ROBOTIC LUNAR LANDERS FOR SCIENCE AND EXPLORATION. B. A. Cohen[1], L. A. Hill[1], J. A. Bassler[1], D. G. Chavers, M. S. Hammond[1], D. W. Harris[1], K W. Kirby[2], B. J. Morse[2], B. D. Mulac[1], and C. L. B. Reed[2]. [1]NASA Marshall Space Flight Center, Huntsville AL 35812 (Barbara.A.Cohen@nasa.gov); [2]The Johns Hopkins University Applied Physics Laboratory, Laurel MD 20723.

NASA Marshall Space Flight Center and The Johns Hopkins University Applied Physics Laboratory has been conducting mission studies and performing risk reduction activities for NASA's robotic lunar lander flight projects. In 2005, the Robotic Lunar Exploration Program Mission #2 (RLEP-2) was selected as a Exploration Systems Mission Directorate precursor robotic lunar lander mission to demonstrate precision landing and definitively determine if there was water ice at the lunar poles; however, this project was canceled. Since 2008, the team has been supporting NASA's Science Mission Directorate designing small lunar robotic landers for diverse science missions. The primary emphasis has been to establish anchor nodes of the International Lunar Network (ILN), a network of lunar science stations envisioned to be emplaced by multiple nations. This network would consist of multiple landers carrying instruments to address the geophysical characteristics and evolution of the moon. Additional mission studies have been conducted to support other objectives of the lunar science community and extensive risk reduction design and testing has been performed to advance the design of the lander system and reduce development risk for flight projects. This paper describes the current status of the robotic lunar mission studies that have been conducted by the MSFC/APL Robotic Lunar Lander Development team, including the ILN Anchor Nodes mission. In addition, the results to date of the lunar lander development risk reduction efforts including high pressure propulsion system testing, structure and mechanism development and testing, long cycle time battery testing and combined GN&C and avionics testing will be addressed. The most visible elements of the risk reduction program are two autonomous lander test articles: a compressed air system with limited flight durations and a second version using hydrogen peroxide propellant to achieve significantly longer flight times and the ability to more fully exercise flight sensors and algorithms. Robotic Lunar Lander design and development will have significant feed-forward to other missions to the Moon and, indeed, to other airless bodies such as Mercury, asteroids, and Europa, to which similar science and exploration objectives are applicable.