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Radiation Hazard Report – UHF-Antenna

This report analyzes electro-magnetic non-ionizing radiation which would accompany the operation of the Black Sky UHF earth station antenna (manufactured by M2 Antenna Systems and known as Model 450CP34-Yagi) which will be used to uplink UHF signals to their two satellites. The antenna will be located at Tukwila, WA. where the site elevation is 15.9m AMSL. The antenna will be transmitting at UHF (435-455MHz).

This report provides calculations which are used to determine the transmission power density in the “Far Field”, the “Near Field”, the “Transition Region” and nearby ground.

Accordingly, we use the “Maximum Permissible Exposure” limits published by the FCC OET 65 Bulletin for the General Population/Uncontrolled Exposure and the limits for the Occupational/Controlled Exposure. The results of the calculations meet the FCC’s requirements.

Far Field Analysis

The calculation for the Far Field location includes the actual distance to where the far field begins, followed by a calculation of the power density at that location.

Near Field Analysis

The power flux density will be at its highest value the whole length of the Near Field area. We evaluate end of the Near Field, followed by the maximum power density in that area.

Transition Area

In the Transition area between the Near and Far Fields, the power density decreases inversely with the square of the distance.

Area from the Antenna to nearby Ground

The power density in this area will be determined by calculation of the nearby ground area.

Conclusions

The following page provides the details of each analyzed area. The results of the calculations demonstrate that the Black Sky UHF antenna will meet all required values of power density.

UHF Power Density

Inputs		Units	Calculations	<u>UHF Power Density</u>	Units
UHF Antenna diameter	2.54	m	Far Field dist	5.80644	m
UHF Gain	16	dBi	On-Axis Power Density Far Field	0.939658941	W/m ²
UHF Gain	39.81071706			0.093965894	mW/cm ²
UHF EIRP	24.15	dBW			
Power UHF	8.15	dBW	Near Field Dist	2.41935	m
Frequency (UHF)	450	MHz	Near Field Power Density	2.193577486	W/m ²
Wavelength UHF	0.6666666667	m		0.219357749	mW/cm ²
Antenna efficiency UHF	0.277875529				
Power in Watts	10	W	Transition Dist	4.112895	m
UHF Antenna Surface Area	5.067074791	m ²	Transition Region Power Density	1.290339697	W/m ²
				0.12903397	mW/cm ²
			Antenna/Ground	1.973525241	W/m ²
				0.197352524	mw/cm ²