

NASA–Blue Origin Integrated Planning, Logistics, and Test Configuration for the MK-1 Moon Lander Thermal Vacuum Test Campaign

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Abstract:

In the spring of 2026, NASA’s Johnson Space Center (JSC) conducted a critical thermal vacuum (TVAC) test campaign for the Blue Origin Blue Moon Mark-1 (MK-1) lander. Utilizing the Space Act Agreement process, this project marked the first lunar lander testing in JSC’s Space Environmental Simulations Facility since the Apollo program. This paper provides a comprehensive evaluation of the planning, logistics, and technical integration required to host a vehicle of this scale within Chamber A.

The technical preparation began in August 2024, followed by a series of technical interchange meetings at JSC and a critical design review in September 2024. The Interface Requirements Control Documents were agreed by both parties in January 2025, and the Facility Readiness Review was presented in October 2025. To support the MK-1 mission, JSC engineered a custom test hardware suite, including a 35' x 20.5' x 31' heater cage, dedicated power systems, and specialized sensor arrays. Following a full facility functional test in November 2025, JSC validated its readiness to simulate the extreme lunar thermal environment.

Furthermore, this paper details the complex multi-modal mobilization strategy required to transport the MK-1 from Merritt Island, Florida, to Houston, Texas. The logistics involved ocean-going vessel transit, a ship-to-barge transfer for NASA’s direct water access, and rapid integration into a Class 8 cleanroom within 48 hours of arrival followed by Chamber integration. By documenting the coordination between NASA and Blue Origin, this study serves as a roadmap for large-scale commercial hardware integration at federal facilities and confirms the operational capability of Chamber A for the next generation of lunar exploration.

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