APPLICATION FOR LICENSE
RADIO STATION WJAS
PITTSBURGH, PENNSYLVANIA

June 28, 2010

1320 KHZ 5 KW - D 3.3 KW - N DA-N

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Executive Summary - WJAS

This engineering exhibit supports an application for license for the newly constructed nighttime directional antenna system of radio station WJAS in Pittsburgh, Pennsylvania. WJAS is presently licensed to operate fulltime on 1320 kilohertz with 5 kilowatts using a nondirectional antenna during daytme hours and a directional antenna during nighttime hours. Construction Permit BP-20070208ABM authorizes operation during nighttime hours with 3.3 kilowatts using a new directional antenna system at a new, separate transmitter site. WJAS will continue to operate at the old site during daytime hours with the licensed nondirectional antenna.[1]

The towers and ground system have been constructed in accordance with the terms of the construction permit and specifications that were provided in the application for construction permit. The directional antenna phasing and coupling equipment has been adjusted to produce the nighttime directional antenna pattern authorized by the construction permit.

Information is provided herein demonstrating that the directional antenna parameters have been determined in accordance with the requirements of section 73.151(c) of the FCC Rules. The antenna system has been adjusted to produce antenna monitor parameters within +/- 5 percent in ratio and +/- 3 degrees in phase of the modeled values, as required by the Rules.

Information regarding direct measurement of power and radiofrequency radiation protection measures at the site is also included herein.

Program test authority for the nighttime directional antenna is hereby requested.

Ronald D. Rackley, P.E.
June 28, 2010

[1] The construction permit shows parameters for a new daytime directional antenna at the new site. That is incorrect, as the daytime directional antenna information is from a previous construction permit – BP-20050826ACB - that expired on November 23, 2008. The application for the present nighttime-only construction permit specifically explained that it was for a new nighttime directional antenna only; it did not request the daytime facility of the previous construction permit.

Analysis of Tower Impedance Measurements to Verify Method of Moments Mode - WJAS

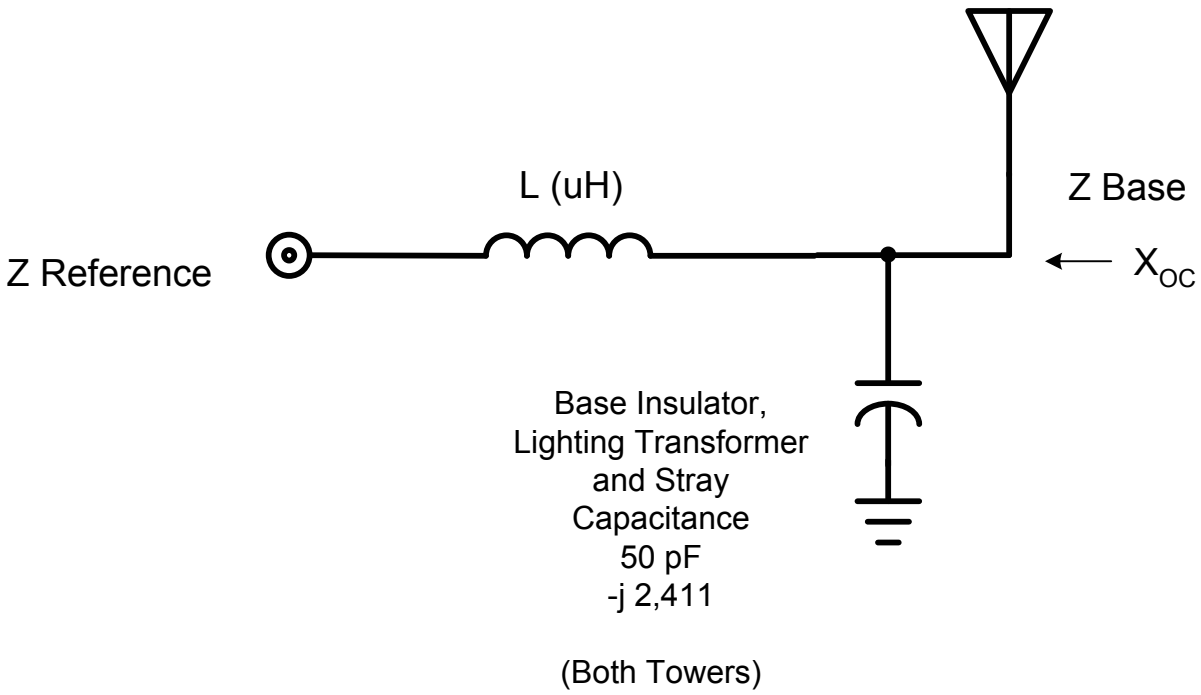
Tower base impedance measurements were made at the output feed-through insulators of the antenna tuning units ("ATUs") using a Hewlett-Packard 8751A network analyzer and a Tunwall Radio directional coupler in a calibrated measurement system. The other tower was open circuited at the same point where an impedance measurement was made for it (the "reference point") for each of the measurements. The sampling line isolation coils were disconnected from the sampling lines that are at tower potential when the measurements were made.

