

From: Carlos Nalda

To: Nimesh Sangani

Date: February 11, 2021

Subject: Additional Information Request

Message:

Care Weather provides the following responses to inquiry Ref. No. 59953 of Feb. 10, 2021:

1. Please provide the equations and calculations used to determine the cross-sectional area of the spacecraft and the area-to-mass of the spacecraft.

Care Weather Response: We apologize for the confusion. The area-to-mass ratio reported in the text of the ODAR included a typographical error and should have read $0.044 \text{ m}^2/\text{kg}$. However, this error was limited to the text of the ODAR and the correct value was used in all of the NASA DAS simulations. A description of the calculation used to arrive at this area-to-mass ratio has been added to Revision C of the ODAR.

2. Some of the components modeled in DAS do not match the dimensions provide in the narrative or ODAR, specifically the cubesat itself and the drag panels. The cubesat is being modeled as a 10 cm x 10 cm x 10 cm box, while the drag panels are 10 cm x 10 cm flat plates. Please provide and use the actual measurements of the components in the modeling software and ensure all other components are accurate as well.

Care Weather Response: Revision C of the ODAR has also been updated with a corrected re-entry debris analysis (requirement 4.7-1) with updated component values including drag panel dimensions and CubeSat bounding box. Note that DAS only uses this component values table in the re-entry debris analysis requirement 4.7-1. Other DAS analyses, including orbital lifetime, rely solely on the area-to-mass ratio, which was correct in the analyses run for Revision B (despite the typo in Section 6 of the ODAR). Accordingly, there is no material change to the orbital lifetime following this update.

The updated ODAR also includes a minor change to the figure numbering to correct a typographical error. This change does not impact the analysis.

Best regards,

Jonathan Bair
Senior Associate
LMI Advisors
jbair@lmiadvisors.com