Analysis of Non-Ionizing Radiation for a 3.5-Meter Earth Station System

This report analyzes the non-ionizing radiation levels for a 3.5-meter earth station system. The analysis and calculations performed in this report comply with the methods described in the FCC Office of Engineering and Technology Bulletin, No. 65 first published in 1985 and revised in 1997 in Edition 97-01. The radiation safety limits used in the analysis are in conformance with the FCC R&O 96-326. Bulletin No. 65 and the FCC R&O specifies that there are two separate tiers of exposure limits that are dependant on the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The Maximum Permissible Exposure (MPE) limits for persons in a General Population/Uncontrolled environment are shown in Table 1. The General Population/Uncontrolled MPE is a function of transmit frequency and is for an exposure period of thirty minutes or less. The MPE limits for persons in an Occupational/Controlled environment are shown in Table 2. The Occupational MPE is a function of transmit frequency and is for an exposure period of six minutes or less. The purpose of the analysis described in this report is to determine the power flux density levels of the earth station in the far-field, near-field, transition region, between the subreflector or feed and main reflector surface, at the main reflector surface, and between the antenna edge and the ground and to compare these levels to the specified MPEs.

Table 1. Limits for General Population/Uncontrolled Exposure (MPE)

Frequency Range (MHz)	Power Density (mW/cm^2)
30-300	0.2
300-1500	Frequency (MHz)*(0.8/1200)
1500-100,000	1.0

Table 2. Limits for Occupational/Controlled Exposure (MPE)

Frequency Range (MHz)	Power Density (mW/cm^2)
30-300	1.0
300-1500	Frequency (MHz)*(4.0/1200)
1500-100,000	5.0

Table 3. Formulas and Parameters Used for Determining Power Flux Densities

Parameter	Symbol	Formula	Value	Units
Antenna Diameter	D	Input	3.5	m
Antenna Surface Area	$A_{surface}$	$\pi D^2 / 4$	9.62	m^2
Subreflector Diameter	D_{sr}	Input	36.5	cm
Area of Subreflector	A_{sr}	$\pi D_{sr}^2/4$	1044.63	cm^2
Frequency	F	Input	14250	MHz
Wavelength	λ	300 / F	0.021053	m
Transmit Power	P	Input	218.70	W
Antenna Gain (dBi)	G_{es}	Input	52.3	dBi
Antenna Gain (factor)	G	$10^{Ges/10}$	169824.4	n/a
Pi	π	Constant	3.1415927	n/a
Antenna Efficiency	η	$G\lambda^2/(\pi^2 D^2)$	0.62	n/a

1. Far Field Distance Calculation

The distance to the beginning of the far field can be determined from the following equation:

Distance to the Far Field Region $R_{ff} = 0.60\ D^2 / \lambda$ (1)
$= 349.1$ m

The maximum main beam power density in the far field can be determined from the following equation:

On-Axis Power Density in the Far Field $S_{ff} = G\ P / (4\ \pi\ R_{ff}^2)$ (2)
$= 24.248$ W/m^2
$= 2.425$ mW/cm^2

2. Near Field Calculation

Power flux density is considered to be at a maximum value throughout the entire length of the defined Near Field region. The region is contained within a cylindrical volume having the same diameter as the antenna. Past the boundary of the Near Field region, the power density from the antenna decreases linearly with respect to increasing distance.

The distance to the end of the Near Field can be determined from the following equation:

Extent of the Near Field $R_{nf} = D^2 / (4\ \lambda)$ (3)
$= 145.5$ m

The maximum power density in the Near Field can be determined from the following equation:

Near Field Power Density $S_{nf} = 16.0\ \eta\ P / (\pi\ D^2)$ (4)
$= 56.606$ W/m^2
$= 5.661$ mW/cm^2

3. Transition Region Calculation

The Transition region is located between the Near and Far Field regions. The power density begins to decrease linearly with increasing distance in the Transition region. While the power density decreases inversely with distance in the Transition region, the power density decreases inversely with the square of the distance in the Far Field region. The maximum power density in the Transition region will not exceed that calculated for the Near Field region. The power density calculated in Section 1 is the highest power density the antenna can produce in any of the regions away from the antenna. The power density at a distance R_t can be determined from the following equation:

Transition Region Power Density $S_t = S_{nf}\ R_{nf} / R_t$ (5)
$= 5.661$ mW/cm^2