The reference point at each tower is at the output of the ATU enclosure. The current passes directly from that point through the enclosure insulator and on to the tower above the base insulator through a tubular conductor. There are no adjustable shunt components following the sampling transformers. An assumed value of 50 pF for the sum of the base insulator, lighting transformer and base region stray capacitance was employed at the base of each tower. Circuit calculations were performed to relate the method of moments modeled impedances of the tower feedpoints to the ATU output measurement (reference) points as shown on the following pages. The Xoc shown for each tower, which was calculated for the assumed base conditions, was used in the method of moments model as a load at ground level for the open circuited case.

In addition to the page showing the schematic of the assumed circuit and tabulation of calculated values, pages showing the results of calculations using the WCAP network analysis program from Westberg Consulting are provided. WCAP performs such calculations using nodal analysis, as do other modern circuit analysis programs such as the commonly available ones based on SPICE software.

In each of the WCAP tabulations, node 2 represents the ATU output reference point and node 3 represents the tower feedpoint. Node 0 represents ground potential. The numerals in the file names shown on the tabulations correspond to the tower numbers. It should be noted that the calculated reference point impedances appear under the "TO NODE IMPEDANCE" columns of the WCAP tabulations, following the phantom 1.0 ohm resistors (R 1 - 2) that were included in series with the drive current sources (I 0 -1)) to provide calculation points for the impedances. The tower base impedances from the method of moments model are represented by complex loads from node 3 to ground (R 3 - 0). The shunt capacitive reactances shown for the towers on the schematic were used for the calculations, although their values only appear to the nearest 0.0001 microfarad on the WCAP printout due to rounding.

The modeled and measured base impedances at the ATU output jacks with the other towers open circuited at their filter unit output jacks agree within +/- 2 ohms and +/- 4 percent for both resistance and reactance, as required by the FCC Rules.



TOWER	L (uH)	X_L	X_{OC}	Z Base (Modeled)	Z Reference (Modeled)	Z Reference (Measured)
1 (SW)	5.088	+ j 42.2	- j 2411	346.2 - j 523.3	230.5 - j 415.0	227.5 - j 415.0
2 (NE)	1.989	+ j 16.5	- j 2411	398.3 - j 535.6	261.9 - j 457.2	260.6 - j 457.4

ANALYSIS OF TOWER IMPEDANCE MEASUREMENTS TO VERIFY METHOD OF MOMENTS MODEL OF NIGHT-DA TOWERS

RADIO STATION WJAS
PITTSBURGH, PENNSYLVANIA
1320 KHZ 5 KW - D 3.3 KW - N DA-N

du Treil, Lundin & Rackley, Inc.

Tower 1 Individually Driven Base Circuit Analysis

```
 WESTBERG CIRCUIT ANALYSIS PROGRAM


 FILE NAME = WJAS1OC.TXT

 I     1.0000    0    1     .0000     .0000     .0000
 R     1.0000    1    2     .0000     .0000     .0000
 L     5.0880    2    3     .0000     .0000     .0000
 C      .0000    3    0     .0000     .0000     .0000
 R   346.2000    3    0 -523.3000     .0000     .0000
 EX     .0000    0    0     .0000     .0000     .0000


 FREQ = 1.320

   NODE      VOLT MAG     VOLT PHASE
    1       475.2076       -60.8412
    2       474.7212       -60.9466
    3       512.0204       -63.2404
                          BRANCH VOLTAGE       BRANCH CURRENT FROM NODE IMPEDANCE  TO NODE IMPEDANCE
                          MAG      PHASE       MAG      PHASE RESISTANCE REACTANCE RESISTANCE
REACTANCE
 R    1-  2     1.000      1.00      .000      1.00      .000    231.54   -414.99    230.54   -414.99
 L    2-  3     5.088     42.20    90.000      1.00      .000    230.54   -414.99    230.54   -457.18
 C    3-  0      .000    512.02   -63.240       .21    26.760       .00  -2411.44       .00       .00
 R    3-  0   346.200    512.02   -63.240       .82    -6.728    346.20   -523.30       .00       .00
```

