

distinctive challenges. Round trip communication at the speed of light required about 45 minutes, so the automated spacecraft had to interrogate itself and self-determine its actions, because corrections sent from Earth would be greatly delayed. The Martian night and dust worried planners. "When we were still considering solar power," said Soffen, "we even thought about ways to tilt solar panels while the Lander was on the surface to shake off dust from dust storms. But actually we always wanted RTGs and we put a lot of effort into keeping the AEC in line to provide them." Viking's design ended with RTGs as the only power source for the Lander and all its experiments.²¹ Each of the two RTGs on the mission was required to produce a minimum of 35 watts for 90 days on the Martian surface.

There were significant problems in adapting the SNAP-19 to the requirements of the Viking mission. Thermal integration of the RTG with the Lander was a major difficulty. The RTGs were to furnish all the electricity for the Lander and the heat to control the Lander's temperature.²² The cold nights and relatively hot days on the Martian surface led to concern about controlling the heat of the instruments. A thermal switch was installed under the two RTGs. As the internal temperature of the Lander became high, a bellows would open a pair of plates to prevent heat from the RTGs from entering the Lander compartment; when the temperature became cold, the bellows would close the plates and allow heat from the RTGs to be conducted into the Lander compartment.

Two other problems led to special design features for the SNAP-19s on Viking. The Martian winds caused designers to construct wind screens over the RTGs—and the wind screens, too, were part of the thermal control system. Even more distinctive was the problem of contamination which required the Lander and all its components to be sterilized before launch. The Viking experimenters wanted to ensure that the landing vehicle was carrying no contamination from Earth to the Martian surface—and they especially wished to guard against carrying life there that might be detected by their Martian-life-seeking instruments. The entire Lander, including the RTGs, was sterilized—"encased in a cocoon which was sealed," according to Bob Brouns, RTG program representative at Langley for Viking. There were concerns that the RTGs might get too warm during the bake cycle, so a cooling coil was placed at the top of the RTG before it was capped with a dome. Water was run through this tube to take heat out of the RTGs during the sterilization cycle.²³