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STRATEGIC DEFENSE INITIATIVE IMPACTS ON MANNED MARS MISSIONS

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ABSTRACT

Research Conducted on a strategic defense system with space based elements may provide key components of systems necessary for Manned Mars Missions. Three areas of impact are Space Logistics, Space Power, and Supporting Systems. These are discussed briefly in this paper.

SPACE LOGISTICS

Emplacement, operation and maintenance of a reliable strategic defense system will necessitate enhancements in space logistics. These include the need to emplace payloads in excess of 100 MT (220,000 lbs.) in LEO, as well as sensor and weapons platforms in a variety of orbits (LEO, 1000 km, 10,000 km, GEO, 3xGEO). For example, boost phase surveillance and interception may require sensor platforms in GEO of 10 MT. The space logistics system must provide a capability to enhance and maintain these payloads. The SDI research effort has the stated goal of cost reduction to $300/lb for payloads into LEO (as a necessary prerequisite for practical defense systems). This will necessitate the development of a new generation of heavy lift launch vehicles. Such technologies will impact the manned Mars mission by providing the means to lift the large (500 klb -> 3 Mlb) LEO systems described with fewer launches and lower costs for the overall mission. In addition, on orbit logistical service may provide a relevant experience base for system buildup in LEO. The advanced power systems developed will also contribute to advanced electric propulsion for interplanetary orbital transfer.

SPACE POWER

The SDI research effort in power is driven by the need to provide standby, operational, and sprint power to weapons systems and operational power to sensor platforms. Mid-course discrimination sensor concepts involve power levels of 1-5 MW electric. Weapons concepts currently under investigation necessitate sprint power (1000's of seconds) operation at 1 - 100 MW. Systems being examined to provide these power levels include advanced chemical and nuclear options. In addition to increased

power levels, advances must be made in power conditioning, precisely delivering and distributing the power to its eventual point of use at the required rate.

Manned Mars mission concepts described will be greatly influenced by the development of 1-5 MW (electric) systems for use in propulsion and surface activity. The existence of the SDI technology base will enhance the attractiveness of a decision to proceed with a Mars program focused on repeated visits and building of a permenent base.

SUPPORTING SYSTEMS

Advanced laser pointing and attitude determination systems, multi-purpose laser systems for laser communications, welding repair tasks, and varied automation and robotics systems required for on-orbit inspection and maintenance may find application on manned Mars missions.