OET-65 Compliance

In determining OET-65 compliance, we started with formula 9 from OET065 edition 97-01:

$$\text{power density (S) [mW/cm}^2] = \frac{33.4 \times \text{Total ERP[kW]}}{(\text{R meters})^2}$$

To determine the distance for a given power density, we can use the derived formula:

$$\text{R meters} = \text{SquareRoot} \left(\frac{33.4 \times \text{TTL ERP[kW]}}{\text{power density (S) [mW/cm}^2]} \right)$$

TTL ERP(kW) is the sum of vertical and horizontal polarizations which is 0.240 kW (0.240 kW Vertical polarization and 0.000 kW Horizontal polarization) for this instant application.

Defining Area of Concern:

The latter formula was used to calculate a radius for area of interest (the "Area of Interest") to protect the public from $0.2 \text{ mW}^2/\text{cm}$ radiation. We determined that Area of Interest to be a 6.33 meter radius of the antenna radiation center.

$$\text{RC m} = \text{SquareRoot}\left(\frac{33.4 \times 0.240}{0.2} \right) = \text{SquareRoot (40.08)} = 6.33 \text{ m}$$

Applying Antenna Vertical Radiation Pattern:

Formula 10 from OET065 edition 97-01 is:

$$\text{power density (S) [mW/cm}^2] = \frac{33.4 \times (\text{Relative Field})^2 \times \text{Total ERP[kW]}}{(\text{R meters})^2}$$

To determine the distance of each vertical azimuth for a given power density, we can use the derived formula:

$$\text{R meters} = \text{SquareRoot} \left(\frac{33.4 \times (\text{Relative Field})^2 \times \text{TTL ERP[kW]}}{\text{power density (S) [mW/cm}^2]} \right)$$

This method was applied to the azimuths of the vertical radiation pattern supplied by the manufacturer of the Scala antenna model GP-FM for determining the particular locations of interest where public would be at risk within the Area of Interest. The results are provided in graphical form in **Figure 1**. The green pattern represents 1 mW/cm^2 levels for Controlled Access and the blue pattern represents 0.2 mW/cm^2 Public radiation exposure. Supporting tabular data is also provided in **Table1** at the end of this document for Public radiation.

Although the manufacturer's data only uses 1 degree increments, the vertical radiation pattern of the one-bay antenna has a main lobe and no minor lobes. Since this is inherently characteristic of one-bay radiators without parasitic elements, it is reasonable to not require additional accuracy for the purpose this data serves.
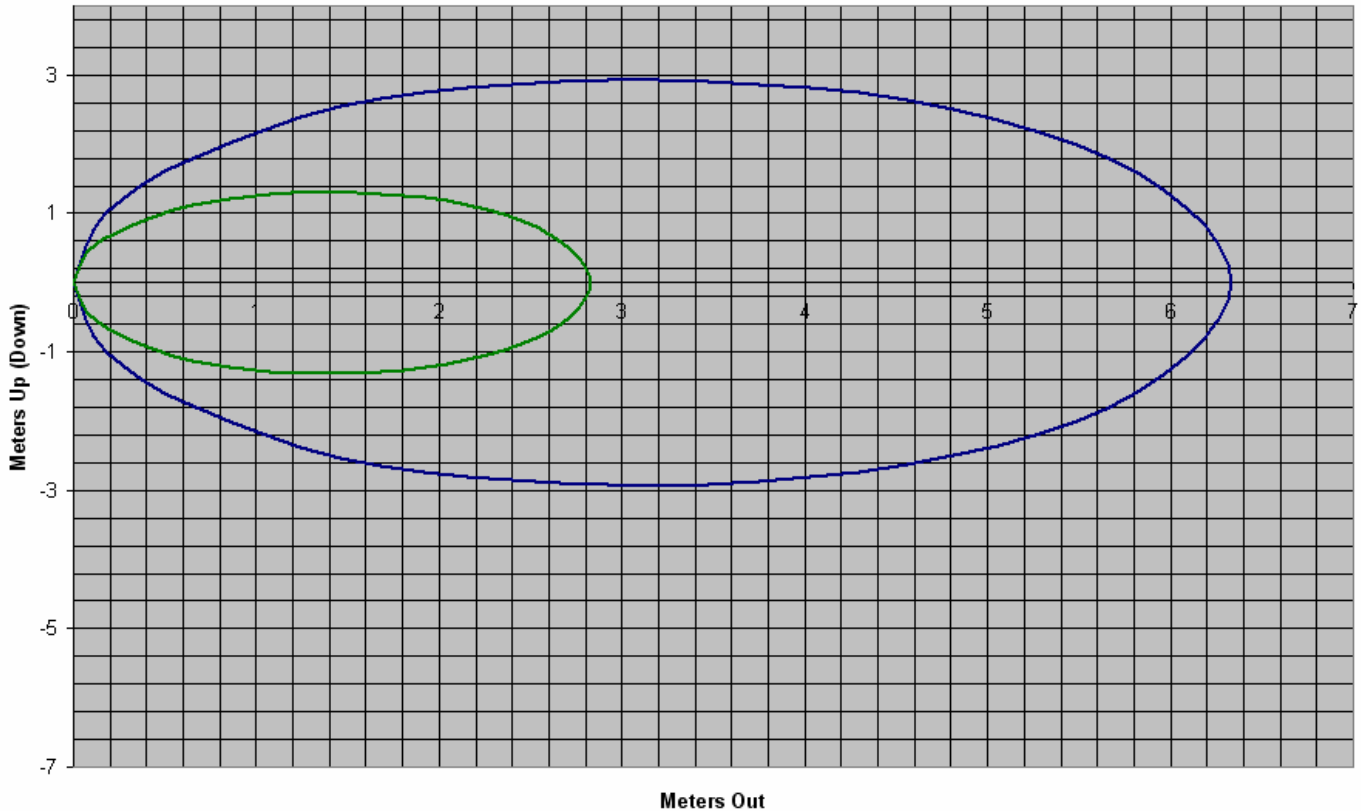
Figure 1

