



***Cost of Planetary Protection
Implementation***

***David Bearden
Eric Mahr
The Aerospace Corporation***

***Committee to Review the Planetary
Protection Policy Development Processes
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Data Review

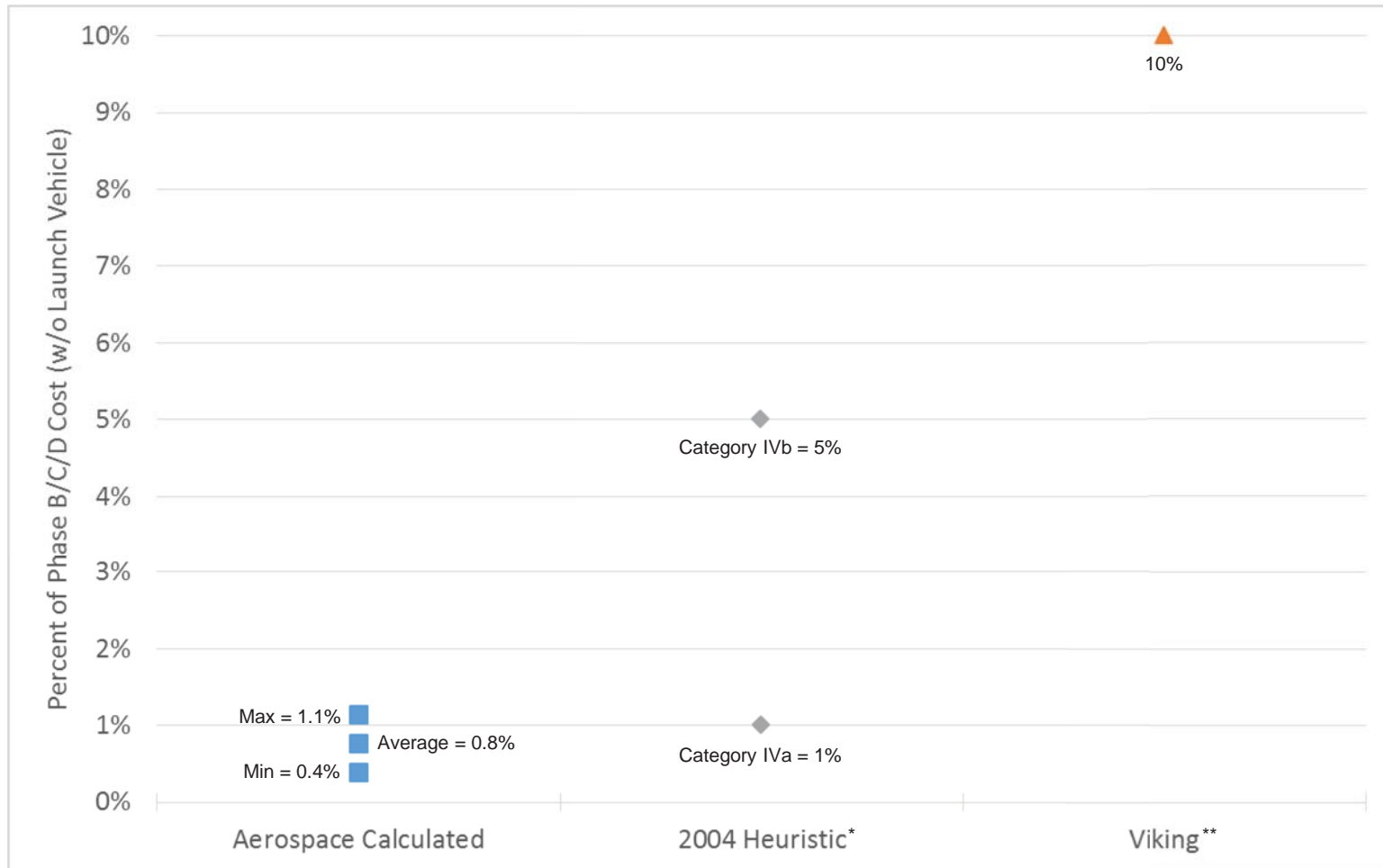
- Reviewed available data on recent/near-term missions
 - *Focused on missions going to high profile destinations, coming in contact with body surfaces and/or returning samples*
- Of the missions of interest, able to identify costs specified as for planetary protection for 6 missions
 - *Primarily bookkept as part of Mission Systems Engineering*
 - *Likely not the extent of the total cost as there are likely additional costs at lower hardware/engineering levels*

Mission	Categorization*
Europa Clipper	III (TBD)
InSight	IVa
Mars 2020	V (restricted)
Mars Exploration Rovers	IVa
Mars Science Laboratory	IVa
Phoenix	IVc

- Additional research and discussion with subject matter experts provided data for comparison

*<https://planetaryprotection.nasa.gov/missions>; as of June 26, 2017

Cost for Planetary Protection



*Planetary Protection: All of the Planets, All of the Time; February 9, 2004

** June 2016 NASA Advisory Council Planetary Subcommittee (June 1-2, 2016), Meeting Minutes, pg. 10



General Observations

- Mission impact is highly dependent on the planetary protection category
 - *Category 1 and 2 requirements have minimal impact on program or hardware design*
 - *Category 3 and 4 level programs will affect the choice of landing site, materials selection used for hardware, interface control, cleaning methods, handling/access restrictions and facilities*
 - *Additionally, for sample return missions (Category 5), a method that isolates the sample to prevent biological contamination of Earth is required*
- Planetary protection work needs to be planned as part of every step of the design, integration and test just like any other part of the hardware design and construction
 - *Need to get early advice from the PPO and then engineer the system with Planetary Protection in mind*
 - *Well thought out Planetary Protection program that is deeply integrated with the systems and I&T tasks, dealing with ICDs, testing, bagging (bio-barriers), separate bakes, etc are manageable and do not need to spiral out of control*