ECLSS-Logistics – Definition of Architecture

- **Assume Pressurized Rover and Surface Habitat work together as an integrated ECLS System**
  - Pressurized Rover leverages the regenerative ECLSS in the Surface Habitat
  - Wastewater products are collected in the rover and transferred to the habitat for processing
  - Clean water and high-pressure oxygen are transferred back to the rover for use
  - Integrated system significantly reduces resupply requirements

Surface Habitat (SH)

SH Architecture Options

- Base ECLS Sub-Systems
- Airlock Gas Recovery
- Oxygen Generation
- HP O_2 Compression (EVA PLSS Recharge)
- Water Recovery
- Modified Partial-g Urine Recovery w/ Brine
- Carbon Dioxide Recovery - Sabatier

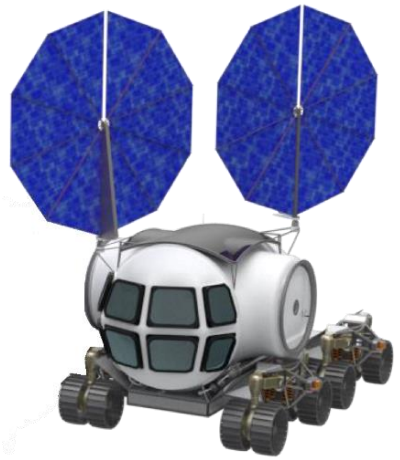
SH to PR Transfer

- HP O_2
- Water

PR to SH Transfer

- Grey Water
- Urine & Flush

Pressurized Rover (PR)