4. Region between the Main Reflector and the Subreflector

Transmissions from the feed assembly are directed toward the subreflector surface, and are reflected back toward the main reflector. The most common feed assemblies are waveguide flanges, horns or subreflectors. The energy between the subreflector and the reflector surfaces can be calculated by determining the power density at the subreflector surface. This can be determined from the following equation:

Power Density at the Subreflector $S_{sr} = 4000\ P / A_{sr}$ (6)
$= 837.428\ mW/cm^2$

5. Main Reflector Region

The power density in the main reflector is determined in the same manner as the power density at the subreflector. The area is now the area of the main reflector aperture and can be determined from the following equation:

Power Density at the Main Reflector Surface $S_{surface} = 4\ P / A_{surface}$ (7)
$= 90.925\ W/m^2$
$= 9.092\ mW/cm^2$

6. Region between the Main Reflector and the Ground

Assuming uniform illumination of the reflector surface, the power density between the antenna and the ground can be determined from the following equation:

Power Density between Reflector and Ground $S_g = P / A_{surface}$ (8)
$= 22.731\ W/m^2$
$= 2.273\ mW/cm^2$

7. Summary of Calculations

Table 4. Summary of Expected Radiation levels for Uncontrolled Environment

Region	Calculated Maximum Radiation Power Density Level (mW/cm^2)		Hazard Assessment
1. Far Field (R_{ff} = 349.1 m)	S_{ff}	2.425	Potential Hazard
2. Near Field (R_{nf} = 145.5 m)	S_{nf}	5.661	Potential Hazard
3. Transition Region ($R_{nf} < R_t < R_{ff}$)	S_t	5.661	Potential Hazard
4. Between Main Reflector and Subreflector	S_{sr}	837.428	Potential Hazard
5. Main Reflector	$S_{surface}$	9.092	Potential Hazard
6. Between Main Reflector and Ground	S_g	2.273	Potential Hazard

Table 5. Summary of Expected Radiation levels for Controlled Environment

Region	Calculated Maximum Radiation Power Density Level (mW/cm^2)		Hazard Assessment
1. Far Field (R_{ff} = 349.1 m)	S_{ff}	2.425	Satisfies FCC MPE
2. Near Field (R_{nf} = 145.5 m)	S_{nf}	5.661	Potential Hazard
3. Transition Region ($R_{nf} < R_t < R_{ff}$)	S_t	5.661	Potential Hazard
4. Between Main Reflector and Subreflector	S_{sr}	837.428	Potential Hazard
5. Main Reflector	$S_{surface}$	9.092	Potential Hazard
6. Between Main Reflector and Ground	S_g	2.273	Satisfies FCC MPE

It is the applicant's responsibility to ensure that the public and operational personnel are not exposed to harmful levels of radiation.

8. Conclusions

Based on the above analysis it is concluded that the FCC MPE guidelines have been exceeded (or met) in the regions of Table 4 and 5. The applicant proposes to comply with the MPE limits by one or more of the following methods.

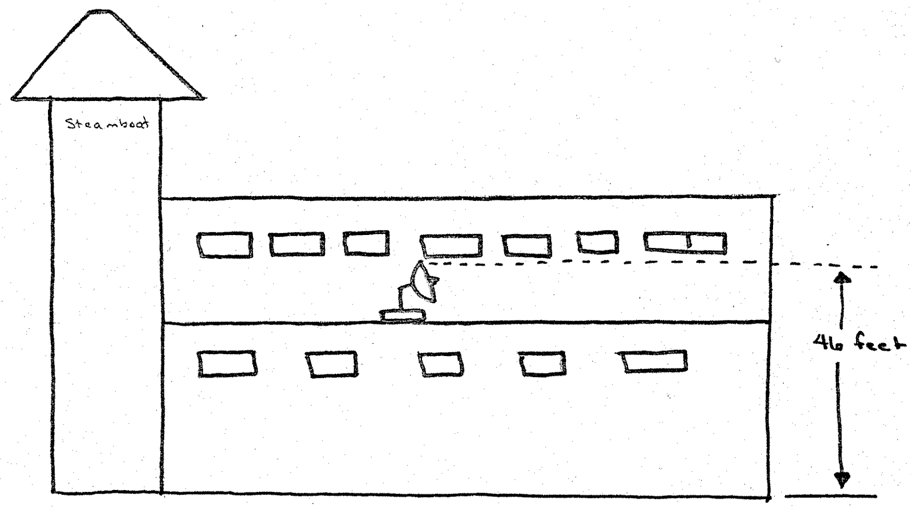
The earth station is located on a Rooftop with secured access. All individuals having access to the roof will be aware of the Radiation Hazard from the antenna, thus creating a controlled environment. The earth station will be located approximately 40 feet above ground level and since one diameter removed from the center of main beam the levels are down at least 20 dB, or by a factor of 100, public safety will be ensured for the near and far field regions of the Uncontrolled Environment.

