

# ***KLEIN BROADCAST ENGINEERING, L.L.C.***

dedicated to improving the science of radio and television communications

SEPTEMBER 2006

EXHIBIT E-10RHS  
FCC FORM 301 APPLICATION  
FOR FM BROADCAST STATION CONSTRUCTION PERMIT  
NRC BROADCASTING, INC.  
K T U N(FM)  
(FCC FACILITY ID# 44012)  
FM CHANNEL 269 C1 / 101.7 mHz.  
EAGLE, COLORADO

## RF RADIATION HAZARD COMPLIANCE STATEMENT

The facilities proposed herein by the applicant, permittee or licensee, in this Engineering Exhibit comply with FCC O.S.T. Bulletin #65 and #65A as revised (1997) and the ANSI C-95.1-1982 RF and ANSI C95.1992 and the NCRP exposure guidelines. The interpolation of the figures from the above referenced document, page 18, supplement "A", shows a WORST case requirement of 19.2 meters height above ground level requirement for the radiation center of the proposed four (4) bay half wave length spaced FM broadcast antenna. A combined vertical and horizontal effective radiated power of 21.0 kilowatts was used for this study and determination (10.50 kW Horiz. & 10.50 kW Vert.) The radiation center of the FM broadcast antenna system is proposed at 30 meters above ground level (AGL), well within the requirement for the antenna as determined from the above referenced documents. The antenna specified and installed is an Electronics Research, Inc., model SHPX-4AC-HW, EPA Type 3, four (4) section, half wave length spaced, circularly polarized antenna. The antenna manufacturer, Electronics Research, Inc., states its antenna meets the BEST case requirements for downward radiation pattern according to the FCC O.S.T. Bulletin #65 Guidelines. The antenna proposed uses no beam tilt and no null fill.

Occupational compliance is certified by the reduction of operating power or the complete cessation of operation during such time maintenance personnel are on the antenna support structure. A transmitter "LOCK OUT" circuit will be installed to prevent accidental turn on of the transmission equipment during the time maintenance personnel are on the antenna support structure. The applicant, will cooperate with other site users in order to comply with The FCC Guidelines on Human Exposure to Non-Ionizing RF Radiation. Presently, there are no other users on the site proposed herein.

In addition to the preceding the applicant, has by computer program, performed additional calculations to predict RF power density at the base of the antenna support structure. This program predicts a maximum power density of 22.4178 microwatts/cm<sup>2</sup> at a distance of 109.0 meters from the base of the antenna support structure at a height of 2.0 meters above ground level. This is less than 11.3% of the allowable RF power density for Uncontrolled areas under the FCC and ANSI/EPA Guidelines, being limited to: 200.0 microwatts/cm<sup>2</sup> for Uncontrolled areas and 1.00mW/cm<sup>2</sup> or (1,000 microwatts/cm<sup>2</sup>) for Controlled areas (areas within fencing). All other power density was calculated to be below this maximum predicted level for a distance of 0 to 1000 meters distance from the base of the antenna support structure at 2.0 meters above ground level. There are no other sources of significant RFR levels at the proposed KTUN(FM) site.

The computer program employed for the RFR analysis in this engineering exhibit uses either the Near Field or Far Field method for the calculation of power density and was written by the Commission's O.E.T. staff. In this particular case the Far Field Method was used. The formula used by the computer program was derived from the FCC O.S.T. Bulletin #65, as revised to date.

The formula may be stated in the following manner:

$$E(V/m) = \frac{1.6 * 221.72 * \text{SQRT}(\text{ERP}) * (\text{element pattern factor}) * (\text{array factor})}{\text{DIST}}$$

$$H(A/m) = \frac{1.6 * 0.588 * \text{SQRT}(\text{ERP}) * (\text{element pattern factor}) * (\text{array factor})}{\text{DIST}}$$

Where:

ERP = effective radiated power in kilowatts, relative to a half wave dipole.

DIST = distance in meters from the antenna radiation center to the observation point in meters.

