Exhibit C

RADIATION HAZARD ANALYSIS

Overview

This Radiation Hazard analysis calculates the levels of non-ionizing radiation emitted from Northwood Space Corporation's ("Northwood") Ka-band gateway earth station. The calculations are performed in accordance with 47 CFR § 1.1310(d) and (e) and the Federal Communications Commission's ("FCC" or "Commission") Office of Engineering and Technology ("OET") Bulletin 65. This analysis covers transmission capability in the 27,500–31,000 MHz band only, consistent with Northwood's application for Part 25 Earth Station Licensing.

The Commission's rules[1] specify two separate tiers of exposure limits:

1. Occupational/Controlled Exposures
    a. Apply in situations where persons are exposed as a consequence of their employment, have training, and are fully aware of and can control their exposure.[2]
    b. Maximum Permissible Exposure ("MPE") limit of no greater than 5 mW/cm^2 for an average of 6 minutes.[3]

2. General Population/Uncontrolled Exposures
    a. Apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.[4]
    b. MPE limit of no greater than 1 mW/cm^2 for an average of 30 minutes.[5]

Using the analysis and equations found in the OET Bulletin 65,[6] this report analyzes the maximum power density levels in the vicinity of an antenna in three regions: the far field, the near field, and at the main antenna surface. This analysis finds that using Northwood's proposed site layout, both Controlled Exposures and Uncontrolled Exposures limits are met with proper mitigations enacted.

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[1] *See* 47 C.F.R. § 1.1310(d) and (e).

[2] *See id.* § 1.1310(e)(2).

[3] *See id.* § 1.1310(e)(1).

[4] *See id.* § 1.1310(e)(3).

[5] *See id.* § 1.1310(e)(1).

[6] Cleveland, R. F., Jr., Sylvar, D. M., Ulcek, J. L., Standards Development Branch, Allocations and Standards Division, Office of Engineering and Technology, & Federal Communications Commission. (1997). Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields. In OET Bulletin 65 (97th–01 ed.).

Input Parameters

Northwood's earth station plans up to six 2.4-meter diameter parabolic antennas capable of scanning the full 360° azimuthal plane of the station site. Each antenna is operated independently of the others, with a single point of communication operating with a single antenna at a time. The minimum elevation angle for transmission is 5°, ensuring that the main beam of the antenna does not radiate towards the horizon.[7] The antennas have a centerline height of 1.52 meters above ground level.

A frequency of 27,500 MHz is used for all analysis, as this provides a bounding worst case due to its longer wavelength compared to 31,000 MHz. System parameters that are used in this analysis include:

Frequency (F)	27,500	MHz
Wavelength (λ)	0.011	Meters
Diameter of Antenna (D)	2.4	Meters
Power per Transmit Beam (P)	1000	Watts
Maximum Antenna Gain (G_{max})	55.2	dBi
Aperture Efficiency (η)	78%	(unitless)
Duty Cycle (ζ)	100%	(unitless)

Antenna Surface

The surface of the antenna holds a high concentration of fields due to its proximity to the feed of the antenna. Equation 1 calculates the maximum power density at the surface of the parabolic dish, which assumes that the antenna is transmitting at full power.

$$S_{\text{Ant\_Surf}} = \zeta * \frac{4*P}{\text{Area}} \qquad (1)$$

$$S_{\text{Ant\_Surf}} = 100\% \frac{4 * 1000\ \text{W}}{\pi * (1.2\ \text{m})^2}$$

$$S_{\text{Ant\_Surf}} = 884.2 \frac{\text{W}}{\text{m}^2} = 88.42 \frac{\text{mW}}{\text{cm}^2}$$

The levels calculated are above the MPE limits for both an Uncontrolled Environment and a Controlled Exposures environment. Uncontrolled Exposures (i.e., general public) is not possible because access to the antenna is controlled by various access control measures (e.g., perimeter fencing, lockout/tagout per 29 CFR 1910.147, private property, etc.). As an additional cautionary measure, Category 4 "WARNING" signage will be posted to alert personnel that radio frequency ("RF") exposure levels beyond this point exceed the general population/uncontrolled and occupational/controlled exposure limits as required by 47 C.F.R. § 1.1307(b)(4). Only authorized personnel of Northwood will be allowed within the operational perimeter, and all employees at the

[7] Consistent with 47 C.F.R. § 25.205.

site will receive training regarding risks at the site, including exposure to non-ionizing radiation. As further health and safety precautions, if there is to be work done on an antenna located at the site for any reason, such as maintenance or inspection, power to the RF transmitters will be turned off, eliminating any power density that might occur in close proximity to the antennas.

