Exposure of humans to RF fields

As per FCC KDB 447498 D01 and Section 2.1091 radio frequency transmitters are required to be operated in a manner that ensures the public is not exposed to RF energy levels.

Calculations have been made using the General Public/Uncontrolled Exposure limits that are defined in Section 1.1310.

Minimum safe distances have been calculated below.

Power density, $mW/cm^2 = E^2/3770$

- General Population / Uncontrolled exposure limit will be 0.29 mW/cm^2
(f/1500 = 440 MHz/1500)

As this radio can operate over the range of 440 - 512 MHz the lowest frequency of operation in the USA, which will give the worst case result, would be 440 MHz.

The minimum distance from the antenna at which the MPE is met is calculated from the equation relating field strength in V/m, transmit power in watts, transmit antenna gain, transmitter duty cycle and separation distance in metres:

Power Density = 0.29 $mW/cm^2 = E^2/3770$

$E = \sqrt{0.29*3770}$

E = 33.1 V/m

The rated maximum transmitter power (P) = 15 watts (+40 dBm).

A duty cycle (DC) of 100% as the transmitter is a base station could possibly be operated for long periods of time.

Transmitter is operated using a quarter wave whip antenna with a gain (G) of 2.14 dBi (1.64).

The safe distance would be calculated as follows:

$d = \sqrt{(30 * P * G*DC) / E}$

$d = \sqrt{(30 * 15 * 1.64 * 1.0) / 33.1}$

d = 0.82 metres or 82 cm

Result: Complies if the safe distances defined above are applied.