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# Maximum Permissible Exposure (MPE) Survey for KQMT-FM, KQKS-FM on Mt. Morrison, CO

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April 16, 2018

## **For Entercom | Denver**

4700 S Syracuse St, Suite 1050

Denver, CO 80237

Daren McMullin, Director of Technical Operations, Engineering

FCC Facility ID 26929, File #BXPB-20160928ADA



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# **Maximum Permissible Exposure (MPE) Survey For KQMT-FM, KQKS-FM on Mt. Morrison, CO**

## **1.0 Executive Summary**

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This report documents a Maximum Permissible Exposure (MPE) survey to satisfy Special Operating Conditions or Restriction #2 of FCC Construction Permit #BXPB-20160928ADA:

“The permittee/licensee shall, upon completion of construction and during the equipment test period, make proper radiofrequency electromagnetic (RF) field strength measurements throughout the transmitter site area to determine if there are any areas that exceed the FCC guidelines for human exposure to RF fields. If necessary, a fence must be erected at such distances and in such a manner as to prevent the exposure of humans to RF fields in excess of the FCC Guidelines (OET Bulletin No. 65, Edition 97-01, August 1997). The fence must be a type which will preclude casual or inadvertent access, and must include warning signs at appropriate intervals which describe the nature of the hazard. Any areas within the fence found to exceed the recommended guidelines must be clearly marked with appropriate visual warning signs.”

The applicant has constructed an auxiliary transmitter facility on Mt. Morrison in Jefferson County, Colorado at 39° 40' 17.00" N 105° 13' 6.00" (NAD 27). The antenna is a directional master FM antenna shared by two Entercom-owned stations: KQMT-FM (99.5 MHz) and KQKS (107.5 MHz).

An MPE survey was conducted on March 29, 2018 using a broadband exposure meter and following methods recommended in OET-65 and ANSI C95.3-2010. Measurements were collected at ground level near the transmit antenna, on the building deck and on an elevated ridge to the south of the antenna tower. Three UHF television stations also operate from the tower and ice bridge. All measurements at ground level outside the perimeter fence were well below the FCC public exposure limit. The highest reading was recorded at 6.5% of occupational. The tower and ice bridge are enclosed by an 8' high chain link fence topped with three strands of barbed wire. The perimeter of the fence was inspected during the MPE survey and the fence integrity is intact. The facility is located on private land, is remote from populated areas and is accessible by a road owned by the site owner. The gate on Grapevine Road located 2.2 miles west of the site prevents unauthorized vehicle traffic.

We can conclude that the facility complies with FCC rule parts 1.1307-1.1310 governing human exposure to radio frequency energy.

## 2.0 Measurement Approach and Results

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Spatial average power density measurements were collected at over 55 locations in the vicinity of the transmit antenna. This antenna is an ERI 2-bay panel antenna with one antenna element per bay, oriented toward 70 degrees true with a narrow azimuth pattern. Vertical distance between radiating elements is half wavelength to achieve an array pattern with near zero downward radiation. See Figure 1.



Figure 1 - Antenna Tower (facing north, FM antenna at mid-tower)

Both Entercom transmitters were verified to be operating at full power during the survey. The three television stations (Channel 18-DT, Channel 15-DT and Channel 45-DT) were also operating at normal power that day.

The MPE survey was accomplished on March 29, 2018 by Jay Jacobsmeyer (*Pericle*) with assistance from Joe Kramer (*Pericle*) and with Entercom chief engineer Daren McMullin present. Measurements were conducted in accordance with the guidelines published in ANSI C95.3-2002 [3] and FCC Bulletin OET-65 [2]. The survey was accomplished with the test equipment listed in Table 1.

Table 1 - Test Equipment Used in Survey		
Instrument	Serial Number	Cal. Due (2 yr.)
Wandel & Goltermann (W&G) EMR-300	B-0053	February 24, 2019
Wandel & Goltermann Type 25.1 Probe, 300 kHz - 40 GHz	B-0053	February 24, 2019

The FCC standard is a whole-body average exposure standard, so measurements should be taken over a volume comparable to that occupied by a standing adult. The W&G probe and meter record power density as percent of the FCC controlled environment standard. The W&G meter also performs an automatic average as the user sweeps the volume of interest. To perform a spatial average with the W&G meter, we used either a vertical straight line method (for levels well below FCC limits) or the zig-zag method (for levels approaching the FCC limit) shown in Figure 2.

