

January 2019
KNUC(FM) Channel 255C
Seattle, WA
Auxiliary Antenna RF Exposure Study

Facilities Proposed

The proposed auxiliary antenna operation will be on Channel 255C (98.9 MHz) with an effective radiated power of 18 kilowatts. Operation is proposed with a 6-element circularly-polarized omni-directional half-wave-spaced antenna. The antenna will be side-mounted on an existing uniform cross-section guyed tower (FCC ASR Number 1033564) located at the Cougar Mountain communications site. (This tower is identified locally as Ratelco Tower No. 4.)

KQMV auxiliary and KNUC auxiliary facilities will operate diplexed via this single antenna system. Separately, KCMS already holds a license for an auxiliary antenna in this same aperture on the tower, but the KCMS auxiliary antenna is installed on a different leg from the proposed KQMV/KNUC auxiliary 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.

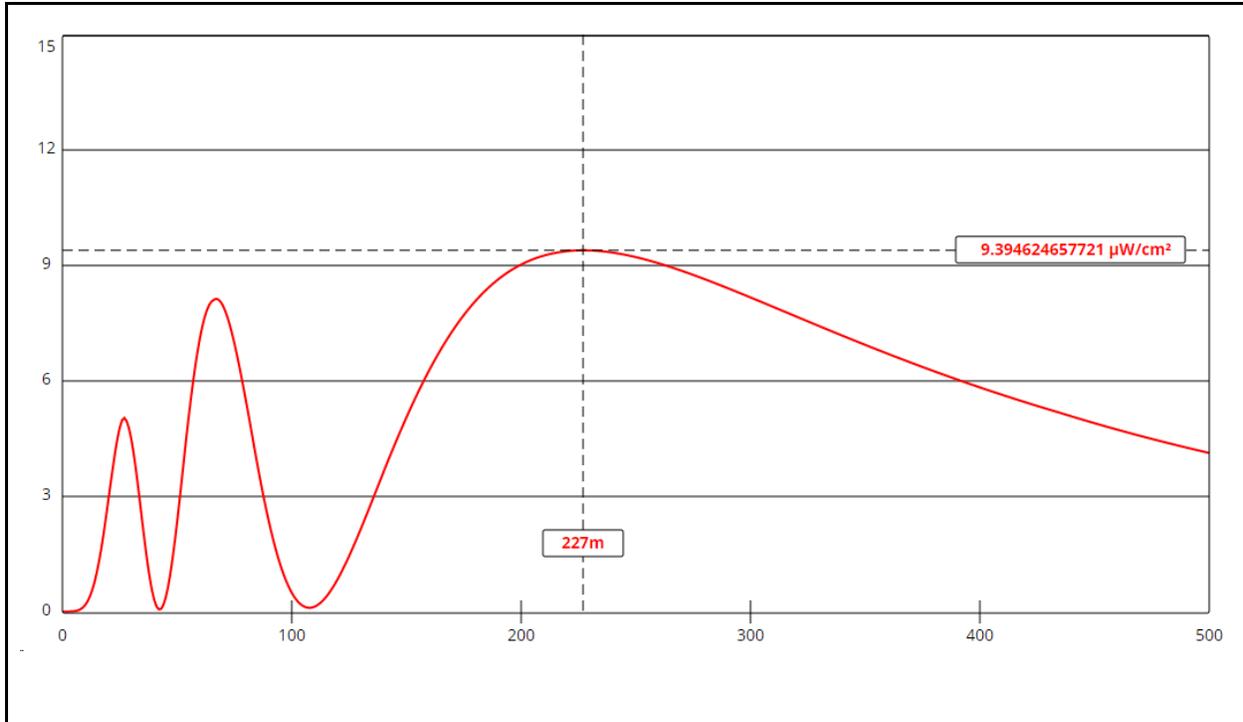
Ground level power densities have been calculated for locations extending from the base of the tower to a distance of 500 meters. Values past this point are increasingly negligible.

Calculations of the power density produced by the proposed antenna system assume a Type 3 element pattern, which is the element pattern for the ERI SHPX-6AC-HW-SP antenna proposed for use. The highest calculated ground level power density occurs at a distance of 227 meters from the base of the antenna support structure. At this point the power density is calculated to be 9.4 $\mu\text{W}/\text{cm}^2$, which is 4.7% of 200 $\mu\text{W}/\text{cm}^2$ (the FCC standard for uncontrolled environments).

These calculations show that the maximum calculated power density produced at two meters above ground level by the proposed auxiliary operation alone is less than 5% of the applicable FCC exposure limit at all locations between 1 and 500 meters from the base of the antenna support structure. Section 1.1307(b)(3) of the Commission's Rules excludes applications for new facilities or modifications to existing facilities from the requirement of preparing an environmental assessment when the calculated emissions from the applicant's proposed facility are predicted to be less than 5% of the applicable FCC exposure limit. Therefore, the proposed facility is in compliance with Section 1.1301 *et seq* and no further analysis of RF exposure at this site is required in this application.

