ATTACHMENT B

Radiation Hazard Study

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ANALYSIS OF NON-IONIZING RADIATION FOR A 5.5 M OFFSAT EARTH STATION ANTENNA

THIS REPORT ANALYZES THE NON-IONIZING RADIATION LEVELS FOR A(n) 4.1 METER EARTH STATION ANTENNA. THE OFFICES OF SCIENCE AND TECHNOLOGY BULLETIN NO. 65, AS REVISED, 1997, SPECIFIES THAT THE MAXIMUM LEVEL OF NON-IONIZING RADIATION THAT A PERSON MY BE EXPOSED TO OVER A SIX MINUTE PERIOD IS AN AVERAGE POWER DENSITY EQUAL TO 5 mW/cm2 (FIVE MILLIWATTS PER CENTIMETER SQUARED). IT IS THE PURPOSE OF THIS REPORT TO DETERMINE THE POWER FLUX DENSITIES OF THE EARTH STATION ANTENNA IN THE FAR FIELD, NEAR FIELD, TRANSITION REGION, BETWEEN THE SUBREFLECTOR AND THE MAIN REFLECTOR SURFACE. AT THE MAIN REFLECTOR SURFACE AND BETWEEN THE ANTENNA EDGE AND THE GROUND.

THE FOLLOWING PARAMETERS WERE USED TO CALCULATE THE VARIOUS POWER FLUX DENSITIES FOR THIS EARTH STATION.

Antenna Diameter, (equivalent for 5.5 X 2.4M reflector)	(D)	=	4.10	meters	410	cm
Antenna Surface area,	(S_a)	=	13.20	$meters^2$	132025.43	cm^2
Feed Flange Diameter (equivalent for 15.24cm square)	(D_f)	=	17.20	cm	0.172	meters
Area of Feed Flange	(F_a)	=	232.35	cm^2	0.023	$meters^2$
Frequency in GHz			6.18	GHz		
Wavelength at Frequency	(λ)	=	4.86	cm	0.0486	meters
Transmit Power at Flange	(P)	=	450.00	Watts		
Antenna Gain at Frequency	(G_{es})	=	45.90	dB		
Gain converted to power ratio			38904.51	dBi		
Antenna Aperture Efficiency	(n)	=	0.56	Percentage / 100		

1. Far Field Calculations:

Distance to the far field region	(R_f)	=	207.6035	meters
On axis power density in the far field	(W_f)		3.23	mW/cm^2

2. Near Field Calculations:

Extent of near field	(R_n)		86.50	meters
Near field power density	(W_n)		7.63	mW/cm^2

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3. Transition Region Calculations:

The maximum power density in the transition region will not exceed that calculated for the near field region. The power density in the near field region, as shown above, will not exceed **7.63** mW/cm^2

4. Region between main reflector & subreflector:

Power density at feed flange (W_f) 7746.86 mW/cm^2

5. Main Reflector Region:

Power density at reflector surface (W_s) 13.63 mW/cm^2

6. Region Between Reflector & Ground:

Power density between reflector & ground (W_g) 3.41 mW/cm^2

Table 1

Summary of Expected Radiation Levels

Based on (5 mW/cm^2) MPE for Controlled Environment

Region	Calculated Maximum Radiation Level (mW/cm^2)	Hazard Assessment
1. Far Field, (R_f)=	3.23	SATISFIES ANSI
2. Near Field, (R_n)=	7.63	POTENTIAL HAZARD
3. Transition Region, (R_t) $R_n < R_t < R_f$	7.63	POTENTIAL HAZARD
4. Between Main Reflector and subreflector	7746.86	POTENTIAL HAZARD
5. Reflector Surface	13.63	POTENTIAL HAZARD
6. Between Antenna and Ground	3.41	SATISFIES ANSI

It is the applicants responsibility to ensure that the public and operational personnel are not exposed to the harmful levels of radiation.