

**Questions from SB Regarding Experimental Application 0409-EX-CN-2024 SC1 Spacecraft**

1. The application indicates that the SC1 satellite will be deploying a cube attached with a tether.

**Answer:** The Technical Description referred to the target cube as “tethered”. This wording was confusing, as there are actually no tethers associated with the SC1 spacecraft. The Technical Description has been updated to remove this reference.

Per NASA-STD-8719.14C, “Process for Limiting Orbital Debris”, a tether is long flexible structure greater than 300 meters in length. The connection to the target cube is less than 30 m in length, and so it is not treated as a tether in the DAS / ODAR.

2. The application describes utilizing a NPC Spacemind ARTICA drag sail in their technical description. However, this drag sail was not addressed in the ODAR.

**Answer:** The drag sail was included in the design early on because the deploy altitude had not been settled by the launch provider at that time. Later, it was determined that the deploy altitude would be 510 km, which does not require a drag device in order to meet the 5 year after mission end orbit lifetime requirement. So the drag sail was removed from the design. We have updated the Technical Description to reflect this.

3. ODAR shows one area-to-mass ratio of 0.1783 m<sup>2</sup>/kg for the operational case. Additionally, we would like to see a non-deployable solar panel and tumbling spacecraft scenario area-to-mass ratio and associated large collision risk probability value.

**Answer:** The requested contingency case has been added to the ODAR, and the revised ODAR has been uploaded as an exhibit. This case results in a large collision risk probability value of 1.2606 E 06.

4. In page 26, ODAR Section 7:

**Assessment of Spacecraft Reentry Hazards**

Name	Qty	Material	Body Type	Mass (kg)	Diameter / Width (m)	Length (m)	Height (m)	Demise Alt	Total DCA	KE
SC1CUBEWHEEL PM ID Flywheel	1	Steel ISI 410	Box	0.27 8	0.1	0.1	0.05	0	0.41	87.34

The risk of human casualty is 1:126,400 from DAS.

() Please provide any information concerning the steps taken to design for demise for the spacecraft that were considered and why the current design was chosen. Were alternate designs considered in an effort to reduce or eliminate all risk? If so, explain in detail why they were not chosen.

**Answer:** Because concern about the reaction wheel component, we took a closer look at how the reaction wheel assembly was modeled in DAS. Additional data from the manufacturer was used, and the model was refined to reflect that there are 4 reaction wheel assemblies, each comprised of 3 components (enclosure, motor and reaction wheel). This refined model reveals that no components survive, so there is no risk to human casualty. A revised ODAR that reflects this model, has been posted as an exhibit to the application.

**Radio Frequency Questions:**

() For the planned WiFi communication in the 2.4GHz band between module inside the spacecraft, how is the applicant ensuring that the radio frequency emission are contain within the spacecraft structure? Is there any chance that the RF emission can be leak out from inside the spacecraft?

**Answer:** We have not determined the shielding properties of the spacecraft walls. However, per the document "SC1 WiFi Power Flux Density Discussion.pdf" which has been uploaded as an exhibit to the application, calculation of PFD at Earth Surface, and at GSD, shows that without taking any credit for shielding by the spacecraft walls, the PFD is lower than the published limits by 29 dB or more, in all cases.

() What is the WiFi maximum EIRP density of the RF emission being used?

**Answer:** Please see the document "SC1 WiFi Power Flux Density Discussion.pdf", which has been uploaded as an exhibit to the application.

() Please provide a power-flux density showing in the 2200-2290 MHz band demonstrating compliance with Article 21.16, Table 21-4 limit.

**Answer:** Please see the document "SC1 WiFi Power Flux Density Discussion.pdf", which has been uploaded as an exhibit to the application.

We note that in the FCC Form 442 for the 2264 MHz band, the EIRP given as 0.38 Watts that calculates to an EIRP -2.1 dBW. However, the EIRP in the SpaceCap API file, calculates to an EIRP of 5 dBW.

() Please review the differences in EIRP values of -2.1 dBW (Form 442) and 5 dBW (SpaceCap API) and adjust one of the value for technical consistency.

**Answer:** The correct value for EIRP on the 2264 MHz emission, is 5 dBW. The value for ERP on Form 442 has therefore been changed to 1.93 W. And, the power value on form 442 was changed to 1 W which is correct.