ANALYSIS OF A NON-IONIZING RADIATION
FOR A 1.2 METER EARTH STATION SYSTEM

This report analysis the non-ionozing radiation levels for a 1.2-m earth station system. The analysis and calculations in this report comply with the methods described in th FCC Office of Engineering and Technology Bulletin, No.65. The radiation safety limits used in the analysis are in conformance with the FCC R&O 96-326. Bulletin No.65 and the FCC R&O specifies that there are two seperate tiers of exposure limits that are dependant on the situation in which the exposure takes place and/or the status of the individuals who are subject to the explosure. The Maximum Permissible Exposure (MPE) limits for person in a General Population/Uncontrolled enviroment are shown in Table 1. MPE limits for persons in an Occupation/Controlled enviromenment are shown in Table 2. The purpose of the analysis of this report is to determine the power flux density levels and to compare these levels to the specified MPEs

Table 1 – Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	**Power Density (mW/cm^2)**
30-300	0.2
300-1500	Frequency (MHz)*(0.8/1200)
1500-100,000	1.0

Table 2 – Limits for General Occupational/Controlled Exposure (MPE)

Frequency Range (MHz)	**Power Density (mW/cm2**
30-300	1.0
300-1500	Frequency (MHz)*(0.8/1200)
1500-100,000	5.0

Table 3 – Formulas and Parameters Used for Determining Power Flux Densities

Parameter	**Value**	**Units**
Antenna Diameter	1.2	m
Antena Surface Area	1,130973355	m2
Subreflector Diameter	0	cm
Area of Subreflector	0	cm2
Frequency	14240	MHz
Wavelength	0.02105263	m
Transmit Power	22	W
Antenna Gain (dBi)	43.00	dBi
Antenna Gain (factor)	19952,62	n/a
Pi	3.1415927	n/a
Antenna Efficiency	0.622229	n/a

1 – Far Field Distance Calculation

The distance to the beginning of the far field **(Rff)** and the on-axis power density **(Sff)** are calculated as below

Rff = 41.040 m
Sff = 2.074 mW/cm2

2 – Near Field Distance Calculation

The distance to the end of the Near Field **(Rnf)** and the maximum power density in the Near Field **(Snf)** are calculated as below

Rnf = 17.100 m
Snf = 4.842 mW/cm2

3 – Transition Region Calculation

The Transit Region is located between Near Field and Far Field Regions. The maximum power density in the Transit Region will not exceed that calculated for the Near Field region. The power density in the Transit Region **(St)** at a distance Rt is calculated as below

St = 4.842 mW/cm2 ,

4- Region Between the Main Reflector and Subrefletor

No Subreflector used in this system.

5- Main Reflector Region

Power density at the Main reflector Surface Ssurface (Ssurface) is calculated as below

Ssurface = 7.781 mW/cm2

6- Region Between the main reflector and the Ground

Power density between the Main Reflector and the Ground (Sg) is calculated as below

Sg = 0.830 mW/cm2

7- SUMMARY OF CALCULATIONS

Table 4. Summary of expected Radiation Levels for **Uncontrolled Enviroment**

Region	Distance (m)	Expected Maximum Radiation Power Density Level mW/cm2	Hazard Assesement
Far Field (Sff)	41,04	2.074	Potential Hazard
Near Field (Snf)	17,1	4,842	Potential Hazard
Transition Region (St)		4.842	Satisfiecs FCC MPE
Main Reflector (Ssurface)		14,147	Potential Hazard
Between Main Reflector & Ground (Sg)		3,537	Potential Hazard

Table 5. Summary of Expected Ration Levels for **Controlled Enviroment**

Region	**Distance (m)**	**Expected Maximum Radiation Power Density Level mW/cm2**	**Controlled**
Far Field	41,04	2.074	Satisfies FCC MPE
Near Field	17,1	4,842	Satisfies FCC MPE
Transition Region		4.842	Satisfies FCC MPE
Main Reflector		14,147	Potential Hazard
Between Main Reflector & Ground		3,537	Satisfies FCC MPE

8. CONCLUSION

Based upon the above analysis it's concluded that FCC RF Guidelines have been exceeded in the specific region(s) of Table 4. The applicant proposes to comply with MPE limits of Uncontrolled and Controlled areas.

The antenna will be installed at the applicants facility on the roof of NPC Building, Washington DC. Since it's a roof top with limited access only for the employee of the Building and Applicant, no general population will be present or near the direct path of main beam. The applicant will mark the earth station with the standart radiation hazard warnings.

Finally the earth station's operation personel will not have access to areas that exceeds the MPE levels, while the earth station is in operation. The transmitter will be turned off during the periods of maintanance, so that MPE standarts will be complied with for those regions in close proximity to the main reflector, which could be occupied by operating personnel.