APPLICATION FOR LICENSE

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NON-COMMERCIAL EDUCATIONAL FM STATION
WWHN-FM - IRONDALE, ILLINOIS
FACILITY ID: 177414

HAWKINS COMMUNICATIONS COMPANY

SEPTEMBER, 2014

APPLICATION FOR LICENSE

The following engineering statement and attached exhibits have been prepared for

Hawkins Communications Company ("Hawkins"), permittee of new NCE FM station WWHN-FM

at Irondale, Illinois, and are in support of their application for license to cover initial construction of

that facility.[1] This application for license seeks to cover construction authorized under FCC File

No. BMPED-20140725AAX.

The facility as authorized and constructed operates on FM channel 205 with a maximum

effective radiated power of 0.1 kW. The facility utilizes a directional antenna comprised of an array

of three Kathrein-Scala CA5-FM/CP/RM Yagi antennas. No beamtilt is employed by the antenna.

The main studio complies with the requirements of Section 73.1125 of the Commission's

Rules. The main studio is located at 808 W. 104th Street in Chicago, Illinois. The geographic

coordinates of the center of the studio building are 41-42-18.8 North Latitude and 87-38-35.6 West

Longitude. Exhibit E-1 illustrates the location of the main studio, a twenty-five mile radius centered

on the main studio location, and the boundaries of Irondale, Illinois, the community of license. As

this map indicates, the entire community of Irondale is located within twenty-five miles of the main

studio location.

The specified transmitter power output achieves the authorized effective radiated power.

The authorized effective radiated power is 100 Watts. As is specified in the directional antenna

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[1] The Facility ID for WWHN-FM at Irondale, Illinois is 177414.

proof attached to this application, the maximum power gain of the antenna is 1.350. The input power to the antenna to achieve the authorized effective radiated power is 74 Watts.

Ahead of the input to the antenna is a transmission line jumper comprised of a one-meter length of Andrew/Commscope LDF4-50 semi-flexible coaxial cable. This jumper has an insertion loss of 0.04 dB, which is equivalent to an efficiency of 99.08 percent. The input power to this jumper to achieve the authorized effective radiated power is 74.9 Watts.

The main run of transmission line is ahead of the antenna input jumper. This run consists of 51.8 meters of Andrew LDF5-50A semi-flexible coaxial cable. Data from the manufacturer indicates an insertion loss of 0.61 dB for this run of line, which corresponds to an efficiency of 86.9 percent. The input power to the main run of transmission line to achieve the authorized effective radiated power is 86.2 Watts.

Prior to reaching the main run of transmission line, the transmitted signal passes through a gas-discharge lightning protection device. This device is specified by the manufacturer as having an insertion loss of 0.1 dB, which corresponds to an efficiency of 97.72 percent. Thus, the input power to the lightning protection device to achieve the authorized effective radiated power is 88.2 Watts.

Ahead of the lightning protection device is a 0.5-meter jumper comprised of Andrew/Commscope LDF4-50 semi-flexible coaxial cable. This jumper has an insertion loss of 0.04 dB, which corresponds to an efficiency of 99.08 percent. The input power to this jumper to achieve the authorized effective radiated power is 89.1 Watts. The input to this jumper, however,

is connected to the output of the transmitter. The value of 89.1 Watts rounds to 89 Watts per Section 73.212 of the Commission's Rules. Thus, the specified transmitter power output achieves the authorized effective radiated power.

The facility was constructed in accordance with the terms of the construction permit. The construction permit, as issued by the Commission, listed seven (7) special conditions or restrictions. Hawkins is in compliance with each of these special conditions, which will be individually discussed.

The first special condition pertains to radiofrequency radiation protection of workers and other personnel. Under this condition, Hawkins must coordinate with all other users of the site to ensure that exposure in excess of the applicable standards does not occur. Hawkins certifies it will perform the necessary coordination activities, which may include, but are not necessarily limited to, a reduction in transmitter power or cessation of operation.

Special condition number two pertains to the award of the construction permit. Under this condition, Hawkins is subject to a holding period of four years of on air operations. During this holding period, Hawkins may not propose to assign the authorization to any other entity that would not have received an equal or greater number of points, and that compensation for the facility does not exceed prudent expenses. Hawkins certifies it will comply with this condition.

