

ATTACHMENT 4A: RADIATION HAZARD STUDY

Maximum Exposure levels of radiation for Boeing's proposed 96 cm REMOTE1A antenna were calculated using the calculation methods given for aperture antennas in OET Bulletin 65, Edition 97-01, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields." The Maximum Permissible Exposure levels of radiation were taken from Table 1 in "Appendix A: Summary of Exposure Guidelines," of that OET Bulletin 65. The calculations are given in the attached spreadsheet, "RF Hazard Analysis."

Discussion for Antenna Type REMOTE1A

Boeing's REMOTE1A antenna will be mounted on the rooftop of a land vehicle, such as a suburban utility vehicle. The antenna will be at least 1.8 meters above the ground and pointed to a satellite with an elevation angle of 10° or more so that, under normal operating conditions, at distances of at least 9.5 meters from the antenna, a person under 2.5 m tall will be at least one antenna diameter from the axis of the main beam. For this scenario, the maximum exposure calculation is given by the cell entitled, "Off-axis Max. in Near Field." This level is 0.014 mW/cm², which is below the permitted general population exposure level of 1 mW/cm².

For regions within 9.5 meters from the antenna, an area encompassing the region in front of the antenna within one antenna diameter of the antenna axis will be marked and the public warned to stay out of this region, e.g. the region within about 1 meter of the antenna axis projected onto the ground could be marked from the vehicle to about 9.5 meters from the vehicle. This will ensure that the general public will be at least one antenna diameter from the axis of the main beam. This scenario then reduces to the case calculated by the cell entitled, "Off-axis Max. in Near Field." This level is 0.014 mW/cm², which is below the permitted general population exposure level of 1 mW/cm².

The region in back of the antenna (i.e. off-axis angles have magnitude greater than 180 degrees) has radiation levels that are below the permitted general population exposure level of 1 mW/cm². The maximum illumination of the edge of the REMOTE1A antenna is less than a level that is -6 dB below the peak illumination level of the antenna, and the maximum exposure level in back of the antenna is less than the illumination at the antenna edge. The spreadsheet gives the maximum exposure level on the antenna surface as about 2.21 mW/cm². Then the maximum exposure level in back of the antenna is less than a level that is 6 dB below 2.22 mW/cm², i.e. less than 0.6 mW/cm². This is less than the permitted general population exposure level of 1 mW/cm².

According to the spreadsheet, a technician/installer/operator of this antenna will be exposed to less than 2.22 mW/cm² on the surface of the antenna, and less than 1.44 mW/cm² in the near field and beyond. These levels are below the permitted occupational exposure level of 5 mW/cm².