RADIATION HAZARD STUDY

SITE: Saint John Gualbert Cathedral

The radio frequency environment in and around the proposed earth station has been evaluated and found it to be safe for continuous exposure of operating personnel and the general public. The actual antenna will be located on the roof of a building with restricted access and with a clear unobstructed path (no other buildings or public access areas) within or directly adjacent to the main beam.

The supporting calculations that are submitted as part of this study show that the proposed earth station is environmentally safe, based on the criteria of FCC Rules Section 1.1310.

Station Parameters

Antenna Diameter (D) = 1.8 M

Operating Wavelength (λ) = .021 M

Antenna Gain (G) = 46.8 dBi

Transmitter RF Power (P) = 8.0 W

Summary of Results

RF Power Density - Centerline of Near Field = 0.84 mw/cm^2

RF Power Density - Far Field = 0.36 mw/cm^2

Near Field Evaluation

The earth station antenna that will be employed for this service is designed to focus nearly all of the radiated radio frequency energy into a cylindrical beam with a diameter only slightly larger than that of the antenna dish. Any intrusion into this beam would impair the performance of this earth station. Therefore, the selected site location for the antenna that will insure that the beam of principle radio frequency radiation is clear of any obstructions, buildings, etc. and cannot accidentally be entered by the general public.

The near field cylindrical projection extends to a distance (d) that is defined by the following relationship:

$$d_{nf} = D^2/4\lambda$$

For the proposed antenna, the near field extends, therefore, to a distance of:

$$d_{nf} = 38.4 \text{ meters}$$

And the far field extends, therefore, to a distance of:

$$d_{ff} = .6D^2/\lambda$$

$$d_{ff} = 92.1 \text{ meters}$$

The maximum radio frequency power density within this near field cylinder is a function of the antenna diameter and transmitter power as follows:

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

$$\eta = (G*\lambda^2 / 4\pi) /(\pi D^2 / 4) = 0.67$$

For the proposed earth station, the maximum power density in the near field was computed not to exceed:

$$S_{nf} = 0.84 \text{ mW/cm}^2$$

At the edge of the near field cylindrical beam, 0.7 antenna diameter removed from its center, the power density is attenuated at least 20 dB to 1/100th of the maximum near field power. The power along the outside edge of the beam will, therefore, not exceed:

$$0.0084 \text{ mw/cm}^2$$

Far Field Evaluation

Beyond the near field region, the cylindrical beam begins to spread gradually into a slightly tapered cone in accordance with the published radiation pattern for the proposed antenna. The specified antenna gain is realized and the radiated power density decreases proportionally to the inverse square of distance from the antenna.

For the purpose of determining the maximum power density within the far field, this broadcaster has conservatively assumed that the full antenna gain is already realized at the limit of the near field cylindrical region. The radio frequency power density in the far field region is given by:

$$S_{ff} = PG/4\pi d^2$$

For the proposed earth station, the maximum radiated power at the point of transition between the near field and far field regions was computed not to exceed:

$$S_{ff} = 0.36 \text{ mw/cm}^2$$

Off-Axis Evaluation

The proposed antenna meets or exceeds the performance specifications under part #25 of the FCC rules.

Summary

Radiation calculations verify that the actual levels, which are accessible to the general given the system design, do not exceed the maximum of 1.0 mw/cm² with-in the accessible areas of the system.