Tower 2 Individually Driven Base Circuit Analysis

```
WESTBERG CIRCUIT ANALYSIS PROGRAM


 FILE NAME = WJAS2OC.txt

 I     1.0000    0    1     .0000     .0000     .0000
 R     1.0000    1    2     .0000     .0000     .0000
 L     1.9890    2    3     .0000     .0000     .0000
 C      .0000    3    0     .0000     .0000     .0000
 R   398.3000    3    0 -535.6000     .0000     .0000
 EX     .0000    0    0     .0000     .0000     .0000


 FREQ = 1.320

   NODE      VOLT MAG     VOLT PHASE
    1       527.3593       -60.0983
    2       526.8616       -60.1926
    3       541.2376       -61.0607
                          BRANCH VOLTAGE       BRANCH CURRENT FROM NODE IMPEDANCE  TO NODE IMPEDANCE
                          MAG      PHASE       MAG      PHASE RESISTANCE REACTANCE RESISTANCE
REACTANCE
 R    1-  2     1.000      1.00      .000      1.00      .000    262.90   -457.16    261.90   -457.16
 L    2-  3     1.989     16.50    90.000      1.00      .000    261.90   -457.16    261.90   -473.65
 C    3-  0      .000    541.24   -61.061       .22    28.939       .00  -2411.44       .00       .00
 R    3-  0   398.300    541.24   -61.061       .81    -7.697    398.30   -535.60       .00       .00
```

Derivation of Operating Parameters for Directional Antenna – WJAS

The method of moments model of the array, following verification with the measured individual open circuited base impedances, was utilized for directional antenna calculations. Calculations were made to determine the complex voltage values for sources located at ground level under each tower of the array to produce current moment sums for the towers that, when normalized, equated to the theoretical field parameters of the authorized directional antenna pattern. With these voltage sources, the tower currents were calculated. Twenty segments were used for each tower, so that the modeled current pulse between the seventh and eighth segments above ground level would correspond to the sampling loop location on each tower – at 35 percent of the total tower height above the base insulator. These pulses have the minimum currents along the towers when they are modeled to be detuned. As the tower structures, sampling loops and sampling lines are identical, the antenna monitor ratios and phases corresponding to the theoretical parameters were calculated directly from the modeled tower currents.

TOWER	Modeled Current Pulse	Modeled Current Magnitude @ Sampling Loop (amperes)	Modeled Current Phase @ Sampling Loop (degrees)	Modeled Antenna Monitor Ratio	Modeled Antenna Monitor Phase (degrees)
1 (SW)	8	2.964	+58.2	0.609	+58.2
2 (NE)	28	4.869	0.0	1.000	0.0

Method of Moments Model Details for Towers Driven Individually – WJAS

The array of towers was modeled using Expert MININEC Broadcast Professional Version 14.5. One wire was used to represent each tower. The tower geometry was specified using the geographic coordinate system. Each tower was modeled using 20 wire segments. As the towers are physically 169.1 degrees in electrical height, the segment length is 8.455 electrical degrees.

The individual tower characteristics were adjusted to provide a match of their modeled impedances, when presented to a circuit model which included branches representing the shunt capacitances and feedline hookup inductances, with the base impedances that were measured at the outputs of the ATUs while the other tower of the array was open circuited. The sampling line isolation coils were disconnected from the sampling lines on the towers for the measurements and, thus, were not considered in the modeling. The method of moments model assumed a load at ground level having the reactance that was calculated for it using the base circuit model for the open circuited tower of the array.

