RADIATION HAZARD STUDY
SITE: Mammoth Mountain

Mammoth Mountain has evaluated the radio frequency environment in and around the proposed earth station and found it to be safe for continuous exposure of operating personnel and the general public.

Only the internal antenna structure, specifically the area between the feedhorn and the dish, shows a radio frequency environment that is considered excessive for continuous exposure of personnel. This area is sufficiently high above ground level that it cannot accidentally be entered without the aid of mechanical equipment.

The supporting calculations that are submitted as part of this study show that the proposed earth station is environmentally safe, not only based on the criteria published in the Occupational Safety and Health Act (OSHA), but also in the light of recent recommendations for stricter control of radio frequency radiation.

1.0 Station Parameters

Antenna Diameter (D) = 1.5 M

Operating Wavelength (λ) = .021 M

Antenna Gain (G) = 45.5 dBi

Transmitter RF Power (P) = 200.0 W

2.0 Summary of Results

RF Power Density - Centerline of Near Field = 27.18 mw/cm^2

RF Power Density - Far Field = 13.8 mw/cm^2

*RF Power Density - Edge of Near Field = 0.27 mw/cm^2

*RF Power Density - Behind Antenna = 0.040 mw/cm^2

* The density levels denoted by an asterisk are representative of the maximum radiation environment in or around the proposed earth station to which the general public may be exposed.

3.0 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. This broadcaster has, therefore, selected a 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.

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

$$d(nf) = D^2/4\lambda$$

$$d(ff) = .6D^2/\lambda$$

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

26.8 meters

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

64.3 meters

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

$$W(nf) = 9.6P/\pi D^2$$

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

27.18mw/cm^2

3.3 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:

$$0.27\ mw/cm^2$$

4.0 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.

4.1 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:

$$W(ff) = PG/4\pi d^2$$

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:

$$13.68\ mw/cm^2$$

5.0 Off-Axis Evaluation

The proposed antenna meets or exceeds the performance specifications under part #25 of the FCC rules. The off-axis gain of this antenna is, therefore, - 10dBi or less in any direction more than 48° removed from the centerline of the main beam.

5.1 The off-axis power density may be conservatively evaluated using the far field method of computation:

$$W\ (OA) = 0.1P/4\pi d^2$$

Assuming a distance of 2 meters from the antenna, the density was calculated to be:

$$0.040\ mw/cm^2$$

6.0 Summary

6.1 The computed values for near field projection distance, RF power density at the centerline, RF power density in the far field, RF power density at the edge of the near field, and RF power density behind the antenna are furnished by the Engineering Department.

6.2 Radiation calculations verify that the actual levels, which are accessible to the general given the system design, do not exceed the OSHA maximum of 5mw/cm² with-in the off-axis access areas of the system.