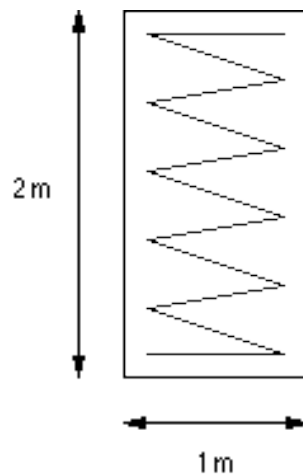


Figure 2 - Zig-zag method for automatic spatial averaging

Measurements were always taken at least 20 cm from reflecting objects in accordance with ANSI C95.3-2002.

Over 55 measurements were collected. Measurement values are shown in Figure 3 in units of percent of FCC occupational exposure limit. All locations measured much lower than the public exposure limit. The highest reading was on the deck at 6.5% of occupational (32.5% of public).

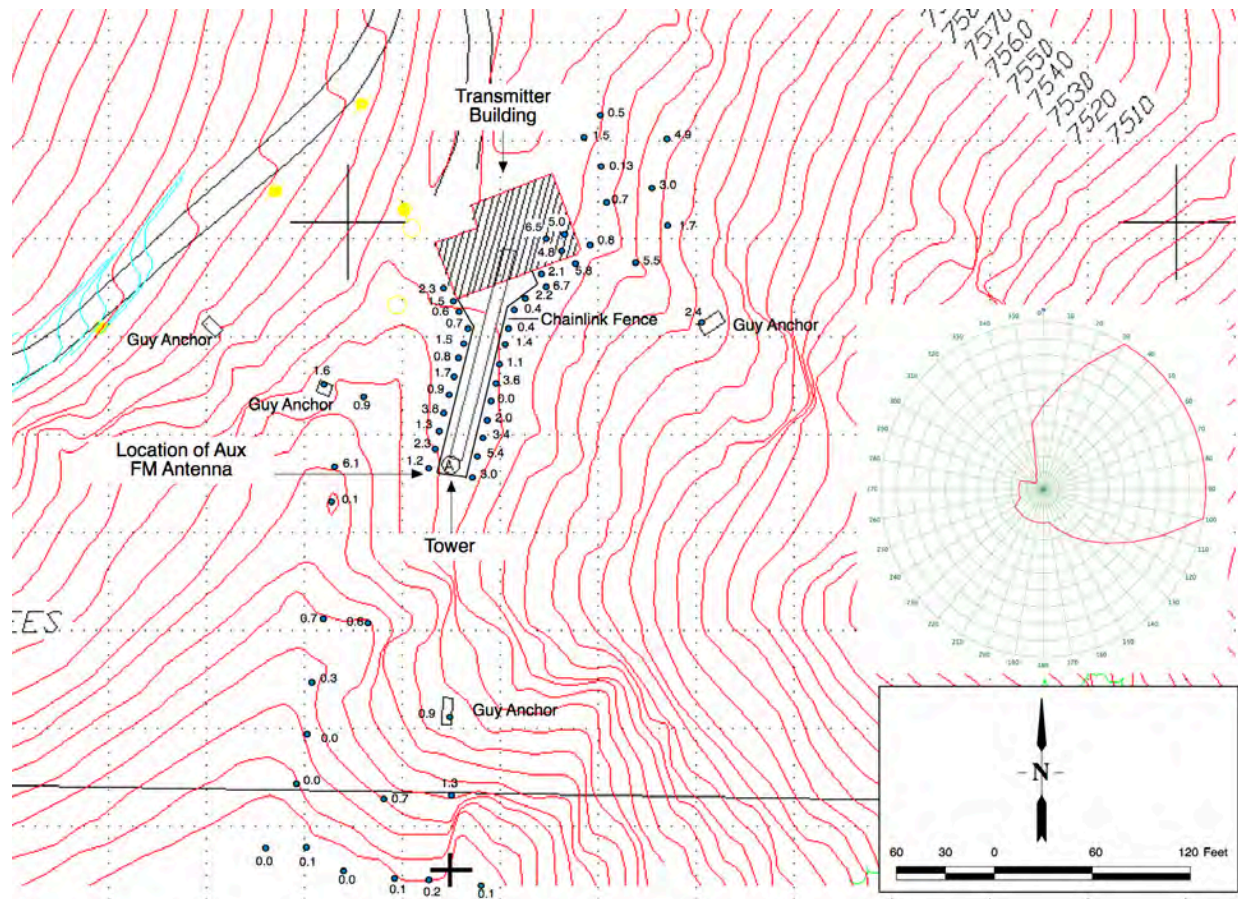


Figure 3 - Measurement Values (Percent of Occupational Limit)

### 3.0 Conclusions and Recommendations

Spatial average exposure measurements were collected at over 55 locations in the vicinity of the transmit antenna, on the building deck and on elevated terrain to the south of the broadcast tower.<sup>1</sup> All locations measured well below the FCC public exposure limit. The highest reading was 6.5% of occupational (32.5% of public). The tower and ice bridge are enclosed by an 8' high chain link fence with three top strands of barbed wire and a gate located 2.2 miles west of the site bars vehicle access. We can conclude that the facility complies with FCC rule Parts 1.1307-1.1310 governing human exposure to radio frequency energy.

