Exhibit 4A

RADIATION CALCULATIONS FOR 8.10 meter EARTH STATION

Nomenclature	Formula	Value	Unit
INPUT PARAMETERS			
M = Antenna Aperture Major Axis		8.10	meters
m = Antenna Aperture Minor Axis		8.10	meters
w = Major Axis of Feed Mouth		0.029	meters
h = Minor Axis of Feed Mouth		0.029	meters
P = Max Power into Antenna		200.0	Watts
n = Aperture Effeciency		52%	
k = Wavelength @ 30 GHz		0.0100	meters
CALCULATED VALUES			
A = Area of Reflector	PIxMxm/4	51.530	meters^2
l = Length of Near Field	M^2/4k	1640	meters
L = Beginning of Far Field	0.6M^2/k	3937	meters
G = Antenna Gain @ 30 GHz	n(4xPIxA)/k^2	3,367,682	(65.3) dBi
a = Area of Feed Mouth	PIxwxh/4	0.001	meters^2

POWER DENSITY CALCULATIONS

Region	Maximum Power Density in Region Formula	Value (mW/cm^2	Hazard Assessment (FCC MPE Limit = 5 mW/cm^2)
1 Near Field	4nP/A	0.81	< FCC MPE Limit
2 Far Field	GP/(4(PI)L^2)	0.35	< FCC MPE Limit
3 Transition	<= Nr Fld Region	0.81	< FCC MPE Limit
4 Near Reflector Surface	4P/A	1.55	< FCC MPE Limit
5 Between Reflector & Ground	P/A	0.04	< FCC MPE Limit
6 Between Subreflector and Feed	4P/a	121116.7	Potential Hazard

DATA TABLE

Antenna Dia (m)	Feed Horn Dia (m)	HPA Pwr (W)
1.0	0.133	2.0
1.2	0.133	2.0
1.8	0.133	2
2.4	0.133	2
3.0		
3.8	0.133	2
4.6	0.1646	16.0
5.6	0.12	350.0
6.1	0.152	300
7.2	0.152	300
7.6	0.152	250
8.1		
9.2	0.102	300
11.0		

< FCC   Potential Hazard

RADIATION HAZARD ANALYSIS
8.10 meter EARTH STATION

This analysis calculates the non-ionizing radiation levels due to transmission from the earth station. The maximum level of non-ionizing radiation to which a person may be exposed corresponds to a power density of 10 Watts/sq.meter (or 1 mW/sq. cm) averaged over any thirty minute period, as derived from Standard C95.1 of the American National Standards Institute (ANSI). This analysis is based on the maximum RF power at the antenna flange of 200 Watts for both antenna types. This is the maximum uplink power control power, which will only be used for very short periods of time during rain. During clear-sky operations, RF levels will be significantly lower.

The analysis estimates the maximum power density levels in the vicinity of the antenna for six regions: near field; far field; transition zone; near the reflector surface; between the reflector and the ground; and between the feed horn and subreflector.

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A brief discusion for each region is given below. The attached table shows the assumptions, formulae and calculations for all cases.

1. NEAR FIELD REGION

The near field (or Fresnel region) is essentially an elliptical volume with its axis co-incident with the antenna boresight. The base of this volume is same as the aperture of the antenna. According to OST Bulletin No. 65, its length is equal to the square of the diameter divided by four times the wavelength. The larger dimension of the antenna (the width) is used in place of the diameter of a circular aperture as a worst case approximation. The maximum value of the on-axis power density is calculated using the equation given in the Bulletin by simply replacing the area of the circular aperture terms with the area of the elliptical aperture antenna.

2. FAR FIELD REGION

The far field (or Fraunhofer region) extends outwards from a distance equal to 0.6 times the square of the reflector diameter divided by the wavelength, according to OST Bulletin No. 65. The larger dimension of the antenna (the width) is used in place of the diameter of a circular aperture. Power density varies inversely as the square of the distance. The maximum value of the power density is calculated using the equation given in the Bulletin.

3. TRANSITION REGION

The transition region between the near field and the far field regions will have a power density that essentially decreases inversely as distance. In any case, the maximum power density will not exceed the maximum value calculated for the near field region, for the purpose of evaluating potential exposure

4. REGION NEAR REFLECTOR SURFACE

The power density in the region near the reflector surface can be estimated as equal to twice the power divided by the area of the reflector surface, assuming that the illumination is uniform and that it would be possible to intercept equal amounts of energy radiated towards and reflected from the reflector surface

5. REGION BETWEEN REFLECTOR AND GROUND

The power density in the region between the reflector and the ground can be estimated as equal to the power divided by the area of the reflector surface, assuming even illumination over the reflector

6. REGION BETWEEN THE FEED MOUTH AND SUBREFLECTOR

The radiation from the feed is essentially confined to a conical region whose vertex is located at the feed mouth and extends to the subreflector. Power density is maximum at the feed mouth, and can be estimated as twice the output power divided by the area of the feed mouth

The analysis shows that the power density levels will never exceed the ANSI limit even during periods of maximum output, except in the region between the feed and the subreflector. To ensure compliance with the ANSI limit, the earth station transmitter will be turned off whenever maintenance and repair personnel are required to work within this potentially hazardous area.

