

## RF EXPOSURE STATEMENT

### Carborne Transmitters

Pursuant to Section 15.247(a)(5), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. *See* § 1.1307(b)(1). For the equipment described in this application, Section 1.1307(b)(1) refers to the requirements specified in Section 1.1307(b)(2) as the applicable section for mobile devices operating under Section 15.247 of Part 15 of the FCC Rules. For mobile equipment operation, MPE compliance must be shown in order to meet the RF exposure requirements specified in the FCC Rules.

The equipment will be operated as described in this application filing and will use high gain (6 dBi or greater) antenna(s) permanently mounted on top of subway cars near a front or back edge of the subway car. There are intervening metallic structures between the antenna and any individuals or personnel in the subway car.

In order to show compliance with the MPE limits the maximum EIRP of 36 dBm for the carborne system configuration is used. Using 36 dBm (4 watts) as the maximum power from the unit and calculating the separation distance required to meet the MPE limit specified in table 1 of Section 1.1310 of 1 mW/cm<sup>2</sup> for general population/uncontrolled exposure yields the following results:

$$P_{\text{den}} = 4/\pi R^2 ; \text{ substituting } 10^{-3} = 1.27 /R^2 ; \text{ calculating } R^2 = 1.27/ 10^{-3} \text{ then } R = 36 \text{ cm or 14 inches}$$

It should be noted that this calculation contains no adjustment for the 5% duty cycle of the transmission. Correcting for the duty cycle, the separation distance requirement is 8 cm.

Since antennas will be mounted on top of subway cars centered near the middle of a front or back edge of the subway car, general populace uncontrolled exposure is always insured due to the installation arrangement since the separation distance from antenna to an individual will always be more than 36 cm. Further, the beam pattern from the antennas and the mounting arrangement will direct the radiated energy away from the car (forward or rearward as the case may be), there will be intervening metallic structure between the antenna and the car interior, and there will be approximately 1 foot or more of interior headroom, the general populace uncontrolled environment RF exposure requirements will easily be met.

During antenna maintenance operations, RF power systems must be turned off that feed power to the antennas. However, performing the same calculation as above except substituting the MPE limit for occupational/controlled exposure the separation distance required for compliance is 16 cm or 6 inches. It should be noted that this calculation contains no adjustment for the 5% duty cycle of the transmission. Adjusting for duty cycle the separation distance becomes <4 cm in this case. In an abundance of caution however, the following statement will be added to the user/installation manual for the carborne transmitters:

**"CAUTION: Before performing any maintenance on the antennas or other radio frequency components of this transmitter you are instructed to turn the RF transmitter off. In performing any system maintenance while the RF transmitter is in operation you must you must maintain a separation distance of 20 cm or greater from any point on the antenna to insure compliance with the FCC RF exposure limits."**

In the above statement 20 cm is specified in lieu of the calculated values in order to insure that MPE conditions, limits, calculations and specifications can be applied to these transmitters.