



Overview of Planetary Protection

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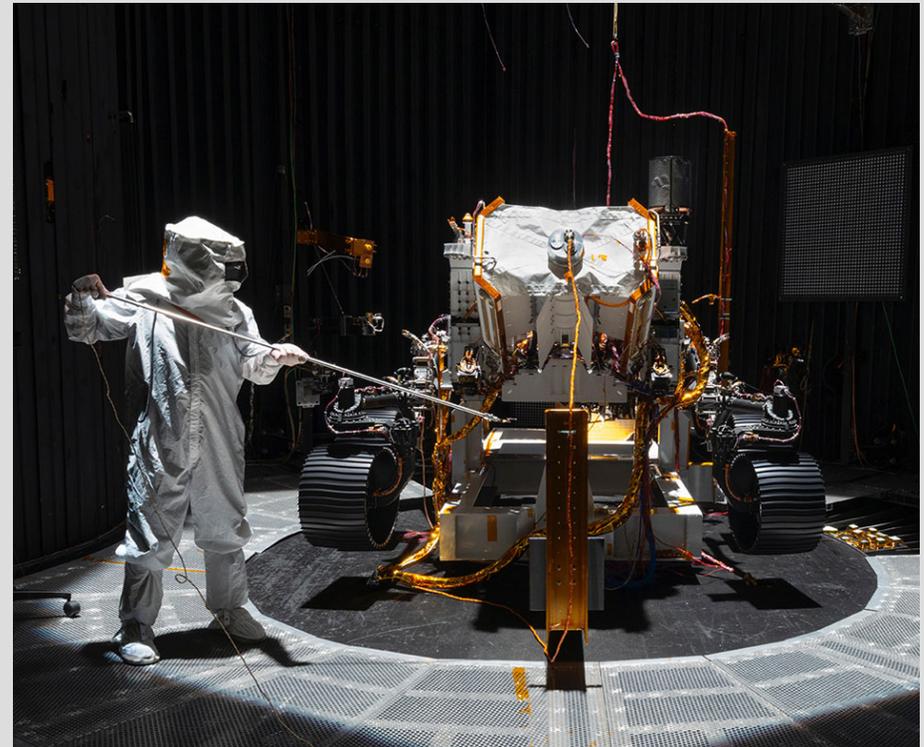
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Planetary Protection Goals

Limit transfer of terrestrial life to other habitable planetary bodies (forward contamination)

Prevent release of any potentially harmful, extraterrestrial biological material to Earth's biosphere during spacecraft return or sample handling (backward contamination)



An engineer uses a solar intensity probe to measure artificial sunlight reaching different portions of the Mars 2020 rover.

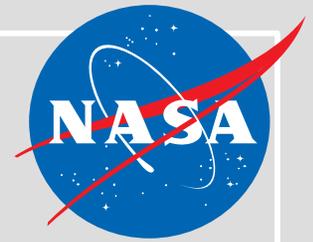
<https://mars.nasa.gov/resources/24676/a-light-touch-required-for-nasas-mars-2020-rover/>



ENDURING AUTHORITY OF OUTER SPACE TREATY (1967)

Article IX. States Parties to the Treaty shall pursue studies of outer space, including the Moon and other celestial bodies, and conduct exploration of them **so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter** and, where necessary, shall adopt appropriate measures for this purpose.

Article VI. States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty.



Lethality of Hardy Terrestrial Organisms

Table 3. Experimental D-values of *Bacillus* ATCC 29669 spores

Bacillus ATCC 29669 Spores							
		Ambient Humidity			Controlled Humidity		
Temp.(°C)	Units	D-value	St. dev.	3 sigma D-value	D-value	St. dev.	3 sigma D-value
115^a	Days	3.35	NA	NA	1.92	NA	NA
125	hr.	18.8	3.79	22.6	10.10	0.26	11.0
150	Min	66.4	3.96	80.8	40.0	1.14	44.1
170	Min	9.76	0.423	11.3	4.90	4.90	5.39
200	Sec	20.5	0.660	22.9	17.8	0.46	19.5

