

**July 2020  
KNUC(FM) Channel 255C  
Seattle, WA  
Antenna Change Engineering**

**Background**

The main KNUC antenna system on West Tiger Mountain (see BLH-20060824AEB) was severely damaged by an antenna fire on November 8, 2018. Since that time, KNUC has operated with either its licensed auxiliary antenna on Cougar Mountain, or with an approved STA facility on West Tiger Mountain.

Installation of a permanent replacement main antenna has now been completed. The prior 8-level panel antenna system has been replaced with a 16-bay ERI SHPXA-16BC-HW-SP “rototiller” antenna system which is shared by several stations. The instant application is therefore being filed in order to reflect the change in the installed antenna model, as well as the associated change in analog transmitter power output. Included with this application is a revised ground-level power density study (below).

**Facilities Constructed**

The modified operation is on Channel 255C (98.9 MHz) with an effective radiated power of 68 kilowatts. Operation is proposed with a 16-element circularly-polarized omni-directional 0.50-wavelength-spaced antenna. The antenna is side-mounted on an existing tower located atop West Tiger Mountain, with FCC Antenna Structure Registration Number 1056093.

**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.

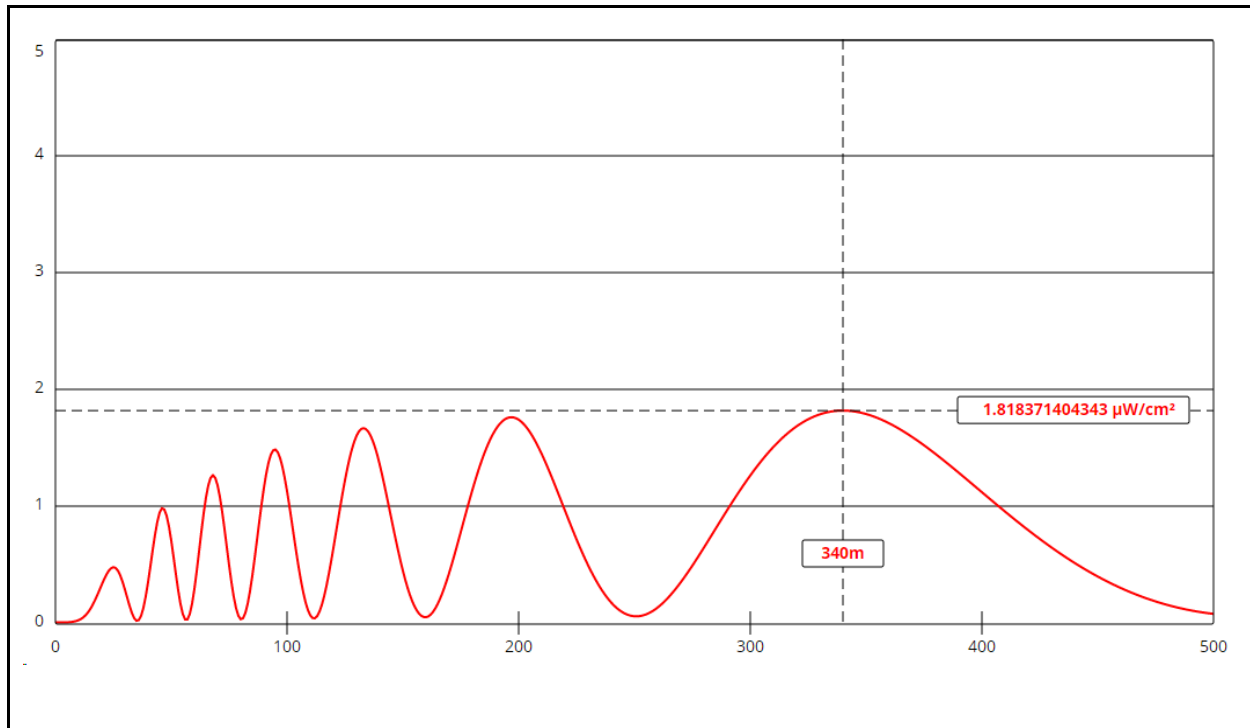
*D* is the distance in meters from the center of radiation to the calculation point.

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 model SHPXA-16BC-HW-SP antenna which has been installed for use. The highest calculated ground level power density occurs at a distance of 340 meters from the base of the antenna support structure. At this point the power density is calculated to be 1.8  $\mu W/cm^2$ , which is 0.2% of 1000  $\mu W/cm^2$  (the FCC standard for controlled environments) and 0.9% of 200  $\mu W/cm^2$  (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 operation alone is less than 5% of the applicable FCC exposure limit at all locations between 1 and 1000 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.

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 Seattle

Antenna Type: ERI SHPXA-16BC-HW-SP "rototiller" (Type 3)  
No. of Elements: 16  
Element Spacing: 0.50 wavelength

Distance: 500 meters  
Horizontal ERP: 68 kW  
Vertical ERP: 68 kW

Antenna Height: 66.7 meters AGL

Maximum Calculated Power Density is 1.8  $\mu\text{W}/\text{cm}^2$  at 340 meters from the antenna structure.