Finally, occupational exposure will be limited, and the transmitter will be turned off during periods of maintenance, so that the MPE standard of 5.0 mw/cm**2 will be complied with for those regions in close proximity to the main reflector, and subreflector, which could be occupied by operating personnel.

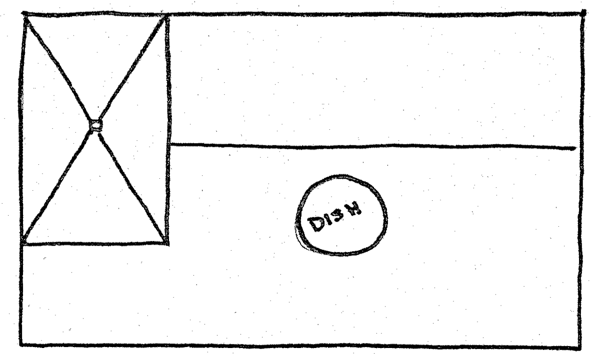
Exhibit 2

FAA Notification Not Required

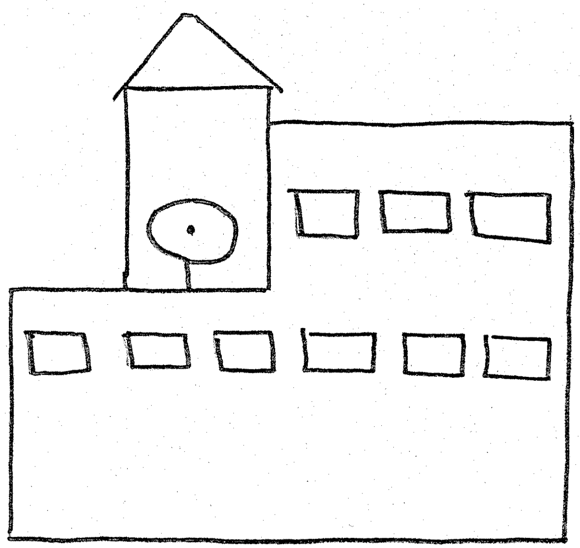
Per Part 17.14 (a) of the FCC rules, FAA notification is not required based on the antennas being surrounded by structures of equal or greater height.



- Side View - Gondola Bldg -



- Top View - Gondola Bldg



End View from Mtn. Side - Gondola Bldg.

Site Sketch - Not to Scale

Gondola Building - Steamboat Ski + Resort C.

2305 Mt. Werner Circle

Steamboat Springs, CO 80487

Steamboat Ski & Resort Corp.
FCC Form 312-EZ
Application for Earth Station License

Description of Transaction and Public Interest Statement

This application seeks authorization to operate a transmit/receive Earth Station facility at Steamboat Springs, CO. Grant of the License application would serve the public interest by allowing Applicant Steamboat Ski & Resort Corp. ("Licensee") to operate a transmit/receive earth station used for live and tape-feed coverage of breaking ski news, weather conditions and featured events at the Steamboat Ski Resort. Without the grant, Licensee would be forced to forego providing these services, leaving guests and skiers without critical news and information.

The Licensee currently operates the facility pursuant to special temporary authority, to replace station authorization E960019, which Licensee unintentionally allowed to lapse as of January 2006. The instant license application corrects the associated coordinates in light of a discrepancy that came to the Licensee's attention in the course of preparing this license application.

Licensee is a wholly-owned subsidiary of American Skiing Co. American Skiing Co. and Steamboat Acquisition Corp. have entered into a Purchase Agreement, dated December 18, 2006 (the "Purchase Agreement"). Pursuant to the Purchase Agreement, Steamboat Acquisition Corp. will acquire all of the issued and outstanding shares of Licensee (the "Transaction"), resulting in a transfer of control of Licensee. The Parties expect to consummate the Transaction in mid-February – i.e., prior to the close of the 30-day public notice period associated with the instant license application. See 47 C.F.R. § 25.151(d). Accordingly, the parties anticipate filing an amendment to the instant license application at that time to notify the commission of the change of control of the Licensee. See 47 C.F.R. § 1.65. The License application is being filed prior to closing in an effort to expedite processing.

Licensee respectfully requests grant of this license application.