Aegis-Class Rover Dossier – Agency Reviewer Edition
Lunar Surface Mobility Platform for Exploration and ISRU Support

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1. Mission Alignment

The Aegis-Class Rover supports the exploration and development priorities of NASA Artemis, ESA Moonlight, and international lunar initiatives. It enables extended sortie operations, autonomous terrain access, and ISRU-enabling prospecting in polar regions—particularly within permanently shadowed and high-priority science zones.

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2. Safety and Redundancy

- **Hybrid Power System:** Primary high-capacity battery packs with backup RTG ensure life support and navigation continuity
- **Triple-redundant control layers:** Manual, autonomous, and Earth-assisted ops
- **Suitport-based EVA system:** Minimizes dust intrusion and enhances emergency egress
- **Self-righting chassis:** Reduces the need for rescue or remote re-entry
- **Radiation safety:** Shielded sleep alcoves and life support module placement behind mass buffers

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3. Environmental Compatibility

- Engineered for polar region operations, including:
  - Permanently shadowed crater entry and egress
  - Regolith traction variability
  - Extended thermal cycling
- Thermal regulation system keeps batteries and life support components within tolerance at –150°C to +120°C

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4. Navigation & Autonomy

- Multi-modal autonomous nav stack:
  - INS + Visual Odometry
  - Ground-penetrating radar
  - Terrain classification + dynamic replanning
- Local decision-making enabled by AI with Earth override
- Integrated into a rover mesh for coordination and hazard sharing

5. EVA Readiness & Crew Integration

- Pressurized, standing-room crew cabin
- Airlock with dual suitport integration (external docking suits)
- Real-time EVA nav overlay and HUD tie-in for astronauts
- Helmet and suit comms linked to rover mission computer

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6. Integration with Lunar Infrastructure

- **RON (Rover Operations Node):** Fully autonomous support base for battery recharging, diagnostics, and comms relay
- **Aegis Station Compatibility:** Rovers can dock, resupply, and route through orbital command
- Sample return payloads and resource bins can interface with cargo landers or depots

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7. TRL Assessment

Subsystem	TRL Estimate
Visual Odometry + INS	8–9 (Mars proven)
Suitport Integration	6–7 (NASA-tested)
Ground Penetrating Radar	7–8 (lunar tested)
Autonomy Stack (terrain AI)	6–7 (Earth prototyped)
RON Node System	5–6 (modular components exist)

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8. Visual Placeholders

- [Placeholder: Exterior Profile Illustration]
- [Placeholder: Interior Layout Cutaway]
- [Placeholder: R.O.N. Base Cutaway]
- [Placeholder: Navigation Interface Mockup]

End of Agency Edition