Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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Starfish Space, Inc.	)	Call Sign: _____
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Application for Authority to Launch and Operate the Otter 24B Satellite Servicing Spacecraft	)	File Number: SAT-LOA-2025_____

APPLICATION

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APPLICATION FOR AUTHORITY TO LAUNCH AND OPERATE THE OTTER 24B SATELLITE SERVICING SPACE CRAFT

Starfish Space, Inc. ("Starfish"), a United States company, respectfully requests authority under the Federal Communications Commission's ("Commission") rules,[1] to (1) launch and operate the Otter 24B spacecraft and (2) conduct short-term satellite servicing and end-of-life disposal missions for two or more Space Force satellites in geosynchronous orbit ("GEO") and near-GEO non-geostationary orbits ("NGSO"). Otter 24B is expected to launch no earlier than June, 2026.

Otter 24B is a versatile and resilient servicing vehicle that can perform satellite life extension and disposal services for multiple satellites. It leverages an off-the-shelf, flight-proven satellite bus, enhanced with proprietary and custom modifications, to create a flexible and safe satellite servicing spacecraft. The use of a heritage bus will help ensure reliable on-orbit performance and facilitate efficient, rapid production to meet the growing demand for in-orbit satellite servicing.

[1] *See* 47 CFR §§ 25.114, 25.123.

The Starfish spacecraft is seeking authority to conduct Space Operations Service ("SOS") and Space Research Services ("SRS") in the 2025-2110 MHz ("S-band") and SRS in the 8450-8500 MHz ("SRS band") bands.[2] Additionally, Starfish requests authority to operate in the 8200-8400 MHz band ("EESS band") on a non-conforming basis, should frequency diversity be needed in order to coordinate with adjacent and in-band federal operators.

I. BACKGROUND AND SYSTEM DESCRIPTION

Otter 24B incorporates innovative technologies enabling autonomous Rendezvous, Proximity Operations, and Docking ("RPOD") missions. Otter 24B's inspection and station-keeping mission ostensibly fits within the Commission's classification of certain spacecraft as providing "In-space Servicing, Assembly, and Manufacturing" ("ISAM") service though the Commission has not yet defined ISAM.

Otter 24B will transit from its launch injection altitude to an altitude between 35,800 and 36,600 kilometers with a three-degree inclination to rendezvous with the first Space Force satellite ("Asset #1"). During this transit ascent, Otter 24B will conduct in-orbit testing, and upon reaching Asset #1's location, Starfish will demonstrate Otter 24B's inspection and station-keeping capabilities before disposing of Asset #1 in the graveyard orbit.

Following its mission with Asset #1, Starfish will carry out de-orbiting missions for additional Space Force satellites, such as Asset #2. Upon completion of these missions, Otter 24B will stand by awaiting additional missions, reaching end-of-life six years post-launch and self-disposing in the graveyard orbit at 36,050 km altitude.

[2] Otter 24B will coordinate or deconflict its use of these frequency bands if and when they are in use by the Space Force spacecraft as further detailed in the Technical Appendix.

Starfish has already taken its first steps towards its mission: to maintain and uplift the ecosystem of space, supporting its growth, health, and long-term viability for human expansion. As part of this effort, Starfish has successfully launched and operated a test satellite servicing spacecraft, the "Otter Pup," under an experimental authorization from the Commission.[3] The Otter Pup mission was a success, and the technical and operational insights gained from that test mission have been used to refine Starfish's satellite service spacecraft design and begin to provide commercial services.

Following the successful execution of its test mission, Starfish has developed a small and economical satellite servicing spacecraft called the "Otter." The Otter is a satellite servicing vehicle that can perform satellite life extension and end-of-life disposal. Otter is capable of autonomous RPOD and conjoined operations using only electric propulsion, enabling efficient servicing in both Low-Earth Orbit ("LEO") and GEO. Additionally, Otter's ability to dock with client spacecraft that are not designed for RPOD means that customers do not need to make any engineering or design changes to their spacecraft to utilize Otter's services. Otter's hardware-agnostic approach means it can serve nearly any spacecraft already flying today. Starfish has recently sought authority to launch the first Otter, Otter 24A, for a commercial satellite servicing mission and now seeks authority to launch Otter 24B to conduct its second commercial satellite servicing mission for the U.S. Space Force.

Starfish leverages four proprietary, modular technologies which enable a uniquely efficient architecture: CEPHALOPOD, CETACEAN, Nautilus, and Manta:

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[3] *See* Grant, Office of Engineering and Technology, File Number: 1117-EX-CN-2022, Call Sign: WN2XEL. *See also*, "Starfish Space executes rendezvous between Otter Pup and D-Orbit's ION, a finale for the Otter Pup mission," Press Release (May 7, 2024). Available at: https://www.starfishspace.com/press-release/starfish-space-executes-rendezvous-between-otter-pup-and-d-orbits-ion-a-finale-for-the-otter-pup-mission/.

- The guidance and control software package, **CEPHALOPOD,** is optimized for low thrust electric propulsion, enabling autonomous RPOD with calculations and trajectories generated and optimized fully onboard.
- **CETACEAN** is Starfish's relative navigation software package. It uses onboard computer processing to fuse data across a flexible suite of onboard sensors (compatible with a variety of sensor types including cameras, LIDAR, RADAR, GPS, star trackers, and Inertial Measurement Units ("IMU") to characterize Resident Space Objects and feed navigation estimates to CEPHALOPOD.
- The **Nautilus** docking mechanism is a universally compatible, non-destructive capture system for RPOD in all orbits. For the Otter 24B mission, Nautilus will employ a mechanical gripper. In all cases, Nautilus allows Otter to perform its mission without requiring a proprietary docking plate or fiducial to be installed on its client, and without the need for a specific hardpoint feature like an apogee kick motor or separation ring.
- **Manta** is a lightweight, articulating boom that enables servicing vehicles like the Otter to efficiently maneuver much larger clients. Once Otter is docked, Manta enables greater efficiency by directing the thrust vector through the combined center of mass of Otter and its client, while also providing flexibility to direct the thruster plume away from sensitive components on the client spacecraft. Manta also contains a radio, which allows Otter to maintain line of sight communications without compromising ideal docking geometry. By using exclusively electric propulsion, Starfish can maintain the Otter's small size

while packing sufficient ΔV[4] onboard the vehicle to transit between customer satellites and conduct station-keeping operations for larger GEO satellites.