Each tower's modeled height relative to its physical height falls within the required range of 75 to 125 percent and each modeled radius falls within the required range of 80 percent to 150 percent of the radius of a circle having a circumference equal to the sum of the widths of the tower sides. The array consists of identical, triangular uniform cross section towers having a face width of 26 inches.

TOWER	Physical Height (degrees)	Modeled Height (degrees)	Modeled Percent of Height	Modeled Radius (meters)	Percent Equivalent Radius
1 (SW)	169.1	181.8	107.5	0.284	90.1
2 (NE)	169.1	179.4	106.1	0.284	90.1

The following pages show the details of the method of moments models for the individually driven towers. The numerals in the file names shown on the tabulations correspond to the tower numbers.

Tower 1 Driven Individually

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IMPEDANCE
   normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.32	346.23	-523.3	627.47	303.5	22.844	-.76093	-7.9393

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.284	20
		0	0	181.8		
2	none	248.	68.5	0	.284	20
		248.	68.5	179.4		

Number of wires = 2
current nodes = 40

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	2	8.97	1	9.09
radius	1	.284	1	.284

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.32	0	1	.0249167	.02525

Sources

source	node	sector	magnitude	phase	type
1	1	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	21	0	-2,411.	0	0	0

Tower 2 Driven Individually

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IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 21, sector 1							
1.32	398.26	-535.6	667.44	306.6	22.452	-.77424	-7.8705

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.284	20
		0	0	181.4		
2	none	248.	68.5	0	.284	20
		248.	68.5	179.4		

Number of wires = 2
current nodes = 40

Individual wires	minimum wire	minimum value	maximum wire	maximum value
segment length	2	8.97	1	9.07
radius	1	.284	1	.284

ELECTRICAL DESCRIPTION
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.32	0	1	.0249167	.0251944

Sources

source	node	sector	magnitude	phase	type
1	21	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-2,411.	0	0	0

Method of Moments Model Details for Directional Antenna - WJAS

The array of towers was modeled using Expert MININEC Broadcast Professional Version 14.5 with the individual towers characteristics that were verified by the individual tower impedance measurements. Calculations were made to determine the complex voltage values for sources located at ground level under each tower of the array to produce current moment sums for the towers that, when normalized, equated to the theoretical field parameters of the authorized directional antenna pattern. The following pages contain details of the method of moments model of the directional antenna pattern.

Tower	Wire	Base Node
1	1	1
2	2	21

It should be noted that voltages and currents shown on the tabulations that are not specified as “rms” values are the corresponding peak values.

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MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 1.32 MHz

tower	field ratio magnitude	phase (deg)
1	.62	57.9
2	1.	0

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	1,191.01	138.3	2.03985	209.
21	1,627.06	75.6	2.15549	120.2

Sum of square of source currents = 17.6143
Total power = 3,300. watts

IMPEDANCE
   normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.32	193.14	-551.	583.87	289.3	35.532	-.48904	-9.7267
source = 2; node 21, sector 1							
1.32	537.3	-530.19	754.85	315.4	21.256	-.81788	-7.6535

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.284	20
		0	0	181.8		
2	none	248.	68.5	0	.284	20
		248.	68.5	179.4		

Number of wires   = 2
          current nodes = 40

Individual wires	minimum wire	minimum value	maximum wire	maximum value
segment length	2	8.97	1	9.09
radius	1	.284	1	.284

ELECTRICAL DESCRIPTION
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1.32	0	1	.0249167	.02525

Sources

source	node	sector	magnitude	phase	type
1	1	1	1,684.34	138.3	voltage
2	21	1	2,301.01	75.6	voltage

