Radiation Hazard Study

Site: Temporary Fixed (Sprinter01)

Applicant: HDNet, LLC

Radiation Hazard Study

Region	Radiation Levels mw/cm^2	Hazard Assessment
Far Field R_f = 92.6 meters	8.490	Potential Hazard
Near Field R_n = 38.6 meters	1.89	Complies with Guidelines
Transisitional Region R_t $R_n < R_t < R_f$	< 1.89	Complies with Guidelines
Reflector Surface	7.859	Potential Hazard
Between Antenna and Ground	.0786	Complies with Guidelines
Between Main Reflector and Feed	4386	Potential Hazard

Conclusion:

Based on the above analysis, it is concluded that harmful levels of radiation will not exist in regions normally occupied by the public or the station's operating personal. The Earth Station and on the antenna itself, will be marked with the standard radiation hazard warnings warning personal to avoid the area in front of the reflector when the transmitter is operational. To ensure compliance with the safety limits, the earth station's transmitter will be turned off whenever maintenance and repair personal are required to work in the area where the radiation level exceeds or could exceed the recommended guidelines. Additionally, the earth station will be secured and it's access will be controlled.

Supporting Calculations
Ref: FCC Bulletin #65

A: Far Field

$$Rf = \frac{0.6D^2}{\lambda} = \frac{0.6x(1.8)^2}{0.021} = 93\,meters$$

$$G = 10^{\frac{ant\,gain\,db}{10}} = 10^{\frac{46.6}{10}} = 4.57x10^4$$

$$S = \frac{PG}{4\Pi R^2} = \frac{200x4.57x10^4}{4\Pi\, 93^2} = 84.9W/m^2$$

$$S = 8.49W/cm^2$$

B: Near Field

$$Rf = \frac{D^2}{4\lambda} = \frac{(1.8)^2}{(4)x0.021} = 38.6\,meters$$

$$S = \frac{16nP}{\Pi D^2} = \frac{(16)(.6)(200)}{\Pi(1.8)^2} = 188.6W/m^2$$

$$S = 1.89mW/cm^2$$

C: Transitional Region

Since the transitional extends between R_n and R_f, the power density can never exceed the power density of the near field

$$S = \frac{S(nf)R(nf)}{R}$$

D: Reflector Surface

With even distribution of energy over the surface of the dish,

$$S = \frac{P}{\Pi r^2} = \frac{200x10^3}{\Pi\,(.9\,x10^2)^2} = 7.8595\,mW/cm^2$$

E: Beween Antenna and Ground

The nearest point is more then 1 times diameter removed from the center of the main beam

$$S= \frac{S(reflector\ Surface)}{100} = .0786/cm^2$$

F: Between Main Reflector and Feed

The diameter of the feed aperture is 7.62cm. The highest density will be at the aperture

$$S= \frac{P}{\Pi r^2} = \frac{200x10^3}{\Pi (3.18)^2} = 4386mw/cm^2$$