Otter 24B will be equipped with four cameras to image the local space environment and residential space objects. Therefore, Starfish will submit an Initial Contact Form to the National Oceanic and Atmospheric Administration ("NOAA") for its review[5] and determination as to whether Starfish will require a remote sensing license application.[6]

a. FREQUENCY BANDS

Starfish requests authority to operate Otter 24B in the following frequency bands in order to conduct its mission.

Frequency Band, Center Frequency (MHz)	Frequency Band (MHz)	Link Direction	Purpose
2025-2120, 2048.5, 2027, 2103	2025-2120	Earth-to-space	Payload and Telemetry, Telecommand, & Command ("TT&C") Uplink
8450-8500, 8490	8450-8500	space-to-Earth	Payload and TT&C Downlink
8025-8400, 8200	8025-8400	space-to-Earth	Backup TT&C

[4] ΔV is a measure of the change of velocity produced by reaction engines, such as rocket engines, and is proportional to the thrust per unit mass and the burn time.

[5] NOAA has previously determined that some on-orbit sensing equipment does not require a remote sensing license. *See e.g.,* Office of Engineering and Technology, File Number: 1117-EX-CN-2022, Letter from dated July 19, 2022. ("Under the authority of the Secretary of Commerce under 51 U.S.C. § 60121 et seq. and 15 CFR Part 960, delegated to NOAA, we have determined that the proposed system as described in your Initial Contact Form does not fall within the Secretary's jurisdiction and therefore will not be required to apply for a NOAA license.").

[6] NOAA previously determined that Otter 24A, which has an identical sensor suite as Otter 24B, did not require a remote sensing license. *See* Letter, from Doctor Sarah Brothers, Director, Commercial Remote Sensing Regulatory Affairs, NOAA to Nicole Brown, Mission Manager, Starfish. File Number: SAT-LOA-20250212-00043, Call sign S3221 (Apr. 20, 2025).

Table 1: Otter 24B Frequency Band Plan

(i) S-Band Uplink (2025-2120 MHz)

Otter 24B will receive command signals in the S-band from earth. The S-band is allocated on a primary basis for federal use in the SRS and SOS.[7] The S-band is authorized for non-federal SOS use related to pre-launch testing and space launch operations.[8] The S-band is allocated internationally for SRS and SOS.

Starfish understands that all operations in this band will require a waiver of the Commission's rules, which it requests below, and understands that its use of this band will be on a non-interference basis. Starfish will coordinate its planned use of the band around a center frequency of 2048.5 MHz with U.S. federal agencies to ensure that it does not cause harmful interference.

(ii) SRS Band Downlink (8450-8500 MHz)

Otter 24B plans to use SRS band to downlink payload and TT&C data. The SRS band is domestically allocated on a primary basis for SRS for both federal and non-federal use.[9] The SRS band is allocated for SRS on a primary basis internationally. The Commission has previously noted that ISAM missions could be consistent with an SRS allocation[10] but out of an abundance of caution, Starfish requests a waiver below.

[7] *See* 47 CFR § 2.106.
[8] *Id*. at n. U.S. 94.
[9] *Id.*
[10] ISAM NPRM at ¶ 34.

Starfish will coordinate its planned use of the band around a center frequency of 8490 MHz with U.S. federal agencies to ensure that it does not cause harmful interference to in-band and adjacent band users.

(iii) EESS band Downlink (8025-8400 MHz)

Starfish requests limited authority to operate in the EESS band as an emergency backup to download TT&C data on a non-conforming basis. The EESS band is not allocated for SOS or SRS; therefore, Starfish requests authority to operate in this band on a non-conforming basis.

In its technical appendix, Starfish details the operational measures it will take to protect in-band and adjacent users. As further detailed below, satellite servicing missions have an uncertain spectrum status in the SRS band, which is subject to coordination requirements with federal users. Otter 24B's onboard antenna includes these bands in its tuning range. Out of an abundance of caution and in order to facilitate coordination, Starfish is seeking access to the EESS band.

Starfish will coordinate its planned use of the band around a center frequency of 8200 MHz with U.S. federal agencies to ensure that it does not cause harmful interference to in-band and adjacent band users. This will ensure that, if operations in EESS band are necessary, Otter 24B does not cause harmful interference to any existing or future users in the EESS band or the adjacent bands as a non-conforming user.

II. AUTHORITY REQUESTED FOR OTTER 24B

The four phases detailed below describe Otter 24B's transition from its injection orbit to ASSET #1, then to ASSET #2, and then to additional assets as future tasks arise. This mission will include extended operations in both non-geostationary ("NGSO") and GEO. As Starfish

explains below, Otter 24B's spectrum use will comply with the Commission's rules for NGSO and GEO operations depending on which operational orbit it is in. Throughout its mission, Starfish will utilize S-band, the SRS band, and, to the extent necessary, the EESS band.

As Starfish will further explain in this application, the intensity of its spectrum use will fluctuate depending on the phase of its mission. Generally, during transit between locations and during station-keeping operations, Starfish will rely on low bandwidth, low data rate links with its ground station network. However, during rendezvous and docking maneuvers, Otter 24B will require more intensive spectrum usage to meet increased data demands. These phases, along with the corresponding technical characteristics for each phase of the mission, are detailed further in the technical appendix.

Throughout all phases of its missions, Starfish will comply with the applicable Power Flux Density ("PFD") limits and applicable International Telecommunications Union ("ITU") recommendations during its NGSO and GEO operations in its transmit bands (space-to-Earth).[11] Starfish will also coordinate operations in Otter 24B's receive band (Earth-to-space) to ensure that its operations will protect existing commercial and federal users of the band in both GEO and NGSO.

a. Phase 1 – LEOP, Transit to Asset #1, and RPOD with Asset #1

The Otter 24B spacecraft will launch as a rideshare payload on a National Security Space Launch and be injected into orbit at approximately 36101 km altitude +/- 100 km. Starfish will conduct in-orbit testing ("IOT") for Otter 24B at this altitude after completing separation from the launch vehicle. During this period, Otter 24B will intermittently transmit and receive signals

[11] *International Telecommunication Union Radio Regulations*, Art. 21 (2024).

to confirm nominal operations and trajectory while testing its onboard sensors and equipment. The limited duty cycle and use of spectrum will enable Starfish to coordinate Otter 24B's spectrum.