CURRENT rms
Frequency = 1.32 MHz
Input power = 3,300. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	2.03985	209.	-1.78466	-.987921
2	0	0	9.09	1.02678	187.5	-1.01806	-.133529
3	0	0	18.18	.660947	135.4	-.470215	.464488
4	0	0	27.27	.990463	88.7	.0226378	.990205
5	0	0	36.36	1.53401	72.	.473714	1.45904
6	0	0	45.45	2.07029	64.7	.883474	1.87231
7	0	0	54.54	2.55282	60.7	1.24818	2.22687
8	0	0	63.63	2.96385	58.2	1.56286	2.51831
9	0	0	72.72	3.29267	56.4	1.82247	2.74231
10	0	0	81.81	3.53177	55.1	2.02252	2.89531
11	0	0	90.9	3.67595	54.	2.1594	2.97483
12	0	0	99.99	3.72214	53.2	2.23065	2.97969
13	0	0	109.08	3.66939	52.5	2.23506	2.91014
14	0	0	118.17	3.51873	51.9	2.17266	2.76785
15	0	0	127.26	3.27317	51.3	2.0448	2.55587
16	0	0	136.35	2.93741	50.9	1.85396	2.27842
17	0	0	145.44	2.51741	50.4	1.60352	1.94064
18	0	0	154.53	2.01966	50.	1.29725	1.54795
19	0	0	163.62	1.44924	49.7	.938105	1.10465
20	0	0	172.71	.804644	49.3	.524705	.61003
END	0	0	181.8	0	0	0	0
GND	90.8923	-230.744	0	2.15548	120.2	-1.08537	1.86228
22	90.8923	-230.744	8.97	1.52741	74.4	.411502	1.47093
23	90.8923	-230.744	17.94	1.86868	39.3	1.44628	1.18333
24	90.8923	-230.744	26.91	2.51793	21.3	2.34533	.916199
25	90.8923	-230.744	35.88	3.20619	11.9	3.13689	.662986
26	90.8923	-230.744	44.85	3.84797	6.3	3.82457	.423723
27	90.8923	-230.744	53.82	4.40868	2.6	4.40411	.200678
28	90.8923	-230.744	62.79	4.86919	360.	4.86919	-3.13E-03
29	90.8923	-230.744	71.76	5.21686	358.	5.21359	-.184541
30	90.8923	-230.744	80.73	5.44305	356.4	5.43239	-.34058
31	90.8923	-230.744	89.7	5.54234	355.1	5.52249	-.468647
32	90.8923	-230.744	98.67	5.51222	354.1	5.48302	-.566642
33	90.8923	-230.744	107.64	5.35302	353.2	5.31545	-.633048
34	90.8923	-230.744	116.61	5.0677	352.4	5.02361	-.666972
35	90.8923	-230.744	125.58	4.66168	351.8	4.61355	-.66816
36	90.8923	-230.744	134.55	4.14248	351.2	4.09322	-.636963
37	90.8923	-230.744	143.52	3.51912	350.6	3.47195	-.574241
38	90.8923	-230.744	152.49	2.80103	350.1	2.75939	-.481165
39	90.8923	-230.744	161.46	1.99553	349.6	1.96302	-.358702
40	90.8923	-230.744	170.43	1.10076	349.2	1.08128	-.206176
END	90.8923	-230.744	179.4	0	0	0	0

Sampling System Measurements – WJAS

Impedance measurements were made of the antenna monitor sampling system using a Hewlett-Packard 8751A network analyzer and a Tunwall Radio directional coupler in a calibrated measurement system. The measurements were made looking into the antenna monitor ends of the sampling lines for two conditions: with them open circuited at their far ends - including the isolation coils and vertical tower runs - and with them connected to the sampling loops on the towers.

The following table shows the frequencies above and below the carrier frequency where resonance – zero reactance corresponding with low resistance – was found. As the length of a distortionless 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 below and closest to the carrier frequency was found to be 450 electrical degrees. The electrical lengths at carrier frequency appearing in the table below were calculated by ratioing the frequencies.

Tower	Sampling Line Open-Circuited Resonance Below 1320 kHz (kHz)	Sampling Line Open-Circuited Resonance Above 1320 kHz (kHz)	Sampling Line Calculated Electrical Length at 1320 kHz (degrees)	1320 kHz Measured Impedance with Sampling Toroid Connected (Ohms)
1 (SW)	1139.40	1596.05	521.3	3.9 – j 3.9
2 (NE)	1139.85	1596.35	521.1	3.9 –j 3.9

The sampling line lengths meet the requirement that they be equal in length within 1 electrical degree.

