FCC Form 312
Exhibit B
RF Hazard Analysis

Analysis of Non-Ionizing Radiation for VMT-2100-10 Earth Station Antenna System

This report analyzes the non-ionizing radiation levels for the VMT-2100-10 earth station antenna system.

The FCC's Office of Engineering Technology's Bulletin No. 65 specifies that there are two separate tiers of exposure limits that are dependent 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, i.e., areas that people may enter freely, at this frequency of operation is 1 mW/cm^2 average power density over a 30 minute period.

The applicable exposure limit for the Occupational / Controlled environment, i.e., areas that only authorized / trained personnel have access to, at this frequency of operation is 5 mW/cm^2 average power density over a 6 minute period.

Summary of expected radiation levels for an Uncontrolled environment

Region	Maximum Power Density	Hazard Assessment
Safe region range (R) $\geq$ 0.712 m	1.0 mW/cm^2	Satisfies FCC MPE
Far field (Rff) = 0.208 m	11.7 mW/cm^2	Potential Hazard

Conclusions

The proposed earth station system will generally be mounted in a location away from users such as on the top of a train, commercial vehicle, or automobile. During operation, the user will be greater than 0.712 m away from the unit. Exposure is further reduced by the fact that the maximum antenna gain (used in this analysis) occurs at a 90 degree elevation angle and is reduced by at least 50% at an elevation angle of 15 degrees and by the fact that the device uses burst transmissions at much less than the 100% duty cycle used for this analysis.

Based on the above analysis it is concluded that no hazard exists for the public.

Analysis

The analysis and calculations that follow in this report are performed in compliance with the methods described in the OET Bulletin No. 65.

Definition of terms

The terms are used in the formulas here are defined as follows:
S = power density at the specified distance
Rff = distance to the beginning of the far-field

R = 0.712 m (28 in)	distance to point of interest
P = 8 W	power fed to the antenna in Watts
D = 0.251 m	effective diameter of antenna array
G = 7.95	power gain relative to an isotropic radiator
F = 1660.5	frequency in MHz
A. = 0.181 m	wavelength in meters ($300/FMH_z$)

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:

Rff $= (0.6 * D^2) / A.$

$= (0.6 * (0.251\ m)^2) / 0.181\ m$

$= 0.208$ m

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

Sff $= (P * G) / (4 * it * Rff^2)$

$= (8\ W * 7.95) / (4 * it * (0.208\ m)^2)$

$= 11.7\ mW/cm^2$

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

Sff $= (P * G) / (4 * it * R^2)$

$= (8\ W * 7.95) / (4 * it * (0.712\ m)^2)$

$= 0.998$ mW/cm2