petitor of nuclear systems is the solar-powered system. The choice among solar, isotope, and reactor systems for long missions depends on many factors, such as weight, size, required power level, cost and adequacy of supply, reliability, convenience of use, and the peculiar requirements of the mission. There are missions having special requirements for which nuclear systems offer important advantages over solar and other competitors.

One such mission is the exploration of places that receive little or no sunlight—as in the shadow of a planet or a moon. Consider that the density of solar energy incidence drops as the square of the distance from the sun. Mars, being about 1½ times as far out as earth, receives less than half the solar energy per square foot that earth does. This means that a solar energy collector on Mars will have to be over twice as large as one producing the same amount of power on earth. Even this might not be prohibitively large, but the comparable size for Jupiter, the next planet after Mars, would be 27 times as large and for Pluto, over 1500 times as large.

Therefore at Pluto it would take solar cells covering an area about as large as an entire football field (Figure 5) to produce as much power as our 500-watt SNAP-10A system—and this is assuming that such a football field of solar cells could be constantly oriented directly toward the sun. At the vicinity of earth, for the same solar power, only about 40 sq ft of solar cells would be needed. Of course, within the dense atmospheres of some of these planets or on their dark sides, practi-

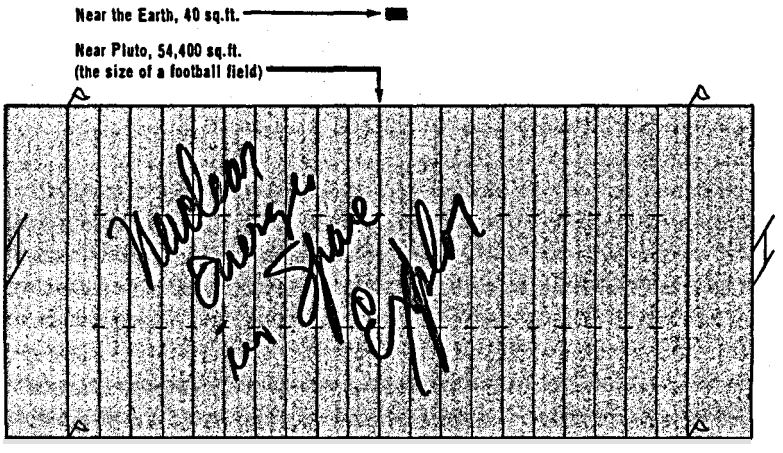

Figure 5. Comparison of size of solar energy collector required.