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RF Exposure Calculations
KQCM(FM) Channel 238A Twentynine Palms Base, CA
KRSX-FM Channel 287A Twentynine Palms, CA

Background

KQCM and KRSX-FM hold construction permits to modify their facilities, to operate from a transmitter site atop Copper Mountain. Both construction permits include conditions requiring that post-construction RF exposure measurements be performed. Based on my review of the facilities currently operating from this transmitter site and from a separate tower site 360 meters distant, I conclude that this condition was included on the KQCM and KRSX-FM permits owing to the sum total of the contributions of the FM stations at the site, and not due strictly to the individual contributions of KQCM and KRSX-FM.

One of the stations licensed at this particular site is KKCM, licensed on Channel 221A at Joshua Tree.[1] However, in order to clear space for installation of KQCM and KRSX-FM on this structure, it was necessary to remove the KKCM antenna. It is my understanding, per information provided by the KKCM licensee, that the KKCM antenna system at Copper Mountain has been shut down and dismantled, and that the station will be notified as off-the-air pending its reactivation under construction permit BMPH-20110524ACU, which authorized a change in transmitter site and a change in community of license to Thermal, California. The new KKCM facility is expected to be activated in the very near future. (That permit expires on December 18, 2011.)

With KKCM no longer operating from the Copper Mountain transmitter site, it is believed that the

[1] Until October 18, 2011, KKCM 221A Joshua Tree held the callsign KQCM.

following RF exposure calculations will satisfy the condition placed on the KQCM and KRSX-FM construction permits, in lieu of post-construction measurements.

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 FM antenna, using the Commission's FMModel software.

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

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.

A PSI model FM-6-HWS antenna has been installed for use by KQCM 238A. Since the PSI antenna is not yet recognized by the FCC as equivalent to a Jampro "double V" antenna, "worst case" calculations of the power density produced by the KQCM antenna system assume a Type 1 element pattern, which is the element pattern for a "ring stub" antenna. Under this worst-case assumption, the highest calculated ground level power density from KQCM occurs at a distance of 9 meters from the base of the antenna support structure. At this point the power density is calculated to be 20.7 μW/cm², which is 10.4% of 200 μW/cm² (the FCC standard for uncontrolled environments).

A PSI model FM-6-HWS antenna has been installed for use by KRSX-FM 287A. Since the PSI antenna is not yet recognized by the FCC as equivalent to a Jampro "double V" antenna, "worst case" calculations of the power density produced by the KRSX-FM antenna system assume a Type 1 element pattern, which is the element pattern for a "ring stub" antenna. Under this worst-case assumption, the highest calculated ground level power density from KRSX-FM occurs at a distance of 9 meters from the base of the antenna support structure. At this point the power density is

calculated to be 32.6 μW/cm², which is 16.3% of 200 μW/cm² (the FCC standard for uncontrolled environments).