Otter 24B will then perform a long-range rendezvous with Asset #1 to demonstrate its RPOD capabilities by performing inspection and docking operations, demonstrate station-keeping capabilities, and eventual disposal. The long-range rendezvous will take 100 days as Otter 24B transits to Asset #1's location between 35,800 and 36,600 km altitude,[12], with an inclination of 3 degrees. During this time, Asset #1 will drift west at approximately 4.2 degrees per day.

After completing in-orbit testing ("IOT") and approaching Asset #1, Otter 24B will initiate its RPOD maneuvers. It will follow an iterative course, charting a conservative flight path designed to ensure a safe rendezvous and avoid any risk of collision. This conservative approach, supported by Otter 24B's onboard sensors and thrusters, will enable a reliable and safe approach to Asset #1. At any point during this approach, Starfish will have the ability to issue an abort command and instruct Otter 24B to conduct safe emergency maneuvers away from Asset #1 if necessary.

Before Otter 24B's final approach, Starfish will halt its progression toward Asset #1 to perform final positioning and internal system state of health checks. Once these final checks are completed, Otter 24B will be given the go ahead to approach Asset #1 for docking. Otter 24B will then dock with Asset #1 and demonstrate its station-keeping abilities. Otter 24B may conduct multiple docking and separation tests during this period. The entire docking concept of

[12] Asset #1 is in an elliptical orbit with a 36500 +/- 100 km apogee and 35900 km +/- 100 km perigee.

operations and station-keeping demonstration is expected to take approximately 14 days to execute and complete. After the demonstration station-keeping mission with Asset #1 is complete, Otter-24B will perform an augmented maneuver to transfer the satellite to GEO graveyard at approximately 36,050 km altitude.

Throughout the approach, docking, detachment and separation operation, Otter 24B's use of spectrum will increase, requiring short term periods of higher duty cycles and larger bandwidths. Given the short duration of these operations, approximately two weeks, Starfish will be able to successfully coordinate this more intensive use. As outlined in the technical appendix, Otter 24B will be equipped with autonomous systems to ensure safe RPOD maneuvers in the event that spectrum access is limited or interrupted.

During station-keeping, Otter 24B's spectrum and bandwidth requirements will again be reduced and should facilitate the protection of other in-band operators through its sporadic use of spectrum. Once the operation is complete and Asset #1 is disposed, Otter 24B will detach from Asset #1 and safely maneuver away from the spacecraft before proceeding to Asset #2.

b. Phase 2 – Transiting to, RPOD and disposal of Asset #2

After servicing Asset #1, Otter 24B will conduct a long-range transfer to the Asset #2 satellite. This transfer will take approximately 3 months as Asset #2 will be located in NGSO, at 10 degrees inclination and drifts approximately 1.2 deg/day (east).

Starfish will coordinate its spectrum use for this stage with in-band operators along the transit path. Otter 24B will then once again use its RPOD system to reliably and safely rendezvous and dock with the Asset #2 satellite. The docking procedure will take approximately fourteen days to complete.

Otter 24B's approach to Asset #2 will follow an identical process as its approach to Asset #1, with the caveat that Starfish aims to glean valuable operational data from the Asset #1 demonstration and may adjust its mission operations based on the results of Phase 1. Once in close proximity to Asset #2, Starfish will halt the approach to perform final system health and positioning checks. Once these final checks are complete, Otter 24B will be given clearance to dock with Asset #2. Otter 24B will then dock with Asset #2. The docking procedure is expected to take approximately fourteen days.

Once docked, Otter 24B will remain attached to Asset #2 and perform an augmented maneuver to dispose of Asset #2 in GEO graveyard beginning at 36,050 km altitude. This disposal will take approximately 2 months.

During the approach, docking, detachment and separation phases, Otter 24B's use of spectrum will increase, requiring short term periods of higher duty cycles and larger bandwidths. Given the short-term nature of these operations, approximately two weeks, Starfish expects it will be able to successfully coordinate this more intensive use. As outlined in the technical appendix, Otter 24B will be equipped with autonomous systems to ensure safe RPOD maneuvers in the event that spectrum access is limited or interrupted.

During Asset #2's disposal, Otter 24B's spectrum and bandwidth requirements will again be reduced and should facilitate the protection of other in-band operators through its variable use of spectrum over the course of its mission.

c. Phase 3 – Transiting to Standby and Additional Missions

After servicing Asset #1 and Asset #2, Otter 24B will have substantial capacity to perform additional on-orbit services. Otter 24B will stand by in a safe orbit until future tasking is determined.

d. Phase 4 –End of Life

When Otter-24B approaches its end-of-life stage within six years after launch, it will conduct orbit raising operations until it reaches the graveyard orbit and prepares for its own end-of-life.

III. GROUND STATION NETWORK

Otter 24B will communicate with a ground station network designed to provide coverage throughout the four phases of its mission. Further information detailing the operator, location, frequency bands and technical characteristics of the ground station network is provided in the technical appendix.

Starfish will control the Otter 24B spacecraft from its Mission Operations Center in Tukwila, WA.

IV. ITU Filing

Starfish has prepared and submitted the necessary ITU Filings for its proposed mission. As affirmed in its ITU Cost Recover Letter,[13] Starfish will pay any ITU cost recovery fees associated with any ITU filings that the Commission may make on its behalf. Starfish's ITU filing will be for an NGSO system per guidance from the ITU's Radiocommunication Bureau.

[13] Starfish has provided a draft ITU Cost Recovery Letter as Attachment B here. It will submit a final copy to the Commission once this application has been assigned a file number and call sign.

V. PUBLIC INTEREST STATEMENT

Grant of this application will serve the public interest by first, advancing national security, second, strengthening U.S. leadership in commercial ISAMs, and third, supporting orbital debris mitigation efforts.

