2015 Annual Recertification of Sampling System

KLVZ Daytime Facility

Brighton, Colorado

Radio Station KLVZ, Brighton, Colorado, operates with separately located day and night directional antenna facilities, both of which were licensed pursuant to the moment method modeling provisions of 47 C.F.R. §73.151(c). The license for the daytime facilities was granted on September 9, 2009; the nighttime facilities were licensed at a later date. As such, the recertification required by 47 C.F.R. §73.155 for the daytime facilities is due at an earlier date than the recertification for the night facilities.

The recertification measurements of the daytime sampling system are tabulated below. The results of these measurements show that the sample system continues to meet the requirements of 47 C.F.R. §73.151(c).

The sampling system consists of Delta Electronics TCT-2 current transformers installed at the output of each antenna tuning unit, immediately adjacent to the final J-plug. Samples from the current transformers are fed to the antenna monitor via equal lengths of 3/8-inch foam-dielectric coaxial transmission lines. The antenna monitor is a Potomac Instruments Type 1901.

Impedance measurements were made of the antenna sampling system using an Agilent E5061A network analyzer. The measurements were made looking into the antenna monitor ends of the sample lines with the tower ends of the sample lines open-circuited.

Twr.	Sample Line Open-Circuited Resonance (kHz)	Sample Line Calculated Electrical Length At 810 kHz (deg.)
1	1024.47	213.5
2	1024.47	213.5
3	1025.875	213.2

The sample lines thus meet the requirement in the Rules that they be equal in length within one electrical degree.

To determine the characteristic impedance values of the sample lines, open-circuited measurements were made with frequencies offset to produce ± 45 degrees of electrical length from resonance.

The characteristic impedance was calculated using the following formula, where $R_1 + j X_1$ and $R_2 + j X_2$ are the measured impedances at the +45 and -45 degree offset frequencies, respectively:

$$Z_O = ((R_1^2 + X_1^2)^{1/2} \times (R_2^2 + X_2^2)^{1/2})^{1/2}$$

Twr.	+ 45 Deg. Offset Frequency (kHz)	+45 Deg. Measured Impedance (ohms)	- 45 Deg. Offset Frequency (kHz)	-45 Deg. Measured Impedance (ohms)	Calculated Characteristic Impedance (ohms)
1	1195.215	8.4+j50.2	853.725	5.8-j49.7	50.4
2	1195.215	8.2+j49.9	853.725	5.6-j50.1	50.5
3	1196.854	8.3+j50.1	854.896	5.9-j50.5	50.8

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

The calibration of the Delta TCT-2 current transformers was verified by removing them all from the ATUs and installing them on a test jig so that each was located very close to the adjacent transformer (spacing of less than two inches). Short transmission lines of equal length were connected between the outputs of all four current transformers and the inputs of the antenna monitor. The Potomac 1901 antenna monitor was calibrated using the internal calibration function. A single source of RF current on the carrier frequency was fed through a conductor passing through all of the current transformers, and the differential phases and ratios were noted on the antenna monitor as follows:

Twr.	Serial No.	Ratio	Phase (deg.)
1	1909	1.002	-0.2
2	1911	Ref.	Ref.
3	1906	1.003	-0.3

The requirement that the sample current transformers are accurate to within the manufacturerôs specification (±2% ratio and ±2 degrees phase) has thus been demonstrated.

The impedance of each of the sample lines was measured with the sample current transformers attached. These impedances are tabulated below:

Twr.	R (ohms)	X (ohms)
1	48.3	+0.7
2	48.2	-0.4
3	48.0	-0.4

Reference Field Intensity Measurements

Radial 15º

Point No.	Dist. km	Latitude	Longitude	Date	Time	Field mV/m
1	4.01	40-03-46.4	104-48-37.4	11/3/2015	1203	13.5
2	5.17	40-04-22.6	104-48-24.8	11/3/2015	1206	15
3	5.99	40-04-48.4	104-48-15.8	11/3/2015	1212	15

Radial 65º

Point No.	Dist. km	Latitude	Longitude	Date	Time	Field mV/m
1	0.42	40-01-47.0	104-49-4.8	11/3/2015	1045	12
2	1.12	40-01-56.6	104-48-38.0	11/3/2015	1100	26
3	2.92	40-02-21.1	104-47-29.5	11/3/2015	1055	7

Radial 99.5º

Point No.	Dist. km	Latitude	Longitude	Date	Time	Field mV/m
1	1.04	40-01-35.3	104-48-37.6	11/3/2015	1102	35
2	4.30	40-01-17.9	104-46-21.9	11/3/2015	1146	8.5
3	7.06	40-01-03.1	104-44-26.9	11/3/2015	1151	4

Radial 220º

Point No.	Dist. km	Latitude	Longitude	Date	Time	Field mV/m
1	2.42	40-00-41.0	104-50-26.9	11/3/2015	1236	290
2	4.01	40-00-01.5	104-51-09.9	11/3/2015	1240	150
3	6.00	39-59-12.4	104-52-03.5	11/3/2015	1248	120

Radial 340.5º

Point No.	Dist. km	Latitude	Longitude	Date	Time	Field mV/m
1	1.86	40-02-37.8	104-49-47.1	11/3/2015	1228	18
2	6.13	40-04-48.3	104-50-47.2	11/3/2015	1219	3.8
3	6.74	40-05-06.8	104-50-55.9	11/3/2015	1221	2.9

Submitted this 4th day of November, 2015 by:

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