Antenna RF Radiation Hazard Study for an AVL -1201K,
Mobile Based Earth Station System

A study was performed, analyzing the non-ionizing radiation levels for a 1.2 meter mobile earth station system. The guidelines of the FCC OET Bulletin, No. 65, Edition 97-01 were used for compliance calculations. The Maximum Permissible Exposure (MPE) guidelines were calculated for both General Population/Uncontrolled and Occupational/Controlled exposure levels.

The calculations were performed as follows:
Appendix A – Earth Station Criteria
Appendix B – Calculations for Antenna RF Radiation Hazard
The applicant is in conformance with the FCC guidelines, with the proposed procedures, as outlined in the OET Bulletin No. 65, Edition 97-01, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, August 1997*.

The applicant proposes to maintain compliance with the MPE for Controlled and Uncontrolled areas in the following manner as shown under NOTE.
NOTE:
The emitting antenna is located on a mobile truck, with the lower edge of the antenna raised 3.5 meters above ground. The general public will not have access within 0.6 meters of the emitting antenna.
Since 0.6 meters is removed from the edge of the antenna, the RF levels are reduced by a factor of 100 or 20 dB. None of the areas exceeding the MPE levels will be accessible by the general public. Radiation Hazard signs will be posted while this earth station is in operation. The applicant will ensure that no buildings or other obstacles are in the path or in the areas that exceed the MPE levels.

The earth station's authorized operational personnel will not have access to the areas that exceed the MPE levels while the earth station is in operation.

The transmitter will be turned off during antenna maintenance.

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Appendix A
Earth Station Criteria

Data Entry:

Dant Antenna main relector diamater	1.2 m
Dfeed(sub) Feed flange (or subreflector) diameter	10.1 cm
Rf transmit frequency	14.250 GHz
Pfeed Max power into atnenna feed-flange	119.40 W
Gant Main-beam gain of ant at xmtr frequency	43.5 dBi
Gant (Numeric)	22387.21
Antenna aperture efficiency	0.70
Antenna main reflector surface area	1.13 m/sq2
Feed flange (or subreflector) surface area	80.12 cm2
Wavelength of the RF transmit frequency	0.021 m
Distance to beginning of far-field region	41.07 m
Distance to extent of near-field region	17.11 m
EIRP	64.27 dBW
EIRP	2,673,033.04 W

Appendix B
Calculations for Antenna RF Radiation Hazard

1. Near Field:

Rnear = extent of the near-field (in meters)
Dant = diameter of the antenna main reflector (in Meters) 1.20 m
λ = wavelength of the RF transmit frequency (in meters) 0.02 m
Rnear = (Dant)2/(4λ) **Rnear = 17.11 m**

Snear = maximum on-axis power density within near field (mw/cm2)
η = antenna aperture efficiency 0.70
Pfeed = maximum power into antenna feed flange (in watts) 119.40 W
Dant = diameter of the antenna main reflector (in Meters) 1.20 m
π = PI 3.14
Snear = {(16ηPfeed)/[π(Dant)2]}/10 **Snear = 29.44 (mw/cm2)**

2. Far Field:

Rfar = distance to beginning of far field (in meters)
Dant = diameter of the antenna main reflector (in Meters) 1.20 m
λ = wavelength of the RF transmit frequency (in meters) 0.02 m
Rfar = [0.6(Dant)2]/λ **Rfar = 41.07 m**

Sfar = maximum on-axis power density in the far field (mw/cm2)
Pfeed = maximum power into antenna feed flange (in watts) 119.40 W
Gant = antenna main beam gain at RF xmt frequency (numeric) 22387.21
Rfar = distance to beginning of far field (in meters) 41.07 m
Sfar = [(PfeedGant)/4π(Rfar)2]/10 **Sfar = 12.61 (mw/cm2)**

3. Antenna Transition Region Power Density Calculation

Str = maximum on-axis power density in the transition region (mw/cm2)
Snear = maximum on-axis power density within near field (mw/cm2)
Rnear = extent of the near-field (in meters)
R = distance within transition region between near field and far field regions.
R = Rfar-Rnear **R = 17.21 m**
Str = SnearRnear/R **Str = 29.27 (mw/cm2)**
Str ? Snear **Str = OK**

4. Antenna Feed-Flange (or Subreflector) Power Density Calculation

Sfeed (sub) = max pwr density at ant feed-flange or subreflector surface (mw/cm2)
Pfeed = maximum power into antenna feed flange (in watts) 119.40 W
Dfeed (sub) = diameter of the antenna feed-flange or subreflector (cm) 0.10 cm
Sfeed (sub) = 1000{[2(Pfeed)]/{[π(Dfeed (sub))2]/4}} **Sfeed = 5961.17 (mw/cm2)**

5. Antenna Main Reflector Power Density Calculation

Sant = maximum power density in the antenna main reflector region (mw/cm2)
Pfeed = maximum power into antenna feed flange (in watts) 119.40 W
Dant = diameter of the antenna main reflector (in Meters) 1.20 m
Sant = {[2(Pfeed)]/{[π(Dant)2]/4}}/10 **Sant = 42.23 (mw/cm2)**

6. Power Density Calculation between the Antenna Main Reflector and the Ground

Sground = maximum power density between the ant main relector and ground (mw/cm2)
Pfeed = maximum power into antenna feed flange (in watts) 119.40 W
Dant = diameter of the antenna main reflector (in Meters) 1.20 m
Sgrouind = {Pfeed/{[π(Dant)2]/4}}/10 **Sground = 10.56 (mw/cm2)**