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PLUNGER POLAR LUNA UNDERGROUND ENERGY RESERVOIR

Abstract

Northrop Grumman (NG) proposes an integrated thermal system which maximizes use of In-Situ Resources on the Moon and provides heating and cooling capability as a service to customers. Proposed lunar systems require significant heat dissipation or generation depending on location, duty cycle and function. PLUNGER services include solar collection, heat transportation, energy storage, heat rejection, and may include heat to electricity conversion. This system also includes switches to direct heat to or remove heat from specific users, stopping collection when the surface is in darkness. PLUNGER utilizes a solar concentrator, made of glass manufactured from lunar regolith, to collect, generate and focus the maximum amount of heat on the production of lunar fuel, while augmenting the heat collection from lunar systems. The PLUNGER loop heat pipe system, using sintered wicks and thermal switches transport that heat to a central storage system consisting of ice/water-based heat exchangers. Buried in the insulating lunar regolith, this heat "well" with sintered walls will contain and store the heat. Ice mined from the lunar surface is fed into the well. This stored energy can remain as heat, be converted to electricity using a Stirling or steam engine. Lastly, the heat can be utilized to melt volatiles for fuel processing.