.

Question 7. What are the most feasible current alternatives to the life support system currently designed for the Apollo Command Module?

Answer 7. The Environmental Control System is being reexamined with emphasis on materials, failure modes, choice of fluids and maintenance and servicing.

Particular attention is being devoted to improving fire resistance by careful selection of materials used and the types of plumbing connections with the aim of minimizing the potential of leakage or joint failure as well as improving the maintenance and servicing of the system.

Tradeoff studies are being conducted to determine the feasibility of eliminating the present coolant fluid from the crew compartment.