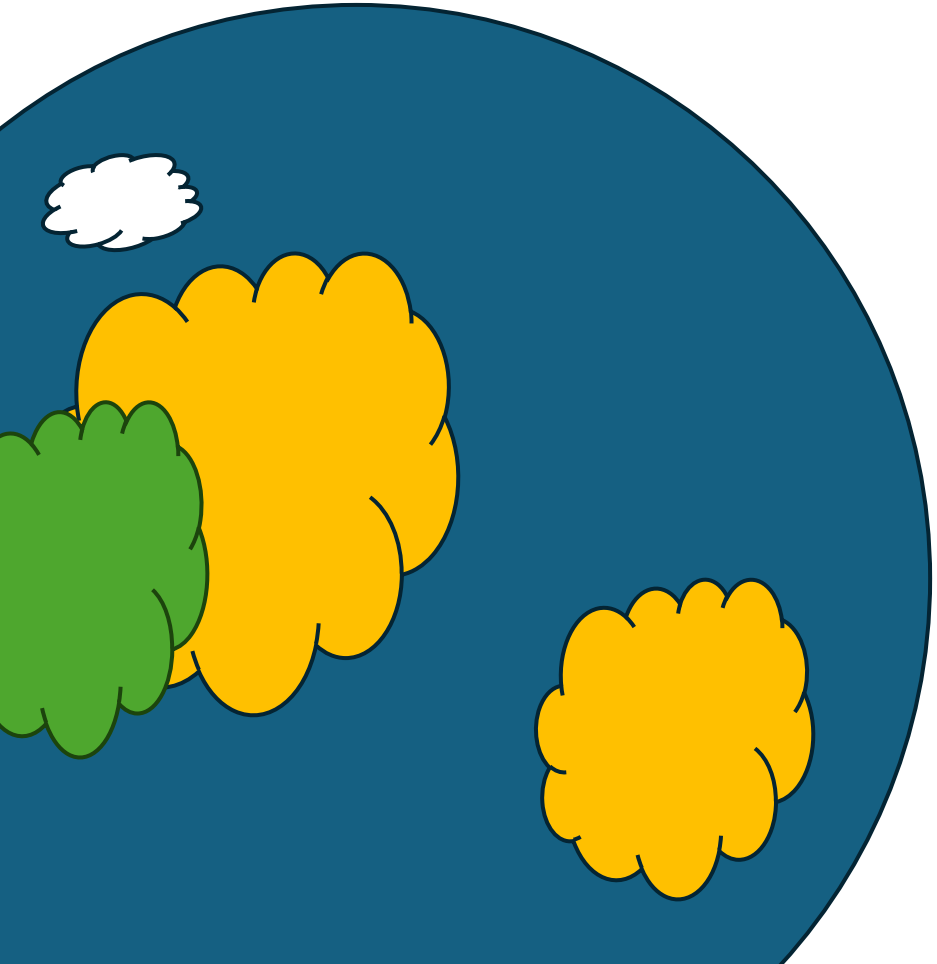
SELENE CHARON

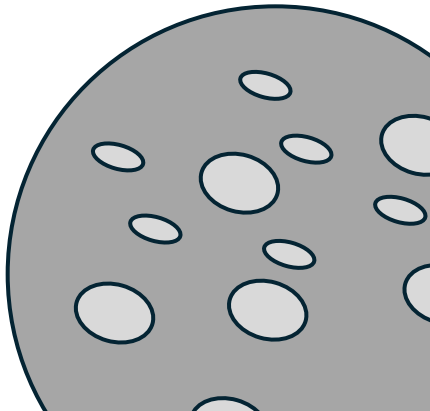
(A CIS-LUNAR FREIGHT SYSTEM)