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:

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

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 (SW)	1025.460	7.3 – j 50.8	1253.340	8.6 + j 50.7	51.4
2 (NE)	1025.865	7.3 – j 50.9	1253.835	8.5 + j 50.9	51.5

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

Antenna Monitor Calibration – WJAS

The antenna monitor's calibration was checked by comparing the tower current ratio and phase observed at carrier frequency using a Hewlett Packard 8751A network analyzer, with its reference signal amplified and fed into the directional antenna common point, to those observed on the antenna monitor under full power operation. The network analyzer was calibrated using its internal calibration function prior to the observations, which were made with the tower 2 sampling line connected to its "B" receiver input and the tower 1 sampling line connected to its "A" receiver input. The measurements with the antenna monitor were made immediately upon activation of the transmitter after a cool-off period, during which the low power network analyzer measurements were made, to avoid warm-up effects. For that reason, the parameters observed for the antenna monitor may differ slightly from those that may be observed under normal operation.

Tower	Network Analyzer Measured		Antenna Monitor Measured	
	Ratio	Phase	Ratio	Phase
1	0.601	+ 58.0	0.603	+58.3
2	1.000	0.0	1.000	0.0

The network analyzer and antenna monitor agreed within less than the antenna monitor manufacturer's rated accuracies of 0.010 ratio and 1.0 degree phase.

Reference Field Strength Measurements – WJAS

Reference field strength measurements were made at three locations each along radials at the azimuths having specified inverse distance field strengths on the construction permit at 52, 85, 188, and 309 degrees true. Additionally, measurements were made on a major lobe maximum radiation radial at 352 degrees true.

A Potomac Instruments FIM-41 field strength meter, serial number 383, was used to make the field strength measurements. It most recently had a calibration check traceable to a reference standard field on April 15, 2010.

The measured field strengths, descriptions and GPS coordinates for the reference measurement points are shown on the following page.

Reference Field Strength Measurements

Radio Station WJAS

Radial (Deg.)	Point	Distance (km)	Field (mV/m)	Coordinates (NAD 27)		Description
				N	W	
52	1	3.52	43	40-29-58.0	79-52-12.6	Intersection of Alpha and Delta by Hydrant
	2	4.36	30	40-30-14.6	29-51-45.4	By storm drain on right side of road
	3	5.17	13.5	40-30-32.4	79-51-18.1	Driveway entrance by mailbox of home 1010
85	1	5.38	8.2	40-29-07.1	79-50-23.9	By hydrant on right side of road.
	2	6.15	5.4	40-29-05.2	79-49-50.5	On Rockliff Road up hill 10 feet from stop sign
	3	7.21	4.6	40-29-07.9	79-49-06.3	Side of road near bushes at Rite Aid
188	1	3.75	38	40-26-46.6	79-54-33.6	Across from house number 6959 Willard Street
	2	4.72	14	40-26-15.7	79-54-39.8	Next to fire hydrant on bend in road
	3	4.97	6.5	40-26-08.1	79-54-41.4	Side of road in front of house number 2100
309	1	5.07	8	40-30-30.8	79-57-00.1	Intersection of Herman and Fisher Streets by sign
	2	5.52	3.3	40-30-40.7	79-57-17.7	Intersection with Park Entrance Road
	3	6.23	4.7	40-30-53.7	79-57-37.9	Middle of road on bend
352	1	3.78	68	40-30-48.0	79-54-33.0	By Wynwood Drive sign on Corner of intersection
	2	5.01	46	40-31-27.4	79-54-41.3	Clearing on right side across from Mayflower Drive
	3	6.16	20.5	40-32-04.9	79-54-47.3	Intersection by Willow Road sign

All measurements were made on June 16, 2010.

Direct Measurement of Power – WJAS

Common point impedance measurements for the nighttime directional antenna were made using a calibrated network analyzer system employing a Hewlett-Packard 8751A vector network analyzer and a Tunwall Radio directional coupler. The common point impedance was adjusted to 50 – j 7 ohms to compensate for the series inductance of the transmitter switching circuitry within the phasor cabinet and provide a 50 ohm non-reactive load at the output terminals of the main transmitter.

The common point current value for 3,564 watts[1] antenna input power with the 50 ohm common point resistance is 8.44 amperes.

[1] The FCC Rules specify an 8 percent input power adjustment for directional antenna system losses at the 3,300 watt nominal power level.

Antenna Monitor System – WJAS

The antenna monitor is a Potomac Instruments model AM-1901, serial number 777. It was purchased new for installation at this transmitter site.

