



Federal Communications Commission
Washington, D.C. 20554

March 23, 2021

Mr. Robert S. Koppel
Lukas, LaFuria, Gutierrez & Sachs, LLP
8300 Greensboro Drive
Suite 1200
Tysons, VA 22102 USA
bkoppel@fcclaw.com

Re: ICEYE US, Inc., IBFS File No. SAT-LOA-20210212-00021 (Call Sign S3082)

Dear Mr. Koppel:

On February 12, 2021, ICEYE US, Inc. (ICEYE) filed the above-referenced application pursuant to the streamlined small satellite licensing procedures,¹ requesting authority to launch, deploy, and operate six satellites that would operate in the Earth-Exploration Satellite Service (EESS), conducting synthetic aperture radar (SAR) imaging. Please provide the following additional information in order to assist in the Commission's review of this application:

1. Please clarify whether all space stations in the planned constellation will be technically identical.
2. Please provide antenna gain contours for each transmit and receive antenna beam, as required by Section 25.114(c)(vi)(B) of the Commission's rules, 47 CFR § 25.114(c)(vi)(B).
3. Please clarify the risk of casualty associated with the space stations' atmospheric re-entry.² In the Narrative Statement, ICEYE states that the requirements for streamlined processing are met for all space stations in the planned system, including the requirement that the risk of human casualty is zero as calculated using the NASA DAS or higher fidelity model.³ However, in the Orbital Debris Assessment Report (ODAR), ICEYE indicates that the "DAS program outputs" demonstrate a risk of human casualty is 1:65,800.⁴ ICEYE also states that no objects are expected to survive reentry, which is inconsistent with a risk of human casualty of 1:65,800.⁵ Please clarify whether there is debris that would be expected to survive atmospheric re-entry as evaluated under the DAS, and if so, please provide, at a minimum, the component name, material, mass, and surviving kinetic energy. Alternatively, please provide the complete DAS logs for the survivability requirement analysis.

¹ 47 CFR § 25.122.

² See 47 CFR § 25.122(c)(8).

³ ICEYE Narrative at 4-5.

⁴ ICEYE Exhibit C – Orbital Debris Assessment Report at 7.

⁵ *Id.*

4. ICEYE states that “[p]ropulsion will be utilized for station-keeping and collision avoidance maneuvers.”⁶ Please provide additional information regarding the expected station-keeping tolerances of the space stations (+/- altitude, inclination, etc.).⁷
5. ICEYE states that the “satellite bus has a total mass of less than 150 kilograms, including propellant.”⁸ Please provide the mass of the satellite bus without propellant. Also, please explain how the amount of propellant was factored into DAS end-of-life calculations.
6. ICEYE states that the space stations use a solid metal propellant.⁹ What is the solid metal being used as propellant?
7. ICEYE states that it “has utilized NASA’s DAS to assess the probability of a collision with objects larger than 10 centimeters in diameter, and found the probability of collision to be 0.00002.”¹⁰ Please clarify whether the 0.00002 collision risk was calculated per satellite, or whether it represents the total risk for the six satellite system.
8. Please provide a statement in response to Section 25.122(d)(5) of the Commission’s rules,¹¹ which requires a description of the design and operational strategies that will be used to avoid in-orbit collision with spacecraft capable of having crew aboard. For example, what operational strategies will the ICEYE use while de-orbiting the space stations through the International Space Station altitude?
9. International Telecommunication Union Radio Regulations (ITU RR) 22.5 provides that, in the 8025-8400 MHz frequency band shared by EESS using non-geostationary orbit satellites with the fixed-satellite service (Earth-to-space) or the meteorological-satellite service (Earth-to-space), the maximum power flux-density produced at the geostationary-satellite orbit by EESS space station will not exceed -174 dB(W/m²) in any 4 kHz band. Please address how ICEYE will comply with ITU RR 22.5.
10. ITU RR SA.1157 specifies protection criteria for deep space earth station receivers in the 8400-8450 MHz band with PSD limited to -221 dBW/Hz at the inputs of deep space earth station receivers. Please address how ICEYE will comply with ITU RR SA.1157.
11. ICEYE has acknowledged that it will need to coordinate with co-frequency Federal and non-Federal earth station operators.¹² Please provide a status update regarding such coordination efforts.

⁶ *Id.* at 3.

⁷ *See* 47 CFR § 25.122(d)(4).

⁸ ICEYE Narrative Statement at 2.

⁹ ICEYE ODAR at 3, 5.

¹⁰ *Id.* at 6.

¹¹ 47 CFR § 25.122(d)(5).

¹² ICEYE Narrative Statement at 4, 7.

12. ITU-R RS.1280 provides guidance on maximizing compatibility between spaceborne and terrestrial radar systems, as well as a methodology for assessing whether the peak or average power of an active spaceborne sensor exceeds that of the example terrestrial sensors provided in the recommendation. Please address how ICEYE will comply with the guidance specified in ITU-R RS.1280.
13. Regarding operations in the 9300-9900 MHz frequency range, ITU RS.2094 states a particular interference mitigation technique may reduce interference caused by SAR antennas. Please provide a description of any mitigation techniques you will be employing in the 9300-9900 MHz range.
14. Concerning use of the 9300-9900 MHz frequency band in the space-to-Earth direction, considering that the band is allocated on a secondary basis for non-Federal operations in the U.S. Table of Allocations, 47 CFR § 2.106, please provide any additional information to elaborate on how the planned satellite network will operate on a non-harmful interference basis with respect to the primary allocated services.
15. ICEYE states that it will provide “the appropriate electronic files for submission to the ITU.”¹³ Please provide those files or provide an update on the status of the preparation of those files.

Please submit the requested information by **April 6, 2021**. See 47 CFR § 25.112(c).

Sincerely,

Karl A. Kensinger

Karl A. Kensinger
Acting Chief, Satellite Division
International Bureau

¹³ *Id.* at 9.