C. STEADY STATE TEMPERATURE PROFILES

The baseline heat source design employs a Carb-I-Tex 500/502 graphite heat shield. Alternate designs have been considered which employ a superalloy, vibration-isolation metal sleeve between the heat shield and thermoelectrics and which consider POCO graphite for the heat shield. These various combinations have been thermally analyzed for both beginning-of-life (BOL) normal operation and launch time (9 months after BOL) normal operation at steady state conditions inside the RTG. In addition, the launch phase was studied for two malfunction conditions - open circuit and normal load electrical operation, both with an RTG internal vacuum to simulate loss of fill gas at launch.

An 85 node thermal model of the heat source was constructed, as shown in Fig. IV-5, for solution with a digital computer code. The model is a 10° pie-slice from one-half of a heat source, since circumferential and axial symmetry can be assumed.

Material properties are handled by the code as constants; values used are given in Table IV-3. The actual thermal fuel loading will be 675 watts per RTG. For conservatism, this analysis assumed complete loading of the capsule - 755 watts.

Results of the code runs are summarized in Table IV-4. The use of a metal sleeve around the heat shield adds 50 to 150°F to all heat source temperatures, and a Carb-I-Tex heat shield results in temperatures about 70°F higher than with a POCO graphite shield. The conductivity of gas contained within the generator changes with time due