EXHIBIT B

RADIATION HAZARD ANALYSIS AND REPORT

This exhibit contains a report of the analysis of the radio frequency (RF) hazard present during the operation of the proposed radio and antenna systems.

Several antenna systems will be examined or tested during the experimental program period and an analysis on the RF radiation hazard of each of systems has been performed.

The hub facility may use a variety of antennas ranging in size from 7.1 m down to 2.4 m and power amplifiers from 400 W down to 40 W.

The mobile test antennas will vary in size from 2.4 m down to 0.22 m and will utilize power amplifiers ranging in size from 25 W down to 4 W

While the radiation hazard analysis for the antennas was conducted using the full output power of their respective power amplifiers, it should be noted that in actual operation the output power will typically be reduced by several dB. Furthermore, the units transmit using a burst access method with varying duty cycles so the average power output is further reduced.

Analysis of Non-Ionizing Radiation for Earth Station Systems

This report analyzes the non-ionizing radiation levels for a number earth station systems. The analysis and calculations performed in this report are in compliance with the methods described in the FCC Office of Engineering and Technology Bulletin No. 65.

Bulletin No. 65 specifies that there are two separate tiers of exposure limits that are dependant upon the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The two tiers are General Population / Uncontrolled environment, and an Occupational / Controlled environment.

The applicable exposure limit for the General Population / Uncontrolled environment at this frequency of operation is 1 mW/cm^2.

The applicable exposure limit for the Occupational / Controlled environment at this frequency of operation is 5 mW/cm^2.

Definition of terms

The terms are used in the formulas here are defined as follows:

$S_{surface}$ = maximum power density at the antenna surface
S_{nf} = maximum near-field power density
S_t = power density in the transition region
S_{ff} = power density (on axis)
R_{nf} = extent of near-field
R_{ff} = distance to the beginning of the far-field
R = distance to point of interest
P = power fed to the antenna in Watts
A = physical area of the aperture antenna in m^2
G = numeric power gain relative to an isotropic radiator
D = diameter of antenna in meters
F = frequency in MHz
λ = wavelength in meters ($300/F_{MHz}$)
η = aperture efficiency

Antenna Surface. The maximum power density directly in front of an antenna (e.g., at the antenna surface) can be approximated by the following equation:

$$S_{surface} = (4 * P) / A$$

$$= x.x \ mW/cm^2$$

Near Field Region. In the near-field or Fresnel region, of the main beam, the power density can reach a maximum before it begins to decrease with distance. The extent of the near field can be described by the following equation **(D** and λ in same units):

$R_{nf} = D^2 / (4 * \lambda)$

$= x.x$ m

The magnitude of the on-axis (main beam) power density varies according to location in the near field. However, the maximum value of the near-field, on-axis, power density can be expressed by the following equation:

$S_{nf} = (16 * \eta * P) / (\pi * D^2)$

$= x.x$ mW/cm^2

Far-Field Region. The power density in the far-field or Fraunhofer region of the antenna pattern decreases inversely as the square of the distance. The distance to the start of the far field can be calculated by the following equation:

$R_{ff} = (0.6 * D^2) / \lambda$

$= x.x$ m

The power density at the start of the far-field region of the radiation pattern can be estimated by the equation:

$S_{ff} = (P * G) / (4 * \pi * R_{ff}^2)$

$= x.x$ mW/cm^2

Transition Region. Power density in the transition region decreases inversely with distance from the antenna, while power density in the far field (Fraunhofer region) of the antenna decreases inversely with the ***square*** of the distance. The transition region will then be the region extending from R_{nf} to R_{ff}. If the location of interest falls within this transition region, the on-axis power density can be determined from the following equation:

$S_t = (S_{nf} * R_{nf}) / R$

$= (x.x \text{ m} * \text{mW/cm}^2) / R$ where R is the location of interest in meters

Analysis of Non-Ionizing Radiation for a 7.1 m Earth Station System

$P = 224.9$ Watts
$A = 39.6\ m^2$
$G = 730665.0$
$D = 7.1$ m
$F = 14{,}250$ MHz
$\lambda = 0.021$ m
$\eta = 0.65$

Summary of expected radiation levels

Region	Maximum Power Density	Uncontrolled environment Hazard Assessment	Controlled environment Hazard Assessment
Far field (R_{ff}) = 1437.7 m	0.633 mW/cm^2	Satisfies FCC MPE	Satisfies FCC MPE
Near field (R_{nf}) = 599.0 m	1.477 mW/cm^2	Potential Hazard	Satisfies FCC MPE
Transition region (R_t) (R_t) = $R_{nf} < R_t < R_{ff}$	1.477 mW/cm^2	Potential Hazard	Satisfies FCC MPE
Main Reflector Surface ($S_{surface}$)	2.273 mW/cm^2	Potential Hazard	Satisfies FCC MPE

Note, power density level in the area between the feed and the reflector surface is greater than the reflector surface and is assumed to be a potential hazard.

