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LOW-EARTH-ORBIT TO LOW-LUNAR-ORBIT LASER FREIGHTER

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The objective of this mission study was to compare laser propulsion to chemical LOX/H2 and nuclear electric propulsion for the specific mission of delivering a 144-metric ton lunar base from low-Earth-orbit to low-lunar-orbit. The basis of comparison was total mass in low-Earth-orbit needed to accomplish this mission. The Office of Exploration approach to establishing the lunar base was to use two vehicles: a nuclear electric propulsion (NEP) vehicle to deliver cargo and a chemical vehicle to deliver humans. The NEP vehicle was reactor driven with a vehicle dry mass of 125 metric tons. The Office of Exploration study did not use chemical propulsion for cargo, but in the present study it was used for cargo for comparison to laser propulsion.

This mission study assumes a high-power laser, either nuclear or solar electric-driven diode laser, is in orbit around Earth, beaming power to a laser propulsion vehicle. Laser power is only used for the LEO escape burn, other much lower-power burns are done with LOX/H2.