Starfish's collaboration with the Space Force is the embodiment of the STRATFI program, which is designed to enhance national security capabilities by leveraging the strengths of the U.S. commercial space industry.[14] This application seeks authority for Otter 24B to execute an unprecedented docking and disposal mission that will directly enhance the operational readiness of National Security Space assets. This mission will ensure that Space Force satellites are safely transitioned to their designated end-of-life locations, enabling the Space Force to reallocate its resources towards other currently operable critical on-orbit systems. This mission represents a pivotal step in the development of commercial in space logistical support, a capability that Space Force leadership has previously identified as vital for future space operations.[15]

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[14] *See* "STRATFI and TACFI Programs Catalyze Funding to Overcome Valley of Death," King, Scott (Sep 4, 2024), https://elaranova.com/stratfi-and-tacfi-programs-catalyze-funding-to-overcome-valley-of-death/. "A STRATFI or TACFI award recognizes that there is operational value and a mission application according to DOD requirements, so they're targeted investments," Gen Teague said. "The awards demonstrate the DOD's belief in these capabilities and sends a strong signal to the investment community that their investment is expected to have a strong outcome within a particular DOD program of record, which will ensure customer demand and revenue growth over time."

[15] *See* U.S. Space Force, U.S. Space Force Releases Commercial Space Strategy to Increase Competitive Advantage (Apr. 10, 2024), https://www.spaceforce.mil//Portals/2/Documents/Space%20Policy/USSF_Commercial_Space_Strategy.pdf. "The capabilities the USSF seeks from the commercial sector are…in-space servicing, and tactically responsive space capabilities that the Service can test, experiment with, and integrate into future missions."

Furthermore, the Space Force has also emphasized a need to develop "augmented maneuver options," a goal consistent with Otter 24B's capabilities in inspection, station-keeping, and disposal missions.[16] Otter 24B contributes to the advancement of Space Mobility and Logistics, a key priority for National Security. By demonstrating critical ISAM capabilities and advancing augmented maneuver technologies, this mission supports both commercial and defense objectives, further reinforcing the U.S. position as a leader in space innovation.

Second, the grant of this application and authorization of the Otter 24B mission will safely advance U.S. policy objectives related to the development of commercial ISAMs and satellite servicing capabilities. Similar to its counterpart, Otter 24A, which will perform life extension services for commercial satellites, Otter 24B will offer life-extension and end-of-life disposal capabilities, including RPOD and augmented maneuvers. These services will expand operational flexibility for both military and commercial satellite operators. By enabling satellite life-extension, relocation or disposal maneuvers, Otter 24B demonstrates innovative and robust capabilities that will reduce costs for taxpayers and satellite operators, offering a more sustainable and cost-effective alternative to manufacturing and deploying replacement satellites. These benefits directly support the Commission's established policies, which acknowledge the "huge costs of building and operating satellite space stations" and has purposefully adopted policies that enhance the value of deployed satellite systems.[17] As such, authorizing Otter 24B's mission aligns with the Commission's previous determinations that extending the life of on-orbit satellite systems will further the public interest.

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[16] *See* "Starfish Space lands $37.5 million Space Force contract for on-orbit servicing vehicle," Erwin, Sandra (May 20, 2024), https://spacenews.com/starfish-space-lands-37-5-million-space-force-contract-for-on-orbit-servicing-vehicle/.

[17] *Loral Spacecom* at 12492 ¶ 7; *see also 2003 Space Station Order* at 12509-10 ¶ 7.

Third, this mission supports U.S. leadership in space sustainability and debris mitigation. Otter 24B is specifically designed to demonstrate advanced technologies that facilitate safe satellite servicing and responsible end-of-life disposal, consistent with the objectives outlined in the Commission's ISAM NPRM,[18] supporting the development of the Commercial ISAM industry, which is a U.S. Space policy objective. [19] The Commission has recognized that ISAM spacecraft,[20] such as Otter 24B, have the potential to play a role in ensuring spacecraft in LEO and GEO are able to be properly de-orbited or disposed of at the end of their missions, in compliance with the Commission's rules.[21]

Finally, to ensure safety and reliability, Starfish is utilizing a range of operational and technological measures with rigorous safety protocols, leveraging reliable and flight-proven technology from the Otter Pup mission,[22] adherence to rigorous industry-standard testing, and comprehensive coordination to prevent conjunction risks. Starfish will also incorporate best practices from the Otter 24A mission, which is scheduled to begin its on-orbit mission approximately five months before Otter 24B's launch window. These measures reflect Starfish's commitment to operational safety and align with the Commission's emphasis on innovative solutions that mitigate orbital debris risks.

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[18] *See* ISAM NPRM at ¶ 2.
[19] *See e.g.,* In-Space Servicing, Assembly, and Manufacturing Interagency Working Group, National In-Space Servicing, Assembly, and Manufacturing Implementation Plan (2022), https://www.whitehouse.gov/wp-content/uploads/2022/12/NATIONAL-ISAM-IMPLEMENTATION-PLAN.pdf.
[20] Starfish has already contracted for a number of additional, similar missions and is well-positioned to scale these operations into routine activities.
[21] *See* ISAM NPRM at ¶ 28. "[The Commission] agree[s] that acknowledging third-party services as an option for post-mission disposal will likely further our goals of promoting innovation and growth of ADR and will also likely provide additional flexibility to applicants when considering their end-of-life disposal options."
[22] *See generally* Office of Engineering and Technology, Call Sign WN2XEL, File No. 1117-EX-CN-2022.

For these reasons, grant of this application clearly serves the public interest and supports the Commission's longstanding commitment to enhancing space operations, reducing costs, and promoting sustainability in orbit.