The third special condition pertains to the directional antenna. This condition requires the submission of an antenna proof of performance. The required antenna proof of performance,

prepared by Shively Labs is attached to this application immediately following all numbered exhibits.

Following the proof of performance is a letter from Mr. Kevin Westerkamp. Mr. Westerkamp is a licensed land surveyor in Illinois. As indicated in his letter, the antenna system was surveyed initially on September 16, 2014, and finally on September 17, 2014. The orientation of each of the antenna elements was found to be in compliance with the specifications provided in the antenna proof. The inclusion of this letter provides compliance with the fourth special condition.

Special condition number five requires the submission of an affidavit from a qualified engineer who oversaw the installation of the antenna. The installation of the antenna was supervised by Mr. Len Watson. The qualifications of Mr. Watson are a matter of record. As his affidavit states, the installation of the antenna was in accordance with the instructions provided by the manufacturer.

The sixth special condition is satisfied by the map in Exhibit E-2. This map illustrates the predicted 60 dBu service contour of the facility along with the boundaries of the community. As is demonstrated, 82.3 percent of the area of Irondale, Illinois is within the 60 dBu service contour based on the actual measured pattern. The facility as constructed complies with the provisions of Section 73.515 of the Commission's Rules.

The final special condition on the construction permit pertains to the description of the antenna. This condition advises that the maximum ERP for the facility is 100 Watts. Additionally, the minimum ERP is stated at 16 Watts at an azimuth of 290 degrees true.

The preceding statement and attached exhibits have been prepared by me, or under my direction, and are true and accurate to the best of my belief and knowledge.

Jeremy D. Ruck, PE
September 26, 2014

WWHN-FM.C
BMPED20140725AAX
Latitude: 41-42-30 N
Longitude: 087-31-25 W
ERP: 0.10 kW
Channel: 205
Frequency: 88.9 MHz
AMSL Height: 209.0 m
Horiz. Pattern: Directional
Vert. Pattern: No
Prop Model: None

Jeremy Ruck & Associates, Inc.

25 Mile Radius
Centered on Studio

Community of License
Irondale, Illinois

WWHN-FM Transmitter
Site Location

STUDIO

WWHN-FM.C

Main Studio
Location

Exhibit E-1
Main Studio Rule Compliance
WWHN-FM - Irondale, Illinois
Hawkins Communications Company
September, 2014