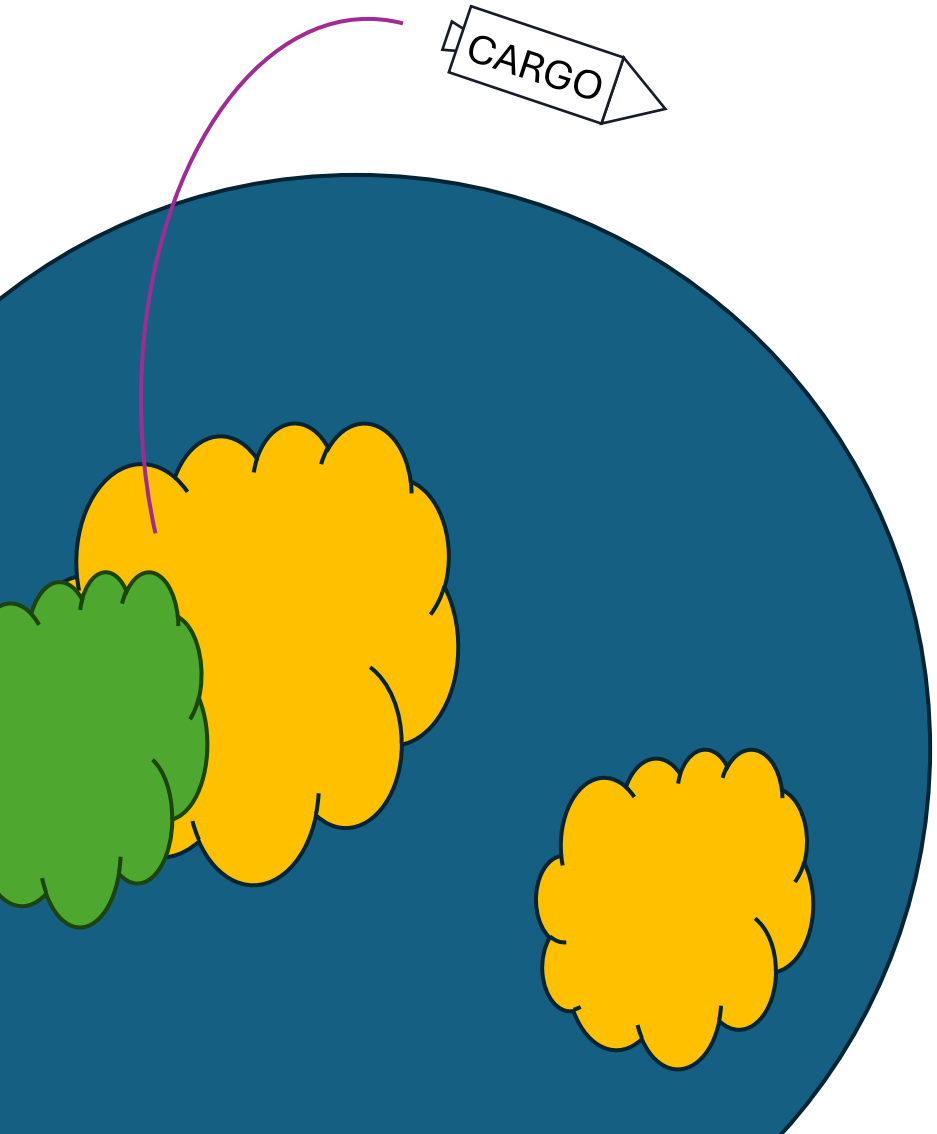
Concept of Operations



A PROPOSAL FROM

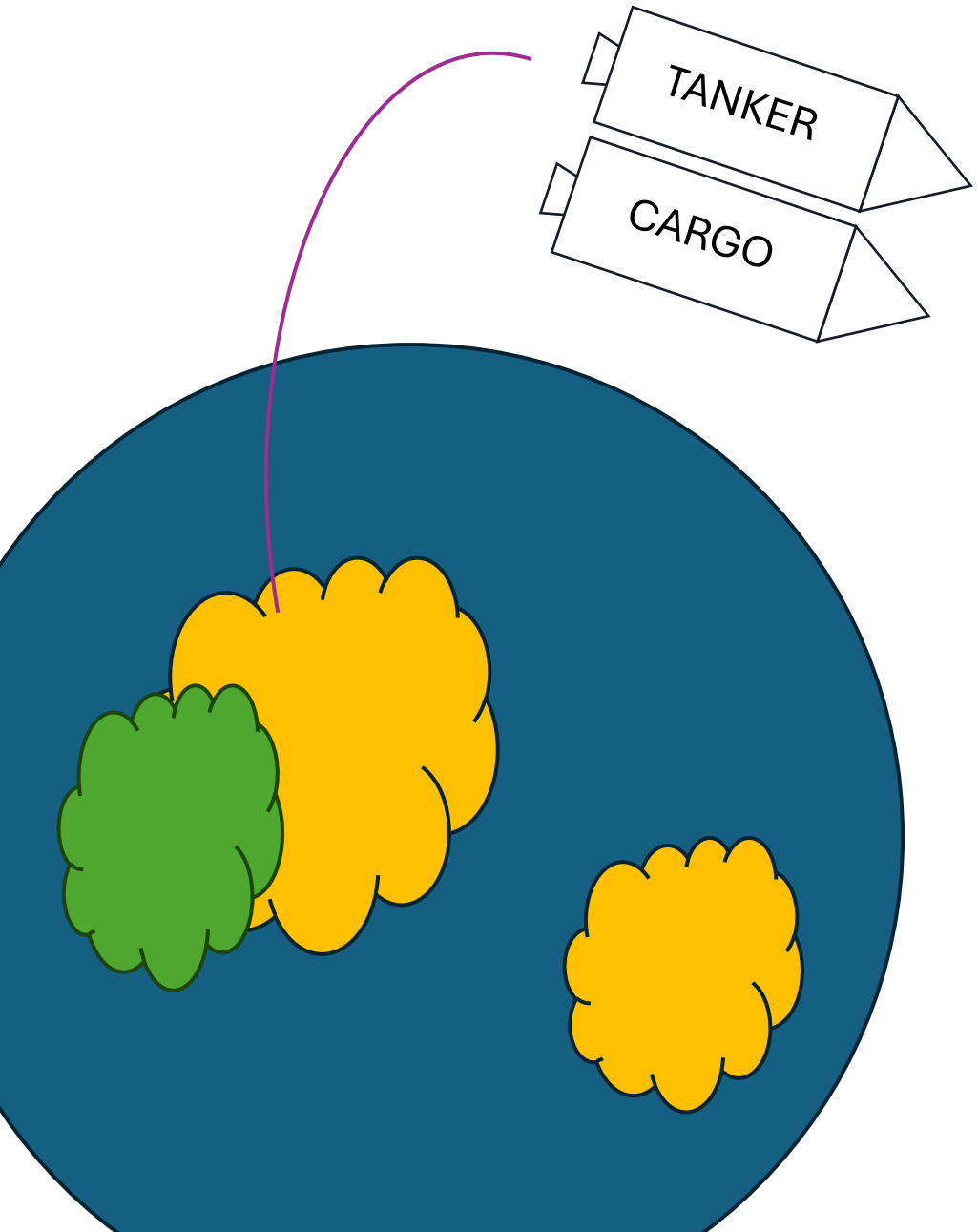
ENERGY RECOVERY RESOURCES, LLC





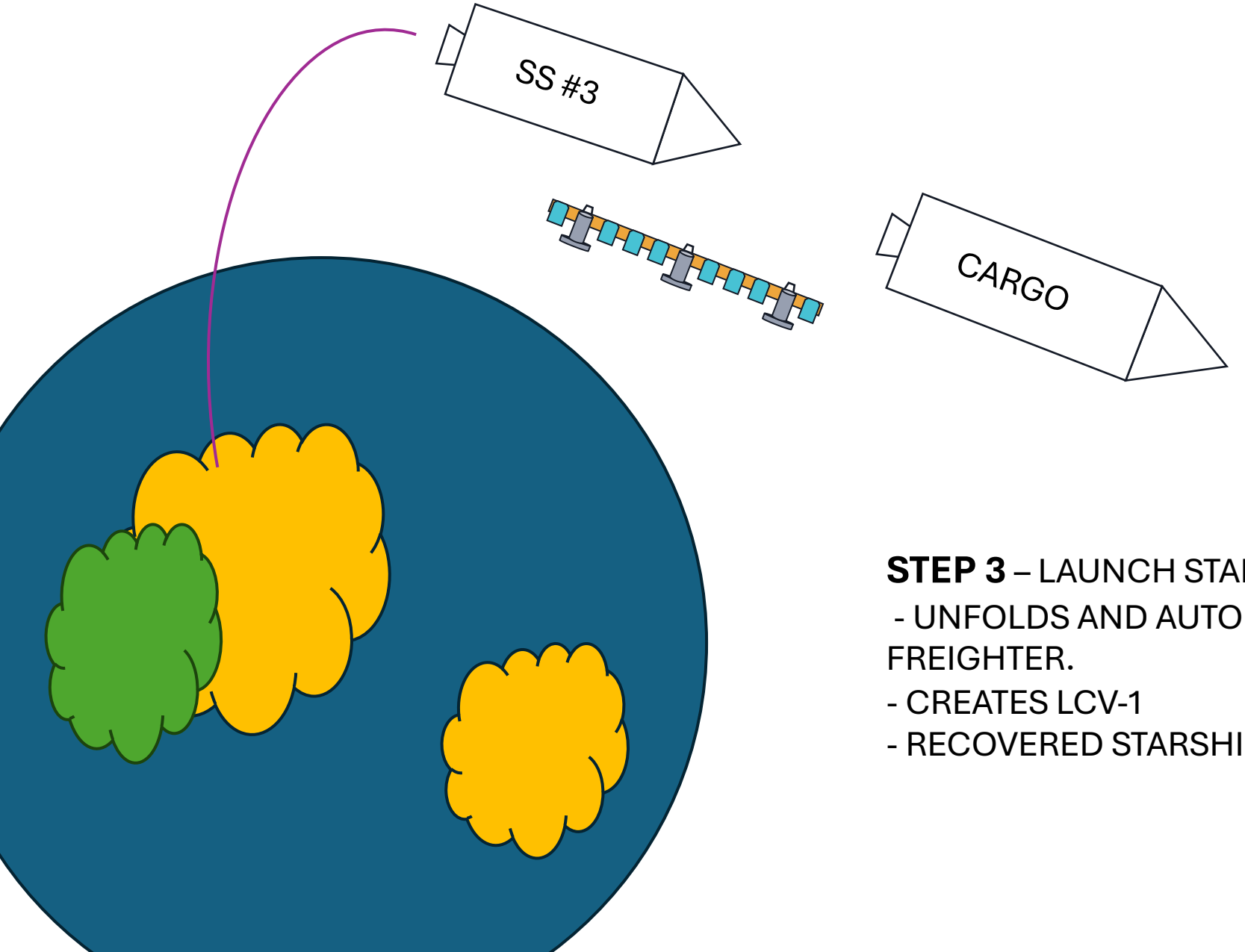
STEP 1 – LAUNCH STARSHIP CARGO VARIANT INTO LEO.

- NO HEAT TILES
- ATTACHMENTS FOR H-FRAME & REFUELING
- 90 – 100 TONS OF PALETIZED CARGO ABOARD
- CURRENTLY MOSTLY SPENT METHALOX FUEL