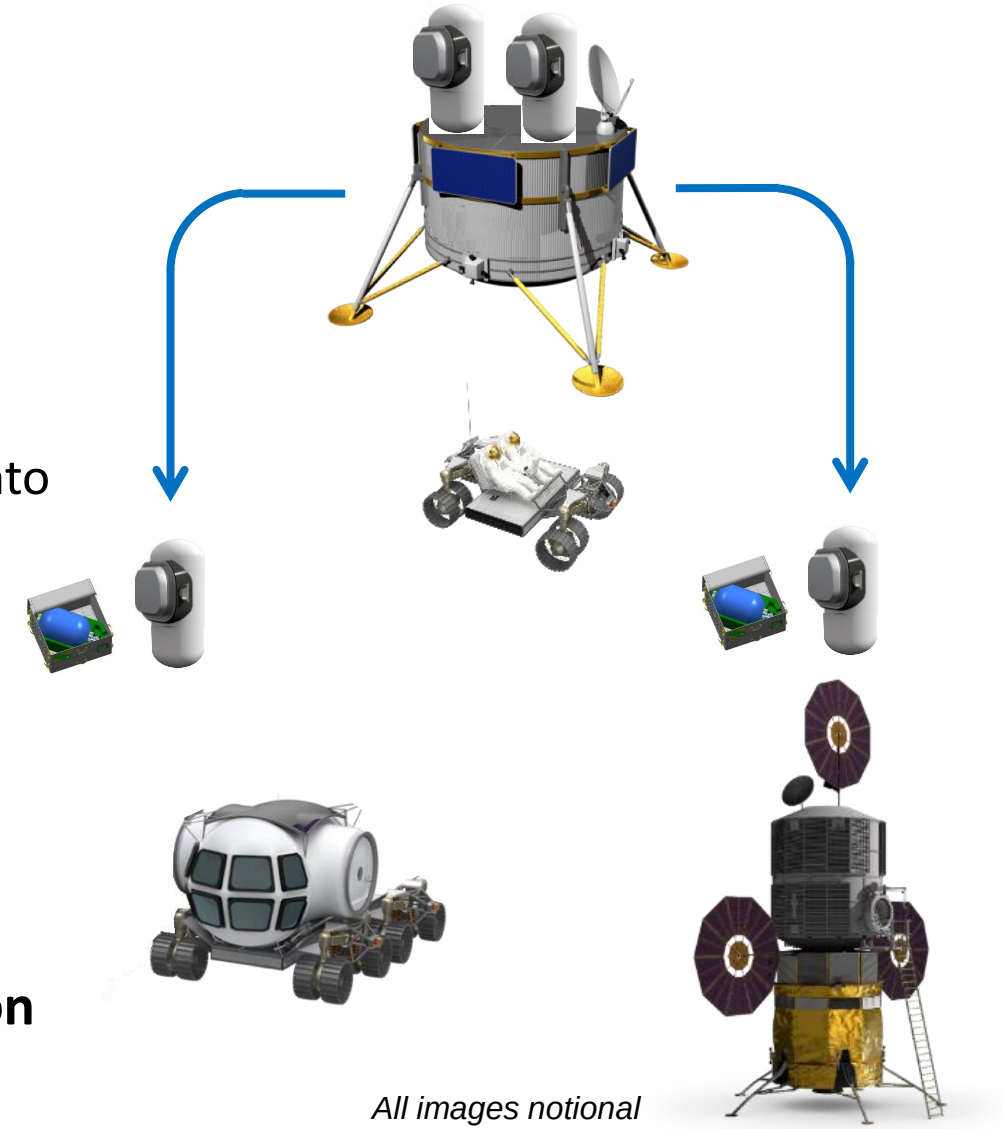
PR Architecture

- Base ECLS Sub-Systems
- CO_2 Removal & Capture
  - Swing Bed or alternative

All images notional

Reference Logistics Resupply Concept - Sustained Lunar

- **Logistics for initial missions are delivered with surface elements**
  - Internal/External with Habitable Mobility Platform (HMP)
  - Internal in Foundation Surface Habitat (FSH)
- **<u>Outyear logistics are delivered via robotic landers</u>**
- **Dry goods and water are delivered in Small Pressurized Logistics Carriers (SPLCs)**
  - Crew transfers logistics for each mission from cargo lander into Pressurized Rover cabin and Surface Habitat.
  - SPLCs are “crew maneuverable”.
  - Modules can be moved at the end of regular EVAs.
  - Can be used with suitports or airlock.
  - Good remain in conditioned environment.
- **Water delivered in Contingency Water Container (CWC) derived water carrier inside of SPLCs**
- **Oxygen and Nitrogen delivered via external Next Generation Gas Resupply tanks**
- **SPLCs reused for trash disposal**

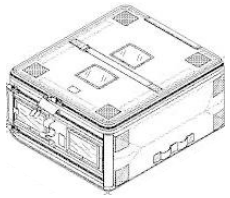


All images notional

Campaign Logistics Resupply Requirements - Sustained Lunar Mission
Annual Logistics Resupply w/Overhead - 4 Crew X 28 Days

DRY GOODS = 638 kg

Food	291
Clothing	47
Waste Collection	29
Wipes/Gloves	22
Towels	11
Hygiene Supplies	5
Health Care Consumables	10
Op Supplies	20
Recreation and Personal	40
EVA Consumables and Spares	110
Spares	43

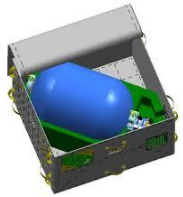


48 CTBs = 40 kg

4 Small Logistics Carriers = 608 kg

WATER = 246 kg

12 CWCs = 15 kg



OXYGEN = 0 kg → **0 Next Gen Tanks = 0 kg**

NITROGEN = 38 kg → **2 Next Gen Tanks = 107 kg**

TOTAL CONSUMABLES = 912 kg

BAGS & TANKS = 162 kg

CARRIERS = 608 kg

Surface Habitat
- OGA
- HP O_2
- A/L Gas Recovery
- WPA
- UPA Brine Recovery
- Water Xfer to HMP
- O_2 Xfer to HMP

Pressurized Rover
- Amine Swing Bed
- Grey Water Xfer to FSH
- Urine Xfer to FSH

TOTAL = 1,682 kg

Note: Additional 230 kg of logistics may be required pending alternate pressurized rover concept studies.

BACKUP

Small Pressurized Logistics Carrier

DESCRIPTION:
The Small Pressurized Logistics Carrier (SPLC) is a small, conditioned pressure vessel intended to deliver pre-supplied logistics for Sustained Lunar missions to the lunar surface.

The SPLC can provide a conditioned environment for delivered cargo from Earth launch until unloaded on the moon. SPLCs .

SPLCs include a suitport interface and hatch for unloading either through a suitport or directly within a pressurized environment.

Pressurized Volume	0.67 m^3
Surface Area	4.0 m^2
Primary Structure	Al-2219
Shell Thickness	5 mm
MLI Thickness	10 mm
Capacity	~10 CTBE
Est. Max. Loaded Cargo	~215 kg
Est. Max Loaded Weight on Moon	~595 N (~134 lbs)

Component	Unit Mass	#	Basic Mass	MGA (%)	CBE Mass (kg)
Al-2219 primary structure + MLI (kg)	54.0	1	54.0	20%	64.8
MLI (kg)	10.0	1	10.0	20%	12.0
Heater (kg)	0.5	4	2.0	15%	2.3
Harness (kg)	5.0	1	5.0	30%	6.5
Manual equalization valve (kg)	2.5	1	2.5	20%	3.0
Hatch (kg)	12.5	1	12.5	20%	15.0
Suitport Interface (kg)	14.5	1	14.5	15%	16.7
External support structure (kg)	10.0	1	10.0	30%	12.0
Sub-Total (kg)			120.5	20%	**132.3**
MER – 15% (kg)					19.8
Total Dry Mass (kg)					**152.1**