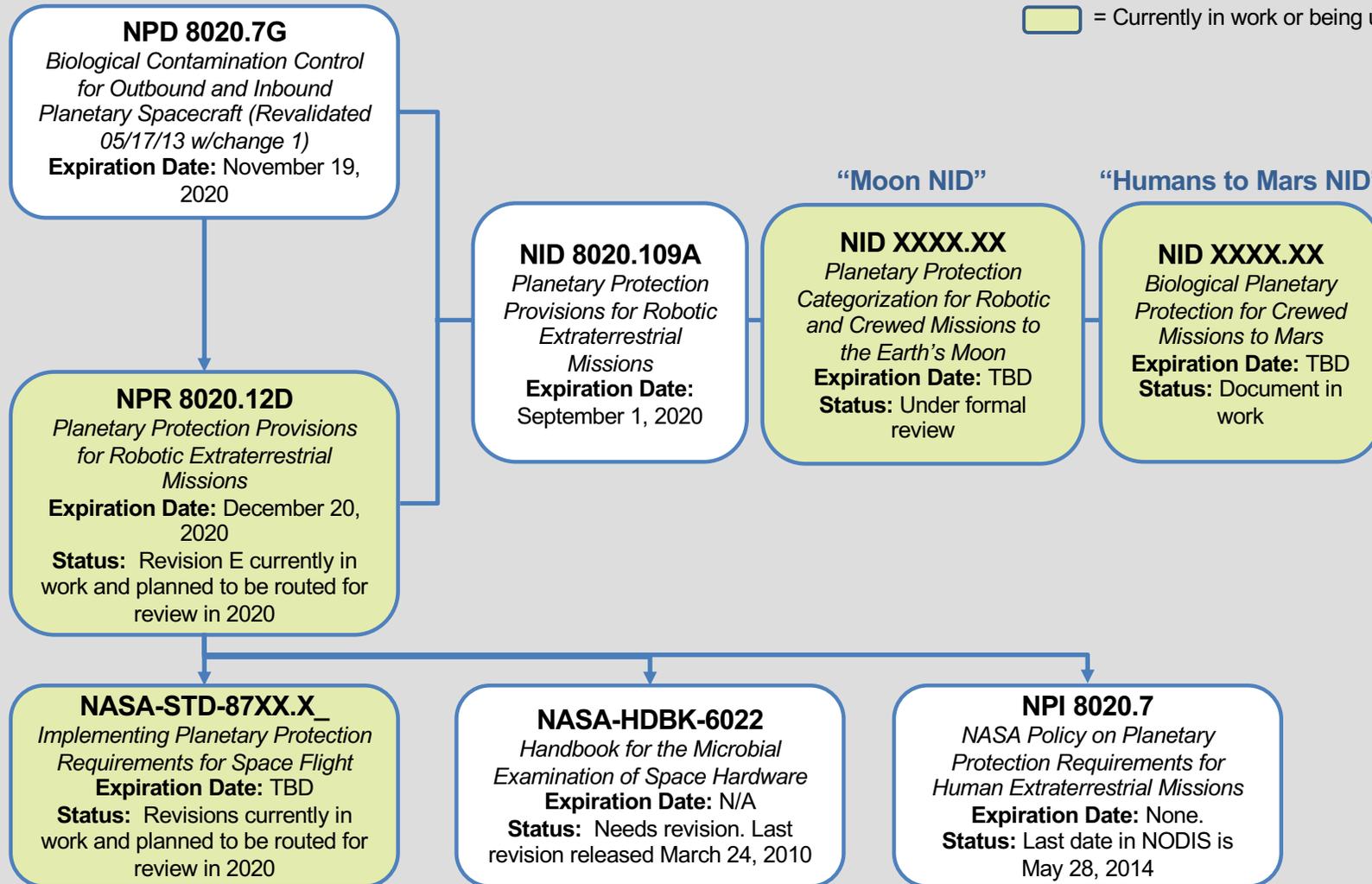


A 90% reduction in growth population is one D-value (decimal reduction)

OPP Policy Documents



 = Currently in work or being updated





Planetary Protection Mission Categories (NASA/ESA/COSPAR Policy)

Types of Planetary Bodies	Mission Type	Mission Category
Not of direct interest for understanding the process of chemical evolution. No protection of such planets is warranted.	Any	I
Of significant interest relative to the process of chemical evolution, but only a remote chance that contamination by spacecraft could jeopardize future exploration. Documentation is required.	Any	II
Of significant interest relative to the process of chemical evolution, and/or the origin of life or for which scientific opinion provides a significant chance of contamination which could jeopardize a future biological experiment. Substantial documentation and mitigation is required.	Flyby, Orbiter Mars, Europa, Enceladus	III
See above	Landed Mars, Europa, Enceladus	IV (IVa, IVb, IVc Mars)
Any solar system body. Unrestricted applies only to bodies deemed by scientific opinion to have no indigenous life forms.	Earth Return Restricted or Unrestricted	V

Closing Remarks



- Many policy documents being updated or created to reflect the latest changes in NASA policy for planetary protection
- OPP continues to support spaceflight missions in understanding PP categorization, requirements, and implementation for specific missions
 - OPP is committed to providing clear communication and working with proposers to answer questions