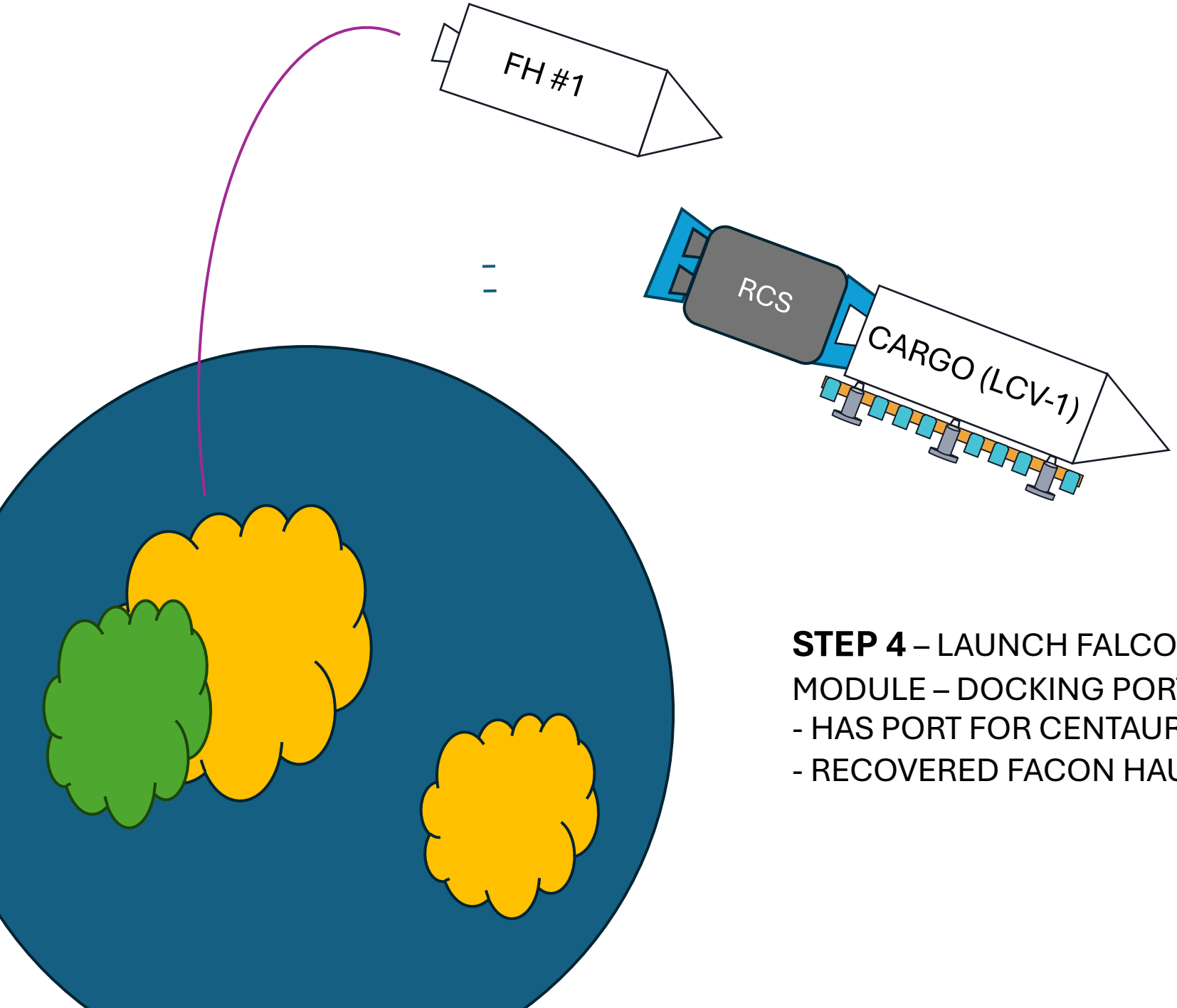


STEP 2 – LAUNCH STARSHIP #2 REFUEL TANKER

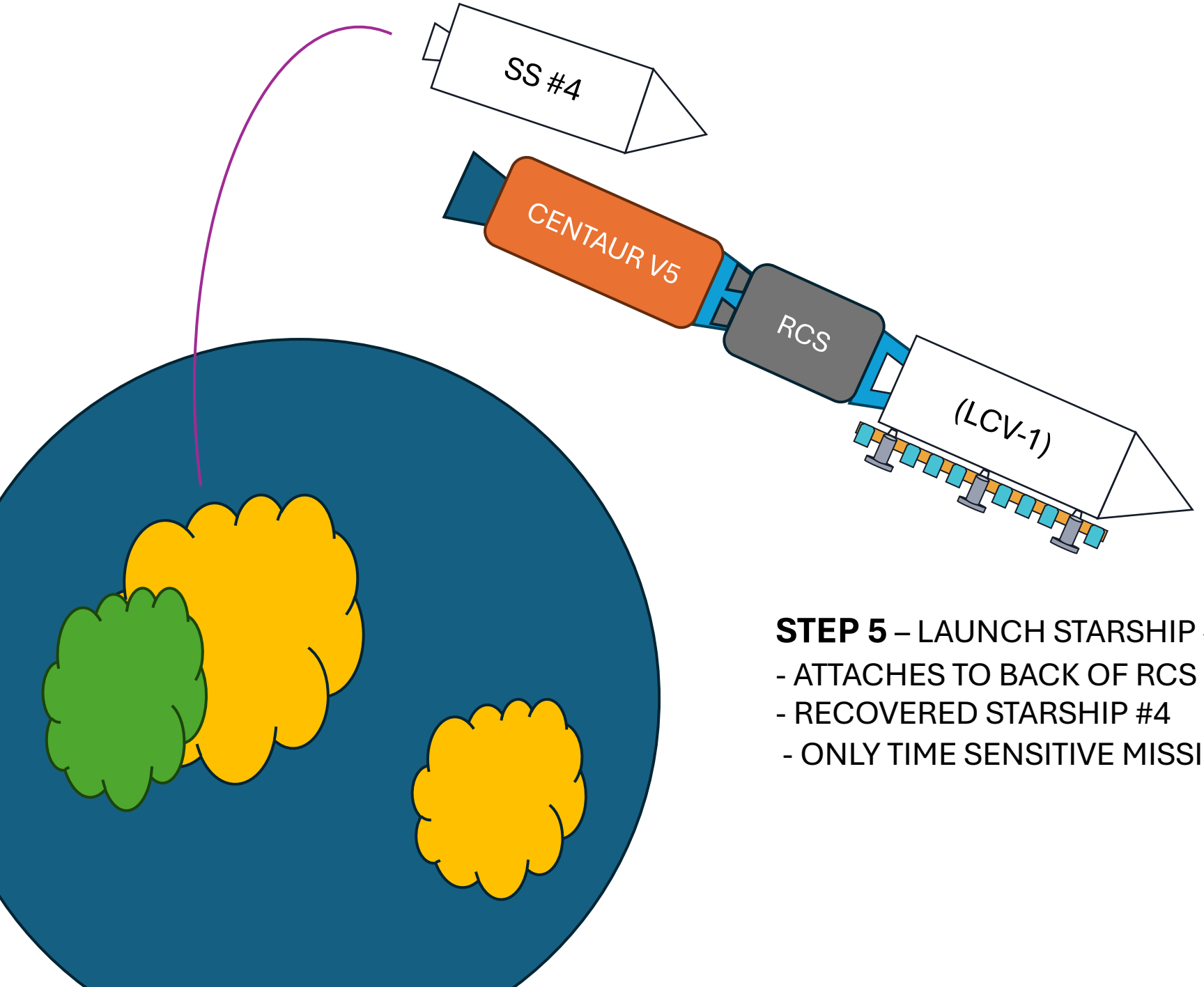
- REFUEL IN LOW EARTH ORBIT.
- EMPTY REFUEL TANKER RECOVERABLE



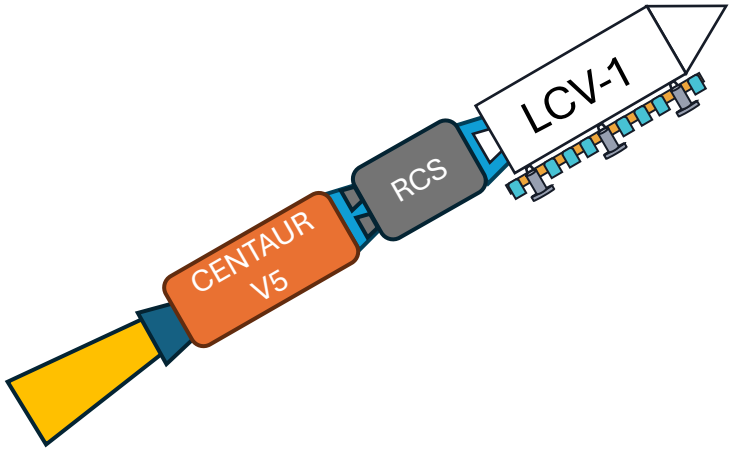
STEP 3 – LAUNCH STARSHIP #3 WITH H-FRAME ASSEMBLY
- UNFOLDS AND AUTONOMOUSLY ATTACHES TO CARGO FREIGHTER.
- CREATES LCV-1
- RECOVERED STARSHIP #3