Scale 1:350,000

km
0   4   8   12
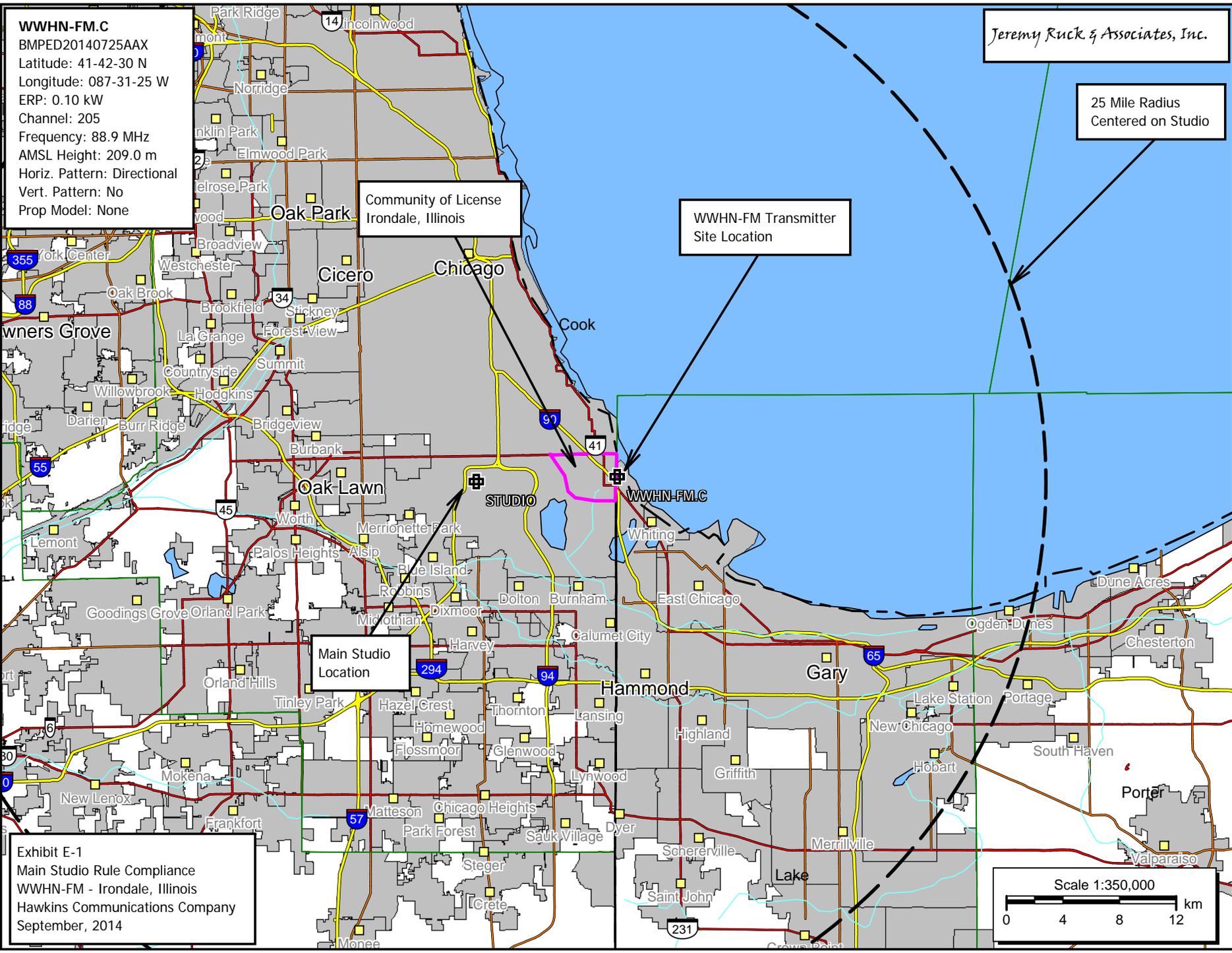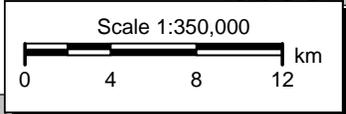
WWHN-FM.X

BMPED20140725AAX
Latitude: 41-42-30 N
Longitude: 087-31-25 W
ERP: 0.10 kW
Channel: 205
Frequency: 88.9 MHz
AMSL Height: 209.0 m
Horiz. Pattern: Directional
Vert. Pattern: No
Prop Model: None

Jeremy Ruck & Associates, Inc.