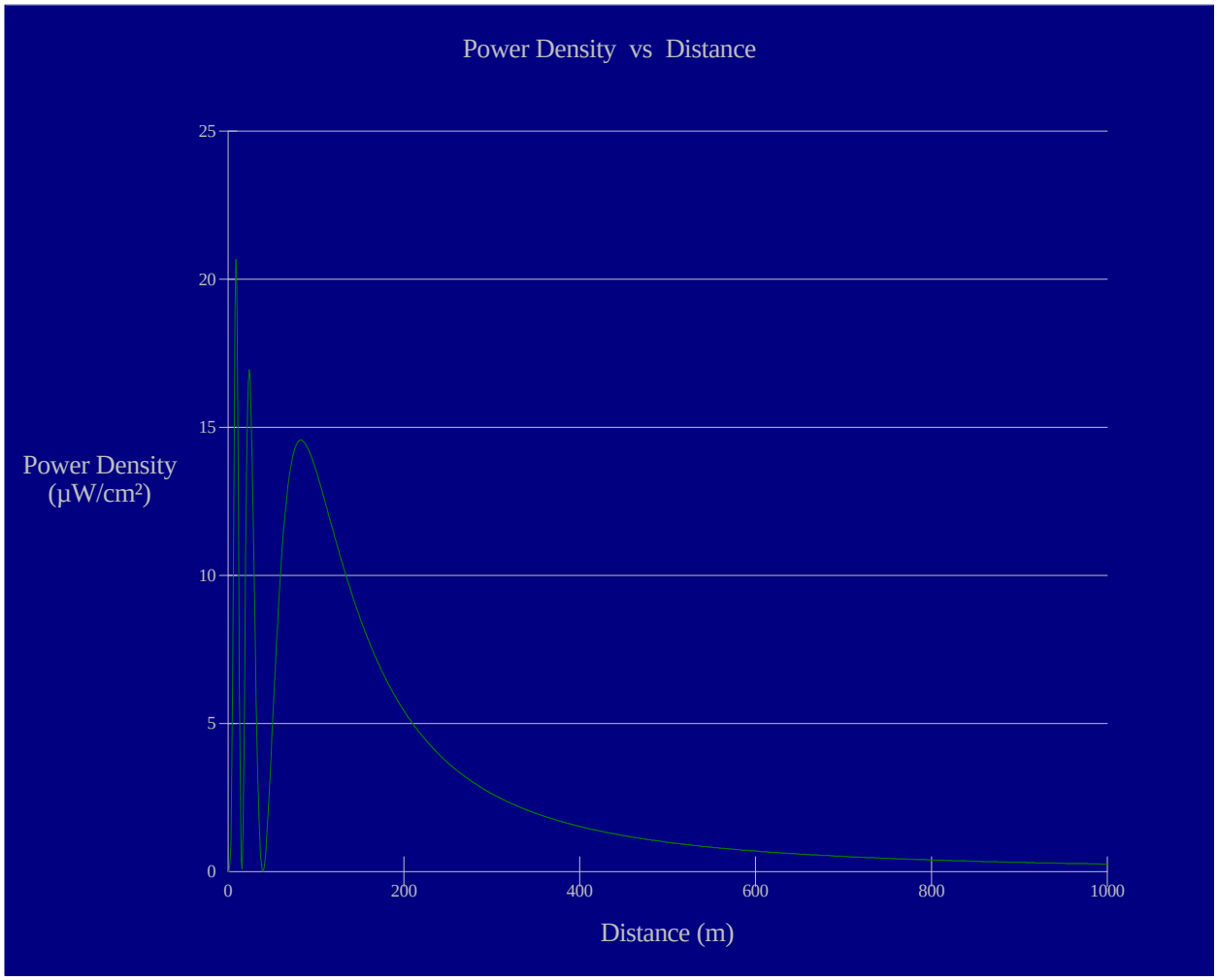
Calculations of the power density produced by KQCM, KRSX-FM and the other stations at this transmitter site are summarized in the following table:

Call	Avg or Peak ERP Antenna Model	Relative Field	Height AGL	Calculated Max Exposure	Gen Pub FCC Limit	% of Limit
KQCM 238A	3.8 kW avg PSI FM-6-HWS ring stub assumed	FMModel	16 m	20.7 μW/cm²	200 μW/cm²	10.4%
KRSX-FM 287A	6.0 kW avg PSI FM-6-HWS ring stub assumed	FMModel	16 m	32.6 μW/cm²	200 μW/cm²	16.3%
K214CR	0.010 kW avg ring stub assumed	FMModel	12 m	4.0 μW/cm²	200 μW/cm²	2.0%
KXCM 242A	6.0 kW avg JAM JMPC-3 RFR double-V 3-bay half-wave	FMModel	17 m	88.7 μW/cm²	200 μW/cm²	44.4%
KPLM-FM1 291D	0.200 kW avg vertical only dipole assumed	FMModel	29 m	8.7 μW/cm²	200 μW/cm²	4.4%
KCDZ 299B1	6.7 kW avg ERI MPX-3E	FMModel	36 m	40.6 μW/cm²	200 μW/cm²	20.3%
TOTAL ..... 97.8% of the General Population Limit						

These calculations show that the maximum calculated power density produced at two meters above ground level by new operations of KQCM 238A and KRSX-FM 287A and the authorized operations of the other stations at this site (were their maxima to coincide, which they do not) is 97.8% of the FCC standard for uncontrolled environments.[2]

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 radiation in excess of FCC guidelines.

[2] This total includes consideration of that fact that KKCM 221A is no longer operating at this transmitter site, pending its soon-to-be-completed relocation to a new transmitter site under construction permit BMPH-20110524ACU.