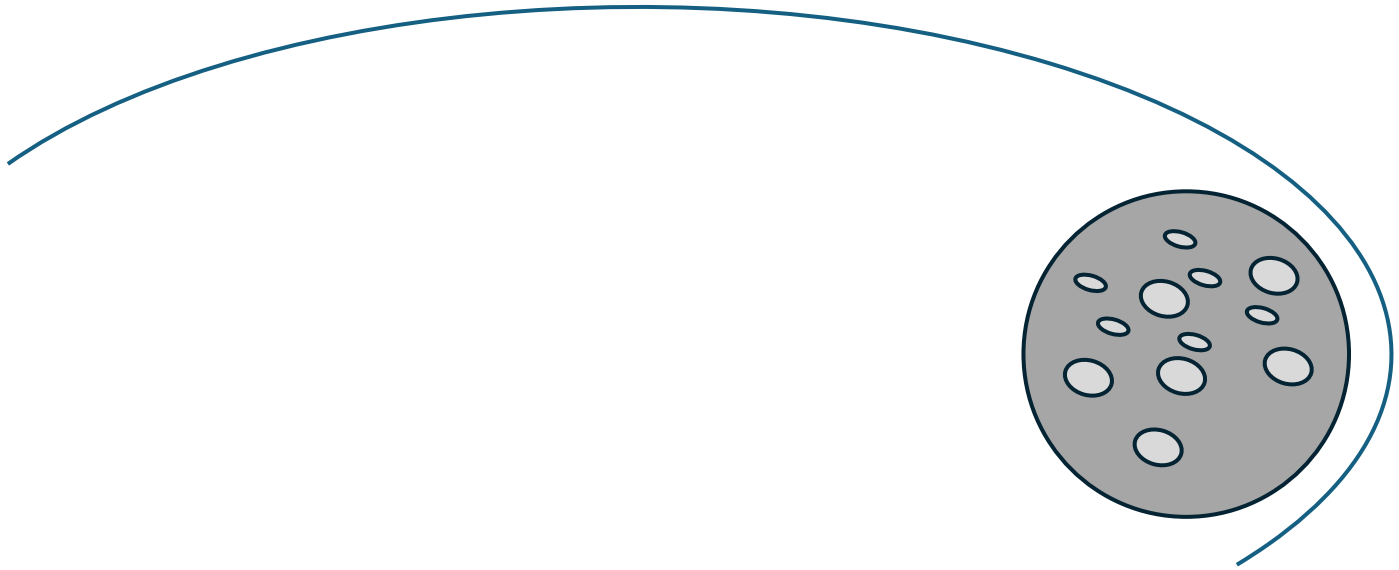


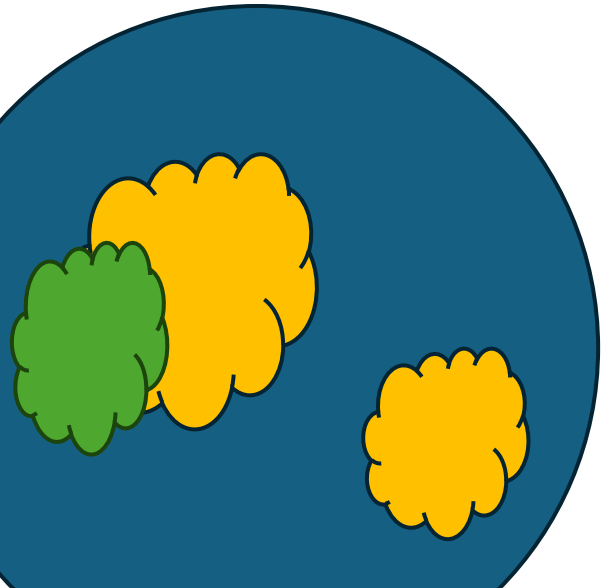
STEP 4 – LAUNCH FALCON HEAVY #1 WITH RCS THRUSTER MODULE – DOCKING PORT AND ATTACHES TO REAR OF LCV-1
- HAS PORT FOR CENTAUR ATTACHMENT AT REAR
- RECOVERED FACON HAULER



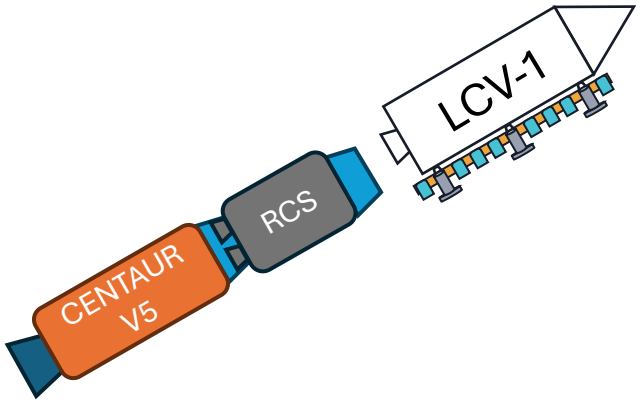
STEP 5 – LAUNCH STARSHIP #4 WITH CENTAUR 5 MODULE
- ATTACHES TO BACK OF RCS PORT
- RECOVERED STARSHIP #4
- ONLY TIME SENSITIVE MISSION DUE TO CENTAUR FUEL

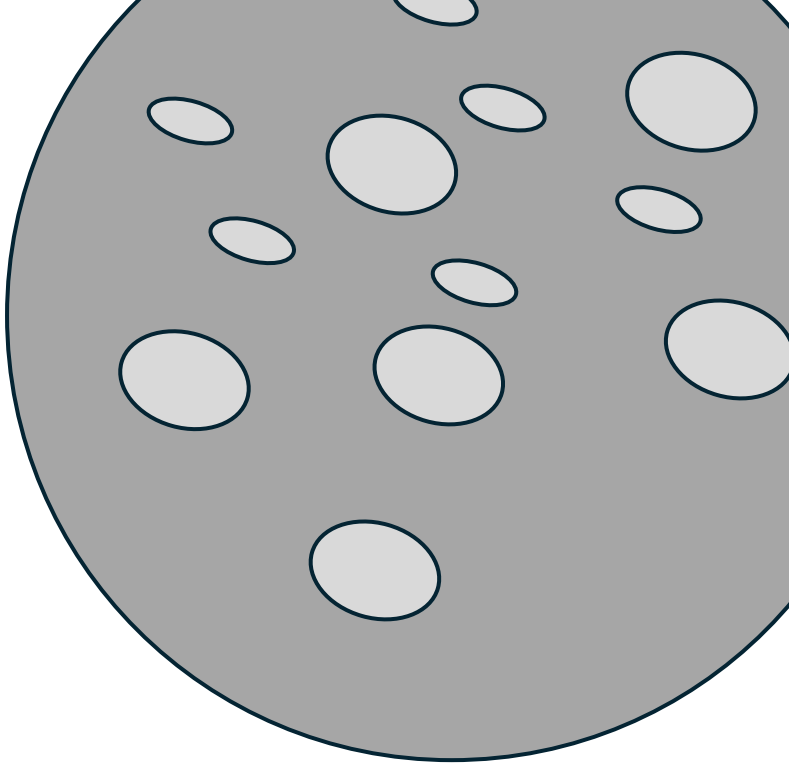


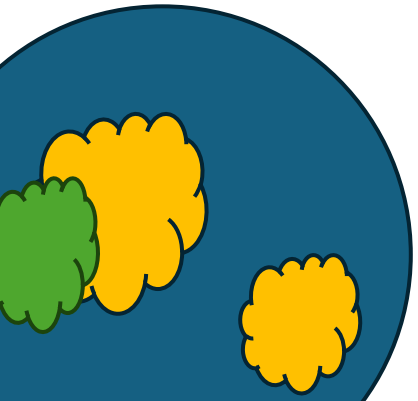




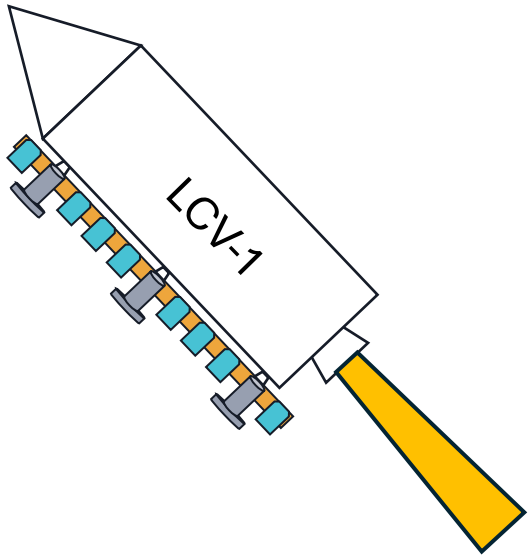
STEP 6 CENTAUR FIRES ENGINE FOR TLI BURN
- FULL CIS-LUNAR FREIGHT SYSTEM HEADS TO MOON