Cook

Portion of Irondale Served
9.93 sq. km / 82.3% of area

WWHN-FM 60 dBu
Service Contour

Portion of Irondale Unserved
2.13 sq. km / 17.7% of area

087-40-

41-45-00 N

087-35-00 W

087-30-00 W

087-25-00 W

etown

Evergreen Park

41

20

90

WWHN-FM.X

Merrionette Park

Whiting

41-40-00 N

Calumet Park

Blue Island

Robbins

Dolton

Burnham

East Chicago

12

Posen   Dixmoor

Riverdale

Community of License
Irondale, Illinois
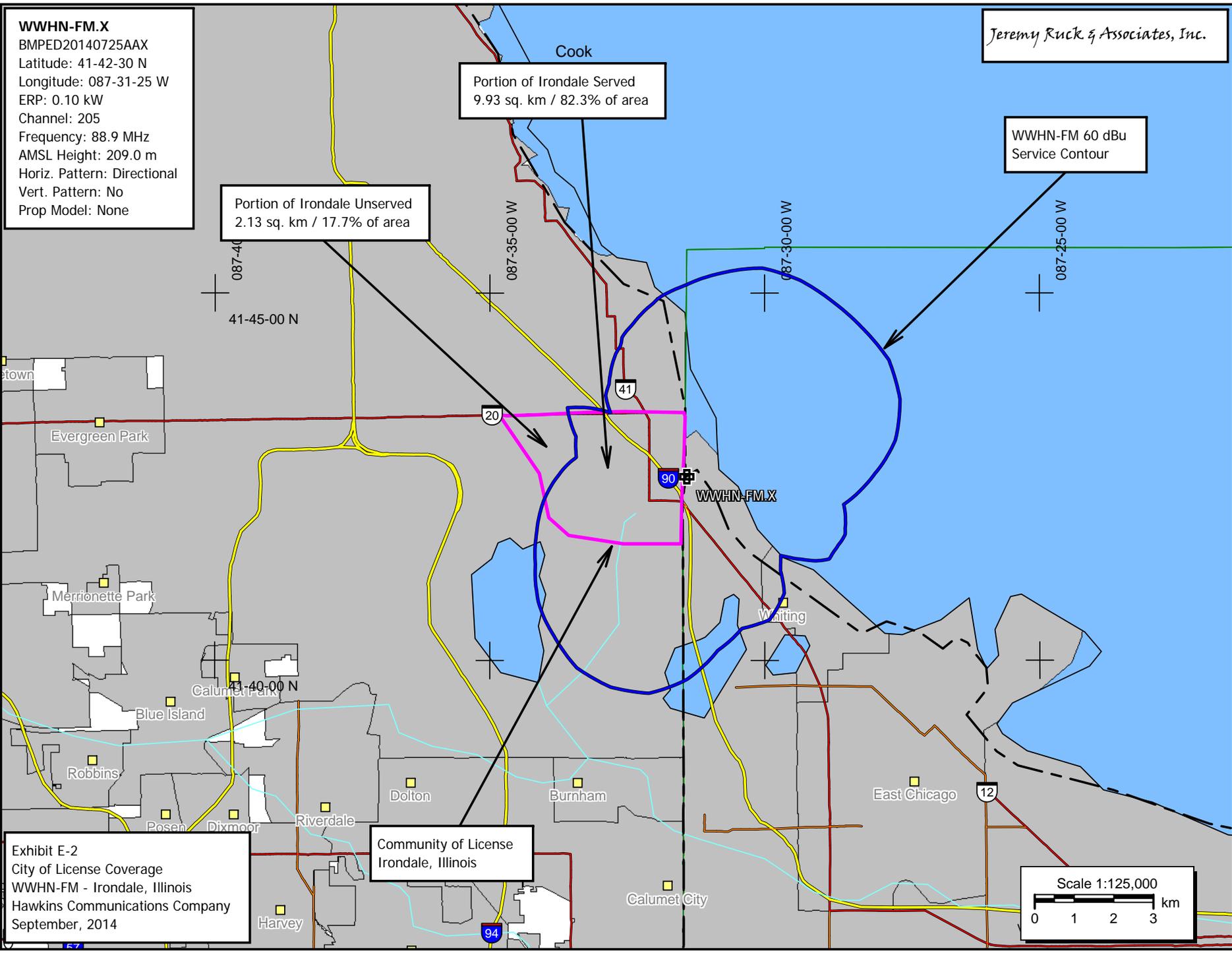
Exhibit E-2
City of License Coverage
WWHN-FM - Irondale, Illinois
Hawkins Communications Company
September, 2014

Harvey

Calumet City

94

57

Scale 1:125,000

km
0   1   2   3
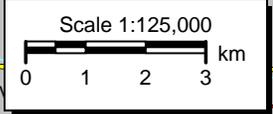
S.O. 31967

Report of Test Scala CA5-FM/CP/RM

for

The Dwelling Place, INC.

WWHN 88.9 MHz Irondale, IL.

OBJECTIVE:

The objective of this test was to demonstrate the directional characteristics of a Scala CA5-FM/CP/RM to meet the needs of WWHN and to comply with the requirements of the FCC construction permit, file number BMPED-20140725AAX. This test characterizes only the radiation characteristics of the antenna when mounted on the tower as described. It does not represent or imply any guarantee of specific coverage which can be influenced by factors beyond the scope of this test.

