

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

dedicated to improving the science of radio and television communications

SEPTEMBER 2006

EXHIBIT E-10RHS  
RFR STUDY & ANALYSIS  
N R C BROADCASTING, INC.  
K C U V – F M  
(FCC FACILITY ID# 37028)  
FM CHANNEL 272 A / 102.3 mHz.  
GREENWOOD VILLAGE , 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 14.9 meters height above ground level requirement for the radiation center of the proposed eight (8) bay 0.8 wave length spaced FM broadcast antenna. A combined vertical and horizontal effective radiated power of 2.0 kilowatts was used for this study and determination (1.0 kW Horiz. & 1.0 kW Vert.) The radiation center of the FM broadcast antenna system is to be located at 49 meters above ground level (AGL), well within the requirement for the antenna as determined from the above referenced documents. The antenna specified for use is an Electronics Research, Inc., model 1080, an eight (8) section, 0.8 wave length spaced, center fed, 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 has been installed to prevent accidental turn on of the transmission equipment during the time maintenance personnel are on the antenna support structure. The applicant, permittee or licensee will cooperate with other site users in order to comply with The FCC Guidelines on Human Exposure to Non-Ionizing RF Radiation.

In addition to the preceding the applicant, permittee or licensee, 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 0.1169 microwatts/cm<sup>2</sup> at a distance of 28.25 meters from the base of the antenna support structure at a height of 2.0 meters above ground level. This is less than 0.00058 % 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 the proposed facility, 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 other sources of significant RFR levels at the KCUV-FM site but because the contribution of this proposal is far less than 5% of the uncontrolled limit, under the "safe harbor" provision of 47 C.F.R. Section 1.1307(b)(3) no further RFR analysis is required.

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 type" EPA Type #3 element used on the Electronics Research, Inc., model 1080 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, mountain area. There is a locked gate and fence around the base of the antenna support structure preventing access to the area surrounding the antenna support structure and the support structure base itself. Only authorized personnel have access to the locked gate. This will prevent General Public access to the actual antenna support structure base and surrounding area.

The applicant, permittee or licensee, 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 1080 antenna to be employed at KCUV-FM 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 0.1169 uW/cm<sup>2</sup> occurring at 28.25 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 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 KCUV-FM FM Broadcast Station at Greenwood Village, Colorado, (Lookout Mountain, Jefferson County) 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, permittee or licensee certifies compliance with the ANSI, NCRP and FCC Human Exposure Guidelines to Non-Ionizing RF Radiation.

ELECTRONICS RESEARCH, INC.  
7777 GARDNER ROAD  
CHANDLER, IN. 47610

FIGURE 4A

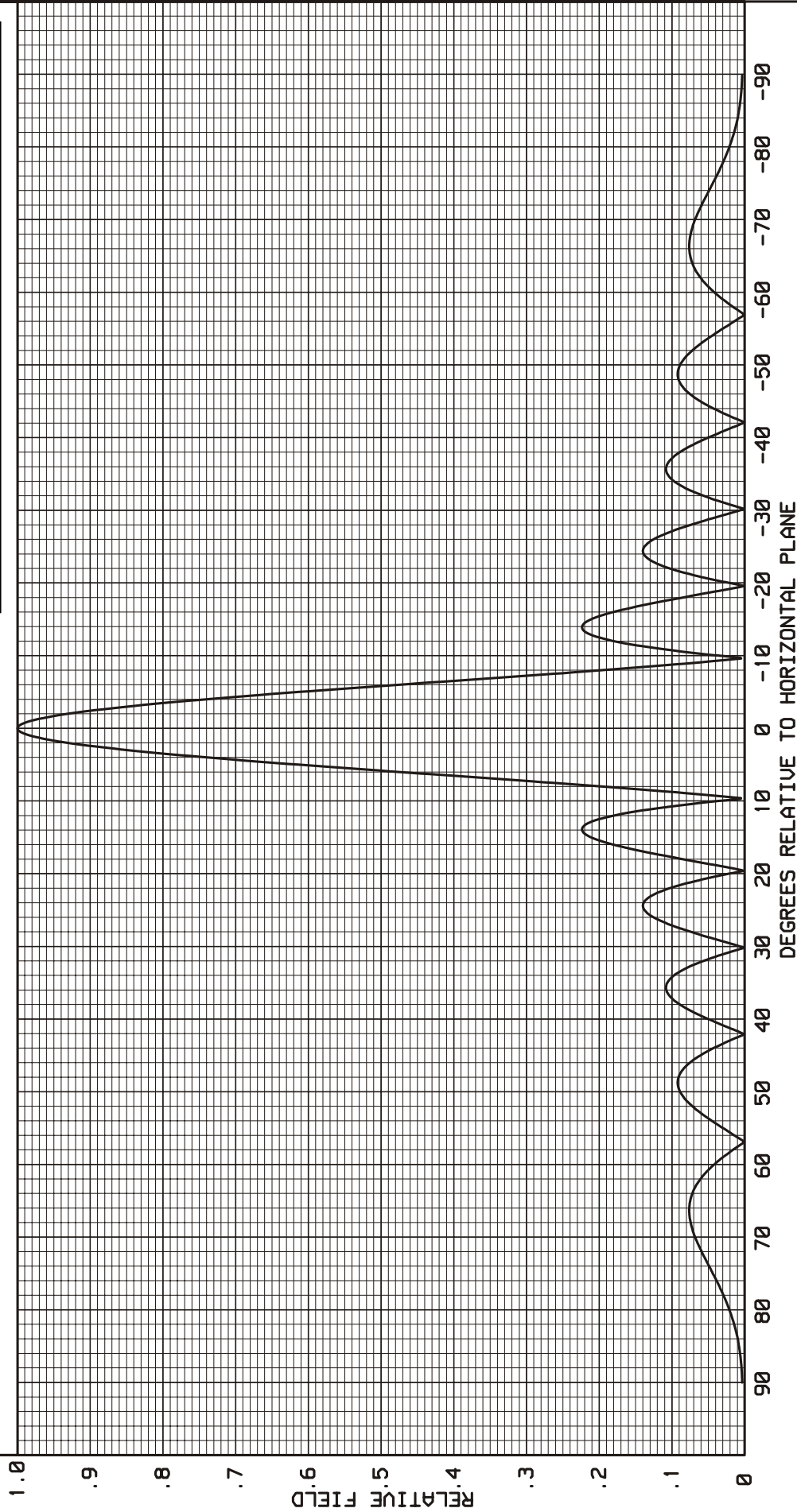
EXHIBIT E-10 Fig.#1.

