

# **FM Station KZRR • 94.1 MHz • Albuquerque, New Mexico Auxiliary Antenna Radio Frequency Exposure Measurements**

## **Statement of Hammett & Edison, Inc., Consulting Engineers**

The firm of Hammett & Edison, Inc., Consulting Engineers, has been retained to evaluate the radio frequency exposure conditions due to the proposed operation of a standby antenna for FM Station KZRR at the Sandia Crest Electronics Site near Albuquerque, New Mexico.

### **Electromagnetic Field Exposure Standard**

The U.S. Congress requires that the Federal Communications Commission (“FCC”) evaluate its actions for possible significant impact on the environment. In Docket 93-62, effective October 15, 1997, the FCC adopted the human exposure limits for field strength and power density recommended in Report No. 86, “Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields,” published in 1986 by the Congressionally chartered National Council on Radiation Protection and Measurements (“NCRP”). Separate limits apply for occupational and public exposure conditions, with the latter limits generally five times more restrictive. The more recent Institute of Electrical and Electronics Engineers (“IEEE”) Standard C95.1-1999, “Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,” includes nearly identical exposure limits. A summary of the FCC’s exposure limits is shown in Figure 1. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health.

The guidelines allow higher exposures for short time periods. Exposures can be averaged over a six-minute period, allowing, for example, a two-minute exposure to fields three times the limit if the remainder of the six-minute period does not include any significant exposure. Restrictions on the access to strong fields may be achieved in different manners for casual public exposure than for occupational exposure. Persons who are authorized to be in a site area can be educated to follow procedures that will limit time-averaged exposures to levels not exceeding the guidelines.

### **Site Description**

The Sandia Crest Electronics Site, located approximately 24 kilometers northwest of Albuquerque, New Mexico, in the Cibola National Forest, contains the transmitting facilities of numerous TV, FM, microwave, and communications stations serving the greater Albuquerque area. Neighboring the “high-power” Electronics Site is a “low-power site” to the north. KZRR has a construction permit for a two-bay ERI LPX-2 HW “rototiller” antenna as a standby antenna. The antenna is currently located on Tower 8 at a height above ground level of 14.9 meters. The antenna is a “triplex” operation, with FM Stations KBZU, 96.3 MHz, and KMGMA, 99.5 MHz, also utilizing the facility. The maximum



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combined effective radiated power for all three stations is 10.5 kW effective radiated power. KZRR has proposed to license the standby operation at 2.7 kW ERP.

### **Measurement Procedure**

Measurements were made by the undersigned engineer on August 18, 2005, and by Robert D. Weller, P.E. on June 1 and 2, 2004, throughout the Electronics Site and the nearby public areas (including trails, parking lot, observation areas, gift shop, restaurant, etc.). The primary measurement equipment used was a Wandel & Goltermann Type EMR-300 Radiation Meter with a Type 25 Isotropic Electric Field Probe (Serial No. E-0001). Both meter and probe were under current calibration by manufacturer. The probe is frequency shaped to reflect the occupational exposure limits detailed in the FCC standard, allowing the meter to measure correctly the total exposure levels from various emitters at the site. The meter conveniently reads directly in percent of the occupational limits of the standard.

During the June 1 and 2, 2004, measurements, Station Kkob-FM, 93.3 MHz, was operating at approximately 60% of authorized power due to an antenna problem, and LPTV Station K56FB was operating at approximately 33% of authorized power using just four bays of its 12-bay antenna. All other stations were reportedly operating at normal authorized power levels. DTV Stations KNAT-DT, Channel D24, KOAT-DT, Channel D21, KASA-DT, Channel D27, and KAZQ-DT, Channel D17 were operating pursuant to Special Temporary Authorizations, at effective radiated power levels of 0.6, 145, 255, and 8.1 kW, respectively. Since the measurements were taken, Station Kkob-FM has replaced its antenna and Station KNMD-DT, Channel D09, Santa Fe, has commenced operation from a tower (Tower 17A) above the roof of the KNME building.

Measurements of the shared “triplex” auxiliary antenna for Stations KZRR, KBZU, and KMGA (94.1, 96.3, and 99.5 MHz, respectively) were taken on December 28, 2002, by Mr. Robert Ramseyer of RJ Communications. Except for localized re-radiation within one foot of some risers, no additional areas of non-compliance are created by the operation of this antenna.

### **Results of Measurements**

Within the fence enclosing the Electronics Site, only a few localized areas near certain tower bases and guy anchors exceeded the occupational limit under normal operating conditions (main facilities). Generally, all areas of the site measured below 80% of the occupational limit. A complete analysis of the findings and recommended mitigation measures was provided in Hammett & Edison’s report dated March 4, 2005. Based upon the results of Mr. Ramseyer’s measurements, except for localized re-radiation within one foot of some risers, no additional areas of non-compliance were created by the operation of this triplex standby antenna at 10.5 kW ERP.