The 1.6 factor found in the ANSI/EPA formula and used above at the beginning of each equation takes into account possible contributions from ground reflections. The element pattern factor in a linearly interpolated relative field value at the appropriate depression angle below the horizon as taken directly from the EPA data. The array factor is computed at the appropriate depression angle using the number of antenna elements, when normalized to 1.0 in the main lobe. This array factor only applies to antenna arrays of point sources where each source has equal power distribution and phase, and are uniformly spaced. The element patterns themselves can be associated with particular antenna designs. As of May 1986 there were six (6) element types identified for FM antennas as listed in the ANSI/EPA data and FCC Bulletin #65. The “crossed ring” EPA Type 3 element is used on the Electronics Research, Inc., model SHPX-4AC-HW EPA Type 3 is listed in the EPA data and was used for the calculations contained herein. There were two types listed for television, one for VHF and one for UHF.

The General Public will not have access to the antenna support structure base because it is in a sparsely populated , rural area. The only access to the site is by four wheel drive dirt road. The antenna support structure base will be protected by a locked gate and fence, approximately 7 feet tall with razor wire at the top of the fence structure. Only authorized personnel have access to the locked gate. This will prevent General Public access to the actual antenna support structure base.

The applicant, will install and post RF Radiation Hazard Warning Signs in and around the site at approximately eye level for additional warning and safety.

A vertical pattern plot of the Electronics Research, Inc., model SHPX-4AC-HW (EPA Type 3) antenna to be employed at KTUNFM) is included with this exhibit and is marked Figure 1. This plot clearly shows this antenna has greatly reduced downward radiation and meets the BEST case requirements of FCC Bulletin #65, as amended to date.

The plot Exhibit marked Figure 2. is a plot of the actual calculated power density in microwatts/cm<sup>2</sup> vs. distance. This plot shows the calculated maximum predicted power density of 22.4178 microwatts/cm<sup>2</sup> occurring at 109 meters distant from the base of the antenna support structure. It also shows, graphically, that all other calculated power density RFR levels are below this maximum between 0 meters and 1000 meters distant from the base of the antenna support structure.

The applicant has commissioned an analysis of this proposal's compliance with Section 106 of the National Historic Preservation Act, pursuant to the rules of the Advisory Council on Historic Preservation, 36 CFR part 800, as modified and supplemented by the Nationwide Programmatic Agreement for the Collocation of Wireless Antennas, Appendix B to Part 1 of the Commission's Rules, and pursuant to the Nationwide programmatic Agreement Regarding the Section 106 National Historic Preservation Act Review Process, Appendix C to Part 1 of the Commission's Rules.

The preceding assures compliance with the FCC, ANSI and NCRP requirements. Based on the preceding documents, tables, guidelines and calculations, the proposed operation of the main transmission facility for the proposed facility for KTUN FM Broadcast Station, at Eagle, Colorado is in compliance with the FCC O.S.T. Bulletin #65 and the ANSI C- 95.1-1992 and the NCRP RF Exposure Guidelines as amended to date. The applicant, certifies compliance with the ANSI, NCRP and FCC Human Exposure Guidelines to Non-Ionizing RF Radiation.