RESULTS:

The following Figures are the results of the measurements from our pattern range:

Figure 1A - Measured Azimuth Pattern with the FCC Composite
Figure 1B - Measured Composite Azimuth Pattern with the FCC Composite
Figure 1C - Tabulation of the Horizontal Polarization for the Measured Azimuth Pattern
Figure 1D - Tabulation of the Vertical Polarization for the Measured Azimuth Pattern
Figure 1E - Tabulation of the Measured Composite Azimuth Pattern
Figure 1F - Tabulation of the FCC Composite

The calculated elevation pattern of the antenna is shown in Figure 3.

Construction permit file number BMPED-20140725AAX indicates that the Horizontal radiation component shall not exceed 0.100 kW at any azimuth and is restricted to the following values at the azimuths specified:

290 Degrees True: 0.016 kilowatts

From Figure 1A, the maximum radiation of the Horizontal component occurs at 60 Degrees True to 62 Degrees True and 198 Degrees True to 202 Degrees True. At the restricted azimuth of 290 Degrees True the Vertical component is 11.119 dB down from the maximum of 0.100 kW, or 0.0077 kW

The R.M.S. of the Horizontal component is 0.639. The total Horizontal power gain is 1.350. The R.M.S. of the Vertical component is 0.637. The total Vertical power gain is 1.181. See Figure 4 for calculations. The R.M.S. of the FCC composite pattern is 0.771. The R.M.S. of the measured composite pattern is 0.681. Eighty-five percent (85%) of the original authorized FCC composite pattern is 0.655. Therefore this pattern complies with the FCC requirement of 73.316(c)(2)(ix)(A).

METHOD OF DIRECTIONALIZATION:

One level of the Scala CA5-/FM/CP/RM was mounted on a pole of precise scale to the 3-inch pole at the WWHN site. The spacing of the antenna to the 3-inch pole achieves the horizontal and vertical patterns shown in Figure 1A. See Figure 2 for mechanical details.

METHOD OF MEASUREMENT:

As allowed by the construction permit, file number BMPED-20140725AAX, a single level of the Scala CA5-FM/CP/RM was set up on the Shively Labs scale model antenna pattern measuring range. A scale of 4.5:1 was used.

SUPERVISION:

Mr. Surette was graduated from Lowell Technological Institute, Lowell, Massachusetts in 1973 with the degree of Bachelor of Science in Electrical Engineering. He has been directly involved with design and development of broadcast antennas, filter systems and RF transmission components since 1974. As an RF Engineer for six years with the original Shively Labs in Raymond, ME and for a short period of time with Dielectric Communications. He is currently an Associate Member of the AFCCE and a Senior Member of IEEE.

He has authored a chapter on filters and combining systems for the latest edition of the CRC Electronics Handbook and for the 9th and 10th Editions of the NAB Handbook.

EQUIPMENT:

The scale model pattern range consists of a wooden rotating pedestal equipped with a position indicator.   The scale model bay is placed on the top of this pedestal and is used in the transmission mode at approximately 20 feet above ground level. The receiving corner reflector is spaced 50 feet away from the rotating pedestal at the same level above ground as the transmitting model. The transmitting and receiving signals are carried to a control building by means of RG-9/U double shielded coax cable.

The control building is equipped with:

Hewlett Packard Model 4395-A Network Analyzer

PC Based Controller

Output Standard Printer or 'pdf'

All testing is carried out in strict accordance with approved procedures under our ISO9001:2008.

TEST PROCEDURES:

The receiving antenna system is mounted so that the horizontal and vertical azimuth patterns are measured independently. The network analyzer was set to 400.05 MHz Calibrated pads are used to check the linearity of the measuring system. For example, 6 dB padding yields a scale reading of 50 from an unpadded reading of 100 in voltage. From the recorded patterns, the R.M.S. values are calculated and recorded as shown in Figure 1A.