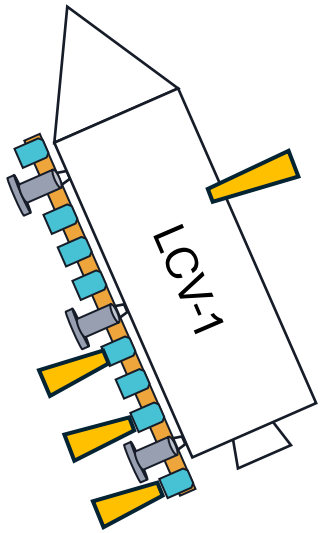




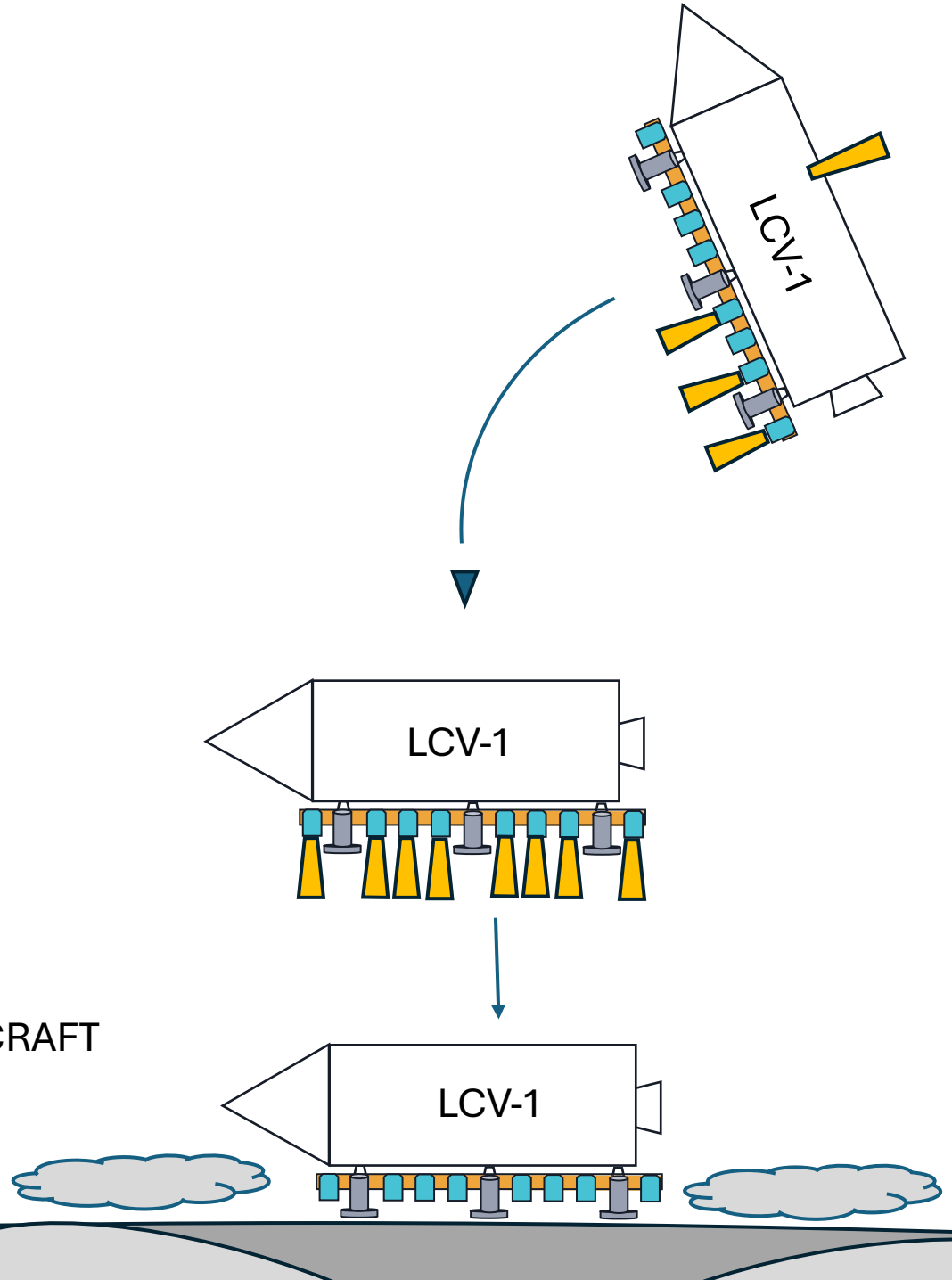
STEP 7 LUNAR ORBIT INSERTION & SEPARATION
- RCS AND SPENT CENTAUR 5 SEPARATES FROM LCV-1
- RCS AND CENTAUR 5 ENTER LLO
- LCV-1 ENTERS LLO SEPARATELY
- RCS AND EMPTY CENTAUR EVENTUALLY SEPARATE.



STEP 8 - LCV-1 APPROACHES LUNAR SURFACE FROM LOW LUNAR ORBIT.

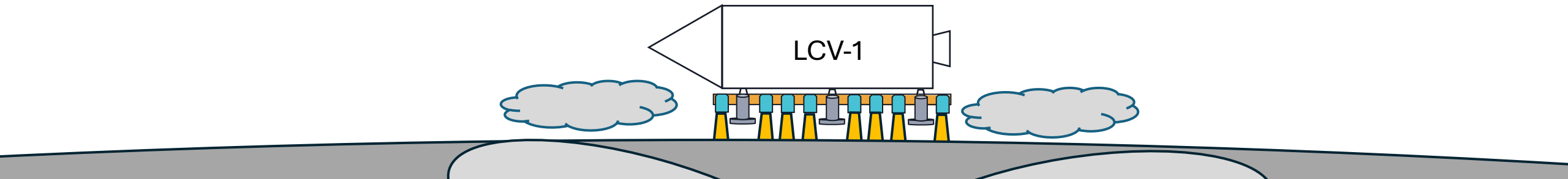


STEP 9 - AT 150 METERS RAPTOR ENGINES CEASE WHILE MID-SHIP RCS THRUSTERS IN CONCERT WITH THRUSTERS FROM H-FRAME FLIP CRAFT FOR HORIZONTAL LANDING.

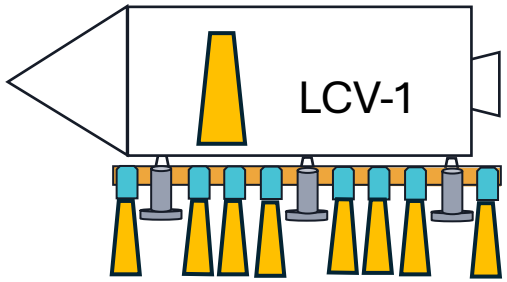


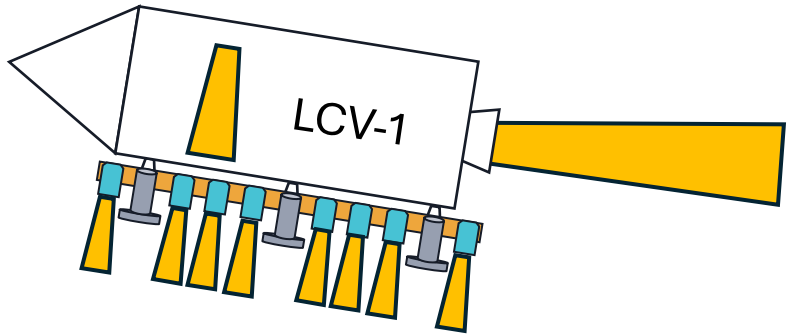
STEP 10 - LANDING OF LCV-1
SUPPORTED BY
OLEO STRUTS WHICH STABILIZE CRAFT
WITH LOW REGOLITH EJECTA.