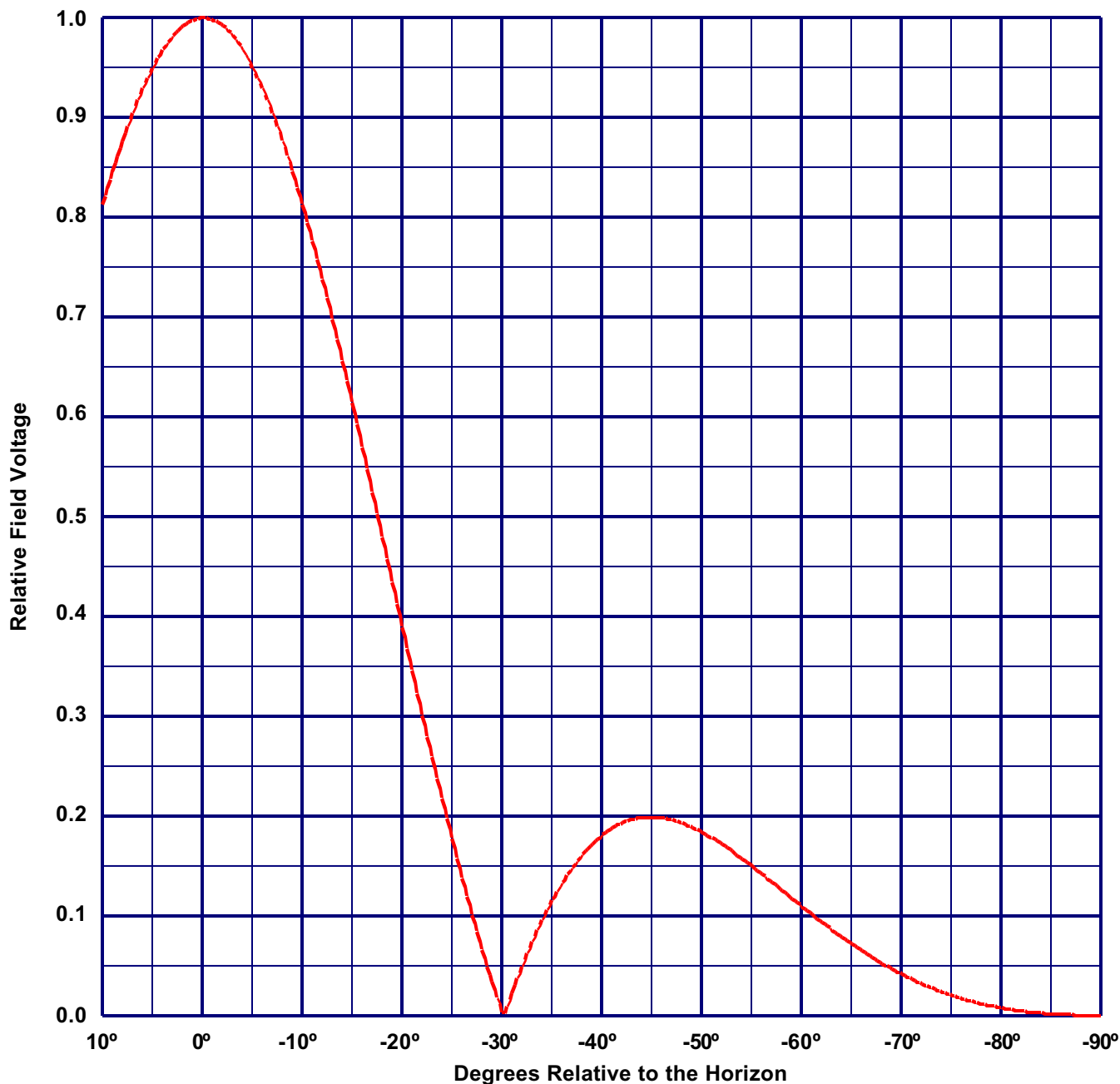


EXHIBIT E-10RHS FIGURE #1. KTUN(FM)

## Vertical Plane Relative Field Pattern

ERI TYPE SHP, SHPX, MP, MPX, LP OR LPX ELEMENTS

*SHPX-4AC-HW, A 4 level, .5 wave-length spaced non directional antenna  
with 0° beam tilt, 0% null fill and a HIV maximum power ratio of 1.000*