-----THEORETICAL-----  
VERTICAL PLANE RELATIVE FIELD  
8 LEVELS OF TYPE 1080 ELEMENTS  
+0.00 DEGREE(S) BEAM TILT  
0 PERCENT FIRST NULL FILL  
0 PERCENT SECOND NULL FILL

AUGUST 4, 2000  
95.7 MHz

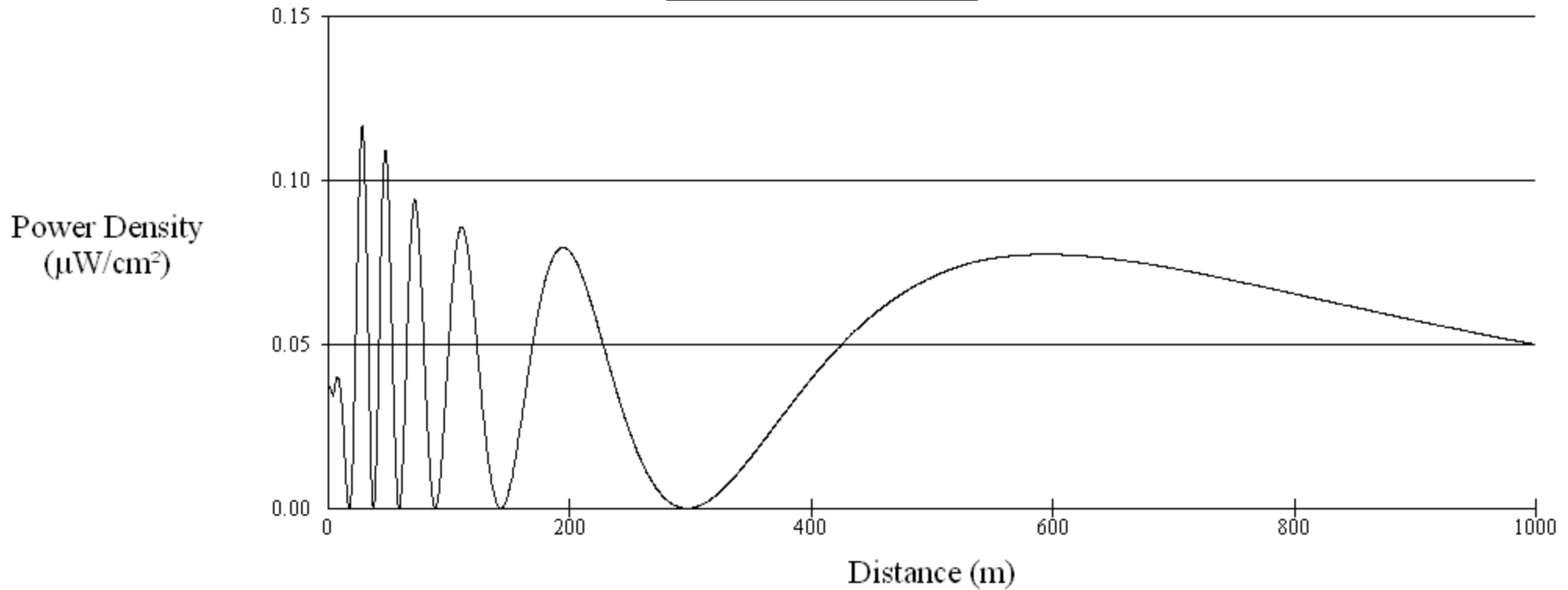
BAY SPACING  
92.00 INCHES  
(.7460 WAVELENGTH)

102.3 mHz BAY SPACING 0.800 WAVELENGTH



# Power Density vs Distance

EXHIBIT E-10 FIGURE #2.



Office of Engineering and Technology

Distance (m):	<input type="text" value="1000"/>	Antenna Type:	<input type="text" value="ERI or JAMPRO JBCP 'Rototiller' (EPA)"/>
Horizontal ERP (W):	<input type="text" value="1000"/>	Number of Elements:	<input type="text" value="8"/>
Vertical ERP (W):	<input type="text" value="1000"/>	Element Spacing:	<input type="text" value=".8"/>
Antenna Height (m):	<input type="text" value="49"/>		

MAXIMUM RFR POWER DENSITY = 0.1169uW/cm2 at a distance of 28.25 meters from the base of the antenna support structure, 2 meters above ground level.

Antenna Manufacturer & Model: Electronics Research, Inc. (ERI)  
Type 1080 Panel Antenna 8 Levels (Directional)