LCV-1 Take-off from the Lunar surface

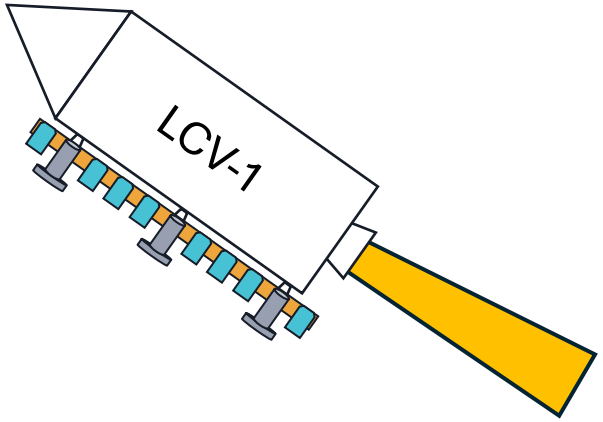


Thrusters from H-Frame and MidShip RCS Thrusters handle Lift off to 100 Meters

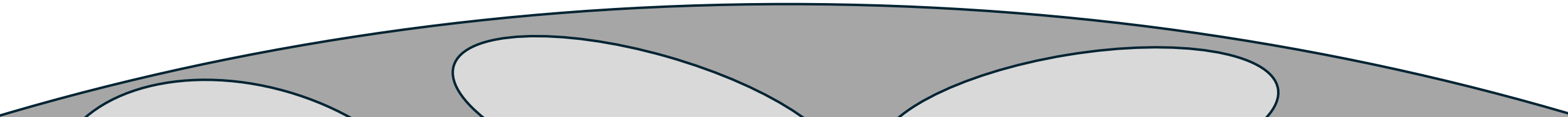


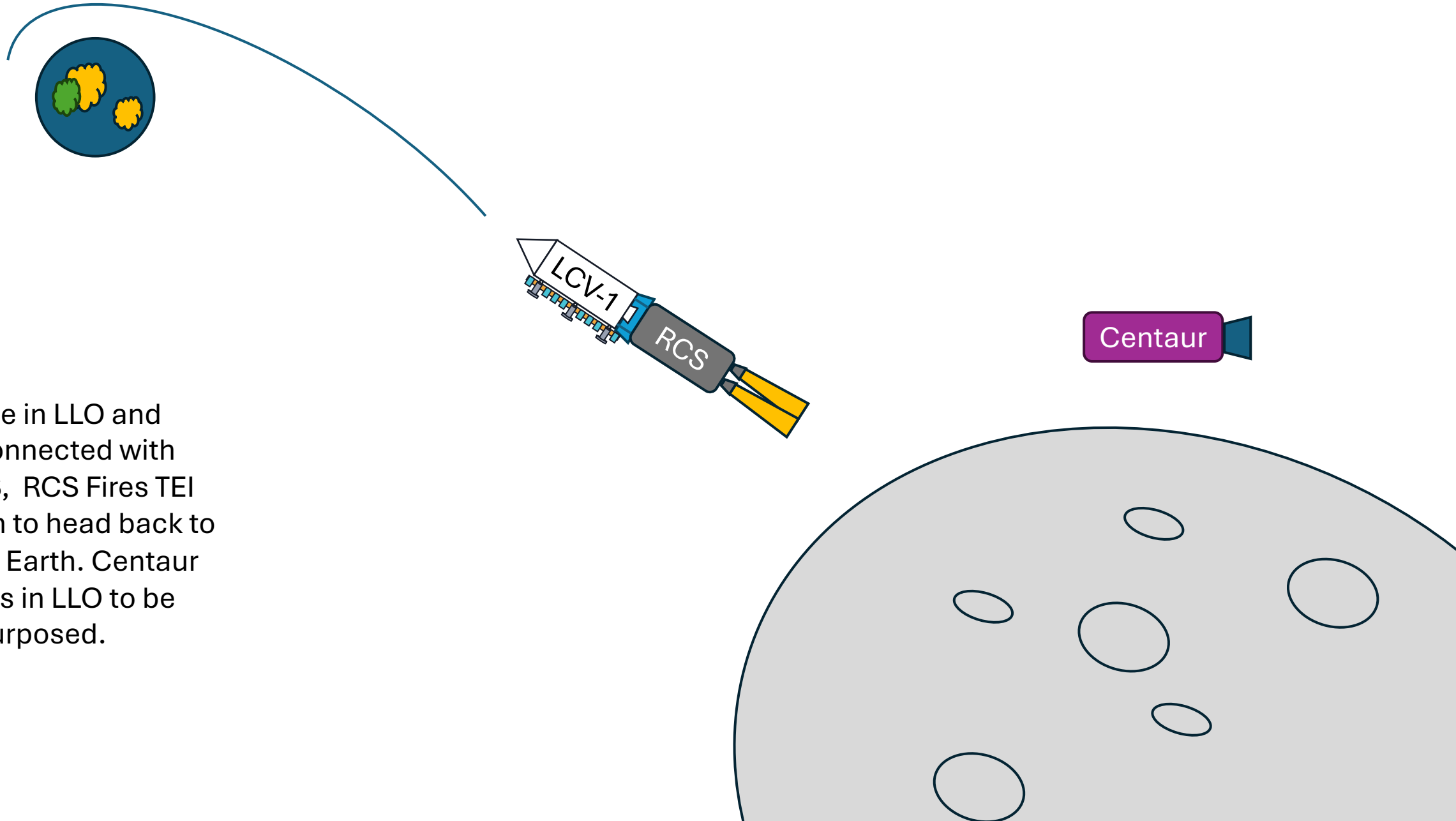


At 100 Meters above the Lunar surface, craft tilts Up to a 5 Degree Angle. Raptors fire to support lift from Lunar surface.

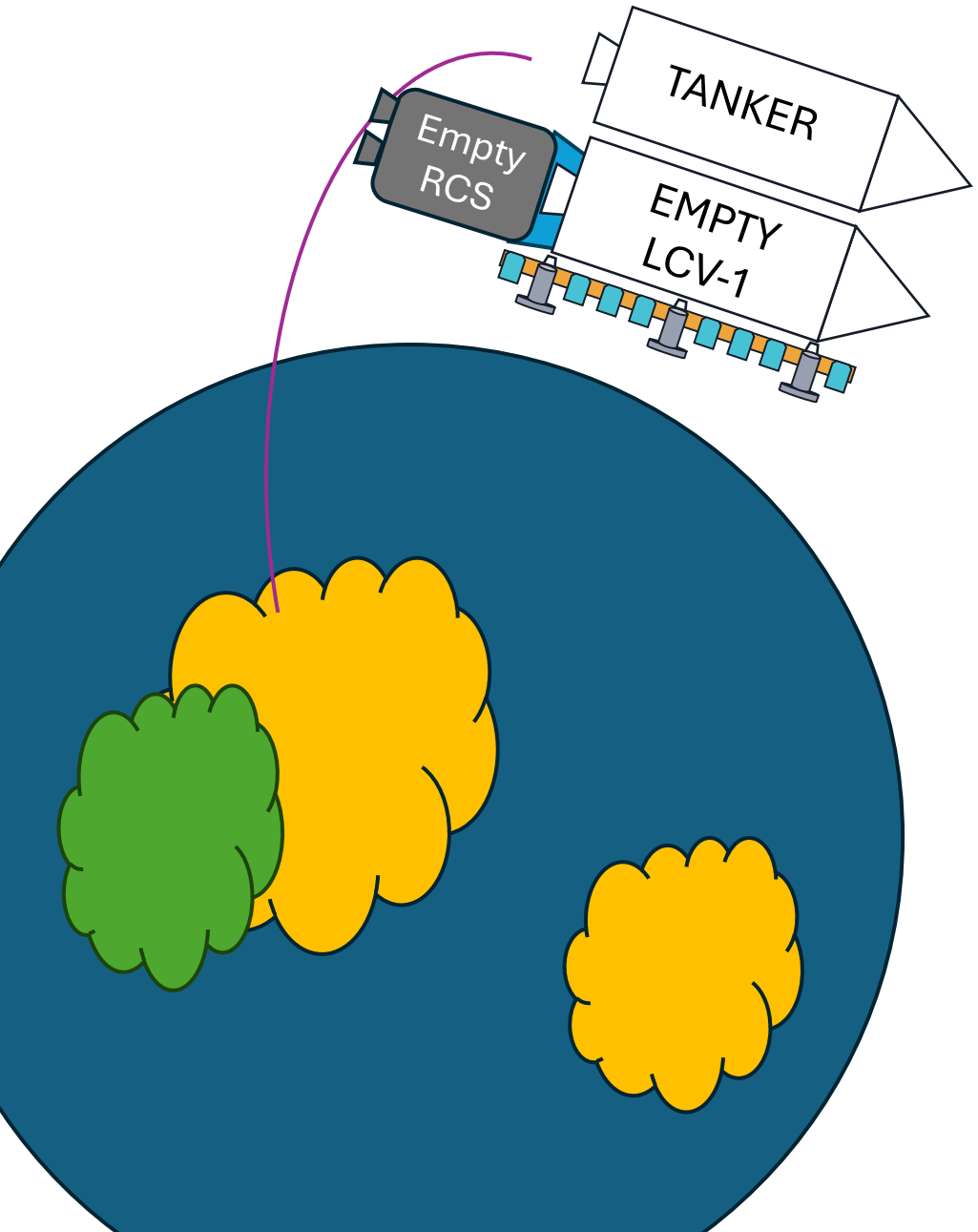


Rocket slowly climbs to vertical using Raptor engines and heads to LLO to join with RCS