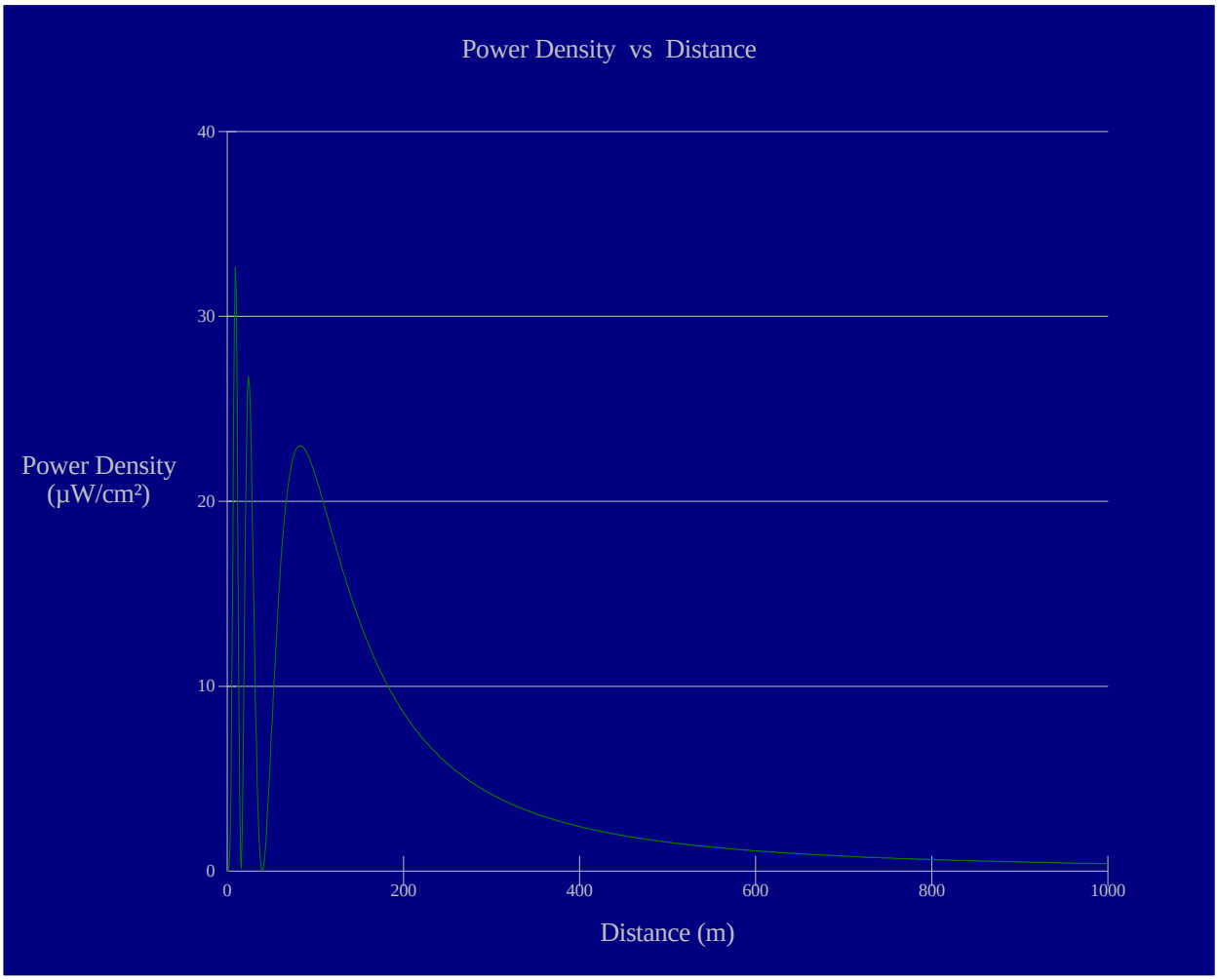


Ground-Level RF Exposure **OET FMModel**

KQCM 238A Twentynine Palms Base

Antenna Type:	PSI FM-6-HWS (“ring stub” assumed for this study)
No. of Elements:	6
Element Spacing:	0.5 wavelength
Distance:	1000 meters
Horizontal ERP:	3.8 kW
Vertical ERP:	3.8 kW
Antenna Height:	16 meters AGL

Maximum Calculated Power Density is 20.7 : W/cm^2 at 9 meters from the antenna structure.



Ground-Level RF Exposure **OET FMModel**

KRSX-FM 287A Twentynine Palms

Antenna Type:	PSI FM-6-HWS (“ring stub” assumed for this study)
No. of Elements:	6
Element Spacing:	0.5 wavelength
Distance:	1000 meters
Horizontal ERP:	6.0 kW
Vertical ERP:	6.0 kW
Antenna Height:	16 meters AGL

Maximum Calculated Power Density is 32.6 : W/cm^2 at 9 meters from the antenna structure.

Statement of Engineer

This Engineering Statement has been prepared by the undersigned. I am a member of the Association of Federal Communications Consulting Engineers (AFCCE) and the Institute of Electrical and Electronics Engineers (IEEE). I am a partner in the firm of Hatfield & Dawson Consulting Engineers and am registered as a Professional Engineer (Electrical) in the States of Washington and Colorado.

I hereby declare that the facts set out in the foregoing Engineering Statement, except those of which official notice may be taken, are true and correct.

Signed this 17th day of October, 2011

Erik C. Swanson, P.E.