

**March 2014**  
**KRRN-FM Channel 224C**  
**Moapa Valley, NV**  
**Auxiliary Facility RF Exposure Study**

**Facilities Proposed**

The proposed auxiliary facility operation will be on Channel 224C (92.7 MHz) with a maximum lobe effective radiated power of 20 kilowatts. Operation is proposed with an existing 2-level circularly-polarized directional panel antenna. The antenna is side-mounted on a tower with FCC Antenna Structure Registration Number 1255600.

The antenna to be used is the same one on which FM booster KRRN-FM2 is licensed. The KRRN-FM licensee has commissioned a directional pattern measurement study from the antenna manufacturer in order to ensure that the 60 dBu contour from the proposed auxiliary facility will not extend beyond the 60 dBu contour of the main KRRN-FM facility. This application specifies the measured pattern of the installed antenna.

**RF Exposure Calculations**

The power density calculations shown below were made using the techniques outlined in OET Bulletin No. 65. "Ground level" calculations in this report have been made at a reference height of 2 meters above ground to provide a worst-case estimate of exposure for persons standing on the ground in the vicinity of the tower. The equation shown below was used to calculate the ground level power density figures from each antenna.

$$S(\mu W / cm^2) = \frac{33.40981 \times AdjERP(Watts)}{D^2}$$

Where: *AdjERP(Watts)* is the maximum lobe effective radiated power times the element pattern factor times the array pattern factor.

*D* is the distance in meters from the center of radiation to the calculation point.

Ground level power densities have been calculated for locations extending from the base of the tower to a distance of 1000 meters. Values past this point are increasingly negligible.

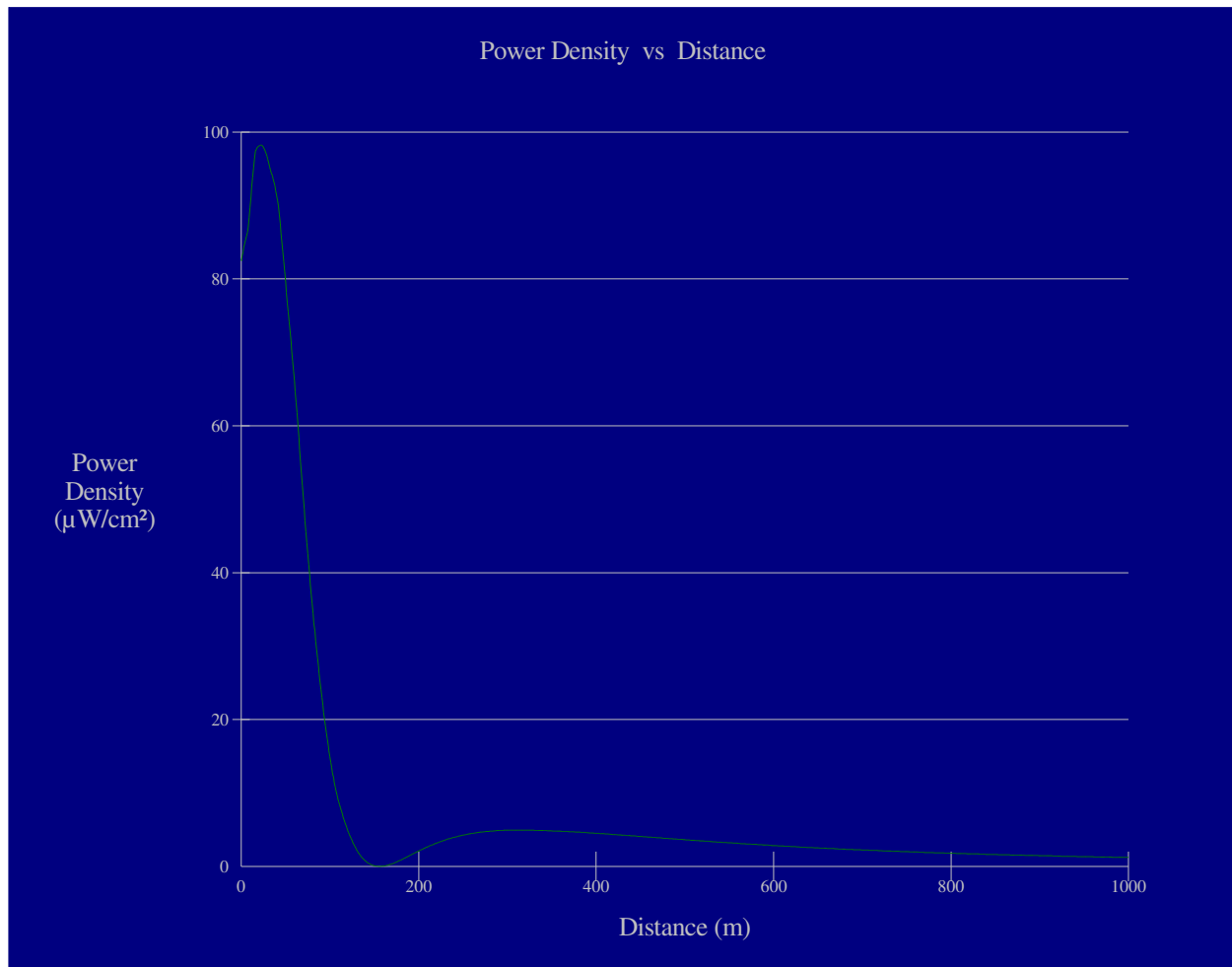
Since the Commission's FMModel software does not include an element pattern for a panel

