Radiation Hazard Analysis

Town:		98812 Unit Meters dBi Band GHz Watts	FCC Callsign: SES ID: STA:	Band L S C X Ku K
R_{ua} = closest point to uncontrolled area	50	meters	•	Ka
Elevation angle at closest point R _{ua} Height (AGL)	10 10.00	Degrees meters	+	0 V
OET 65 Calculated Values	Formula	Value	Unit	
$\lambda = Wavelength$	<u>c</u> F	0.0107	meters	
G = Antenna Gain	10 ^(G/10)	2884031.503	(W) linear	
η = Apperture Efficiency	$\frac{G\lambda^2/4\pi}{\pi D^2/4}$	63%	percentage	
A = Area of reflector	πR^2	41.854	meters ²	
$a = area \ of \ subreflector$	πr^2	2463.009	cm^2	
$R_{nf} = Near$ -Field Region	$\frac{D^2}{4\lambda}$ >R _{nf}	1244.263 216	meters Meters AGL	
$R_t = Transition Region$	>R _{nf} <r<sub>ff</r<sub>	1244.263 2986.231	>meters <meters< td=""><td></td></meters<>	
$R_{ff} = Far Field Region$	$\frac{0.6D^2}{\lambda}$	2986.231 519	meters	

					Exposure Limits	
	Radiation Analysis Zone	Formula	Level	Value	General Public	Occupational
					<1mW/cm2	<5mW/cm2
1	Power Subreflector	$\frac{4P}{a}$	243.605	mW/cm2	>FCC MPE See Note 1	>FCC MPE See Note 2
2	Antenna Surface	$\frac{4P}{A}$	1.434	mW/cm2	>FCC MPE See Note 1	<fcc mpe<="" td=""></fcc>
3	Main Reflector Ground	$\frac{P}{A}$	0.358	mW/cm2	<fcc mpe<="" td=""><td><fcc mpe<="" td=""></fcc></td></fcc>	<fcc mpe<="" td=""></fcc>
4	S_{nf} =Near-Field Power Density	<u>4η P</u> A	0.901	mW/cm2	<fcc mpe<="" td=""><td><fcc mpe<="" td=""></fcc></td></fcc>	<fcc mpe<="" td=""></fcc>
5	$S_t = Max Transition Power Density$	<u>≺</u> S _{nf}	0.901	mW/cm2	<fcc mpe<="" td=""><td><fcc mpe<="" td=""></fcc></td></fcc>	<fcc mpe<="" td=""></fcc>
6	$S_{ff} = Max Far field Power Density$	$\frac{PG}{4\pi R_{ff}^{2}}$	0.386	mW/cm2	<fcc mpe<="" td=""><td><fcc mpe<="" td=""></fcc></td></fcc>	<fcc mpe<="" td=""></fcc>
7	Off Access Level Near Field	S _{nf} - 20 dB	0.00901	mW/cm2	<fcc mpe<="" td=""><td><fcc mpe<="" td=""></fcc></td></fcc>	<fcc mpe<="" td=""></fcc>

Notes

1. The antenna is installed in a controlled location access is restricted to authorized personnel only. The antenna is marked with RF Radiation Hazard signage.

2. Inside the controlled area, MPE levels exceed the MPE exposure for occupational levels. The levels will be reduced to safe MPE by removing power to the transmitters when work is performed on or around the antenna. This area can only be accessed by qualified personnel.

3. The field develops 10 meters above ground level at the minimum elevation angle which is not accessable to the general public.

