

## A Scenario For Handling Returned Mars Samples

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Astrobiology focuses on the study of life in the universe including the search for extraterrestrial life. An early opportunity to address this objective will come when Mars soil samples are returned to Earth robotically on a Mars Sample Return (MSR) mission. Such a mission could be launched in 2005 and return samples to Earth in 2008. Since a prime objective will be to search for life (extant or extinct) and indicators of life, a mission requirement will be to return a Martian sample that is free from terrestrial biological or organic contamination. In 1997, the National Academy of Sciences (NAS) issued a report dealing with planetary protection guidelines for a MSR mission. It concluded that although the chance for extant life on Mars is quite small, it is not zero, and that samples returned from Mars be considered hazardous until proven otherwise. This results in a mission requirement that the samples be contained so as to prevent introducing uncontained Martian materials into the Earths biosphere.

Given these two mission requirements, a scenario for handling Mars samples will be analyzed. It will include: biological and chemical cleanliness guidelines for lander components contacting the sample; sample containment; transfer to the return vehicle without contamination by uncontained Mars materials; sample environmental conditions and integrity of the seal; Earth entry, retrieval, and transfer; properties of the containment facility; analysis of samples for extant life and biomarkers; characteristics of a quarantine protocol to determine if the sample poses a hazard; sterilization of samples for early release from containment; criteria for release of samples to a curation facility for controlled distribution to the scientific community.