Lunar Water Tanker Dossier

The Backbone of Orbital Water Logistics and Shielding for Aegis Station

---

1. Overview

The Lunar Water Tanker is a specialized class of autonomous hauler designed to transport extracted water from the lunar surface to low lunar orbit (LLO), enabling large-scale radiation shielding for orbital habitats such as Aegis Station. These vehicles form the logistical spine of the Aegis water strategy, bridging lunar in-situ resource utilization (ISRU) with orbital infrastructure.

Each tanker is optimized for repeat flights, minimal maintenance, and high-volume throughput—making it the workhorse of cislunar development and the first economically viable step in transforming lunar ice into orbital infrastructure.

---

2. Design Summary

The tankers are built around a single mission profile: lift 15 metric tons of purified lunar water from a south polar mining facility to a designated orbit at 100 km altitude. Designed for high frequency operation and rapid turnaround, each unit is:

- Fully reusable
- Capable of multiple round-trips per day
- Autonomous or teleoperated from surface control hubs

Key specifications:

- **Payload capacity:** 15 metric tons (liquid water)
- **Dry mass:** ~8 metric tons
- **Turnaround time (surface to orbit and back):** 6–10 hours
- **Propulsion:** Lunar-optimized chemical (LOX/methane or LOX/LH2), with provisions for future electric boost stages
- **Docking & transfer:** Standardized orbital port with active thermal management and low-loss pumping

Physical Dimensions:

- **Tank Pod (Detachable):** ~3.5–5.0 m length × 2.0–2.5 m diameter, ~15 m^3, 15,000 kg payload

- **Booster Vehicle:** ~8–10 m total height, 2.5 m core diameter
- **Landing Footprint:** ~5–6 m wide
- **Docking Port:** Top-mounted or lateral interface

---

3. Fleet Operations

The operational fleet consists of **20 tankers**, staged and launched from a network of surface pads near the lunar south pole. These vehicles operate on a synchronized schedule to maintain **300 metric tons of water delivery per day** into LLO.

Operational principles:

- Continuous rotation: 24/7 ops with automated queuing and refueling
- Hot-swappable tanks: Surface rigs fill pre-loaded tanks to minimize downtime
- Orbital delivery: Water is pumped into Aegis Station's shield layer as soon as hull sections are sealed

---

4. Subsystems & Support

Propulsion

Tankers use high-efficiency, pressure-fed or pump-fed engines optimized for lunar gravity. All designs prioritize reliability, throttleability, and long nozzle expansion ratios for vacuum performance.

Guidance & Autonomy

Each vehicle is equipped with:

- Lunar surface-to-orbit navigation
- Obstacle avoidance and precision landing
- Onboard redundancy with failover to remote manual override

Water Handling

Tanks are radiation-shielded and insulated to prevent ice crystallization or thermal expansion loss. In orbit, active heaters and transfer pumps maintain flow rates during docking.

---

5. Delivery Timeline & Capacity

The 20-tanker fleet is capable of lifting **300 metric tons of water per day** to low lunar orbit. At that rate, the **Aegis Station shielding system**—which requires ~408,000 metric tons—can be fully filled in approximately **3.7 years**.

Delivery prioritization:

- **Phase 1:** Central hub and Ring 1 shielding (for crew habitation)
- **Phase 2:** Rings 2 and 3
- **Phase 3:** Orbital water storage and backup reserves

---

6. Long-Term Vision

Once Aegis Station's shielding layer is complete, the tanker fleet transitions to sustaining an orbital water economy. This includes not only maintenance deliveries to Aegis, but also the establishment of **dedicated orbital depots** to serve other customers and vehicles.

Future applications include:

- Fuel depot provisioning (LOX/LH2 cracking)
- Shielding for additional orbital habitats
- Fluid supply for orbital agriculture and closed-loop life support
- Water transfers for deep space missions and cargo routes

Initial depots would be stationed in **low lunar orbit**, with later expansion to **libration points and cislunar transfer hubs**.

Future tanker variants may incorporate:

- ISRU refueling capability
- Inter-orbital range beyond LLO
- Expanded payload profiles for non-water cargo