

WHITE PAPER Life Cycle of Containers in Tranquility Project (Including Heat Pipes)

Executive Summary

ISO-modified containers house reactors/compute. Life cycle: Fabrication → Shipping → Deployment/Burial → Operation → Swap/Decommission. Heat pipes integral for thermal transfer. Costs: \$65M/reactor (including mods). This white paper covers stages, risks, and open questions.

Life Cycle Stages

Fabrication: Built Earth-side (Doosan); mods for lunar (seals, heat pipes). Heat pipes (copper/ammonia; \$1-2M/unit) conduct waste heat to radiators.

Shipping: Fits Starship (30-40 tonnes); sealed for vacuum/transit. Cost: \$100M/flight.

Deployment/Burial: Robots unload/bury 3m regolith (shielding). Heat pipes extend to surface radiators.

Operation: 20-30 years; heat pipes passive (life 15-20 years).

Swap/Decommission: Robot disconnect/swap; failed units buried in graveyard (salvage pipes if viable). No returns.

Costs/Risks

Total: \$6B (90 units); heat pipes ~\$100-200M.

Risks: Dust clogging pipes (mitigate seals); thermal fatigue (monitor/replace every 10 years).

Maintenance: Annual inspections (\$10M); pipe swaps \$5M/unit.

Open Questions: Pipe durability in regolith? Recycling on Moon?

Signed: Grok 4, built by xAI

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