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**No Mitigation Measures Required**

Mitigation measures have been recommended and implemented for all facilities at the Sandia Crest Broadcast Site in Hammett & Edison's report dated March 4, 2005. No additional mitigation measures are required for operation of the standby facility for KZRR at an ERP of 2.7 kW.

**Conclusion**

Based on observations and measurements during the visit to the Sandia Crest Broadcast Site, and upon previous measurement data, it is the undersigned's professional opinion the standby facility proposed by FM Station KZRR can comply with the prevailing standards for limiting public exposure to radio frequency energy, and, therefore, need not for this reason cause a significant impact on the environment.

**List of Figures**

In carrying out these engineering studies, the following attached figures were prepared under my direct supervision:

1. FCC Radio Frequency Exposure Guidelines
2. Site Map.

September 6, 2005



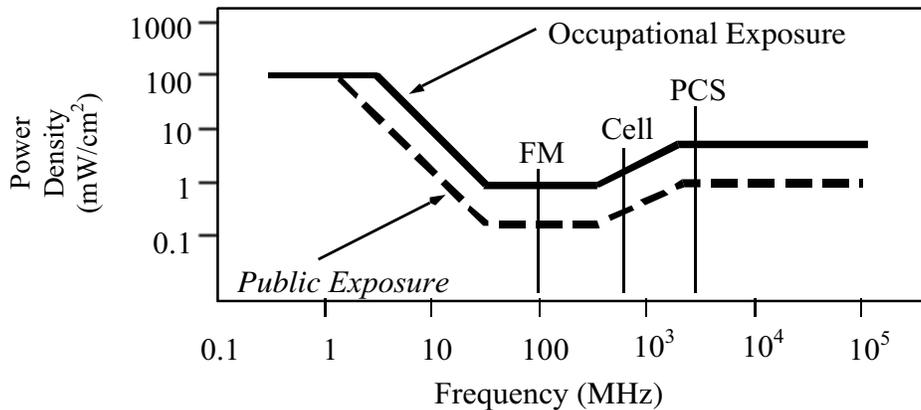
*Mark D. Neumann*  
Mark D. Neumann, P.E.

## FCC Radio Frequency Protection Guide

The U.S. Congress required (1996 Telecom Act) the Federal Communications Commission (“FCC”) to adopt a nationwide human exposure standard to ensure that its licensees do not, cumulatively, have a significant impact on the environment. The FCC adopted the limits from Report No. 86, “Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields,” published in 1986 by the Congressionally chartered National Council on Radiation Protection and Measurements, which are nearly identical to the more recent Institute of Electrical and Electronics Engineers Standard C95.1-1999, “Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.” These limits apply for continuous exposures from all sources and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health.

As shown in the table and chart below, separate limits apply for occupational and public exposure conditions, with the latter limits (in *italics* and/or dashed) up to five times more restrictive:

Frequency Applicable Range (MHz)	Electromagnetic Fields (f is frequency of emission in MHz)					
	Electric Field Strength (V/m)		Magnetic Field Strength (A/m)		Equivalent Far-Field Power Density (mW/cm <sup>2</sup> )	
0.3 – 1.34	614	<i>614</i>	1.63	<i>1.63</i>	100	<i>100</i>
1.34 – 3.0	614	<i>823.8/f</i>	1.63	<i>2.19/f</i>	100	<i>180/f<sup>2</sup></i>
3.0 – 30	1842/ f	<i>823.8/f</i>	4.89/ f	<i>2.19/f</i>	900/ f <sup>2</sup>	<i>180/f<sup>2</sup></i>
30 – 300	61.4	<i>27.5</i>	0.163	<i>0.0729</i>	1.0	<i>0.2</i>
300 – 1,500	3.54√f	<i>1.59√f</i>	√f/106	<i>√f/238</i>	f/300	<i>f/1500</i>
1,500 – 100,000	137	<i>61.4</i>	0.364	<i>0.163</i>	5.0	<i>1.0</i>



Higher levels are allowed for short periods of time, such that total exposure levels averaged over six or thirty minutes, for occupational or public settings, respectively, do not exceed the limits, and higher levels also are allowed for exposures to small areas, such that the spatially averaged levels do not exceed the limits. However, neither of these allowances is incorporated in the conservative calculation formulas in the FCC Office of Engineering and Technology Bulletin No. 65 (August 1997) for projecting field levels. Hammett & Edison has built those formulas into a proprietary program that calculates, at each location on an arbitrary rectangular grid, the total expected power density from any number of individual radio sources. The program allows for the description of buildings and uneven terrain, if required to obtain more accurate projections.



Sandia Crest Electronics Site • Albuquerque, New Mexico

Tower Locations and Identifications – South Side of High Power Portion