VI. WAIVER REQUESTS

Starfish respectfully requests waivers of specific Commission rules within the framework of this Application. The Commission has authority to grant waivers of its rules upon demonstration of "good cause." and that a waiver request warrants deviation from the rules due to special circumstances.[23] In general, good cause exists if granting such a waiver would not undermine the intended objectives of the rule and would otherwise serve the public interest. As discussed below, there are compelling justifications for granting the requested waivers in association with Starfish's Application.

a. Section 25.114(a)(1) - Applications for space station authorizations

Starfish requests a waiver of Section 25.114(a)(1), which requires applicants to submit a Schedule S as part of its application. Specifically, Schedule S requires inputs related to the minimum and maximum saturated flux density (SFD), which are not applicable for regenerative links. Consequently, placeholder values of -99 dBW/m^2 and -98 dBW/m^2 were entered for the Minimum SFD and Maximum SFD, respectively, for each service link receive beam. A waiver of this portion of the Schedule S is warranted and would be consistent with the public interest, as the inclusion of placeholder values does not undermine the purpose of the rule, will not affect other in-band users, and reflects the technical limitation of completing the form for regenerative

[23] *See* 47 CFR § 1.3; *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1164 (D.C. Cir. 1990); *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969).

systems. Accordingly, this limited wavier would not subvert the Commission's objectives and is justified under the circumstances.

b. Section 25.123(b)(1)- Consideration of application for streamlined small spacecraft authorization

Starfish requests a waiver of Section 25.123(b)(1) of the Commission's rules to permit this application to be processed under the Commission's streamlined small spacecraft licensing procedures. Section 25.123(b)(1) requires, among other criteria, that a small spacecraft be operated and disposed of beyond Earth's orbit in order to qualify for the streamlined process. Grant of this waiver is in the public interest because Starfish's intends to operate and dispose of Otter 24B in a manner that is otherwise fully consistent with the intent of the rule. Otter 24B's end-of-life disposal plan adheres to established best practices applicable to its operational orbit, ensuring a safe and responsible conclusion to it mission.

The Commission implemented sections 25.122 and 25.123 in an effort to streamline the processing for space stations applications that would present relatively limited concerns regarding spectrum use and orbital debris mitigation.[24] In doing so, the Commission considered two use cases: NGSO systems in lower-Earth orbit and for spacecraft operating beyond Earth's gravity.[25] While the Otter 24B mission does not fall squarely within either category, it meets the threshold of nearly all the substantive criteria in Section 25.123 that justify streamlined

[24] *See e.g., Streamlining Licensing Procedures for Small Satellites*, Report and Order, 34 FCC Rcd 13077 (2019) (Small Sat R&O"), ¶ 10. "The goal of this small satellite process is to enable satellites that have shorter missions, less intensive spectrum use, and lower risk of producing orbital debris to be licensed on a streamlined basis."

[25] *See* Small Sat R&O at ¶ 15-16. "The goal of this small satellite process is to enable satellites that have shorter missions, less intensive spectrum use, and lower risk of producing orbital debris to be licensed on a streamlined basis."

processing. A comparison table demonstrating Otter 24B's alignment with theses criteria is provided below.

Streamlined Rules Requirements[26]	**Starfish Certifications**
(1) The space station(s) will operate and be disposed of beyond Earth's orbit	No, Otter 24B will be safely disposed of in the geostationary graveyard orbit in a safe manner consistent with the Commission's rules for space stations that operate in and around GSO.[27]
(2) The total in-orbit lifetime for any individual space station will be six years or less.	Otter 24B will be in operational for no longer than six years.
(3) Each space station will be identifiable by a unique signal-based telemetry marker distinguishing it from other space stations or space objects.	Otter 24B will have a unique transmitting telemetry channel, allowing it to be identifiable during commissioning and in-orbit activities.
(4) The space station(s) will release no operational debris.	Otter 24B will not release any operational debris.
(5) The space station operator has assessed and limited the probability of accidental explosions, including those resulting from the conversion of energy sources on board the space station(s) into energy that fragments the spacecraft.	Starfish has assessed and limited the probability of accidental explosions.
(6) The probability of a collision between each space station and any other large object (10 centimeters or larger) during the orbital lifetime of the space station is 0.001 or less as calculated using current NASA software or other higher fidelity model.	Otter 24B has a 4.66E-5 probability of collision with any other large object during its orbital lifetime, less than a 0.001.
(7) Operation of the space station(s) will be compatible with existing operations in the authorized frequency band(s). Operations will not materially constrain future space station entrants from using the authorized frequency band(s).	Otter 24B will be compatible with existing operations due to sporadic and narrow use of the band, coordinated by Starfish's ground-station-as-a-service partner.

[26] *See* 47 C.F.R. 25.123.
[27] *See* 47 C.F.R. 25.283.

(8) The space station(s) can be commanded by command originating from the ground to immediately cease transmissions and the licensee will have the capability to eliminate harmful interference when required under the terms of the license or other applicable regulations.	Otter 24B can be commanded by command originating from the ground to immediately cease transmissions and Starfish will have the capability to eliminate harmful interference when required under the terms of the license or other applicable regulations.
(9) Each space station is 10 cm or larger in its smallest dimension.	Otter 24B is 10 cm or larger in its smallest dimension.
(10) Each space station will have a mass of 500 kg or less, including any propellant.	Otter 24B has a mass of 380 kg.
(11) Upon receipt of a space situational awareness conjunction warning, the operator will review and take all possible steps to assess the collision risk, and will mitigate the collision risk if necessary. As appropriate, steps to assess and mitigate the collision risk should include, but are not limited to: Contacting the operator of any active spacecraft involved in such a warning; sharing ephemeris data and other appropriate operational information with any such operator; and modifying space station attitude and/or operations.	Upon receipt of a space situational awareness conjunction warning Starfish will review and take all possible steps to assess the collision risk, and will operate Otter 24B in a manner that will mitigate the collision risk if necessary.

Table 2: 25.123 Checklist

The Commission established 25.123 (and 25.122) with specific use cases in mind and, at the time, perceived no need to develop a streamlined process for space stations operating between low-Earth-orbit and beyond Earth's gravity. However, grant of this waiver request would be consistent with the principles and policy objectives underlying that rulemaking. Starfish is proposing a mission that will adhere to long-standing orbital debris mitigation and end-of-life disposal best practices.

Starfish's inability to comply with Section 25.123(b)(1) stems solely from the fact that Otter 24B will be safely disposed of in a location different from that articulated in the rule. When developing these rules, the Commission emphasized the importance of operators being able to

safely remove spacecraft from operational orbits.[28] Starfish's proposed operation and disposal of Otter 24B is consistent with the Commission requirements for end-of-life disposal applicable to operators in and around GSO orbit,[29] and otherwise reflects the same underlying policy goals of the streamlined process.

