AQUEOUS SEDIMENTARY DEPOSITS IN HOLDEN CRATER: LANDING SITE FOR THE MARS SCIENCE LABORATORY. R. P. Irwin III and J. A. Grant, National Air and Space Museum, Smithsonian Institution, MRC 315, 6th St. at Independence Ave. SW, Washington DC 20013-7012, irwinr@si.edu, grantj@si.edu.

Site Description: Holden crater (26°S, 34°W, 155 km diameter, Fig. 1) preserves a diverse assemblage of sedimentary deposits and is an accessible and scientifically compelling target for the Mars Science Laboratory. The crater retains a central peak, rugged rim, and secondary crater chains, suggesting that it formed near the Noachian/Hesperian (N/H) transition [1,2]. Holden overlies the margin of a 300-km-diameter basin and interrupts the formerly continuous Uzboi-Ladon-Margaritifer meso-scale outflow system, which extended from the Argyre rim at least to Margaritifer/Iani Chaotes [1,3]. Later flows of Uzboi Vallis, possibly supplied by its Nirgal Vallis tributary, incised Holden's southwestern rim. This discharge produced a broad fan [1] with high thermal inertia that radiates from the entrance breach. Water ponded to at least 50 m depth [1,2]. Later, interior gullies incised deep alcoves into more elevated sections of the crater rim, forming a now deflated bajada complex along the western wall and individual alluvial fans elsewhere [4,5]. Ponding associated with the youngest fans created a sharply defined area of low thermal inertia near the crater's center (Fig. 1), which may represent a low-energy depositional setting. Groundwater recharge in Holden crater likely contributed to late stage discharge along Ladon Valles to the east [1]. Evidence for multiple stages of discharge into Holden crater, incipient fan segmentation and fan-head entrenchment, and multiple frontal scarps bounding some fans [2,4] all point to an extended record of preserved deposits that formed under varying climate and erosional base level.

Science Objectives: The proposed landing ellipse centered at 26.4°S, 34.7°W (Fig. 1) is within driving range of deposits emplaced in a variety of quiescent depositional settings (Fig. 2). Perhaps the most intruiging of these are continuous, finely layered deposits just south of the proposed ellipse and channel bed materials that occur within the area (Fig. 2). A 2.5-km crater at the southern edge of the landing area may have excavated these materials and distributed them as ejecta within the ellipse. Detailed sedimentary analysis of these deposits would provide important insights into environmental conditions of the N/H transition and enable assessment of potential habitability. These materials preserve a record of the duration and variability of fluvial activity, weathering and sediment transport processes, and aqueous geochemistry.

Engineering Constraints: This landing zone satisfies all engineering constraints (Table 1).

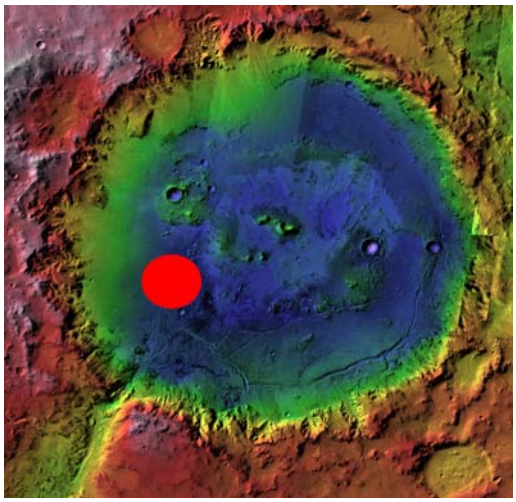

Figure 1. Holden crater with 20-km red landing zone, in THEMIS day IR mosaic colored with topography.

Figure 2. MOC E0102248, inverted channels (left), light-toned layered deposits (right) near landing zone. Resolution 3.44 m/pixel, 2.4 km across, north at top.

Constraint	Limit	Observation
Latitude	±60°	–26.4°
Elevation (m)	2000 or –2000	–2230 to –2330
2–5 km slope	<3°	<1°
Thermal inertia	>100 (SI unit)	288–504 (SI unit)
Rocks	~10%	sandy to rocky?

Table 1. Engineering constraints and available data.

References: [1] Grant J. A. and Parker T. J. (2002) *JGR*, *107*(E9), doi:10.1029/2001JE001678. [2] Irwin R. P. III et al. (2005) *JGR*, *110*, E12S15, doi:10.1029/2005JE002460. [3] Parker T. J. (1985) Master's thesis, Calif. State Univ., Los Angeles. [4] Moore J. M. and Howard A. D. (2005) *JGR*, *110*, E04005, doi:10.1029/2004JE002352. [5] Pondrelli M. et al. (2005) *JGR*, *110*, E04016, doi:10.1029/ 2004JE002335.