

Catawba Test Range and Nationwide Radiation Hazard Mitigation Report

This experimental application requests authority for transmissions using the same 2.4m antenna at two Ku-band frequencies, 12.75 GHz and 14.5 GHz. Testing with these antennas will occur at the Catawba Test Range location, but also at unspecified locations throughout the United States. Each test antenna will be served by a 4 watt (6.02 dBW) transmitter, but with 0.75 dB of waveguide and switch loss between the transmitter and antenna. This results in an input power to the antenna of 5.27 dBW (3.37 watts). A summary of each of the transmissions is provided in Table 1 below.

Table 1: Antenna transmissions requested

Tx frequency (GHz)	Tx power at input to antenna (W)	Antenna size (m)	Antenna gain (dBi)	EIRP (dBW)
12.75	3.37	2.4	48.1	53.37
14.5	3.37	2.4	48.95	54.22

The applicant has used the guidance in OET Bulletin 65 to calculate the RF exposure in the near field, far field and antenna surface for the requested transmissions. In all cases, the worst-case power density occurs in the near field, which is obtained using the following equation:

$$S_{\text{near}} = 4P/\eta A_e,$$

where

- P is the power into the antenna, 3.37 watts,
- η = antenna efficiency of 0.6,
- A_e = effective antenna area of transmitting antenna, 4.52 m².

The near field power density is independent of transmit frequency. Using the parameters from Table 1 and the equation above, the near field power density is calculated as

$$4.96 \text{ W/m}^2, \text{ or,}$$

$$0.496 \text{ mW/cm}^2.$$

The worst-case power density is well below the general population MPE limit of 1.0 mW/cm².

As a further mitigation, the transmit antennas will only be operated by trained personnel at all locations.