Aside from 25.123(b)(1), the Otter 24B spacecraft satisfies all other criteria for eligibility under the streamlined small spacecraft process. Because Starfish's planned disposal is consistent with the best practices of Otter 24B's operational orbit and with the intent of Section 25.123(b)(1), grant of this waiver would serve the public interest. It would also facilitate the timely authorization of a mission that advances U.S. national security, commercial satellite servicing, and orbital debris mitigation objectives.

c. Sections 25.157 - Consideration of applications for NGSO-like satellite operations

Starfish requests a waiver of Section 25.157(c) of the Commission's rules to permit it to conduct operations in NGSO without triggering a processing round. Sections 25.127 set forth procedural requirements for the filing and consideration of NGSO space station applications. However, spacecraft that seek authority to operate pursuant to Section 25.123[30] are exempt from processing round requirement. Accordingly, this waiver may be unnecessary if the Commission grants Starfish's related request for a waiver of Section 25.123(b)(1).

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[28] *See e.g.,* Small Sat R&O at ¶ 66. "While we will not require a qualifying certification related to spacecraft disposal by atmospheric re-entry, we will ask that applicants for a streamlined small spacecraft license provide a brief description of their disposal plan, since there are multiple potential disposal scenarios."
[29] *See* 47 C.F.R. 25.283(b).
[30] *See* 47 C.F.R. 25.157(i).

In the alternative, if the Commission does not grant the request, Starfish submits that a waiver of Section 25.157(c) is still appropriate and consistent with the Commissions precedent and evolving policy. In the ISAM NPRM, the Commission proposed waiving NGSO processing round and first-come-first-served queue rules for ISAM operators[31] and has previously waived this rule for proposed ISAM missions.[32] The Commission proposed applying such an exemption when an applicant demonstrates that its operations "will be compatible with existing operations in the authorized frequency bands and submit a narrative description to demonstrate spectrum sharing capabilities are technically possible, and that the operations will not materially constrain future space station entrants from using the authorized frequency band(s)."[33]

In line with the proposed framework, Starfish provides the requisite demonstration in its Technical Appendix. This includes narrative and technical analysis affirming that Otter 24B's operations will be compatible with existing operations in the authorized frequency bands and will not materially constrain future space station entrants from using the authorized frequency band(s).

Therefore, whether under the Commission's existing small spacecraft framework, the proposed rules for ISAMs, or a separate grant based on the public interest and technical compatibility, Starfish respectfully requests a waiver of Section 25.157(c) of the Commission's rules. Grant of this waiver would align with the Commission's objectives and serve the public interest by enabling a mission that advances national security, commercial servicing, and orbital debris mitigation objectives.

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[31] *See* ISAM NPRM at ¶ 17.
[32] *See e.g.,* Grant, Spaceflight Inc., File No. SAT-LOA-20220111-00007, Call Sign S3133 (May 10, 2022) at Condition 7.
[33] *Id*. *See also* 47 CFR § 25.157(i).

d. Sections 25.164 and 25.165 – Milestone and Bond Requirements

Starfish requests a limited waiver of Sections 25.164 and 25.165 of the Commission's rules, which govern milestone and bond requirements in a manner consistent with the treatment afforded to satellites and spacecraft authorized pursuant to Section 25.123. This request is made in the event that the Commission does not grant Starfish's earlier waiver request to treat Otter 24B as a Section 25.123 eligible spacecraft.[34]

The Commission has previously determined that deferring milestone and bond obligations for certain space stations, particularly those likely to deploy quickly, serves the public interest. Such deferrals help the Commission strike a balance between the need to deter spectrum speculators with the need to incentivize new missions with less intensive and more accommodating spectrum uses.

In the ISAM NPRM, the Commission proposed deferring the posting of surety bonds by one year after the grant of a license, consistent with its treatment of small satellites and small spacecraft.[35] While the Commission tentatively concluded that such a deferral would be appropriate for ISAM missions, it has yet finalized a rule to that effect, and ISAM operators are not explicitly exempt from the Commission's bond and milestone requirements.

Accordingly, Starfish requests that the Commission waive Sections 25.164 and 25.165 of its rules and grant a one-year deferral of the associated bond and milestone obligations for Otter 24B, consistent with the Commission's ISAM NPRM proposal. Granting this waiver would align with Commission policy objectives and support the growth of the ISAM sector during the interim period before formal rules for ISAM bond and milestone requirements are adopted.

[34] *See* 47 C.F.R. 25.165(a).
[35] *See* ISAM NPRM at ¶ 18. *See also* Smallsat R&O at ¶ 97.

e. 2.106 - Table of Allocations

Starfish requests a waiver of the United State Table of Frequency Allocations set forth in Section 2.106 of the Commission's rules.

The Commission applies a specific waiver standard to requests involving non-conforming spectrum uses. As the Commission has previously stated, "may grant a waiver of the Table of Frequency Allocations for non-conforming uses of spectrum when there is little potential for interference into any service authorized under the Table of Frequency Allocations and when the non-conforming operator accepts any interference from authorized services."[36] This standard has been consistently applied in cases involving operations that do not conform to the U.S. Table of Allocations, as well as those that diverge from the International Telecommunication Union (ITU) Radio Regulations.[37]

a. 2025-2110 MHz

Starfish requests a waiver of the U.S. Table of Allocations in the 2025-2110 MHz bands to the extent necessary to execute the Otter 24B mission.

Special circumstances justify a waiver to permit Otter 24B to conduct SOS and SRS operations in the 2025-2110 MHz band. Otter 24B's SOS operations in this band are consistent with the international table of allocations. Similarly, Otter 24B's operations align with the technical parameters typically consistent with SRS operations. However, the Commission's rules do not definitively state that ISAM missions fall within the scope of the SRS allocation.

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[36] *Application for Modification of License to Authorize a Second-Generation NGSO MSS Constellation by Iridium Constellation LLC*, Order and Authorization, 31 FCC Rcd 8676 (IB 2016) ("Iridium Order and Authorization"). *See also, Applications by Orbcomm License Corp. For Authority to Modify its Non-Voice, Non-Geostationary Satellite System et al.*, Order and Authorization, 23 FCC Rcd 4804, 4809, para. 15 (IB/OET 2008).

[37] See *Iridium Order and Authorization* at paras 21-22.

