Survey Certification

Per the FCC's Public Notice of October 29, 2009 (DA 09-2340), licensed stations such as KFEQ, which are not proposing a change in the authorized theoretical patterns, are exempt from the provisions of Section 73.151(c)(1)(ix) of the Commission's Rules. Accordingly, a surveyor's certification is not included herewith.

Sampling System Measurements

Impedance and length measurements were made of the antenna monitor sampling system using a precision calibrated measurement system consisting of a *Hewlett-Packard* model 8753C network analyzer in conjunction with a *Tunwall Radio* directional coupler system and an *Electronic Navigation Industries* (ENI) Model 310 L RF amplifier. Analyzer calibration was field verified prior to each measurement using the procedures specified in the manufacturer's instruction manual using precision calibration standards and techniques.

The measurements were accomplished by looking into the antenna monitor ends of the sampling lines for two conditions – with and without the sampling lines connected to the sampling devices at the tower bases under open-circuited conditions.

The following table shows the frequency nearest the carrier frequency where resonance (zero reactance corresponding with low resistance) was found. As the length of a distortion-less transmission line is 180 electrical degrees at the difference frequency between adjacent frequencies of resonance, and frequencies of resonance occur at odd multiples of 90 degrees electrical length, the sampling line length at the resonant frequency above carrier frequency, which is the closest one to the carrier frequency in terms of the ratio of frequencies, was found to be 450 electrical degrees.

The electrical lengths at carrier frequency appearing in the following table were calculated by ratioing the frequencies in the customary fashion.

KFEQ Tower	Sampling Line Open-Circuited Resonance Nearest to 680 kHz	Sampling Line Ratio Calculated Electrical Length at 680 kHz	680 kHz Measured Impedance with Sampling Toroid (TCT) Connected
1 – East	886.39 kHz	345.2°	48.002 +j0.6125 Ω
2 – East Central	886.53 kHz	345.2°	48.209 +j0.7777 Ω
3 – West Central	886.60 kHz	345.1°	48.127 +j0.7949 Ω
4 – West	886.46 kHz	345.2°	47.857 +j0.8049 Ω

As shown, the sampling line lengths meet the Commission's requirement that they be equal in length within +/-1 electrical degree.

The characteristic impedance of the sampling lines was calculated using the following formula, where $R_1 + jX_1$ and $R_2 + jX_2$ are the measured impedances at the +45 and –45 degree offset frequencies, respectively:

$$Zo = \sqrt{\sqrt{R_1^2 + X_1^2} \bullet \sqrt{R_2^2 + X_2^2}}$$

KFEQ Tower	-45 Degree Offset Frequency (kHz)	-45 Degree Measured Impedance (Ohms)	+45 Degree Offset Frequency (kHz)	+45 Degree Measured Impedance (Ohms)	Calculated Characteristic Impedance (Ohms)
1 – East	797.75	4.5723 –j49.967	975.03	9.3809 +j51.389	51.20
2 – East Central	797.88	4.5801 –j49.967	975.18	9.3535 +j51.389	51.20
3 – West Central	797.94	4.543 –j49.969	972.26	9.3145 +j51.279	51.14
4 – West	797.81	4.5859 –j49.787	975.11	9.3359 +j51.172	51.00

As shown, the sampling line measured characteristic impedances meet the Commission's requirement that they be equal within +/-2 ohms.

The *Delta Electronics, Inc.* TCT-3 toroidal transformers used for the station were calibrated by measuring their outputs with a common reference signal using a *Hewlett-Packard* 8753C network analyzer in a calibrated measurement system. They were placed side-by-side