Technical Spec Sheet: 90-Year Space Mission

Mission Overview

Duration: 90 years

Crew: 2 humans

Objective: Long-term deep space habitation with minimal resupply and high system redundancy.

Power Generation

System: RTG Array

Units: 12 RTGs deployed for redundancy

Target Output: 2 kW sustained after 90 years

Degradation Rate: ~0.5% per year

Total Excess Energy Stored: ~88,000 kWh over mission duration

Thermal Storage

Medium: Water (dual-use for life support and heat storage)

Total Water Mass: ~394,470 kg

Thermal Capacity: ~45.6 MWh (based on 100°C temperature swing)

Advantages: Non-toxic, already required for life support, high specific heat

Food and Water Requirements

Diet: Lentils and algae-based

Caloric Intake: 1,800 kcal/day/person

Total Calories: ~118.3 million kcal

Estimated Food Mass: ~32.6 metric tons

Water Usage: ~394,470 liters (includes hydration, cooking, hygiene, humidity loss)

Backup Energy Storage

Storage Systems:

- Lithium-Ion Battery Bank (low-temp chemistry)

- Flywheel Module (mechanical storage)

- Thermal Storage via Water

Purpose: Emergency systems, peak load buffering, redundancy

Total Backup Capacity: ~88,000 kWh