The site chosen for this instant application was leveled when a well and pump were previously installed for the public water system. Therefore there are no locations within the Area of Interest significantly higher than the proposed transmit antenna installation.

Closest Point of Interest to the Public:

There are no structures within the Area of Interest that might allow the public to be higher than the antenna system reference elevation. The lowest Point of Interest is 2.9 meters below Radiation Center ("RC") at 40 degrees below RC, corresponding to 0.72 field strength as provided by the manufacturer.

Compliance with OET-65:

Since RC is 7 meters AGL at the site, the lowest Point of Interest is therefore 4.1 meters AGL, above the area where the public would be affected and therefore in compliance with requirements of OET-65 standards.

Applicant shall install radiation hazard warning signs, also in compliance with OET-65 standards.

TABLE 1

GP-FM.DAT

ELEV ANGLE	FIELD STRENGTH	FIELD DB	ELEV ERP(KW)	ELEV DBK	PUBLIC DIST (M)	DISTANCE OUT (M)	DISTANCE UP(DOWN)	ELEVATION AMSL (M)
-90	0	-60	0	-66.2	0.006	0	-0.01	74
-80	0.16	-15.9	0.0062	-22.1	1.015	0.18	-1	73
-70	0.3	-10.5	0.0214	-16.7	1.89	0.65	-1.78	72.2
-60	0.46	-6.7	0.0513	-12.9	2.927	1.46	-2.54	71.5
-50	0.59	-4.6	0.0832	-10.8	3.728	2.4	-2.86	71.1
-40	0.72	-2.9	0.1231	-9.1	4.534	3.47	-2.91	71.1
-30	0.83	-1.6	0.166	-7.8	5.266	4.56	-2.63	71.4
-20	0.92	-0.7	0.2043	-6.9	5.841	5.49	-2	72
-10	0.98	-0.2	0.2292	-6.4	6.187	6.09	-1.07	72.9
0	1	0	0.24	-6.2	6.331	6.33	0	74
10	0.98	-0.2	0.2292	-6.4	6.187	6.09	1.07	75.1
20	0.92	-0.7	0.2043	-6.9	5.841	5.49	2	76
30	0.83	-1.6	0.166	-7.8	5.266	4.56	2.63	76.6
40	0.72	-2.9	0.1231	-9.1	4.534	3.47	2.91	76.9
50	0.59	-4.6	0.0832	-10.8	3.728	2.4	2.86	76.9
60	0.46	-6.7	0.0513	-12.9	2.927	1.46	2.54	76.5
70	0.3	-10.5	0.0214	-16.7	1.89	0.65	1.78	75.8
80	0.16	-15.9	0.0062	-22.1	1.015	0.18	1	75
90	0	-60	0	-66.2	0.006	0	0.01	74

GP-FM.DAT   MAX: 6.33m   -2.91m   71.1m