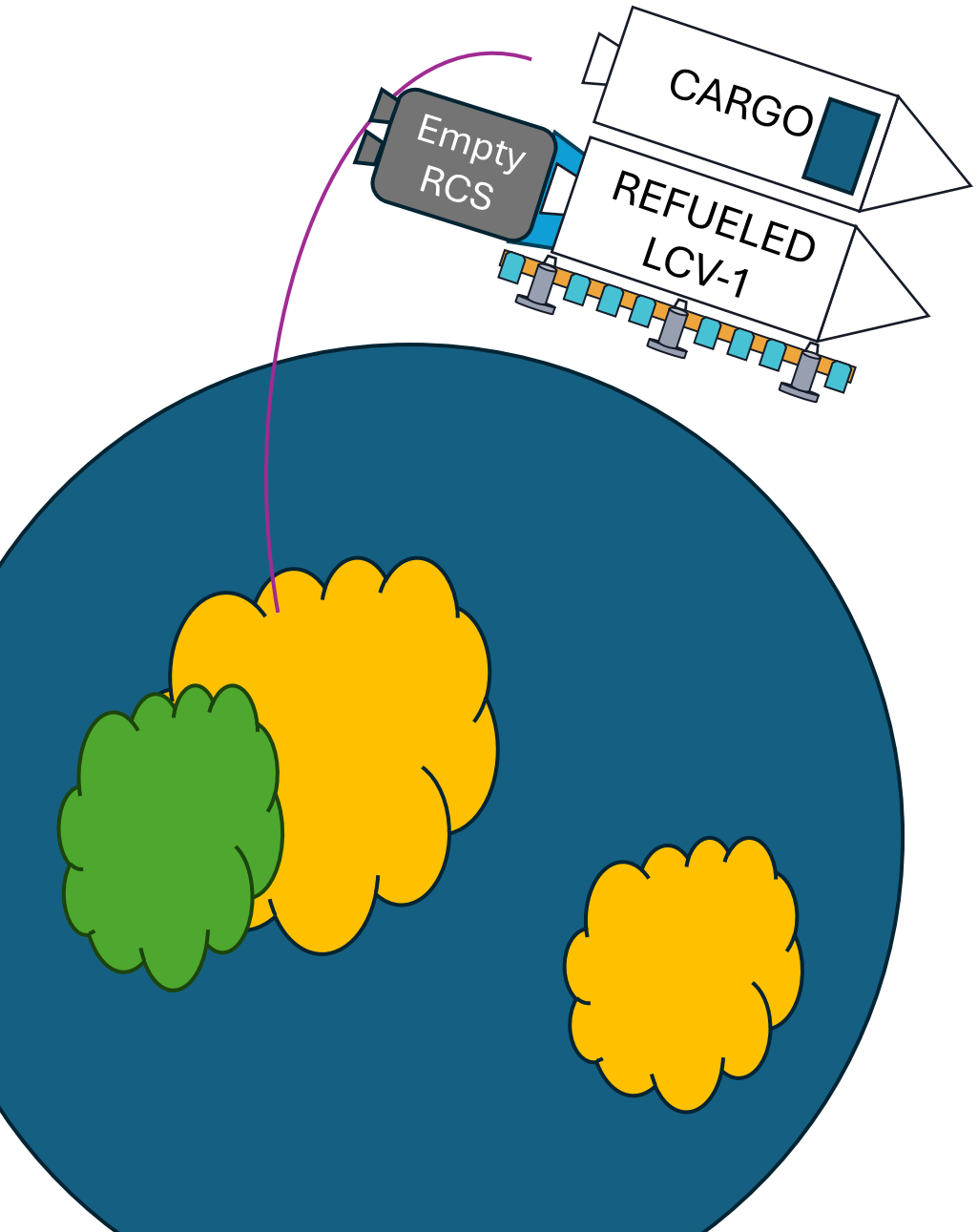


Once in LLO and reconnected with RCS, RCS Fires TEI burn to head back to LEO Earth. Centaur stays in LLO to be repurposed.



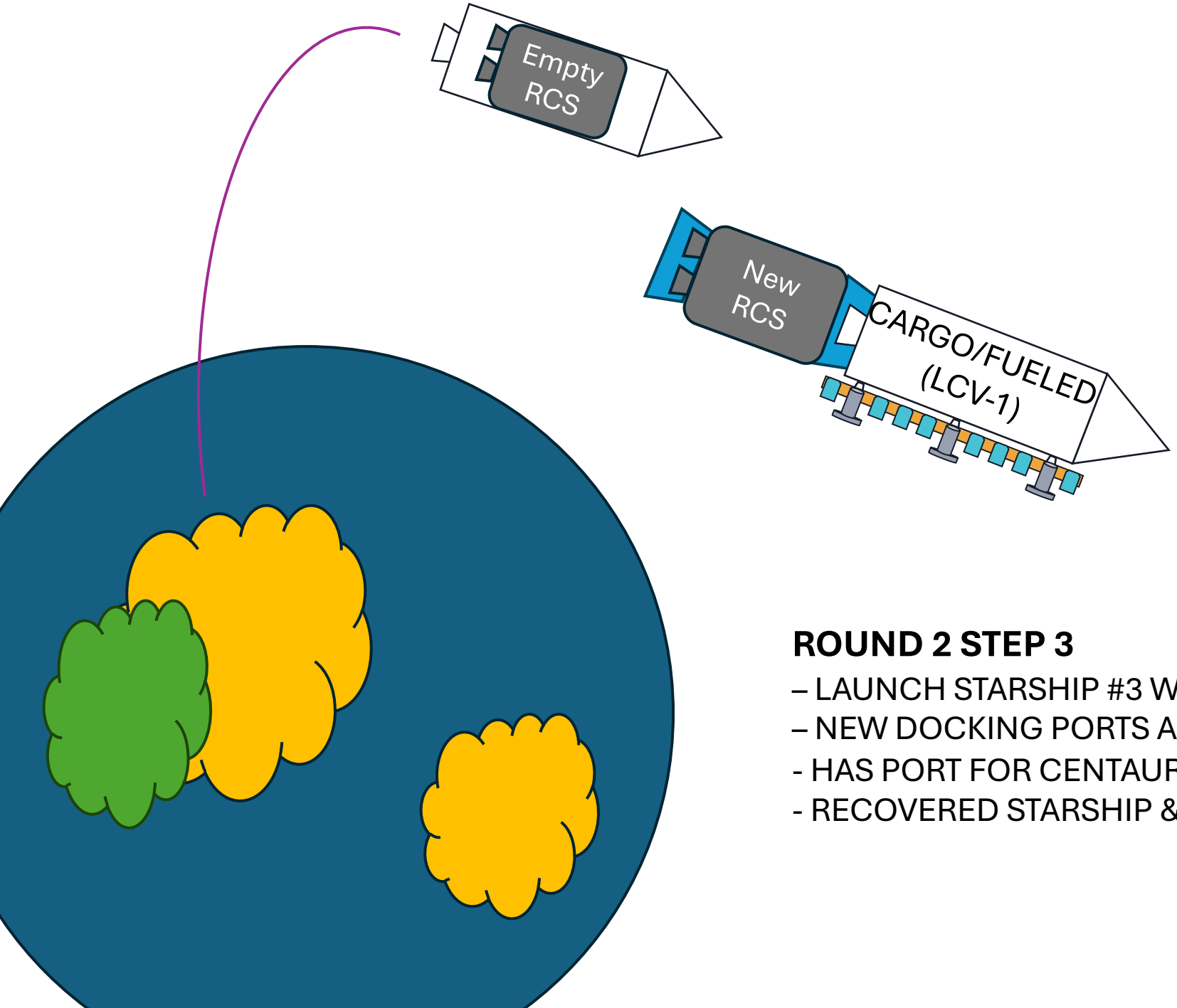
ROUND 2 STEP 1 – LAUNCH STARSHIP REFUEL TANKER

- REFUELS CARGO CARRIER IN LOW EARTH ORBIT.
- REFUELS NITRO FOR LCV-1 THRUSTERS
- EMPTY REFUEL TANKER RECOVERABLE



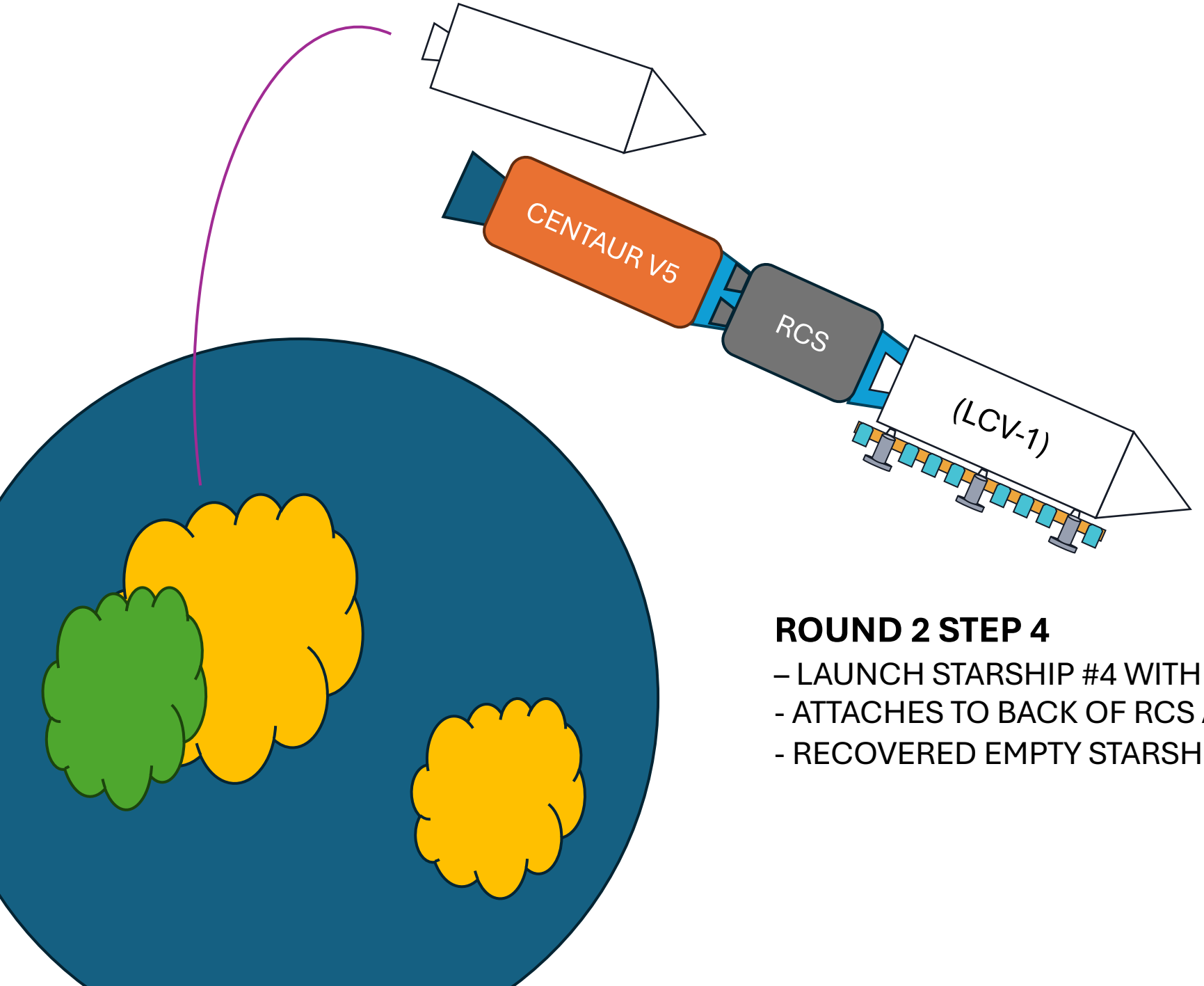
ROUND 2 STEP 2 – LAUNCH STARSHIP #2 CARGO HAULER