Exhibit 4B

RADIATION CALCULATIONS FOR		5.60	meter EARTH STATION
Nomenclature	Formula	Value	Unit
INPUT PARAMETERS			
M = Antenna Aperture Major Axis		5.60	meters
m = Antenna Aperture Minor Axis		5.60	meters
w = Major Axis of Feed Mouth		0.029	meters
h = Minor Axis of Feed Mouth		0.029	meters
P = Max Power into Antenna		200.0	Watts
n = Aperture Effeciency		51%	
k = Wavelength @ 30 GHz		0.0100	meters
CALCULATED VALUES			
A = Area of Reflector	PIxMxm/4	24.630	meters^2
l = Length of Near Field	M^2/4k	784	meters
L = Beginning of Far Field	0.6M^2/k	1882	meters
G = Antenna Gain @ 30 GHz	n(4xPIxA)/k^2	1,578,716	(62.0) dBi
a = Area of Feed Mouth	PIxwxh/4	0.001	meters^2

POWER DENSITY CALCULATIONS

Region	Maximum Power Density in Region Formula	Value (mW/cm^2)	Hazard Assessment (FCC MPE Limit = 5 mW/cm^2)
1 Near Field	4nP/A	1.66	< FCC MPE Limit
2 Far Field	GP/(4(PI)L^2)	0.71	< FCC MPE Limit
3 Transition	<= Nr Fld Region	1.66	< FCC MPE Limit
4 Near Reflector Surface	4P/A	3.25	< FCC MPE Limit
5 Between Reflector & Ground	P/A	0.08	< FCC MPE Limit
6 Between Subreflector and Feed	4P/a	121116.7	Potential Hazard

DATA TABLE

Antenna Dia (m)	Feed Horn Dia (m)	HPA Pwr (W)
1.0	0.133	2.0
1.2	0.133	2.0
1.8	0.133	2
2.4	0.133	2
3.0		
3.8	0.133	2
4.6	0.1646	16.0
5.6	0.12	350.0
6.1	0.152	300
7.2	0.152	300
7.6	0.152	250
8.1		
9.2	0.102	300
11.0		

< FCC   Potential Hazard

RADIATION HAZARD ANALYSIS
5.60 meter EARTH STATION

This analysis calculates the non-ionizing radiation levels due to transmission from the earth station. The maximum level of non-ionizing radiation to which a person may be exposed corresponds to a power density of 10 Watts/sq.meter (or 1 mW/sq. cm) averaged over any thirty minute period, as derived from Standard C95.1 of the American National Standards Institute (ANSI). This analysis is based on the maximum RF power at the antenna flange of 200 Watts for both antenna types. This is the maximum uplink power control power, which will only be used

The analysis estimates the maximum power density levels in the vicinity of the antenna for six regions: near field; far field; transition zone; near the reflector surface; between the reflector and the ground; and between the feed horn and subreflector.

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A brief discusion for each region is given below. The attached table shows the assumptions, formulae and calculations for all cases.

1. NEAR FIELD REGION

The near field (or Fresnel region) is essentially an elliptical volume with its axis co-incident with the antenna boresight. The base of this volume is same as the aperture of the antenna. According to OST Bulletin No. 65, its length is equal to the square of the diameter divided by four times the wavelength. The larger dimension of the antenna (the width) is used in place of the diameter of a circular aperture as a worst case approximation. The maximum value of the on-axis power density is calculated using the equation given in the Bulletin by simply replacing the area of the circular aperture terms with the area of the elliptical aperture antenna.

2. FAR FIELD REGION

The far field (or Fraunhofer region) extends outwards from a distance equal to 0.6 times the square of the reflector diameter divided by the wavelength, according to OST Bulletin No. 65. The larger dimension of the antenna (the width) is used in place of the diameter of a circular aperture. Power density varies inversely as the square of the distance. The maximum value of the power density is calculated using the equation given in the Bulletin.

3. TRANSITION REGION

The transition region between the near field and the far field regions will have a power density that essentially decreases inversely as distance. In any case, the maximum power density will not exceed the maximum value calculated for the near field region, for the purpose of evaluating potential exposure.

4. REGION NEAR REFLECTOR SURFACE

The power density in the region near the reflector surface can be estimated as equal to twice the power divided by the area of the reflector surface, assuming that the illumination is uniform and that it would be possible to intercept equal amounts of energy radiated towards and reflected from the reflector surface.

5. REGION BETWEEN REFLECTOR AND GROUND

The power density in the region between the reflector and the ground can be estimated as equal to the power divided by the area of the reflector surface, assuming even illumination over the reflector.

6. REGION BETWEEN THE FEED MOUTH AND SUBREFLECTOR

The radiation from the feed is essentially confined to a conical region whose vertex is located at the feed mouth and extends to the subreflector. Power density is maximum at the feed mouth, and can be estimated as twice the output power divided by the area of the feed mouth.

The analysis shows that the power density levels will never exceed the ANSI limit even during periods of maximum output, except in the region between the feed and the subreflector. To ensure compliance with the ANSI limit, the earth station transmitter will be turned off whenever maintenance and repair personnel are required to work within this potentially hazardous area.