Conclusions

The proposed earth station system will be located in a fenced in area with controlled access and will be serviced by trained personnel. Based on the above analysis it is concluded that harmful radiation levels will not exist in regions normally occupied by the public. The transmitter will be turned off when the system is being serviced.

Analysis of Non-Ionizing Radiation for a 6.0 m Earth Station System

P = 224.9 Watts
A = 28.3 m^2
G = 521799.8
D = 6.0 m
F = 14,250 MHz
λ = 0.021 m
η = 0.65

Summary of expected radiation levels

Region	**Maximum Power Density**	**Uncontrolled environment Hazard Assessment**	**Controlled environment Hazard Assessment**
Far field (R_{ff}) = 1026.7 m	0.886 mW/cm^2	Satisfies FCC MPE	Satisfies FCC MPE
Near field (R_{nf}) = 427.8 m	2.068 mW/cm^2	Potential Hazard	Satisfies FCC MPE
Transition region (R_t) (R_t) = $R_{nf} < R_t < R_{ff}$	2.068 mW/cm^2	Potential Hazard	Satisfies FCC MPE
Main Reflector Surface ($S_{surface}$)	3.182 mW/cm^2	Potential Hazard	Satisfies FCC MPE

Note, power density level in the area between the feed and the reflector surface is greater than the reflector surface and is assumed to be a potential hazard.

Conclusions

The proposed earth station system will be located in a fenced in area with controlled access and will be serviced by trained personnel. Based on the above analysis it is concluded that harmful radiation levels will not exist in regions normally occupied by the public. The transmitter will be turned off when the system is being serviced.

Analysis of Non-Ionizing Radiation for a 4.5 m Earth Station System

$P = 283.2$ Watts
$A = 15.9\ m^2$
$G = 293512.4$
$D = 4.5$ m
$F = 14,250$ MHz
$\lambda = 0.021$ m
$\eta = 0.65$

Summary of expected radiation levels

Region	Maximum Power Density	Uncontrolled environment Hazard Assessment	Controlled environment Hazard Assessment
Far field (R_{ff}) = 577.5 m	2.128 mW/cm^2	Potential Hazard	Satisfies FCC MPE
Near field (R_{nf}) = 240.6 m	4.629 mW/cm^2	Potential Hazard	Satisfies FCC MPE
Transition region (R_t) (R_t) = $R_{nf} < R_t < R_{ff}$	4.629 mW/cm^2	Potential Hazard	Satisfies FCC MPE
Main Reflector Surface ($S_{surface}$)	7.122 mW/cm^2	Potential Hazard	Potential Hazard

Note, power density level in the area between the feed and the reflector surface is greater than the reflector surface and is assumed to be a potential hazard.

Conclusions

The proposed earth station system will be located in a fenced in area with controlled access and will be serviced by trained personnel. Based on the above analysis it is concluded that harmful radiation levels will not exist in regions normally occupied by the public. The transmitter will be turned off when the system is being serviced.

Analysis of Non-Ionizing Radiation for a 3.7 m Earth Station System

P = 88.5 Watts
A = 11.3 m^2
G = 209299.7
D = 3.8 m
F = 14,250 MHz
λ = 0.021 m
η = 0.65

Summary of expected radiation levels

Region	**Maximum Power Density**	**Uncontrolled environment Hazard Assessment**	**Controlled environment Hazard Assessment**
Far field (R_{ff}) = 411.8 m	0.869 mW/cm^2	Satisfies FCC MPE	Satisfies FCC MPE
Near field (R_{nf}) = 171.6 m	2.029 mW/cm^2	Potential Hazard	Satisfies FCC MPE
Transition region (R_t) (R_t) = $R_{nf} < R_t < R_{ff}$	2.029 mW/cm^2	Potential Hazard	Satisfies FCC MPE
Main Reflector Surface ($S_{surface}$)	3.121 mW/cm^2	Potential Hazard	Satisfies FCC MPE

Note, power density level in the area between the feed and the reflector surface is greater than the reflector surface and is assumed to be a potential hazard.

Conclusions

The proposed earth station system will be located in an area with controlled access and will be serviced by trained personnel. Based on the above analysis it is concluded that harmful radiation levels will not exist in regions normally occupied by the public.

Analysis of Non-Ionizing Radiation for a 2.4 m Earth Station System

P = 7.5 Watts
A = 4.5 m^2
G = 83488.0
D = 2.4 m
F = 14,250 MHz
λ = 0.021 m
η = 0.65

Summary of expected radiation levels

Region	Maximum Power Density	Uncontrolled environment Hazard Assessment	Controlled environment Hazard Assessment
Far field (R_{ff}) = 164.3 m	0.186 W/cm^2	Satisfies FCC MPE	Satisfies FCC MPE
Near field (R_{nf}) = 68.4 m	0.434 mW/cm^2	Satisfies FCC MPE	Satisfies FCC MPE
Transition region (R_t) (R_t) = $R_{nf} < R_t < R_{ff}$	0.434 mW/cm^2	Satisfies FCC MPE	Satisfies FCC MPE
Main Reflector Surface ($S_{surface}$)	0.668 mW/cm^2	Satisfies FCC MPE	Satisfies FCC MPE

Note, power density level in the area between the feed and the reflector surface is greater than the reflector surface and is assumed to be a potential hazard.

