

HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)
Near Term Strategies for Lunar Surface Infrastructure (1)

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NASA EPSCOR CAN 2009: INTEGRATED STRATEGIES FOR THE HUMAN EXPLORATION OF
THE MOON AND MARS

Abstract

In order to overcome the challenges of human settlement in other environments outside Earth, it is necessary to gain a deeper understanding of numerous system-wide and operational regarding habitation and surface operation techniques. The NASA EPSCoR CAN 2009 grant was obtained by the Human Spaceflight Laboratory (HSL) at the Department of Space Studies from the University of North Dakota (UND). Its main objective is to develop a lunar base scenario that shall consist of two electrical rovers, one of them pressurized, and an inflatable lunar habitat capable of housing four astronauts.

The University of North Dakota (UND) Human Spaceflight Lab (HSL) is working in the North Dakota Planetary Exploration Initiative. The Initiative is an analog project in which an autonomous planetary base (for Lunar and Martian missions) is being built as five separate components: an inflatable habitat, pressurized electric rover (PER), space suits, space suit ports connecting the suits to the rover, and a docking mechanism linking the rover to the habitat. When all components are combined, the UND developed full pressure NDX-2 space suits will be docked to the rover which will be docked to the habitat. All three main components will be kept at the same atmospheric pressure and composition, to prove that the concept of interconnected components will work on an extra-planetary surface. The pressurized rover was built by the UND HSL during the summer of 2010 and tested in 2011. During the summer of 2011 the second integration phase of the NDX-2 components was conducted. Pressurization tests were also performed. The team is finishing the internal design and construction of the inflatable habitat that will consist of a rigid frame covered by an inflatable bladder. It will include four sleeping compartments, where the subjects will be able to rest and stow their personal belongings, a small galley/dining room, a bathroom and laboratory space. The integration of these subsystems will be tested in the Badlands of North Dakota in April 2013. Preliminary results and construction details will be presented.