While the Commission has not formally affirmed that ISAM operations qualify as SRS, it has suggested that such an interpretation is under consideration. Additionally, the NTIA has proposed that the SRS allocation may be suitable for supporting the current state of ISAM development.[38] Starfish's proposed uses of the band for command, spacecraft telemetry, mission telemetry and tracking are consistent with Recommendation ITU-R SA.364-6.[39]

As demonstrated in the Technical Annex, Otter 24B will only receive signals from earth stations located at only two U.S. sites, one of which is a back-up option expected to operate on a relatively limited basis. Most transmissions in this band will originate from foreign earth stations, where such transmissions are consistent with the international table of allocations. At all ground station sites, Otter 24B's spectrum use will be infrequent and limited in scope, which will facilitate the protection of and coordination with other in-band operations.

Starfish will further coordinate its limited use of this band with in-band primary federal spectrum users, ensuring Otter 24B's operations will not interfere with critical U.S. government missions. Starfish will also coordinate its operations with all commercial and foreign systems. As such, Otter 24B's utilization of the 2025-2110 MHz band will not undermine the Commissions policy of preserving this spectrum for federal communications, and granting this waiver would be consistent with both domestic and international spectrum management objectives.

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[38] *See* Reply Comment of National Telecommunications and Information Administration, IB Docket No. 22-271, 22-272 (Nov. 21, 2023), 5. "The Space Research Service (SRS) is an appropriate service category for missions involving scientific or technical research. This allocation could support early demonstration programs."

[39] *See* Recommendation ITU-R SA.364-6Annex, (2) "Space research missions use frequency bands allocated to the SRS to provide the space operation functions as well as the mission telemetry within a single radio system. This allows for more efficient use of the radio-frequency spectrum, as well as less stringent requirements for spacecraft power, component space, and weight."

b. 8450-8500 MHz

Starfish believes that its proposed use of Otter 24B spacecraft falls within the existing SRS allocation in the 8450-8500 MHz band. However, given that the Commission is actively evaluating whether ISAM missions qualify under the SRS allocation in an ongoing rulemaking,[40] Starfish respectfully requests a waiver for its proposed use of the SRS band.

The 8400-8450 MHz band is allocated on a co-primary basis to both federal and non-federal SRS users. While Otter 24B's intended operations, command telemetry, tracking and mission data communications, are consistent with the technical parameters outlined in Recommendation ITU-R SA.364-6,[41] the Commission's rules do not definitively state that ISAM missions constitute SRS operations. That said, both the Commission and the NTIA have suggested that such a classification may be appropriate given the current state of ISAM development and operational needs.[42]

Starfish will coordinate all of its operations in-band with both in-band and adjacent band federal spectrum users to ensure protection of existing and planned services. As noted in the Technical Appendix, Otter 24B's use of this band is relatively limited in scope and duration, and there are limited deployments in the band from other operators, which will further facilitate coordination.

To the extent that the Commission does not determine that Otter 24B's proposed mission qualifies as an SRS operation, Starfish requests a waiver of the U.S. Table of Allocations for

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[40] ISAM NPRM at ¶ 34.
[41] *See* Recommendation ITU-R SA.364-6, Annex, (2) "Space research communication and tracking functions and their technical requirements."
[42] *See* Reply Comment of National Telecommunications and Information Administration, IB Docket No. 22-271, 22-272 (Nov. 21, 2023), 5. "The Space Research Service (SRS) is an appropriate service category for missions involving scientific or technical research. This allocation could support early demonstration programs."

non-conforming use. Such a waiver would be appropriate given that Otter 24B's proposed operations pose minimal risk of harmful interference and will not constrain future authorized operations in the band.

c. 8025-8400 MHz

Starfish respectfully requests a waiver of the U.S. Table of Allocations to permit emergency, non-conforming back up space-to-earth transmissions in the (8025-8400 MHz band ("EESS band").

While Starfish plans to conduct all downlink operations in the SRS band, access to both the SRS band and EESS bands is subject to federal coordination, and the spectrum status for ISAM missions in the SRS band is uncertain. Given this uncertainty, Starfish seeks authority to operate in the EESS band, should it become necessary.

The proposed use of the EESS band would be identical to those in the SRS band, featuring low duty cycles and relatively narrow channels. These characteristics, coupled with the relatively light use of the band, will facilitate coordination and ensure that Otter 24B can protect existing in-band and adjacent band operations.

The Commission has previously authorized similar non-conforming use of the EESS band by SRS missions,[43] recognizing the public interest benefits of operational flexibility and risk mitigation. Starfish's request is consistent with that precedent.

Accordingly, given the limited threat of harmful interference and the procedural and operational benefit of having authority to operate in the EESS band, a waiver of the Table of

[43] *See e.g.,* Grant, Turion Space Corp, File No. SAT-LOA-20240516-00104, Call Sign S3198 (Dec. 26, 2024).

Allocations to permit Starfish's proposed non-conforming use of the EESS band is in the public interest.

VII. POST-MISSION DISPOSAL AND ORBITAL DEBRIS MITIGATION

Starfish has designed the Otter 24B spacecraft to comply with the Commission's orbital debris regulations. In its Technical Appendix, Starfish provides a more detailed overview of how Otter 24B will meet the Commission's orbital debris mitigation regulations and will not exceed any of the limits set forth by the Commission rules.

Here Starfish affirms that Otter 24B will be identifiable through a unique signal-based telemetry marker, distinguishing it from other space stations, and will employ active tracking. Additionally, Starfish commits to registering Otter 24B prior to deployment with the 18th and 19th Space Defense Squadrons via their Satellite Registration Form and Space Situational Awareness Sharing Agreement to facilitate ongoing coordination and space safety efforts.

To enhance space situational awareness and improve the accuracy of conjunction analysis, Starfish intends to provide the 18th Space Defense Squadron information regarding initial deployment, owner/operator ("O/O") ephemeris, and planned maneuvers. Starfish will share information in a manner consistent with the 18th and 19th Space Defense Squadron's Spaceflight Safety Handbook for Satellite Operators. By sharing higher accuracy O/O ephemeris data, Starfish aims to improve the quality of CA, reduce the frequency of Conjunction Data Messages, and contribute to a safer orbital environment.

Additionally, Starfish intends to share ephemeris data with other operators through Space-Track.org, further promoting transparency and collaboration in maintaining space safety.

VIII. OWNERSHIP INFORMATION

Starfish's ownership structure is attached as Attachment A.

IX. CONCLUSION

For the reasons set forth above, Starfish respectfully requests that the Commission grant this Application.