<sup>1</sup> The deck is also inside the fenced area that includes the tower and ice bridge.



We find that additional Notice and Caution signs should be posted so that it is more clear to the public where there is risk of exposure to radio frequency power densities exceeding the public limit. We recommended the following signs be placed on the site:

- **Blue RF Notice Signs** facing outward at eye level every 30' along the entire perimeter of the existing fence, including one on the gate (at the tower) and a second gate at the building. See Figure 3 for an example of this sign.
- **Yellow RF Caution Signs** at two locations: on the tower at eye level inside the gate (not on the fence or gate) and on the ice bridge at building deck level where authorized personnel may also attempt to access the tower. Also see Figure 3 for an example of this sign.



Figure 3 - RF Notice and Caution Signs (Available from TESCO and other distributors)

We understand that the Entercom chief engineer and site owner are working to have these signs posted as soon as possible with a goal of no later than May 1, 2018.

## 4.0 References

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- [1] ANSI C95.1-2005, "Safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz."
- [2] OET Bulletin No. 65, FCC, "Evaluating compliance with FCC guidelines for human exposure to radiofrequency electromagnetic fields," Edition 97-01, August 1997.
- [3] ANSI C95.3-2010, "Recommended practice for the measurement of hazardous electromagnetic fields - RF and microwave."
- [4] ANSI C95.2-1999, "American National Standard radio frequency radiation hazard warning symbol."
- [5] Code of Federal Regulation, Title 47, Parts 1.1307 - 1.1310, October 1, 2017.

## 5.0 Engineer's Statement

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Mt. Morrison  
Jefferson County, CO

This Maximum Permissible Exposure (MPE) survey addressed electromagnetic radiation in the from 300 kHz to 300 GHz. Fields from extremely low frequency (ELF) sources, such as those emitted by 60 Hz electrical distribution lines, were not measured. Also, induced and contact radiofrequency currents were not measured.

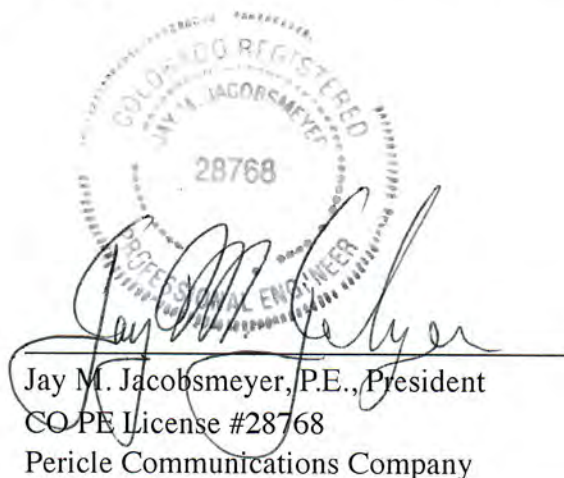
Tower climbers should carry portable power density meters (e.g., Nardalert™) to verify that transmitter powers have been reduced to safe levels before working in the vicinity of high power transmit antennas. Transmission line lockouts are available at this site and should be used when working on the tower.

Measurements were conducted according to procedures described in OET-65, ANSI C95.3-2010 and the user's manual for the meter used. Our conclusions are limited to those locations actually measured or predicted. All measurements were conducted with test equipment assumed to be calibrated and working properly. If new high power transmitters are constructed at the site, measured power densities will change.

This survey shows that the new 99.5-FM and 107.5-FM auxiliary transmitter facility will comply with FCC guidelines for human exposure to radio frequency energy.

All representations contained herein are true to the best of my knowledge. I am a radio engineer with over 35 years experience. I hold a Bachelor of Science degree in Electrical Engineering from Virginia Tech and a Master of Science degree in Electrical Engineering from Cornell University. I am a corporate officer and stockholder of Pericle Communications Company and a Registered Professional Engineer in the State of Colorado.

Signed this 16th day of April, 2018.



The image shows a circular professional engineer seal for the State of Colorado. The seal contains the text "COLORADO REGISTERED PROFESSIONAL ENGINEER", "JAY M. JACOBMEYER", and the license number "28768". Overlaid on the seal is a handwritten signature in black ink. Below the signature, the following text is printed: "Jay M. Jacobsmeyer, P.E., President", "CO PE License #28768", and "Pericle Communications Company".

Jay M. Jacobsmeyer, P.E., President  
CO PE License #28768  
Pericle Communications Company