

III. PERFORMANCE STUDIES

A. RTG OPTIMIZATION

This section presents the results of RTG optimization studies performed for TAGS-85/2N and 3P/2N RTG concepts for the Viking Lander mission. In the studies, the radiator fin root operating temperature was varied and the resultant effect on RTG fuel inventory, specific power, electrical power output and weight determined for a fixed hot junction temperature. Two generator housing lengths, the present 8.9 inch and a longer 9.5 inch housing, were evaluated. Although the present 8.9 inch long housing will accommodate the IHS, increasing the housing length to 9.5 inches is proposed to increase the thermal insulation thickness at the ends of the heat source.

1. Radiator Parameters

The RTG radiator consists of the outer cylindrical housing, end covers and six fins spaced at 60-degree increments around the housing. The radiator emissive coating is a zirconium oxide/sodium silicate (binder) mixture developed on the SNAP 9A program. Measured coating properties show the thermal (infrared) emissivity to be ~ 0.83 and the solar absorptivity to be ~ 0.2. Telemetered SNAP 9A S/N 04 RTG housing temperature data received from Transit Satellite 1963-49B provide evidence of the excellent stability of this coating after approximately six years of space operation. Figure III-1 shows radiator temperature data for the first three years of operation. APL reports no apparent degradation through the present.