Near Field

The near field region of the antenna is defined as the region generally in proximity to an antenna or other radiating structure, in which the electric and magnetic fields do not have a substantially plane-wave character but vary considerably from point to point. This distance which the near field extends to is between the face of the antenna and the distance found in Equation 2:

$$L_{\mathrm{nf}} = \frac{D^2}{4*\lambda} \qquad (2)$$

$$L_{\mathrm{nf}} = \frac{(2.4\ \mathrm{m})^2}{4 * 0.011\ \mathrm{m}}$$

$$L_{\mathrm{nf}} = 130.91\ \mathrm{m}$$

The power density in this near field varies according to location in the near field. However, the maximum value of the near-field, on-axis, power density can be expressed by Equation 3;[8]

$$S_{\mathrm{nf}} = \zeta * \frac{4P}{\eta * \mathrm{Area}} \qquad (3)$$

$$S_{\mathrm{nf}} = 100\% * \frac{4 * 1000\ \mathrm{W}}{78\% * \pi * (1.2\ \mathrm{m})^2}$$

$$S_{\mathrm{nf}} = 1133.6 \frac{\mathrm{W}}{\mathrm{m}^2} = 113.36 \frac{\mathrm{mW}}{\mathrm{cm}^2}$$

This maximum value assumes the main beam is pointed directly at the target. Because the main beam cannot be formed at elevation angles lower than 5°, any person at ground level is at least 5° off the beam axis. The reference radiation pattern of Recommendation ITU-R S.465-6 gives an off-axis gain of approximately 14.5 dBi at 5°, which is 40.7 dB below the 55.2 dBi main-beam gain. [9] Applying this discrimination to the on-axis near-field maximum gives 0.0097 mW/cm²:

$$S_{\mathrm{nf\_off\_axis}} = \frac{S_{\mathrm{nf}}}{10\text{^}((40.7\ \mathrm{dB})/10)} = 0.097 \frac{\mathrm{W}}{\mathrm{m}^2} = 0.0097 \frac{\mathrm{mW}}{\mathrm{cm}^2}$$

[8] *See* IEEE Std. C95.3-2021, Section D.4.4. Note that the antenna aperture efficiency (η) is located in the denominator for a more conservative calculation.

[9] *See* Recommendation ITU-R S.465-6, *Reference radiation pattern for earth station antennas in the fixed-satellite service in the frequency range from 2 to 31 GHz* where Gain(5°) = 32 – 25·log10(5) = 14.53 dBi.

This level is well below both the Uncontrolled/General Public and Controlled Environment MPE limits. Although the on-axis near-field value is above both limits, personnel are not expected to be within the main beam given the 5° minimum-elevation limitation.

Far Field

The far-field region of the antenna is defined as the region of the field of an antenna where the angular field distribution is essentially independent of the distance from the antenna. In this region (also called the "free space region"), the field has a predominantly plane-wave character, i.e., locally uniform distribution of electric field strength and magnetic field strength in planes transverse to the direction of propagation. The distance at the point where this field takes plane-wave characteristics starts is found using Equation 4:

$$L_{\text{ff}} = \frac{0.6 * D^2}{\lambda} \qquad (4)$$

$$L_{\text{ff}} = \frac{0.6 * (2.4\ \text{m})^2}{0.011\ \text{m}}$$

$$L_{\text{ff}} = 314.18\ \text{m}$$

The power density in the far field varies according to location and rolls off as a function of distance squared. Equation 5 calculates the power density at the start of the far field:

$$S_{\text{ff}} = \zeta * \frac{P * G}{4 * \pi * L_{\text{ff}}^2} \qquad (5)$$

$$S_{\text{ff}} = 100\% * \frac{1000\ \text{W} * 10^{55.2/10}}{4 * \pi * (314.18\ \text{m})^2}$$

$$S_{\text{ff}} = 267 \frac{\text{W}}{\text{m}^2} = 26.7 \frac{\text{mW}}{\text{cm}^2}$$

This power density represents the maximum power density with boresight of the main beam pointing directly at a spot. As the control electronics of the system do not allow any beam to transmit at elevations below 5°, the power density using the off-axis gain is used to find the exposure to a person standing on the ground.

