Engineering Statement

RADIOFREQUENCY EXPOSURE CALCULATIONS

prepared for

Commonwealth of Kentucky – Kentucky Authority for Educational Television

Commonwealth of Kentucky – Kentucky Authority for Educational Television ("KET") is the licensee of fixed "Ku Band" satellite uplink E870490. The following study was conducted to evaluate whether proposed changes in EIRP and emissions, as proposed in the instant application, would continue to comply with FCC permissible exposure limits to the general public and to occupational workers.

Human Exposure to Radiofrequency Electromagnetic Field

The proposed *KET* operation was evaluated using the procedures outlined in FCC OET Bulletin No. 65 ("OET 65"). OET 65 describes a means of determining whether a proposed facility exceeds the RF exposure guidelines specified in §1.1310 of the Rules. Under present Commission policy, a facility may be presumed to comply with the limits in §1.1310 if it satisfies the exposure criteria set forth in OET 65. Based upon that methodology, and as demonstrated in the following, the transmitting system complies with the cited adopted guidelines at publicly accessible locations when procedures described herein are followed.

Public Exposure

According to representatives of *KET*, the uplink antenna is installed atop a building rooftop with a radiation center height approximately 14.0 meters above the ground. The mechanical design of the mounting equipment is optimized to orient the antenna toward satellites that operate well above the horizon. Prevention of public exposure to predicted RF electromagnetic field in excess of the general population/uncontrolled limit[1] is achieved by controlling access to the vicinity of the antenna through locked doors and by assuring that no publicly accessible area is within the "main beam" of the uplink antenna and at least 5.6 meters (one dish diameter) above the horizon and all area buildings.

[1] The general population/uncontrolled maximum permissible exposure ("MPE") limit of 1 mW/cm² for 14,250 MHz is specified in §1.1310 of the Rules.

Based on data provided by the applicant, the following parameters were used in the study:

Antenna Manufacturer	Andrew
Antenna Model	ESA5.6MGT
Center Transmit Frequency	14.250 MHz
Wavelength at Center Frequency	0.02104 meters
Max Average Antenna Input Power	358.2 Watts
Antenna Diameter	5.6 meters
Antenna Gain	56.9 dBi
Antenna Gain Ratio	489,779
Antenna Aperture Efficiency	0.700

The area in the immediate vicinity of the antenna is known as the "near field region." In this region (372 meters in the case at hand), the antenna directional characteristics have not fully formed. Therefore, antenna manufacturer "off-axis" discrimination specifications cannot be utilized for the purpose of determining RF exposure. OET 65 provides a methodology (Equation 13) for calculating the "worst case" exposure figure within this region. Additionally, OET 65 specifies that the "worst case" power density would be reduced by 20 dB at locations at least one antenna diameter (5.6 meters) off-axis from the "main beam" of the antenna. In this instance, the predicted off-axis, near field is 0.058 mW/cm^2, or 5.8 percent of the general population/uncontrolled limit. Off-axis predicted fields reduce commensurately at greater distances from the antenna in the antenna transition region.

In the "far field" region of the antenna (in this case, starting at a distance of 894 meters from the antenna), the antenna directional characteristics have formed and the off-axis "far field" power density can be readily calculated using "off-axis" antenna discrimination specifications. At locations greater than five degrees off-axis from the "main beam," the manufacturer of the proposed antenna specifies a minimum side-lobe attenuation of 45 dB. Again using the methodology detailed in OET65, this "off-axis" attenuation is predicted to result in a power

density less than 0.0001 mW/cm², or 0.01 percent of the general population/uncontrolled limit. As shown above, this "compliant area" is defined by any location more than five degrees and 5.6 meters away from the satellite antenna "main beam."

Controlled Access Area Exposure

Access to the vicinity of the antenna is limited and restricted to authorized, trained personnel. Using data provided by the applicant, the potential for RF exposure to occupational workers was evaluated. As described previously, the maximum predicted off-axis, "near field" power density is 0.058 mW/cm², or 1.16% of the controlled limit. As any personnel will be confined at locations behind the parabolic reflector or at locations more than five degrees and 5.6 meters away from the antenna "main beam," actual exposure will be substantially less than the above "worst case" prediction.

With respect to worker safety, it is believed that based on the preceding analysis, excessive exposure would not occur provided that adequate physical separation is established. As mentioned previously, detailed operator policy will be employed protecting workers from excessive exposure when work must be performed where high RF levels may be present. Such protective measures may include, but will not be limited to, restriction of access to areas where levels in excess of the guidelines may be expected, or the complete shutdown of facilities when work or inspections must be performed in areas where the exposure guidelines would otherwise be exceeded. On-site RF exposure measurements may also be undertaken to establish the bounds of safe working areas. The applicant will coordinate exposure procedures with all pertinent facilities.

Conclusion

As demonstrated herein, excessive levels of RF energy will not be caused at publicly accessible areas. Consequently, members of the general public and occupational staff will not be exposed to RF levels in excess of the Commission's guidelines. Access to the vicinity of the uplink antenna is controlled through locked doors and conspicuous RFR warning signs as part of an overall RF safety program.

Certification

The undersigned hereby certifies that the foregoing statement was prepared by him or under his direction, and that it is true and correct to the best of his knowledge and belief. Mr. Ryson is a senior engineer in the firm of Cavell, Mertz & Associates, Inc.

Daniel G. Ryson
September 1, 2010

Cavell, Mertz & Associates, Inc.
7839 Ashton Avenue
Manassas, VA 20109
(703) 392-9090