ATTACHMENT C – Radiation Hazard Analyses for Quincy

Ka band

RADIATION HAZARD CALCULATIONS FOR 9.2 meter EARTH STATION			
Nomenclature	**Formula**	**Value**	**Unit**
INPUT PARAMETERS			
D = Antenna Diameter		9.20	meters
d = Diameter of Feed Mouth		0.029	meters
P = Max Power into Antenna		200	Watts
n = Apperture Effeciency		58%	
k = Wavelength @ 29.1 GHz		0.0103	meters
CALCULATED VALUES			
A = Area of Reflector	PI*D^2/4	66.476	meters^2
l = Length of Near Field	D^2/4k	2053	meters
L = Beginning of Far Field	0.6D^2/k	4926	meters
G = Antenna Gain @ 29.1 GHz	n(PI*D/k)^2	4,559,369	66.6 dBi
a = Area of Feed Mouth	PI*d^2/4	0.0007	meters^2

POWER DENSITY CALCULATIONS			
Region	**Maximum Power Density in Region**		**Hazard Assessment**
	Formula	**Value (mW/cm^2)**	**(FCC MPE Limit = 5 mW/cm^2)**
1 Near Field	4nP/A	0.70	< FCC MPE Limit
2 Far Field	GP/(4(PI)L^2)	0.30	< FCC MPE Limit
3 Transition	<= Nr Fld Region	0.70	< FCC MPE Limit
4 Near Reflector Surface	4P/A	1.20	< FCC MPE Limit
5 Between Reflector & Ground	P/A	0.30	< FCC MPE Limit
6 Between Subreflector and Feed	4P/a	121116.7	> FCC MPE Limit (See Attachment)

Q/V band

RADIATION HAZARD CALCULATIONS FOR 9.2 meter EARTH STATION			
Nomenclature	Formula	Value	Unit
INPUT PARAMETERS			
D = Antenna Diameter		9.20	meters
d = Diameter of Feed Mouth		0.029	meters
P = Max Power into Antenna		200	Watts
n = Apperture Effeciency		49%	
k = Wavelength @ 51.4 GHz		0.0058	meters
CALCULATED VALUES			
A = Area of Reflector	PI*D^2/4	66.476	meters^2
l = Length of Near Field	D^2/4k	3626	meters
L = Beginning of Far Field	0.6D^2/k	8702	meters
G = Antenna Gain @ 51.4 GHz	n(PI*D/k)^2	12,017,472	70.8 dBi
a = Area of Feed Mouth	PI*d^2/4	0.0007	meters^2

POWER DENSITY CALCULATIONS

Region	Maximum Power Density in Region		Hazard Assessment
	Formula	Value (mW/cm^2)	(FCC MPE Limit = 5 mW/cm^2)
1 Near Field	4nP/A	0.59	< FCC MPE Limit
2 Far Field	GP/(4(PI)L^2)	0.25	< FCC MPE Limit
3 Transition	<= Nr Fld Region	0.59	< FCC MPE Limit
4 Near Reflector Surface	4P/A	1.20	< FCC MPE Limit
5 Between Reflector & Ground	P/A	0.30	< FCC MPE Limit
6 Between Subreflector and Feed	4P/a	121116.7	> FCC MPE Limit (See Attachment)