Respectfully submitted by:

Robert A. Surette
Director of Sales Engineering
S/O 31967
September 4, 2014

Shively Labs

Shively Labs, a division of Howell Laboratories, Inc.   Bridgton, ME   (207)647-3327

Figure 1A
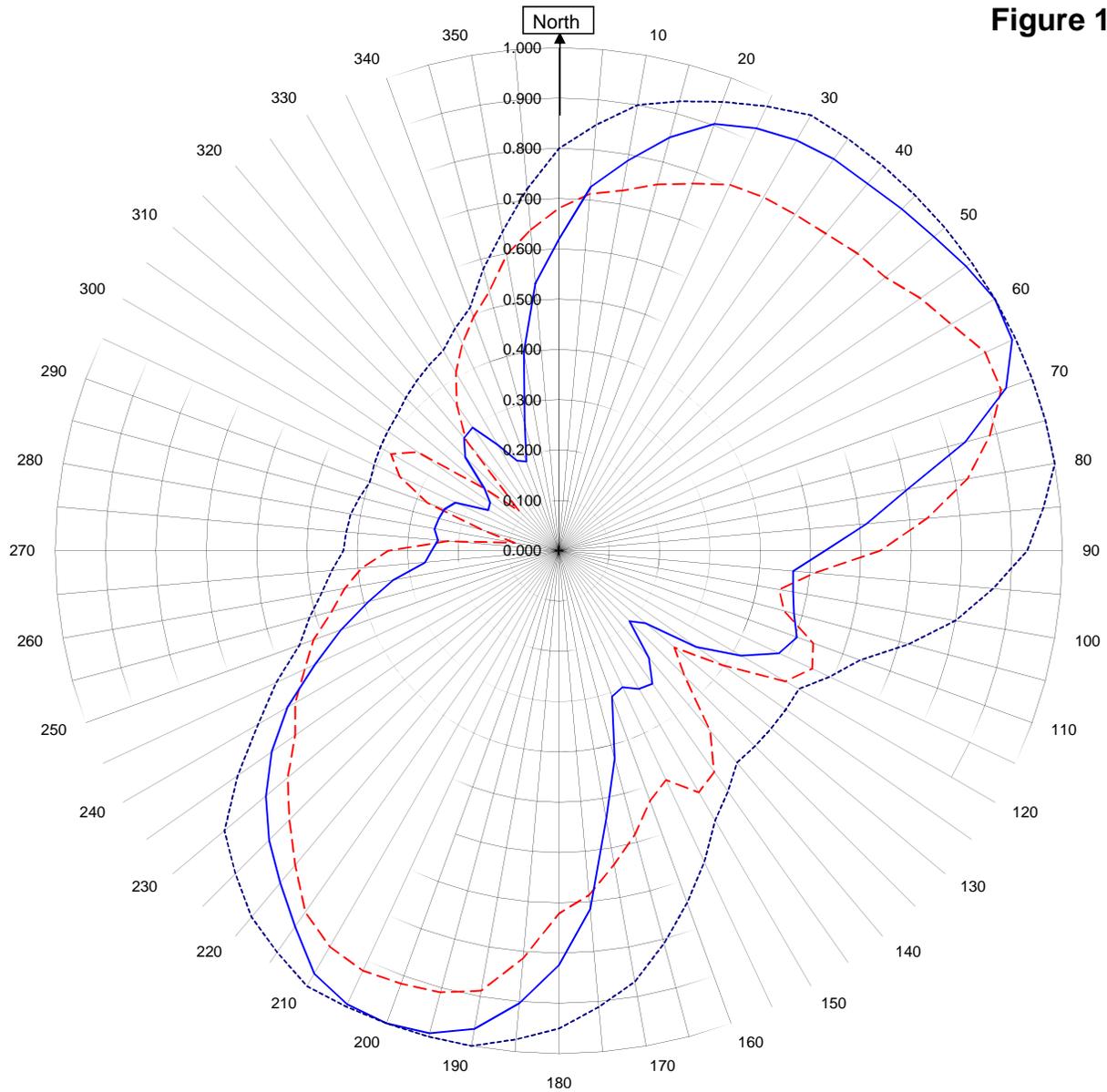
WWHN   IRONDALE, IL

31967

September 4, 2014

Horizontal RMS	0.639		Frequency	88.9 / 400.05 mHz	
Vertical RMS	0.637		Plot	Relative Field	
H/V Composite RMS	0.681		Scale	4.5 : 1	
..............FCC Composite RMS	0.771			See Figure 2 for Mechanical Details	

Antenna Model	SCALA CA5-/FM/CP/RM
Pattern Type	Directional Azimuth

Shively Labs

Shively Labs, a division of Howell Laboratories, Inc.   Bridgton, ME   (207)647-3327