Respectfully submitted,

/s/ Ben Ponto
Ben Ponto
Mission Manager
Starfish Space, Inc.
665 Andover Park W
Tukwila, Washington 98188

May 23, 2025

Attachment A
Starfish Ownership Information

Starfish Space Inc. ("Starfish") is a privately held corporation. The following individuals hold 10% or more of the equity and/or voting interests in Starfish

Shareholder	Citizenship or Country of Incorporation	Equity and/or Voting Interest Percentage
Munich Re Fund II, LP	USA	12.333% Equity Interest / 20% Voting Interest on Board of Directors
Shield Capital Fund II, LP	USA	20% Voting Interest on Board of Directors
NFX Capital Fund III, LP	USA	20% Voting Interest on Board of Directors
Austin Link	USA	20% Voting Interest on Board of Directors
Trevor Bennett	USA	20% Voting Interest on Board of Directors

The following individuals are on Starfish's board of directors.

Name	Citizenship
Austin Link	USA
Trevor Bennett	USA
Morgan Beller	USA
Peter Ortez	USA
Letitia Long	USA

The following individuals are Starfish's officers.

Name	Citizenship or Country of Incorporation	Title
Austin Link	USA	Co-Founder, CEO
Trevor Bennett	USA	Co-Founder, Secretary

Attachment B
Draft ITU Cost Recovery Letter

Starfish Space, Inc.
665 Andover Park West
Tukwila, WA 98188

[], 2025

Secretary
Office of the Secretary
Federal Communications Commission
45 L Street, N.E.
Washington, D.C. 20554

Subject: ITU Cost Recovery Declaration for the Otter 24B
Satellite Network Operating in "Non-geostationary Orbit" in the "Non-planned"
Frequency Bands. (Otter 24B)

Reference: FCC Application File No. _____; Callsign _____

Dear FCC Secretary,

Starfish Space, Inc. is aware that in accordance with Resolution 88 of the International Telecommunication Union's (ITU) Plenipotentiary Conference (Marrakech, 2002), and ITU Council Decision 482, as modified, cost-recovery fees will apply to satellite network filings received by the Radiocommunications Bureau after November 7, 1998. As a consequence, Commission applicants are responsible for any and all fees charged by the ITU to process their satellite network filings. Starfish Space, Inc. hereby states that it is aware of this requirement and unconditionally accepts all cost recovery responsibilities associated with the ITU filings for the Otter 24B satellite network. Please address all cost-recovery inquires, and ITU correspondence and filings, related to the Otter 24B satellite network to the following point of contact. We understand that should there be any change in the point of contact information, we will inform the Commission within 30 days of the foreseen event.

Point of Contact Name:	Jonathan Kneller, Head of Project Execution
Organization Name:	Starfish Space, Inc.
Address:	665 Andover Park West, Tukwila WA. 98188
E-Mail:	jonathan@starfishspace.com
Telephone Number:	516-661-0225

Starfish Space, Inc. understands that it must remit payment of any resultant cost-recovery fee to the ITU by the due date specified in the ITU invoice, unless an appeal filed prior to the due date is pending with the ITU. We fully understand that a license granted in reliance on such a commitment will be conditioned upon discharge of any such cost-recovery obligation. We also acknowledge that, in accordance with 47 CFR §25.111, should we have an overdue ITU cost-recovery fee and have no appeal pending with the ITU, the Commission may dismiss any application associated with that satellite network.

Sincerely,

/s/ Jonathan Kneller
Jonathan Kneller
Head of Project Execution
Starfish Space, Inc.

Attachment C
47 C.F.R. 25.114 Checklist

Rule/Requirement	Location in Draft
Introduction and Overview	Legal Narrative, I.
Space Station Description	Legal Narrative, I.
Public Interest Statement	Legal Narrative, V.
Technical Description	
47 CFR 25.114(c)(4)(i)	Technical Appendix, A, ii.; Schedule S
47 CFR 25.114(c)(4)(ii)	Schedule S
47 CFR 25.114(c)(4)(ii)	Schedule S
Antenna Gain Contour Specifications	
47 CFR 25.114(c)(4)(vi)(B)	Technical Appendix, VII.
47 CFR 25.114(c)(4)(vi)(D	Technical Appendix, VII.
Orbital Parameters and Spacecraft Characteristics	
47 CFR 25.114(c)(6)	Technical Appendix, III.C.; Schedule S
47 CFR 25.114(c)(7)	Technical Appendix, IV.A.
47 CFR 25.114(c)(8)	Technical Appendix, IX; Annex C.
47 CFR 25.114(c)(10)	Legal Narrative, I.
47 CFR 25.114(c)(11)	Form 312
47 CFR 25.114(c)(13)	Schedule S
Orbital Debris Rule Compliance to satisfy the Commissions orbital debris mitigation rules outlined in its rules, including 47 C.F.R § 25.114(d)(14).	
25.114(d)(14)	Technical Appendix, XI.
25.114(d)(14)(i)	Technical Appendix, XI.D.
25.114(d)(14)(ii)	Technical Appendix, XI.C.
25.114(d)(14)(iii)	Technical Appendix, XI.C.
25.114(d)(14)(iv)	Technical Appendix, XI.D.
25.114(d)(14)(iv)(A) - Where the application is for an NGSO space station or system, the following information must also be included:	
25.114(d)(14)(iv)(A)(1)	Technical Appendix, XI.C.
25.114(d)(14)(iv)(A)(2)	Technical Appendix, XI.C.
25.114(d)(14)(iv)(A)(4)	Technical Appendix, III. C.; Schedule S.
25.114(d)(14)(iv)(A)(5)	Technical Appendix XI. D. iv.
25.114(d)(14)(v)	Technical Appendix III. A. iv.
Where the application is for an NGSO space station or system, the statement shall also disclose the following:	

25.114(d)(14)(v)(A)	Technical Appendix III., C.
25.114(d)(14)(v)(B)	Narrative VII
25.114(d)(14)(v)(C)	Narrative VII; Technical Appendix XI.
25.114(d)(14)(vi)	Technical Appendix XI
25.114(d)(14)(vii)	Technical Appendix XI. E.
In addition, the following specific provisions apply:	
25.114(d)(14)(vii)(C)	Technical Appendix XI F.