antenna, calculations of the power density produced by the proposed antenna system assume a Type 1 element pattern, which is the “worst case” element pattern. Under this “worst case” assumption, the highest calculated ground level power density from the KRRN-FM auxiliary facility occurs at a distance of 22 meters from the base of the antenna support structure. At this point the power density is calculated to be  $98.2 \mu\text{W}/\text{cm}^2$ .

Calculations of the power density produced by the co-located KQRT antenna system assume the appropriate element pattern for the PSIFHR-8C “Power-Tiller” antenna used by that station. The highest calculated ground level power density from the KQRT facility occurs at a distance of 29 meters from the base of the antenna support structure. At this point the power density is calculated to be  $16.7 \mu\text{W}/\text{cm}^2$ .

These calculations show that the maximum calculated power density produced at two meters above ground level by the proposed operation of KRRN-FM auxiliary and the present operation of KQRT (were their maxima to coincide, which they do not) is  $114.9 \mu\text{W}/\text{cm}^2$ , which is 11.5% of  $1000 \mu\text{W}/\text{cm}^2$  (the FCC standard for controlled environments) and 57.5% of  $200 \mu\text{W}/\text{cm}^2$  (the FCC standard for uncontrolled environments).

The permittee/licensee in coordination with other users of the site must reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency exposure in excess of FCC guidelines.



## Ground-Level RF Exposure

## OET FMModel

### KRRN-FM Auxiliary

Antenna Type: PSIFMP-2-DA (ring-stub element model used for this study)

