Educational Media Foundation **Exhibit A**

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Radiofrequency Radiation Hazard Study

In the facility proposed in this application, Educational Media Foundation (“EMF”) will use two 3.8-meter elliptical antennas, normally configured so that only one antenna is transmitting at a given time (the other normally acts as a backup antenna). The earth station transmitting equipment and antennas are located within a controlled area and are not accessible to the general public. Entry is restricted to employees who have been made fully aware of the potential for human exposure and can exercise control over their exposure.

For this study, EMF has used the FCC’s guidelines and procedures for evaluating environmental effects of radio frequency (RF) emissions, as expressed in OET-65, August 1997, for frequencies between 300KHz and 100GHz. Since the equipment is not accessible to the general public, occupational (controlled) exposure maximum power density limits are used in this study.

EMF’s Ku-Band satellite earth station will be equipped with amplifiers having a maximum output of 50 watts. One transmitter will feed one of the 3.8m antennas via a transmission link having 5.83 dB loss. Therefore, the following calculations are based on a maximum output power at the antenna flange of 13.06 watts:

Antenna Surface: The maximum power density directly in front of the antenna may be expressed as:

$$S_{surface} = \frac{4P}{A}$$

where: $S_{surface}$ = maximum power density at the antenna surface
P = power fed to the antenna
A = physical area of the aperture antenna

Using the parameters for EMF’s antennas:

$S_{surface}$ = (4)(13.06 watts) / ( )(3.8 meters/2)^2
$S_{surface}$ = 52.24 watts / 11.34 m^2
$S_{surface}$ = 4.61 watts / m^2
$S_{surface}$ = 0.46 mW / cm^2

Near-Field Region: In the near field 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:

$$R_{nf} = \frac{D^2}{4\lambda}$$

where: R_{nf} = extent of near field
D = maximum diameter
= wavelength

Using the parameters for this antenna:
= 0.0207 meters (at 14.5 GHz)
R_{nf} = (3.8 meters)^2 / (4)(0.0207 meters)
R_{nf} = 14.44 / 0.083 meters
R_{nf} = 174.6 meters

The magnitude of the on-axis 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:

$$S_{nf} = \frac{16\eta P}{\pi D^2}$$

where: S_{nf} = maximum near field power density
= aperture efficiency
P = power fed to the antenna
D = antenna diameter

Using the parameters for this antenna:

= 0.65
P = 13.06 watts
S_{nf} = (16)(0.65)(13.06 watts) /( )(3.8 meters)^2
S_{nf} = 135.832 watts / 45.365 meters^2
S_{nf} = 2.99 watts / meter^2
S_{nf} = 0.3 mW / cm^2

Far Field Region: For purposes of evaluating RF exposure, the distance to the beginning of the far field region can be approximated by the following equation:

$$R_{ff} = \frac{0.6D^2}{\lambda}$$

where: R_{ff} = distance to the beginning of far field
D = diameter of antenna
= wavelength

Using the parameters for this antenna:

R_{ff} = (0.6)(3.8 meters)^2 / 0.0207 meters
R_{ff} = 419.1 meters

The power density in the far field region of the antenna pattern decreases inversely as the square of the distance. The power density in the far field region of the radiation pattern can be estimated by the equation:

$$S_{ff} = \frac{PG}{4\pi R^2}$$

where: S_{ff} = power density (on axis)
P = power fed to antenna
G = power gain of the antenna in the direction of interest
R = distance to the point of interest

Using the parameters for this antenna:
S_{ff} = (13.06 watts)(53.2 dBi) / (4)( )$(419.1)^2$
S_{ff} = 2728789 / 2206690
S_{ff} = 1.24 watts/meter^2
S_{ff} = 0.12 mW/cm^2

Main Reflector – Feed Horn Region

The RF energy radiated from the feed system is confined to a conical shape whose vertex is located at the feed and extends outward to the main reflector surface. This power density at any point in this region is expressed by the equation:

$$S_{feed} = \frac{P}{A}$$

where: S_{feed} = Power density at the feed horn
P = Radiated transmitted power in watts
A = Cross sectional area of the conical region in meters^2

At the feed horn, the power density is:

S_{feed} = 13.06 watts / ( )$(0.1 / 2)^2$
S_{feed} = 1662.95 watts/meter^2
S_{feed} = 166.3 mW/cm^2