**Vertical Polarization Gain:**

**Maximum: 1.307 (1.163 dB)**

**Horizontal Plane: 1.307 (1.163 dB)**

**Horizontal Polarization Gain:**

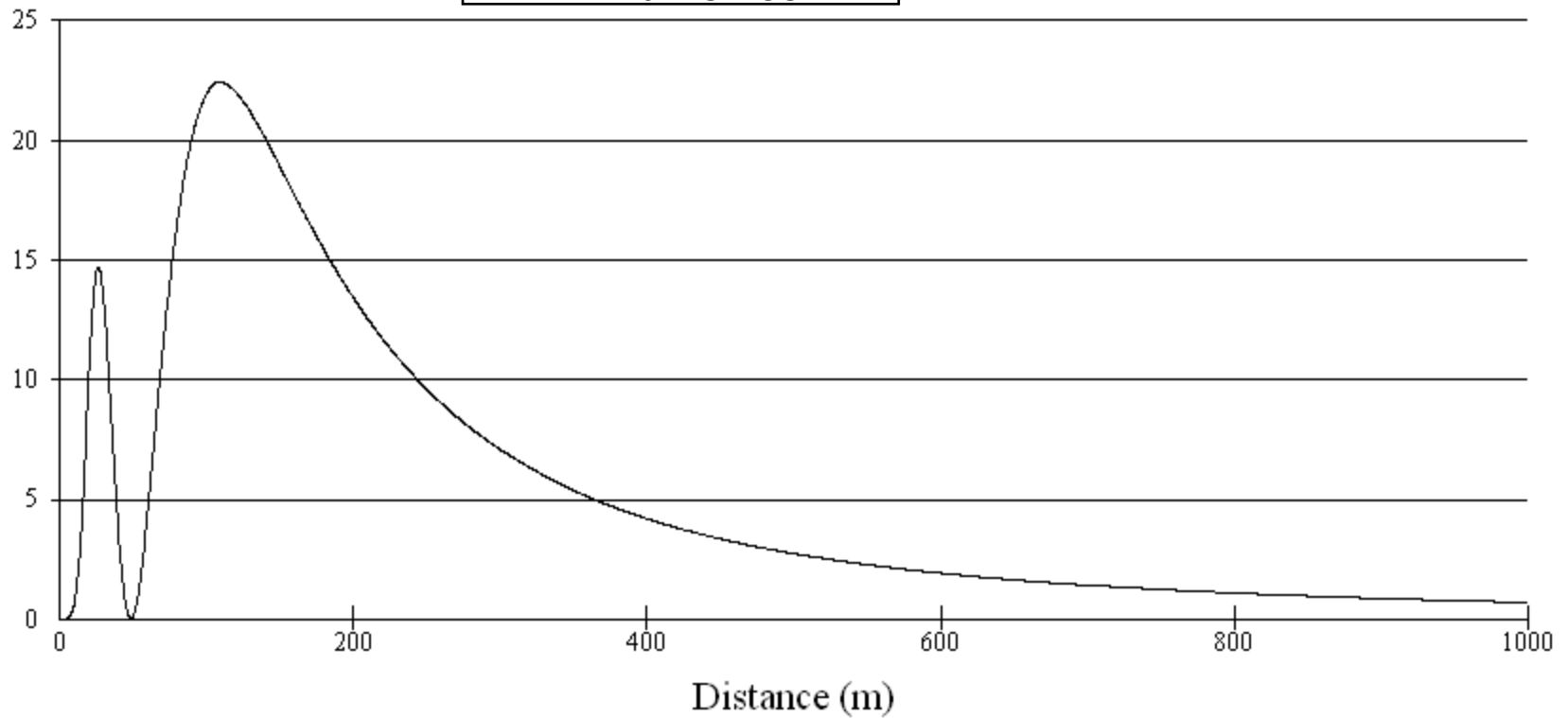
**Maximum: 1.307 (1.163 dB)**

**Horizontal Plane: 1.307 (1.163 dB)**

# Power Density vs Distance

EXHIBIT E-10RHS FIGURE #2.

Power Density  
( $\mu\text{W}/\text{cm}^2$ )



Office of Engineering and Technology

Distance (m):	<input type="text" value="1000"/>	Antenna Type:	<input (epa)"="" rototiller"="" type="text" value="ERI or JAMPRO JBCP "/>
Horizontal ERP (W):	<input type="text" value="10500"/>	Number of Elements:	<input type="text" value="4"/>
Vertical ERP (W):	<input type="text" value="10500"/>	Element Spacing:	<input type="text" value=".5"/>
Antenna Height (m):	<input type="text" value="30"/>		

MAXIMUM RFR POWER DENSITY = 22.4178uW/cM2 at a distance of 109 meters from the base of the antenna support structure, 2 meters above ground level.

ANTENNA MANUFACTURER & MODEL: Electronics Research, Inc. (ERI) SHPX-4AC-HW, a four section, center fed, half wave spaced antenna array.