Conclusions

Based on the above analysis it is concluded that harmful radiation levels will not exist in regions normally occupied by the public.

Analysis of Non-Ionizing Radiation for a 0.6 m Earth Station System

P = 3.0 Watts
A = 0.28 m^2
G = 5218.0
D = 0.6 m
F = 14,250 MHz
λ = 0.021 m
η = 0.65

Summary of expected radiation levels

Region	Maximum Power Density	Uncontrolled environment Hazard Assessment	Controlled environment Hazard Assessment
Far field (R_{ff}) = 10.3 m	1.161 W/cm^2	Potential Hazard	Satisfies FCC MPE
Near field (R_{nf}) = 4.3 m	2.727 mW/cm^2	Potential Hazard	Satisfies FCC MPE
Transition region (R_t) (R_t) = $R_{nf} < R_t < R_{ff}$	2.727 mW/cm^2	Potential Hazard	Satisfies FCC MPE
Main Reflector Surface ($S_{surface}$)	4.278 mW/cm^2	Potential Hazard	Satisfies FCC MPE

Note, power density level in the area between the feed and the reflector surface is greater than the reflector surface and is assumed to be a potential hazard.

Conclusions

The proposed earth station system will be located in a controlled environment or mounted on an elevated platform and will be operated and serviced by trained personnel. Based on the above analysis it is concluded that harmful radiation levels will not exist in regions normally occupied by the public.

Analysis of Non-Ionizing Radiation for a 0.6 m Earth Station System

P = 14.0 Watts
A = 0.28 m^2
G = 5218.0
D = 0.6 m
F = 14,250 MHz
λ = 0.021 m
η = 0.65

Summary of expected radiation levels

Region	Maximum Power Density	Uncontrolled environment Hazard Assessment	Controlled environment Hazard Assessment
Far field (R_{ff}) = 10.3 m	5.502 W/cm^2	Potential Hazard	Potential Hazard
Near field (R_{nf}) = 4.3 m	12.928 mW/cm^2	Potential Hazard	Potential Hazard
Transition region (R_t) (R_t) = $R_{nf} < R_t < R_{ff}$	12.928 mW/cm^2	Potential Hazard	Potential Hazard
Main Reflector Surface ($S_{surface}$)	19.889 mW/cm^2	Potential Hazard	Potential Hazard

Note, power density level in the area between the feed and the reflector surface is greater than the reflector surface and is assumed to be a potential hazard.

Conclusions

The proposed earth station system will be located in a controlled environment or mounted on an elevated platform and will be operated and serviced by trained personnel. Based on the above analysis it is concluded that harmful radiation levels will not exist in regions normally occupied by the public. The transmitter will be turned off when the system is being serviced.

Analysis of Non-Ionizing Radiation for a 0.3 m Earth Station System

P = 4.5 Watts
A = 0.067 m^2
G = 1236.7
D = 0.2921 m
F = 14,250 MHz
λ = 0.021 m
η = 0.65

Summary of expected radiation levels

Region	Maximum Power Density	Uncontrolled environment Hazard Assessment	Controlled environment Hazard Assessment
Far field (R_{ff}) = 2.4 m	7.395 W/cm^2	Potential Hazard	Potential Hazard
Near field (R_{nf}) = 1.0 m	17.257 mW/cm^2	Potential Hazard	Potential Hazard
Transition region (R_t) (R_t) = $R_{nf} < R_t < R_{ff}$	17.257 mW/cm^2	Potential Hazard	Potential Hazard
Main Reflector Surface ($S_{surface}$)	26.55 mW/cm^2	Potential Hazard	Potential Hazard

Note, power density level in the area between the feed and the reflector surface is greater than the reflector surface and is assumed to be a potential hazard.

Conclusions

The proposed earth station system will be located in a controlled environment or mounted on an elevated platform and will be operated and serviced by trained personnel. Based on the above analysis it is concluded that harmful radiation levels will not exist in regions normally occupied by the public. The transmitter will be turned off when the system is being serviced.

Conclusions

The proposed earth station systems will be located in either controlled or elevated environments with limited access and will only be operated and serviced by trained personnel. Further, per OET-65, the expected power levels one antenna diameter removed from the main axis will be 20 dB (100 times) lower than the power in the main antenna beam.

Based on the above analysis it is concluded that harmful radiation levels will not exist in regions normally occupied by the public. The earth station's transmitter will be turned off during antenna maintenance so that the FCC MPE limit of 5 mW/cm^2 will be complied with for those regions with close proximity to the reflector that exceed acceptable levels.