ANALYSIS OF NON-IONIZING RADIATION
for NEVADA STATE OF
Site: CARSON FACILITY State: NV
Latitude: 39 9 43.2 Longitude: 119 45 44.7 (NAD83)
08-18-2005

The Office of Science and Technology Bulletin, No. 65, October 1985, specifies that the maximum level of non-ionizing radiation that a person may be exposed to over a six minute period is an average power density equal to 5 mW/cm**2 (five milliwatts per centimeter squared). It is the purpose of this report to determine the maximum power flux densities of the earth station in the far zone, near zone, transition zone, at the main reflector surface, and between the antenna edge and the ground.

Parameters which were used in the calculations:
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Antenna Diameter, (D) = 3.8000 m

Antenna Surface Area (Sa) = pi(D**2)/4 = 11.3411 m**2

Sub Reflector Diameter (Ds) = 50.8000 cm

Area of the Sub Reflector (As) = pi(Ds**2)/4 = 0.2027 m**2

Wavelength at 14.2500 GHz (lambda) = 0.0210 m

Transmit Power at Flange (P) = 25.0000 Watts

Antenna Gain at Earth Site (GES) = 53.4000 dBi = 218776.1624
Power Ratio:
AntiLog
(GES/10)

pi = 3.1415927

Antenna Aperture Efficiency (n) = 0.6500

1. FAR ZONE CALCULATIONS

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Distance to the Far Zone      (Df) =    (n)(D**2)     = 446.9524 m
                                        ---------
                                         lambda


Far Zone Power Density        (Rf) =    (GES)(P)      = 2.1788 W/m**2
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                                      4*pi*(Df**2)
                                                      = 0.2179 mW/cm**2
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2. NEAR ZONE CALCULATIONS

Power Flux Density is considered to be at a maximum value throughout the entire length of this Zone. The Zone is contained within a cylindrical volume which has the same diameter as the antenna. Beyond the Near Zone, the Power Flux Density will decrease with distance from the Antenna.

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Distance to the Near Zone     (Dn) =      D**2        = 171.9048 m
                                        --------
                                        4*lambda


Near Zone Power Density       (Rn) =    16.0(n)P      = 5.7313 W/m**2
                                        --------
                                        pi(D**2)

                                                      = 0.5731 mW/cm**2
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3. TRANSITION ZONE CALCULATIONS

The Power Density begins to decrease with distance in the Transition Zone. While the Power Density decreases inversely with distance in the Transition Zone, the Power Density decreases inversely with the square of the distance in the Far Zone. Since the maximum Power Density in the Transition Zone will not exceed the Near Zone values, it is not calculated.

4. ZONE BETWEEN THE SUB AND MAIN REFLECTORS

Transmissions from the feed horn are directed toward the Sub Reflector surface and are reflected back toward the Main Reflector. The energy between the Sub Reflector and Main Reflector surfaces can be calculated by determining the Power Density at the Sub Reflector surface as follows:

Sub Reflector Power Density = $\frac{2(P)}{As}$ = 246.6907 W/m**2

= 24.6691 mW/cm**2

5. MAIN REFLECTOR ZONE

Main Reflector Power Density = $\frac{2(P)}{Sa}$ = 4.4087 W/m**2

= 0.4409 mW/cm**2

6. ZONE BETWEEN THE MAIN REFLECTOR AND THE GROUND

Applying uniform illumination of the Main Reflector Surface:

Main to Ground Power Density = $\frac{P}{Sa}$ = 2.2044 W/m**2

= 0.2204 mW/cm**2

CALCULATED SAFETY MARGINS SUMMARY AND EVALUATION

Safety Margin = 5.0 - Calculated Zone Value (mW/cm**2)

	Zones	Safety Margins (mW/cm**2)	Conclusions
1.	Far Zone	4.7821	Complies with ANSI
2.	Near Zone	4.4269	Complies with ANSI
3.	Transition Zone	Rf < Rt < Rn	Complies with ANSI
4.	Sub to Main Reflector	-19.6691	POTENTIALLY HAZARDOUS
5.	Main Reflector Surface	4.5591	Complies with ANSI
6.	Main Reflector to Ground	4.7796	Complies with ANSI

7. EVALUATION

The SUB to MAIN Reflector ZONE does not comply with the ANSI standards! WARNING SIGNS will be posted for the affected Zone indicating danger while the system is in use. Additionally, the system will be shut down for servicing.