- REPLACES CARGO IN LOW EARTH ORBIT.
- RETURNS ANY RETRO MATERIALS
- CARGO HAULER RECOVERABLE



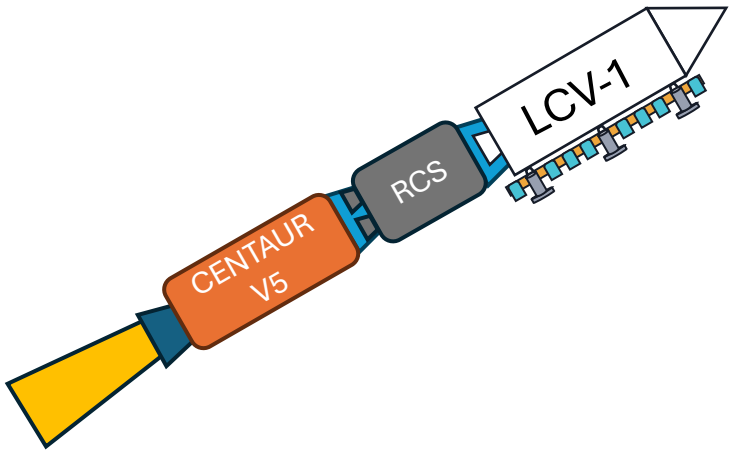
ROUND 2 STEP 3

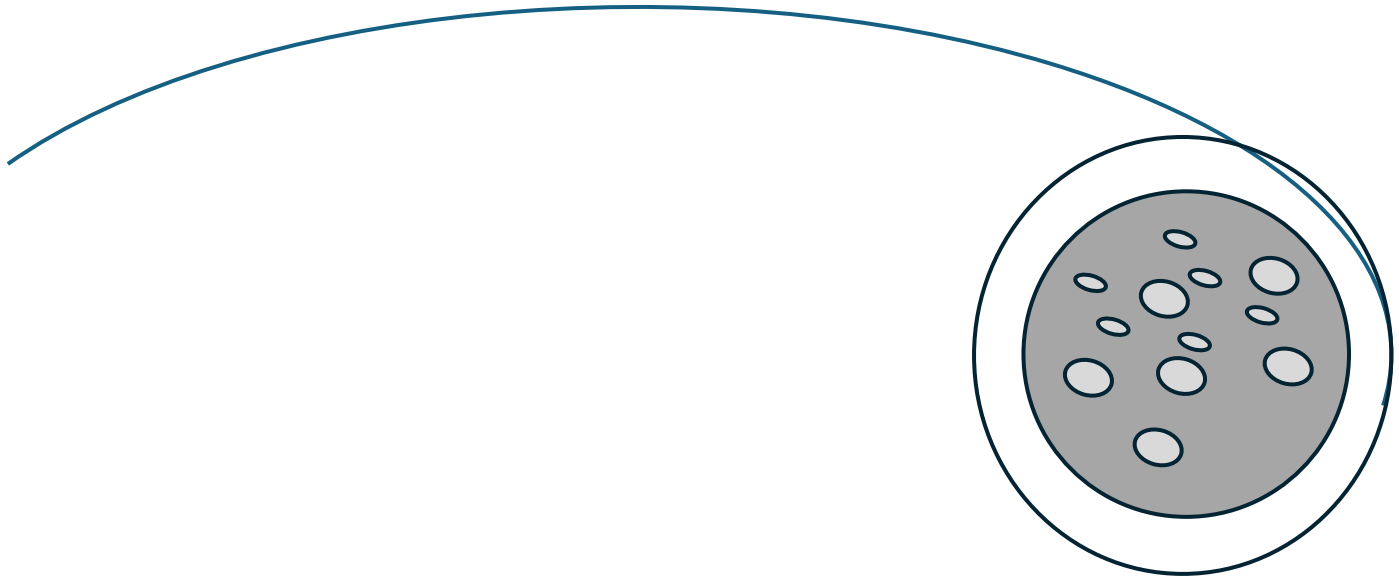
– LAUNCH STARSHIP #3 WITH NEW RCS THRUSTER MODULE
– NEW DOCKING PORTS AND ATTACHES TO REAR OF LCV-1
- HAS PORT FOR CENTAUR ATTACHMENT AT REAR
- RECOVERED STARSHIP & EMPTY RCS

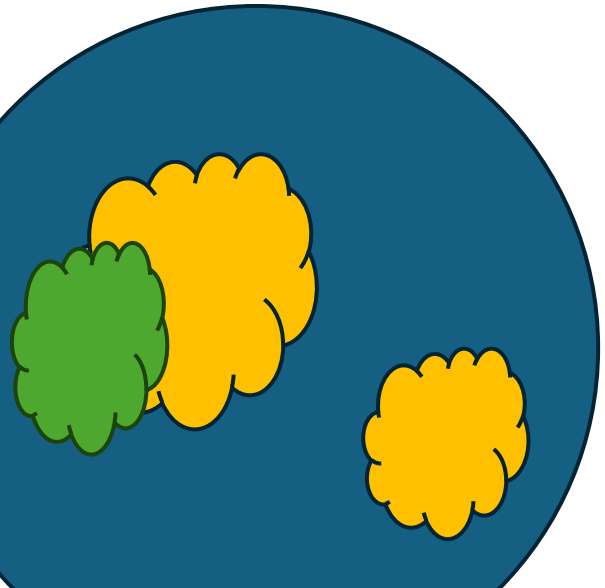


ROUND 2 STEP 4

– LAUNCH STARSHIP #4 WITH CENTAUR 5 MODULE
- ATTACHES TO BACK OF RCS ADAPTER
- RECOVERED EMPTY STARSHIP HAULER







ROUND 2 STEP 5 CENTAUR FIRES ENGINE FOR TLI BURN

- FULL CIS-LUNAR FREIGHT SYSTEM HEADS TO MOON TO LLO
- DUPLICATES ROUND 1 ACTIONS FROM THIS POINT

Selene Charon Cis-Lunar Freight System

PER-CYCLE RECURRING COST BY PHASE ($M)

Cost to fly ONE freight cycle. Excludes one-time Lighter capital (see Node Lifecycle).			
Line item	Phase A: Bootstrap (RPS expended, H-Frame flying)	Phase B: Pad-building (RPS recovered, H-Frame flying)	Phase C: Mature (RPS recovered, H-Frame retired)
Cargo run (Starship, reusable)	$90	$90	$90
Tanker (Starship, methalox)	$90	$90	$90
Centaur — launch (Starship)	$90	$90	$90
Centaur — expended hardware	$40	$40	$40
RPS — launch (Starship)	$90	-	-
RPS — hardware / refurbishment	$50	$15	$15
H-Frame — amortized renewal	$42	$42	-
N2 replenish	$3	$3	$3
Hypergolic propellant	$3	$3	$3
TOTAL per cycle (recurring)	$498	$373	$331

Selene Charon Cis-Lunar Freight System

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Selene Charon Cis-Lunar Freight System PER-CYCLE RECURRING COST BY PHASE ($M)