No. of Elements: 2

Element Spacing: 1.0 wavelength

Distance: 1000 meters

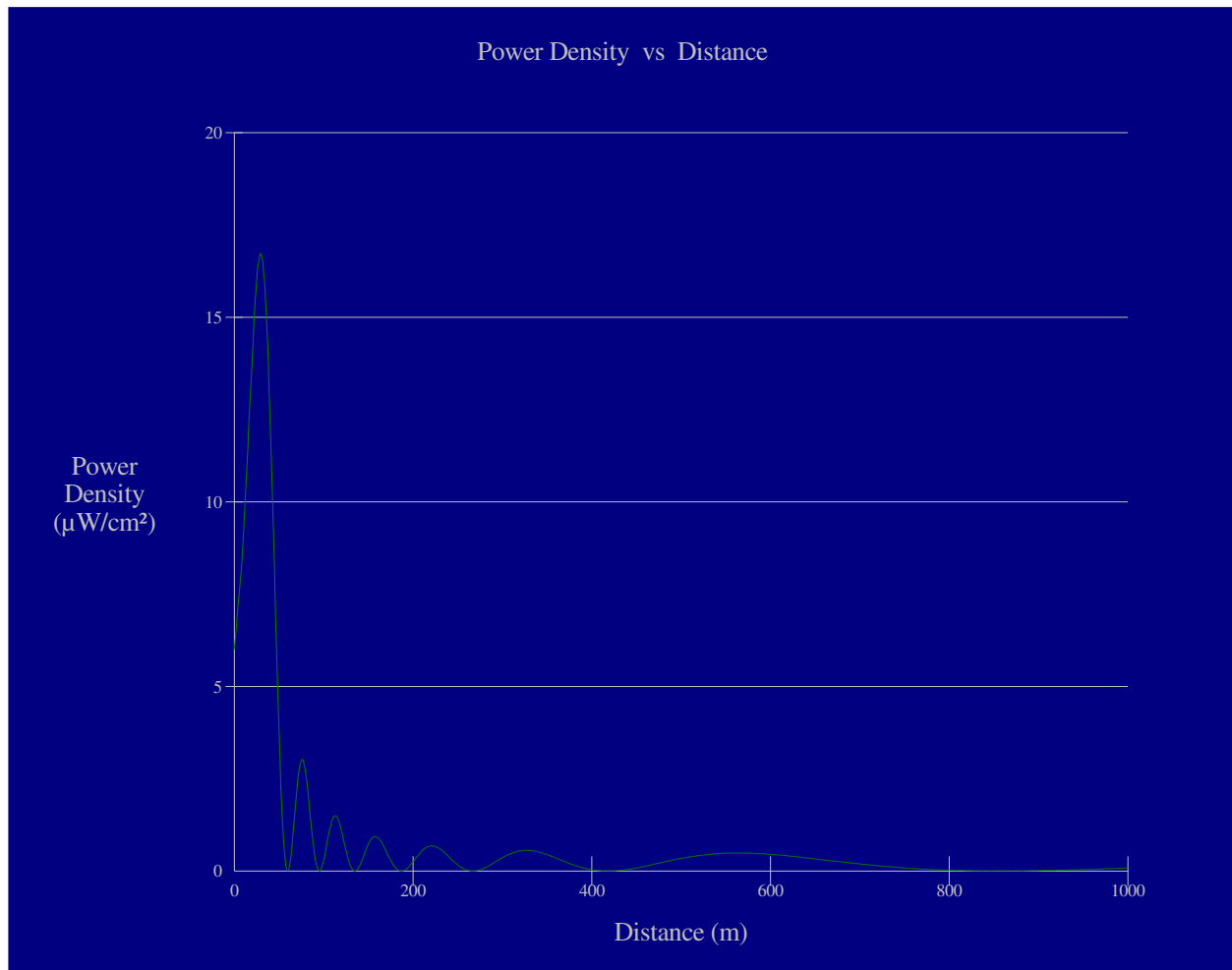
Horizontal ERP: 20 kW

Vertical ERP: 20 kW

Antenna Height: 92 meters AGL

Maximum Calculated Power Density is  $98.2 \mu\text{W}/\text{cm}^2$  at 22 meters from the antenna structure.

Hatfield & Dawson Consulting Engineers



### Ground-Level RF Exposure

OET FMModel

#### KQRT 286C2 Las Vegas

Antenna Type: PSIFHR-8C "Power-Tiller"  
No. of Elements: 8  
Element Spacing: 1.0 wavelength

Distance: 1000 meters  
Horizontal ERP: 50 kW  
Vertical ERP: 50 kW

Antenna Height: 110 meters AGL

Maximum Calculated Power Density is  $16.7 \mu\text{W}/\text{cm}^2$  at 29 meters from the antenna structure.

Hatfield & Dawson Consulting Engineers