Lunar Water Logistics

Shielding Humanity in Orbit
Updated with Finalized 1g Configuration and Expanded Delivery Architecture

Mission-Critical Objective

To make Aegis Station viable, we must deliver **3.3 million metric tons** of water to lunar orbit. This water forms a **3-meter-thick radiation shield** embedded directly in the structure of each of the station's **three rotating habitat rings**—protecting inhabitants from cosmic radiation and stabilizing the thermal environment.

The only viable source for this water is the Moon.

Shielding Requirements

Parameter	Value
Shield thickness per ring	3 meters
Total shielding volume	~3.3 million m^3
Water mass required	~3.3 million metric tons
Olympic pool equivalent	~1,320 swimming pools

The shield layer spans from radius **47 m to 50 m**, flush against the outer hull, enclosing each ring in a sealed, circulating water reservoir.

Water Source: Moon Only

- ❌ Earth-launched water
  Logistically possible, **financially catastrophic**

- ✅ Lunar-sourced water
  Technically feasible, cost-effective, infrastructure-enabling

All shielding water will be extracted and launched from the **lunar south pole**.
Earth-sourced alternatives are excluded from Aegis planning.

ISRU and Extraction Systems

Autonomous surface operations mine and process ice from permanently shadowed craters:

- Thermal augers and radiant heating rigs
- Vapor capture and cold-trap recondensation
- UV and particulate filtration
- Cryogenic surface tanks and loading cradles

Modules are **scalable**, **redundant**, and **operational year-round**.
Water extraction feeds directly into the launch queue.

Transport Architecture (Updated for 1g Configuration)

Parameter	Value
Number of tankers	45 autonomous craft
Payload per tanker	45 metric tons
Daily throughput	~2,025 tons/day
Full fill time	~4.5 years
Estimated trips	~73,333

Tankers are equipped with:

- Pressurized or cryogenic tanks
- Hybrid chemical-electric propulsion
- Autonomous guidance and rendezvous systems
- Modular cartridge interfaces for shield delivery

Deliveries are staggered and parallelized across all three rings using **dedicated docking arrays**.

Shield Fill Strategy

- Rings begin shielding **immediately** upon arrival in lunar orbit.

- Water is offloaded into **five evenly spaced fill ports per ring** via a **rotating vestibule and cartridge system**.
- Water flows inward, aided by centrifugal force, into **vertically stacked segments** of the shield layer.
- Rotation is maintained throughout the fill to preserve inertial balance.

⚠️ **No partial spin-up.** Rings are spun only when shield mass is near full to prevent slosh and imbalance.

Cost Estimate (Updated Baseline)

Metric	Value
Delivery cost per kg	~$150/kg
Total water mass	3.3 billion kg
Estimated total cost	~$495 billion USD

Includes:

- Surface mining and ISRU ops
- Tanker production and maintenance
- Orbital rendezvous and transfer ops
- Cartridge logistics and vestibule systems

Post-Shielding Applications

Once Aegis Station is filled, the infrastructure remains:

- Life support for future stations or deep space vessels
- LOX/LH_2 production for lunar and interplanetary missions
- Water resale to depots, visiting spacecraft, or Mars-bound vehicles
- Support for orbital depots, lunar manufacturing, or station expansions

Strategic Role of Aegis Station

- Anchors the first scalable lunar ISRU economy
- Justifies industrial-scale launch and water extraction
- Spurs private and public investment in cislunar infrastructure
- Becomes the world’s first fully shielded, long-term orbital habitat
- Establishes a replicable model for deep space stations wherever water is available

This isn’t just water.
It’s the foundation of civilization off Earth.
— A.S., Principal Architect