 Frequency

 1000-2000

 2000-4000

 4000-8000

 8000-12500

 12500-18000

 18000-25500

 26500-40000

 40000-50000

 50000-75000

Radiation Hazard Analysis

Operator:					
Location Designation:			FCC Callsign:		
5	Ventura		SES ID:		
	Okanogan		STA:		
	Washington	98812			_
Input Values	Value	Unit		Band	Frequency
D = Aperture Diameter	9.10	Meters		L	1000-2000
d = Subreflector Diameter	0.56	Meters		S	2000-4000
G = Antenna Gain	66.4	dBi		С	4000-8000
FCC Designation	Ka	Band		X	8000-12500
F = Frequency	28.000	GHz		Ки	12500-18000
P = Transmitter Power Watts:	150	Watts		K	18000-25500
$R_{ua} = closest point to uncontrolled area$	50	meters		Ka	26500-40000
Elevation angle at closest point R_{ua}	10	Degrees]	0	40000-50000
Height (AGL)	12.00	meters]	V	50000-75000
				1	
OET 65 Calculated Values	Formula	Value	Unit	Į	
$OET 65 Calculated Values$ $\lambda = Wavelength$	<u>c</u> F	Value 0.0107	Unit meters		
	<u>C</u>				
$\lambda = Wavelength$	<u>c</u> F	0.0107	meters		
λ = Wavelength G = Antenna Gain	$\frac{\frac{c}{F}}{10^{(G/10)}}$ $\frac{G\lambda^2/4\pi}{2}$	0.0107 4365158.322	meters (W) linear percentage meters ²		
λ = Wavelength G = Antenna Gain η = Apperture Efficiency	$\frac{\frac{c}{F}}{10^{(G/10)}}$ $\frac{G\lambda^2/4\pi}{\pi D^2/4}$ $\frac{\pi R^2}{\pi r^2}$	0.0107 4365158.322 61%	meters (W) linear percentage meters ²		
λ = Wavelength G = Antenna Gain η = Apperture Efficiency A = Area of reflector a = area of subreflector	$\frac{\frac{C}{F}}{10^{(G/10)}}$ $\frac{\frac{G\lambda^2}{4\pi}}{\pi D^2/4}$ $\frac{\pi R^2}{\pi r^2}$ $\frac{D^2}{2}$	0.0107 4365158.322 61% 65.039	meters (W) linear percentage		
λ = Wavelength G = Antenna Gain η = Apperture Efficiency A = Area of reflector	$\frac{\frac{c}{F}}{10^{(G/10)}}$ $\frac{\frac{G\lambda^2}{4\pi}}{\pi D^2/4}$ $\frac{\pi R^2}{\pi r^2}$ $\frac{D^2}{4\lambda}$	0.0107 4365158.322 61% 65.039 2463.009	meters (W) linear percentage meters ² cm ²		
$\lambda = Wavelength$ $G = Antenna \ Gain$ $\eta = Apperture \ Efficiency$ $A = Area \ of \ reflector$ $a = area \ of \ subreflector$ $R_{nf} = Near-Field \ Region$	$\begin{array}{c} \frac{c}{F} \\ 10^{(G/10)} \\ \overline{G\lambda^2/4\pi} \\ \pi D^2/4 \\ \pi R^2 \\ \pi r^2 \\ \overline{\Omega^2} \\ 4\lambda \\ R_{nf} \end{array}$	0.0107 4365158.322 61% 65.039 2463.009 1933.522	meters (W) linear percentage meters ² cm ² meters		
λ = Wavelength G = Antenna Gain η = Apperture Efficiency A = Area of reflector a = area of subreflector	$\begin{array}{c} \frac{c}{F} \\ 10^{(G/10)} \\ \hline \frac{G\lambda^2/4\pi}{\pi D^2/4} \\ \pi D^2/4 \\ \hline \pi R^2 \\ \hline \pi r^2 \\ \hline \frac{D^2}{4\lambda} \\ \hline R_{nf} \\ < R_{ff} \end{array}$	0.0107 4365158.322 61% 65.039 2463.009 1933.522 336	meters (W) linear percentage meters ² cm ² meters Meters AGL		
$\lambda = Wavelength$ $G = Antenna \ Gain$ $\eta = Apperture \ Efficiency$ $A = Area \ of \ reflector$ $a = area \ of \ subreflector$ $R_{nf} = Near-Field \ Region$	$\frac{c}{F}$ $10^{(G/10)}$ $\frac{G\lambda^2/4\pi}{\pi D^2/4}$ πR^2 πr^2 $\frac{D^2}{4\lambda}$ R_{nf} $< R_{ff}$ $0.6D^2$	0.0107 4365158.322 61% 65.039 2463.009 1933.522 336 1933.522	meters (W) linear percentage meters ² cm ² meters Meters AGL >meters		

					Exposure Limits	
	Radiation Analysis Zone	Formula	Level	Value	General Public	Occupational
					<1mW/cm2	<5mW/cm2
1	Power Subreflector	<u>4P</u> a	243.605	mW/cm2	>FCC MPE See Note 1	>FCC MPE See Note 2
2	Antenna Surface	$\frac{4P}{A}$	0.923	mW/cm2	<fcc mpe<="" td=""><td><fcc mpe<="" td=""></fcc></td></fcc>	<fcc mpe<="" td=""></fcc>
3	Main Reflector Ground	$\frac{P}{A}$	0.231	mW/cm2	<fcc mpe<="" td=""><td><fcc mpe<="" td=""></fcc></td></fcc>	<fcc mpe<="" td=""></fcc>
4	S _{nf} =Near-Field Power Density	<u>4η P</u> A	0.565	mW/cm2	<fcc mpe<="" td=""><td><fcc mpe<="" td=""></fcc></td></fcc>	<fcc mpe<="" td=""></fcc>
5	$S_t = Max$ Transition Power Density	<u>≺</u> S _{nf}	0.565	mW/cm2	<fcc mpe<="" td=""><td><fcc mpe<="" td=""></fcc></td></fcc>	<fcc mpe<="" td=""></fcc>
6	$S_{ff} = Max Far field Power Density$	$\frac{PG}{4\pi R_{ff}}^2$	0.242	mW/cm2	<fcc mpe<="" td=""><td><fcc mpe<="" td=""></fcc></td></fcc>	<fcc mpe<="" td=""></fcc>
7	Off Access Level Near Field	S _{nf} - 20 dB	0.00565	mW/cm2	<fcc mpe<="" td=""><td><fcc mpe<="" td=""></fcc></td></fcc>	<fcc mpe<="" td=""></fcc>

Notes

1. The antenna is installed in a controlled location access is restricted to authorized personnel only. The antenna is marked with RF Radiation Hazard signage.

2. Inside the controlled area, MPE levels exceed the MPE exposure for occupational levels. The levels will be reduced to safe MPE by removing power to the transmitters when work is performed on or around the antenna. This area can only be accessed by qualified personnel.

3. The field develops 12 meters above ground level at the minimum elevation angle which is not accessable to the general public.