The sampling devices are identical sampling loops and they are mounted identically on each of the two towers. The towers are identical structures. Each tower's sampling loop is mounted at the 122.5 foot level above its base insulator, which is 35 percent of the total 350 foot tower height, and is at tower potential. The sampling lines have their outer conductors bonded to tower potential at the sampling loops, where they leave to go to the isolation coil enclosures at the tower bases and at approximately the halfway points between the tower bases and the sampling loops. The sampling loops are connected through equal length ½ inch foam heliax sampling lines to the antenna monitor.

RFR Protection – WJAS

The operation of WJAS at the new site will not result in the exposure of workers or the general public to levels of radio frequency radiation in excess of the limits specified in 47 CFR 1.1310. Fences have been installed about the tower bases to restrict access to distances beyond those necessary to prevent electric and magnetic field exposure above the required levels.

The fence sizes were determined with reference to Tables 2 and 3 of Supplement A to FCC OET Bulletin 65 (Edition 97-01). Tables 2 and 3 show predicted distances "for compliance with FCC limits" for towers 0.25 and 0.5 wavelengths in height, respectively. The WJAS towers are between 0.25 and 0.5 wavelengths in height, at 0.47 wavelength. Each table shows a distance of 2 meters for 5,000 watts input power with a single tower radiator. Although the 3,300 watt input power of the WJAS nighttime directional antenna is divided between the two towers of the array, fences have been installed to restrict access within a 24-by-24 foot (7.3-by-7.3 meter) area centered around each of them to ensure that the requirement is met.

As WJAS operates from a different site in the daytime, workers may enter the fenced areas of the nighttime site then without any restriction related to radio frequency radiation. The new WJAS nighttime site is, therefore, in full compliance with the FCC's requirements with regard to radio frequency radiation exposure.

Item 11

Summary of Certified Array Geometry - WJAS

The relative tower locations based on the distance in feet and azimuth (referenced to True North) provided in the Tower Location Certification of Appendix A were compared to the relative distance and azimuth of the array elements specified on the construction permit. The Certified and specified values were converted to the rectangular coordinate system to facilitate calculating the non-reference tower's specified-to-certified distance, which was then converted to the polar coordinate system to determine its magnitude. This tabulation shows that distance and other information that is relevant to its determination:

Tower	Specified Array Geometry			Post-Construction Certification*		Distance From Specified Base Location	
	Spacing (Deg.)	Spacing (Feet)	Azimuth (Deg. T.)	Spacing (Feet)	Azimuth (Deg. T.)	(Feet)	(Deg.)
1 (SW)	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
2 (NE)	248.0	513.3	68.5	515.3	68.7	2.7	1.3

The "as built" tower displacement from the specified location expressed in electrical degrees at carrier frequency is within the 1.5 degree tolerance specified in FCC Public Notice DA 09-2340, October 29, 2009.

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* As built tower locations from June 25, 2010 Tower Location Certification prepared by Kevin Patrick Hannegan, Registered Professional Land Surveyor, Pennsylvania registration SU-048536-E.

Appendix A

Certified Post Construction Array Geometry

GATEWAY
On Call. On Time. On Target.

THE GATEWAY ENGINEERS, INC.

400 HOLIDAY DRIVE, SUITE 300
PITTSBURGH, PA 15220-2727
412.921.4030 PHONE
412.921.9960 FAX

www.gatewayengineers.com

June 25, 2010
C-16899-0002

Mr. Jason Horvath
Renda Broadcasting Corporation
900 Parish Street, 4th Floor
Pittsburgh, PA 15220

Re: WJAS Tower Certification

Dear Mr. Horvath:

We are certifying to the as-built locations of two (2) towers recently constructed in the City of Pittsburgh, Allegheny County, Pennsylvania.

The Latitude and Longitude values of the two (2) towers are based on NAD 83 True North. We certify that the two (2) towers are located as follows:

1) Westerly Tower Location	Latitude (North) = 40°28'47.652" Longitude (West) = 79°54'08.872"
2) Easterly Tower Location	Latitude (North) = 40°28'45.804" Longitude (West) = 79°54'15.085"

We also certify that the bearing and distance, as related to True North, from the Westerly Tower to the Easterly Tower is North 68°42'44.22" East and 515.277 feet.

Sincerely,
The Gateway Engineers, Inc.