At 5° off boresight, the maximum gain of the transmitting beam while staying compliant with ITU-R S.465-6 is approximately 14.5 dBi, or approximately 28.35 in linear gain. Using this gain, a person standing 314.18 meters from the front of the antenna would see the following power density, with the main beam transmitting at a 5° elevation angle:

$$S_{\text{Off\_Axis}} = \zeta * \frac{P * G_{\text{Off\_angle}}}{4 * \pi * L_{\text{ff}}^2}$$

$$S_{\text{Off\_Axis}} = 100\% * \frac{1000\ \text{W} * 28.35}{4 * \pi * (314.18\ \text{m})^2}$$

$$S_{\text{Off\_Axis}} = 0.0229 \frac{\text{W}}{\text{m}^2} = 2.29 \frac{\mu\text{W}}{\text{cm}^2}$$

This level is below both the Controlled Exposures and Uncontrolled Exposures MPE limits.

Mitigations

The analysis shows that power density within the main beam of the antenna exceeds the Uncontrolled Environment/General Public MPE limits along the full on-axis extent analyzed, with the highest value occurring on-axis within the near field. The Commission has defined categories for different exposure limits.[10]

Table 1. FCC Exposure Limit Categories

<10	W/m^2	FCC Category 1	Uncontrolled / General Public
>10 & <50	W/m^2	FCC Category 2	Controlled / Occupational
>50 & <500	W/m^2	FCC Category 3	Up to 10x Occupational
>500	W/m^2	FCC Category 4	More than 10x Occupational

The area near the surface of the antenna[11] classifies as a Category 4 area. 47 C.F.R. § 1.1307 requires the following precautions for Category 4 areas:

> "Category Four—WARNING/DANGER: Where the occupational limit could be exceeded by a factor of more than ten, "WARNING" signs with the associated color (orange), controls, or indicators (e.g., chains, railings, contrasting paint, diagrams) are required (in addition to the positive access control established for Category Two) surrounding the area in which the occupational exposure limit in a controlled environment is exceeded by more than a factor of ten. Signs must contain the components discussed in paragraph (b)(4)(vi) of this section. "DANGER" signs with the associated color (red) are required where immediate and serious injury will occur on contact, in addition to positive access control, regardless of mitigation actions taken in Categories Two or Three. If the boundaries between Category Three and Four are such that placement of both Category Three and Four signs would be in the same location, then the Category Three sign is optional. No access is permitted without Category reduction. If power reduction, and therefore

[10] *See* 47 C.F.R. § 1.1307(b)(2).

[11] Within the 2.4-meter zone for antenna surface power density calculations.

Category reduction, is not feasible, then lockout/tagout procedures in 29 CFR 1910.147 must be followed."

As discussed in previous sections, if there is a need for a Northwood employee to be near the antenna (defined as within a distance of D, or 2.4 meter[12]) for any reason (maintenance, inspection, etc.), power to the RF transmitters will be turned off, eliminating any power density that might occur in close proximity to the antennas. All employees will also undergo site-specific training informing each employee how to operate the system, including locations of power turn-off switches in case of emergency.

Further, as mentioned above, Northwood will take the additional precaution of placing Category 4 signage at the site, warning of the dangers of being near a transmitting antenna, to deter any unexpected intrusions on the site, however unlikely this may be.

Conclusion

Northwood has used power density calculations in the previous sections consistent with approved Commission bulletins to perform initial site analysis and has identified regions where power density levels may exceed MPE limits. As shown in this analysis, the general public will always be kept below the 1 mW/cm^2 Uncontrolled Exposures limit, and radiation from this earth station antenna will not harm the general public. For all Northwood employees, training will be conducted to make all persons aware of the dangers of RF radiation and informed of all operations that occur on site. Northwood has implemented further mitigations to ensure all employees are kept below the Occupational/Controlled Exposures limits by ensuring the cessation of all transmissions if access to the antenna is needed and by placing appropriate Category 4 signage at the site.

Northwood is committed to the safety of all employees and the general public and will protect them by implementing the mitigations described in this report as required by the Commission's rules.

[12] *Id.*