

# **Tower 31 • Sandia Crest Electronics Site • Albuquerque, New Mexico**

## **Radio Frequency Exposure Measurements**

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

The firm of Hammett & Edison, Inc., Consulting Engineers, has been retained by RJ Communications to evaluate the radio frequency (“RF”) exposure conditions at ground level near Tower 31 at the Sandia Crest Electronics Site near Albuquerque, New Mexico, due to the recent commencement of operation by several broadcast facilities from that tower.

### **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 C95.1-2019, “Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz,” includes similar 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.

### **Site Description**

The Sandia Crest Electronics Site, located approximately 12 miles northeast 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. The Electronics Site comprises two parts: the “high-power site” to the south and the “low-power site” to the north. Except for the steep drop-off to the west, which itself limits access, the high-power portion of the Sandia Crest Electronics Site is encompassed by a chain-link fence,\* with access into the area controlled by a locked main entrance gate. A CAUTION sign, as well as signs indicating that the site is for occupational access only and closed to the general public, have been posted on the main gate to the site.

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\* There were observed several gaps in the fence due to fallen trees.



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### Radio Frequency Exposure Measurements

There have been a number of broadcast stations recently added to Tower 31, as summarized in the table below:

Station	TV Channel or FM Frequency	Effective Radiated Power	Antenna Height COR AGL	Antenna Make and Model
KABG	98.5	14,000 watts	144 ft	ERI SHPX-4AE
KTEL-CD	D15	15,000 <sup>†</sup>	110	Scala 4x3KBBU <sup>‡</sup>
KHFM Aux	95.5	6.1	26	Nikom BKG77
KKSS Aux	97.3	47		
KLVO Aux	97.7	6.1		
KABG Aux	98.5	47		
KKRG Aux	105.1	47		
KRZY Aux	105.9	45		
KVCN (Emergency)	106.7	20		

### Measurement Procedure

Measurements were made by Mr. David Kelly, a qualified field technician employed by Hammett & Edison, Inc., on June 21, 2022, in the vicinity of Tower 31 with KABG operating on its auxiliary antenna and were repeated with KABG operating on its main antenna. The measurement equipment used was a Narda Type NBM-520 Broadband Field Meter with Type EA-5091 Isotropic Broadband Electric Field Probe (Serial No. 01035). The meter and probe were under current calibration by the manufacturer. The Type EA-5091 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 limit of the standard.

### Measurement Results

With KABG on its auxiliary antenna, the maximum spatially-averaged RF exposure level measured at ground in the vicinity of Tower 31 was 61% of the FCC public exposure limit. With KABG on its main antenna, the maximum spatially-averaged RF exposure level measured at ground in the vicinity of Tower 31 was 68% of the FCC public exposure limit. A summary of the ground-level field measurements is shown in Figure 2. Previous measurements throughout the site, detailed in our report dated August 31, 2020, show that spatially-averaged levels in all areas were less than the occupational limit; a few localized areas near certain other tower bases and guy anchors exceeded the occupational limit.

<sup>†</sup> Reported to be operating at 88% of full licensed power during the measurements.

<sup>‡</sup> Also known as Alive Model BPE4C3-U.

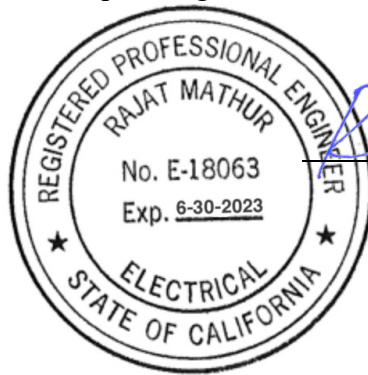
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**Recommendations**

Because RF exposure levels were measured not to exceed the FCC public exposure limit at any accessible ground level location near Tower 31, when spatially averaged, no additional mitigation measures are required to comply with FCC public exposure guidelines. To prevent inadvertent site access by unauthorized personnel, it is recommended that the several gaps in the fence due to fallen trees be repaired, and that the recommendations in our August 31, 2020, report be followed.

**Conclusion**

Based on observations and measurements during the visit to the Sandia Crest Electronics Site, it is the undersigned's professional opinion that the recently added facilities on Tower 31 comply with the prevailing standards for limiting public exposure to radio frequency energy, therefore, do not for this reason cause a significant impact on the environment. Certain mitigation measures are recommended to comply with FCC occupational exposure guidelines.



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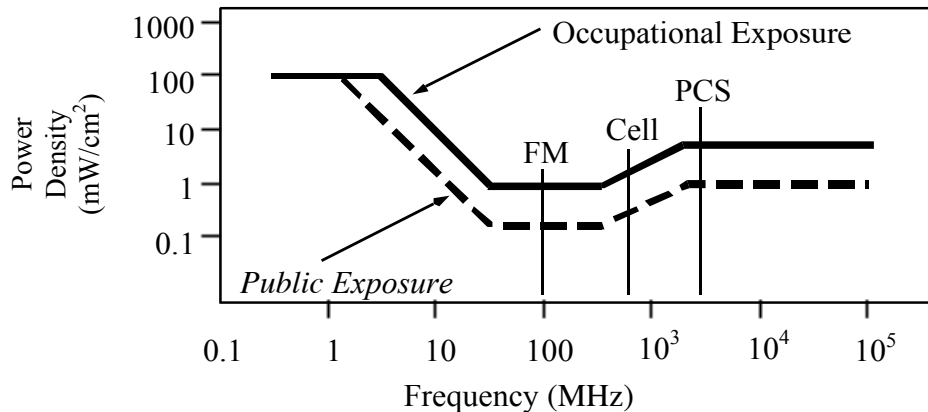


## FCC Radio Frequency Protection Guide

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 (“NCRP”). Separate limits apply for occupational and public exposure conditions, with the latter limits generally five times more restrictive. The more recent standard, developed by the Institute of Electrical and Electronics Engineers IEEE C95.1-2019, “Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz,” includes similar limits. 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	Electromagnetic Fields (f is frequency of emission in MHz)					
Applicable Range (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. Hammett & Edison has incorporated conservative calculation formulas in the FCC Office of Engineering and Technology Bulletin No. 65 (August 1997) for projecting field levels in a computer program capable of calculating, at thousands of locations on an arbitrary grid, the total expected power density from any number of individual radio frequency sources. The program allows for the inclusion of uneven terrain in the vicinity, as well as any number of nearby buildings of varying heights, to obtain more accurate projections.





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**Radio Frequency Exposure Measurements**

**KABG on Auxiliary Antenna**



Measurements taken June 21, 2022. Levels shown as percent of FCC public exposure limit; spatially-averaged maximum measured was 61%.





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**Radio Frequency Exposure Measurements**

**KABG on Main Antenna**



Measurements taken June 21, 2022. Levels shown as percent of FCC public exposure limit; spatially-averaged maximum measured was 68%.