Kevin P. Hannegan, P.L.S.
Survey Team Leader

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
Kevin Patrick Hannegan
LAND SURVEYOR
SU-048536-E

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SECTION III - LICENSE APPLICATION ENGINEERING DATA

Name of Applicant

RENDA BROADCASTING CORPORATION OF NEVADA (LICENSE FOR NIGHT SITE ONLY)

PURPOSE OF AUTHORIZATION APPLIED FOR: (check one)

☑ Station License ☐ Direct Measurement of Power

1. Facilities authorized in construction permit

Call Sign	File No. of Construction Permit (if applicable)	Frequency (kHz)	Hours of Operation	Power in kilowatts	
				Night	Day
WJAS	BP-20070208ABM	1320	UNLIMITED	3.3	5.0

2. Station location

State	City or Town
PENNSYLVANIA	PITTSBURGH

3. Transmitter location

State	County	City or Town	Street address (or other identification)
PA	ALLEGHENY	PITTSBURGH	7155 HIGHLAND RIVE

4. Main studio location

State	County	City or Town	Street address (or other identification)
PA	ALLEGHENY	PITTSBURGH	900 PARISH ST. 3RD FLOOR

5. Remote control point location (specify only if authorized directional antenna)

State	County	City or Town	Street address (or other identification)
PA	ALLEGHENY	PITTSBURGH	900 PARISH ST. 3RD FLOOR

6. Has type-approved stereo generating equipment been installed? ☐ Yes ☑ No

7. Does the sampling system meet the requirements of 47 C.F.R. Section 73.68? ☑ Yes ☐ No ☐ Not Applicable

Attach as an Exhibit a detailed description of the sampling system as installed. Exhibit No. ENG.

8. Operating constants:

RF common point or antenna current (in amperes) without modulation for night system	RF common point or antenna current (in amperes) without modulation for day system
8.44	NO CHANGE

Measured antenna or common point resistance (in ohms) at operating frequency		Measured antenna or common point reactance (in ohms) at operating frequency	
Night	Day	Night	Day
50.0	NO CHANGE	-j7.0	NO CHANGE

Antenna indications for directional operation

Towers	Antenna monitor Phase reading(s) in degrees		Antenna monitor sample current ratio(s)		Antenna base currents	
	Night	Day	Night	Day	Night	Day
1(SW)	+58.2		0.609		-	
2(NE)	0.0		1.000		-	
					-	

Manufacturer and type of antenna monitor: POTOMAC INSTRUMENTS 1901 (SN 777)

SECTION III - Page 2

9. Description of antenna system ((f directional antenna is used, the information requested below should be given for each element of the array. Use separate sheets if necessary.)

Type Radiator	Overall height in meters of radiator above base insulator, or above base, if grounded.	Overall height in meters above ground (without obstruction lighting)	Overall height in meters above ground (include obstruction lighting)	If antenna is either top loaded or sectionalized, describe fully in an Exhibit.
UNIFORM CROSS-SECTION, STEEL GUYED	106.7	107.6	108.5	Exhibit No. N/A

Excitation ☑ Series ☐ Shunt

Geographic coordinates to nearest second. For directional antenna give coordinates of center of array. For single vertical radiator give tower location.

North Latitude	40	o	28	'	46	"	West Longitude	79	o	54	'	12	"

If not fully described above, attach as an Exhibit further details and dimensions including any other antenna mounted on tower and associated isolation circuits. Exhibit No. ENG.

Also, if necessary for a complete description, attach as an Exhibit a sketch of the details and dimensions of ground system. Exhibit No. N/A

10. In what respect, if any, does the apparatus constructed differ from that described in the application for construction permit or in the permit?

NONE

11. Give reasons for the change in antenna or common point resistance.

N/A

I certify that I represent the applicant in the capacity indicated below and that I have examined the foregoing statement of technical information and that it is true to the best of my knowledge and belief.

Name (Please Print or Type)	Signature
RONALD D. RACKLEY	Ronald D. Rackley
Address (include ZIP Code)	Date
DLR, INC. 201 FLETCHER AVENUE SARASOTA, FL 34237	6/28/2010
	Telephone No. (Include Area Code) 941-329-6000

☐ Technical Director ☑ Registered Professional Engineer

☐ Chief Operator ☐ Technical Consultant

☐ Other (specify)