

# Planetary Protection Categories and Requirements



Planetary Protection addresses microbial contamination of the solar system by spacecraft that we launch from Earth (forward contamination). This contamination must be prevented in order to preserve the integrity of exploring the solar system; celestial bodies that may have once held an environment suitable for life (e.g., Mars and outer planet icy bodies) are especially vulnerable. Likewise, extraterrestrial contamination of the Earth and Moon (backward contamination), by way of sample return missions, must be prevented. We must approach with caution and preparedness in bringing unknown and potentially dangerous biological materials back to Earth.

To address both types of contamination concerns, a Planetary Protection category for each mission is assigned according to the combination of the type of encounter a spacecraft may have and the nature of its destination (e.g., lander and moon). If a target body has the potential to support life, a spacecraft going there must undergo stringent cleaning and sterilization processes, and greater operating restrictions. Likewise, samples from planetary bodies that have the potential to support life must be sealed and sterilized prior to Earth-entry.

It is anticipated that the Psyche mission will be a Category II.

Mission Type	Types of Planetary Bodies	Types of Bodies	Category
<b>Flyby, Orbiter, Lander</b>	Planetary Protection requirements not obligated as there is no origin-of-life interest.	Undifferentiated, metamorphosed asteroids	I
<b>Flyby, Orbiter, Lander</b>	Bodies where there is an origin-of-life interest and rare chance that contamination carried by a spacecraft could jeopardize future missions.	Venus; Moon; Comets; Asteroids; Jupiter; Saturn	II
<b>Flyby, Orbiter</b>	Bodies where there is an origin-of-life interest and there is a significant chance that contamination carried by a spacecraft could jeopardize future missions. PP documentation and implementation required.	Mars; Europa; Enceladus	III
<b>Lander, Probe</b>	Bodies where there is an origin-of-life interest and there is a significant chance that contamination carried by a spacecraft could jeopardize future missions. PP documentation and implementation required. Category IV missions for Mars are subdivided into IVa, IVb, and IVc.	Mars; Europa; Enceladus	IV
<b>Restricted Earth-Return</b>	Earth-return missions from bodies with significant risk of backward contamination. Requires containment of any unsterilized samples collected and returned to Earth.	Mars; Europa; Enceladus	V (restricted)
<b>Unrestricted Earth-Return</b>	Earth-return missions from bodies "deemed by scientific opinion to have no indigenous life forms." Category I and II PP requirements suffice.	Venus, Moon	V (unrestricted)