Public access to the site is restricted by a locked gate and the antenna tower is posted with warning signs. Pursuant to OET Bulletin No. 65, all station personnel and contractors are required to follow appropriate safety procedures before any work is commenced on the antenna tower, including reduction in power or discontinuance of operation before any maintenance work is undertaken.

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

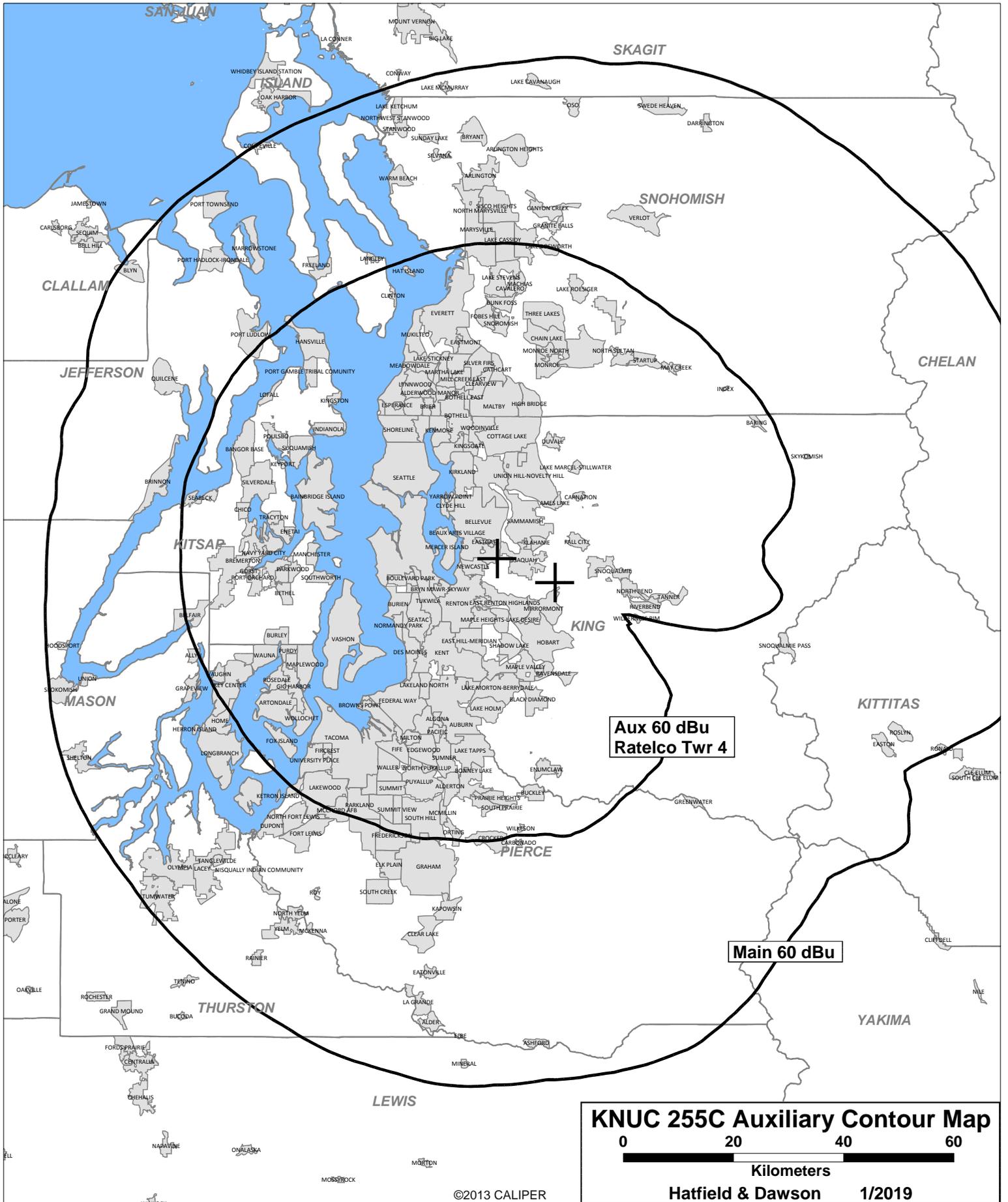
KNUC 255C Auxiliary

Antenna Type: ERI SHPX-6AC-HW-SP “rototiller” (Type 3)
 No. of Elements: 6
 Element Spacing: 0.5 wavelength

Distance: 500 meters
 Horizontal ERP: 18 kW
 Vertical ERP: 18 kW

Antenna Height: 40 meters AGL

Maximum Calculated Power Density is 9.4 μW/cm² at 227 meters from the antenna structure.



Aux 60 dBu
Ratalco Twr 4

Main 60 dBu

KNUC 255C Auxiliary Contour Map

0 20 40 60

Kilometers

Hatfield & Dawson 1/2019