RE-CERTIFICATION OF SAMPLE SYSTEM
(Method of Moments Proof)

RADIO STATION KKYX

COX RADIO, INC.

680 kHz, 10.0/50.0 kW, DA-N

SAN ANTONIO, TEXAS

NOVEMBER, 2017

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KKYX - Technical Summary Statement

These technical exhibits constitute the bi-annual sample system re-certification of radio station KKYX, San Antonio, Texas. KKYX operates on 680 kHz, with a Non-directional power of 50.0 kW daytime and a directional power of 10.0 W nighttime.

Information is provided herein demonstrating that the directional antenna parameters are operating within the licensed tolerances and that the sample system is operating within the tolerances of manufacturers and the Regulations of the FCC. This report has been prepared in accordance with the requirements of Section 73.155 of the FCC. The data contained herein was gathered 11-05-2017.

//electronically signed//
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November 6, 2017

KKYX - Sample System Measurements

Using a Hewlett-Packard 8753C network analyzer and a Tunwall Radio directional coupler, in a calibrated measurement system, impedance measurements were made of the antenna monitor sampling system. The towers were placed in an open circuited condition by removing the ATU output j-plug. The measurement equipment was connected to the antenna monitor end of the sample lines and measurements were made for two conditions. The first condition was with the sample line terminated in its associated Delta Electronics TCT sampler and the second condition where the sample line was open circuited by disconnecting the line from its TCT.

Samples from the TCT's are connected to equal lengths of 0.5 inch, foam dielectric coaxial cable (Cablewave FCC-12-50J.

The following table shows the frequencies of the first and second resonances. As the length of a distortionless transmission line is 180 electrical degrees at the difference frequency between adjacent resonant frequencies, and frequencies of resonance occur at odd multiples of 90 degrees electrical length. The sample line length at the resonant frequency closest to the carrier frequency, was found to be 90 electrical degrees. The electrical lengths at carrier frequency appearing in the following table were calculated by dividing the carrier frequency by the resonant frequency closest to the carrier and multiplying by 90 degrees.

Tower	Sample Line Open-Circuited First Frequency of Resonance (MHZ)	Sample Line Open-Circuited Second Frequency of Resonance (MHZ)	Sample Line Calculated Electrical Length at 680 kHz (Degrees)	680 kHz Measured Z with TCT-1-HV Connected (Ohms)
1	.431860	1.306740	141.712	49.5 -j 0.3
2	.433040	1.309290	141.323	49.4 -j 0.2
3	.432710	1.308950	141.434	49.4 -j 0.2
4	.431010	1.304870	141.992	49.6 -j 0.2

The sample line lengths meet the specification that they be equal in length within one electrical degree.

The Characteristic impedance was calculated using the following formula, where R1 +jX1 and R2 +jX2 are the measured impedances at the +45 and -45 degree offset frequencies respectively:

$$Zo = ((R1^2 + X1^2)^{1/2} \bullet (R2^2 + X2^2)^{1/2})^{1/2}$$

Tower	+45 Degree Offset Frequency (MHz)	+45 Degree Measured Impedance (Ohms)	-45 Degree Offset Frequency (MHz)	-45 Degree Measured Impedance (Ohms)	Calculated Characteristic Impedance (Ohms)
1	1.088946	4.89 +j48.86	0.647790	7.07 -j48.89	49.25
2	1.091071	4.79 +j48.39	0.649575	7.02 -j48.69	48.91
3	1.090787	4.64 +j46.11	0.649065	6.95 -j 48.71	47.75
4	1.087387	4.91 +j48.76	0.649515	7.00 -j48.80	49.15

The sample line measured characteristic impedances meet the requirement that they be equal within 2 ohms.

The TCTs were calibrated by measuring their outputs with a common reference signal using a Hewlett-Packard 8753C network analyzer in a calibrated measurement system. The TCTs were placed side by side, bolted to a two inch wide piece of copper strap with a conductor passing the reference signal through them. The outputs of the TCTs were fed into the Channel A and Channel B receiver inputs of the 8753C, which was set up to measure the relative ratios and phases of the output voltages.

The following results were measured for the carrier frequency, 680 kHz:

Tower	Ratio	Phase (deg)	TCT Model #	TCT Serial #
1	1.007	-0.680	TCT-1	1991
2	1.012	-0.750	TCT-1	2032
3	1.008	-0.720	TCT-1	1943
4	Reference	-0.330	TCT-1	1817
5	1.0016	- 0.081	TCT-1-HV	3175

TCT-1 are 0.5 Volt/amp toroidal current transformers manufactured by Delta Electronics. These TCTs are rated for absolute magnitude accuracy of +/- 2% and absolute phase accuracy of +/- 3 degrees. The maximum measured transformer-to-transformer variations among the four were less than 0.1% and 0.42 degree, and as such provide far more accurate relative indications than could be the case within the manufacturer's rated accuracy.

The KKYX Potomac Instruments AM-1901-4 (Serial # 440), antenna monitor was factory calibrated October, 2017.