1.4 Mission Requirements

The customer constraints for the system require that the system remains under a budget of $225M, and is ready for launch by September 1st, 2028. The system must be confined to a volume of 1.5m x 1.5m x 1.5m before deployment, must not exceed a mass of 85kg, and cannot use a Radioisotope Thermoelectric Generator (RTG). The entire system cannot contain more than 5g of radioactive material.

For mission success, the system must additionally be able to determine water ice abundance, isotopic variation, and volatile components near the permanently shadowed regions (PSRs). The system cannot contain more than 2 science instruments and must be able to communicate with the spacecraft orbiting the moon in a circular polar orbit at 100km.

Req #	Requirement	Rationale	Parent Req	Child Req	Verification method	Relevant Subsystem	Req met?
Mission Reqs							
MR-1	The system shall determine water ice abundance in the lunar regolith.	Provided by the Mission Document	Customer	ESP-2, CDH-2	Demonstration	Payload	Met
MR-2	The system shall determine the isotopic variation of lunar regolith.	Provided by the Mission Document	Customer	ESP-2, CDH-2	Demonstration	Payload	Met
MR-3	The system shall gather water ice compounds and formations in the lunar regolith.	Provided by the Mission Document	Customer	ESP-2, CDH-2	Demonstration	Payload	Met

MR-4	The system shall determine volatile components in and around lunar permanently shadowed regions(PSRs).	Provided by the Mission Document	Customer	TCS-1, ESP-2, CDH-2	Demonstration	Payload	Met
MR-5	The mission shall not exceed a cost of $225M, not including launch or cruise costs.	Provided by the Mission Document	Customer		Inspection	Payload	Met
MR-6	The system shall be ready for launch by September 1st, 2028.	Provided by the Mission Document	Customer		Inspection	Payload	Met
Mechanical Reqs							
MEC-1	The system shall be confined to a volume of 1.5m x 1.5m x 1.5m cubic feet before deployment.	Provided by the Mission Document	Customer		Inspection	All	Met
MEC-2	The system shall not exceed a total mass of 85kg.	Provided by the Mission Document	Customer		Inspection	All	Met
MEC-3	The system shall not contain more than 5g of radioactive material.	Provided by the mission Document	Customer		Inspection	All	Met

Electrical Power System (EPS) Reqs							
EPS-1	The system shall not contain a Radioisotope Thermoelectric Generator (RTG) or derivative of such.	Provided by the Mission Document	Customer		Inspection	Payload	Met
ESP-2	The system shall power all necessary components for mission completion.	The system will require power to complete mission requirements	MR-1, MR-2, MR-3, MR-4		Demonstration	All	Not Met
Payload Reqs							
PAY-1	The system shall not contain more than 2 science instruments.	Provided by the Mission Document	Customer		Inspection	Payload	Met
Command & Data Handling Reqs (CDH)							
CDH-1	The system communicates directly with the designated orbiting spacecraft.	Provided by the mission document	Customer	CDH-1.1	Test	Communications	Met

CDH-1.1	The system must transmit communications to a distance necessary to reach the orbiting spacecraft in a circular polar orbit at 100km.	Allows communication with orbiting spacecraft	CDH-1		Test	Communications	Not Met
Thermal Control System Reqs (TCS)							
TCS-1	System shall regulate itself to an appropriate temperature range for functionality of all components.	Temperatures in shadowed regions of the moon can range from 88-100K	MR-4		Analysis	Thermal Control System	Not Met

Table 1.4.1: Mission Requirements Overview and Verification Status for Lunar Exploration Project