Figure 1B
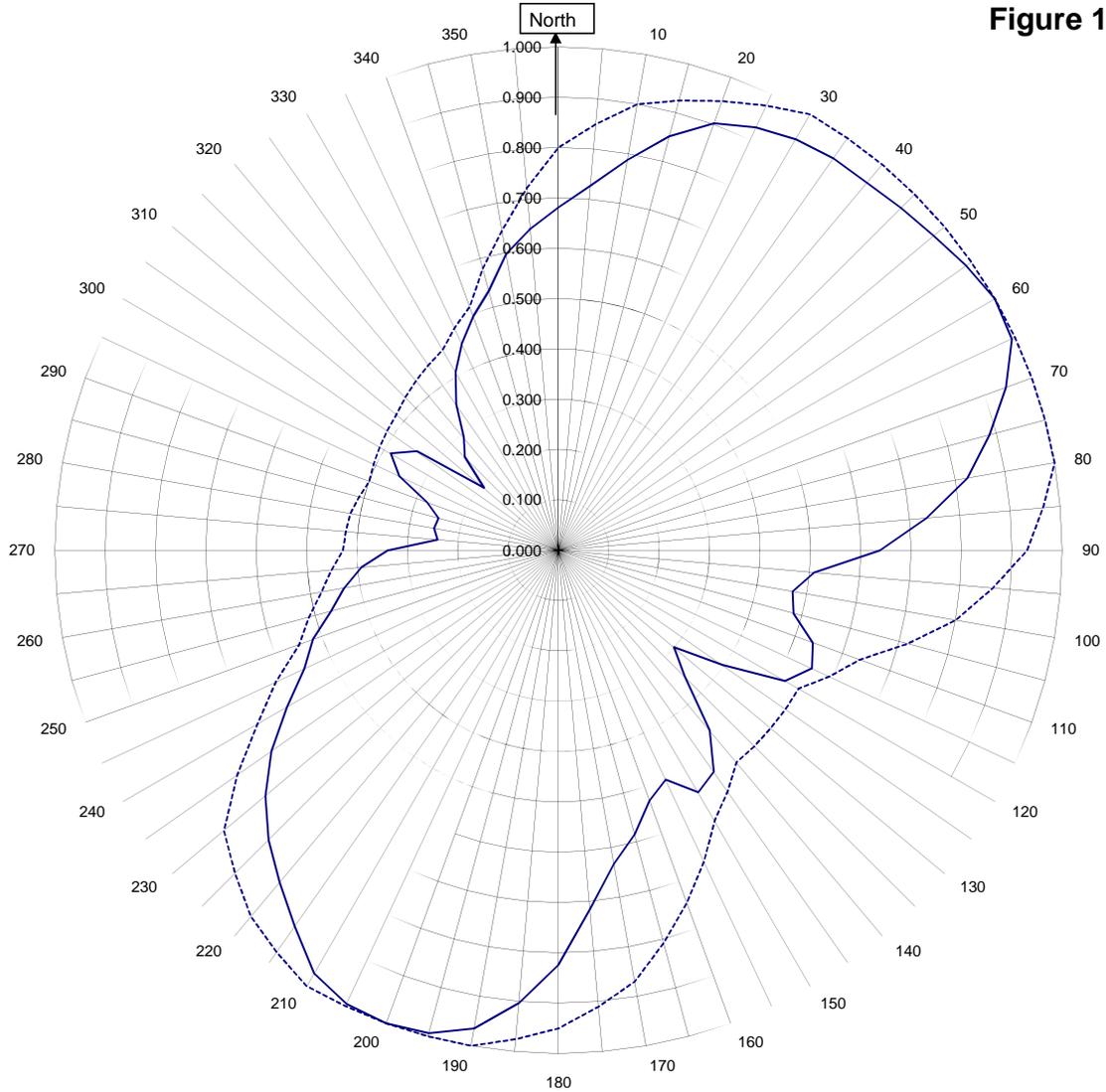
WWHN   IRONDALE, IL

31967
September 4, 2014

_____H/VComposite RMS	0.681	
……….…...FCC Composite RMS	0.771	

Frequency	88.9 / 400.05 mHz
Plot	Relative Field
Scale	4.5 : 1
	See Figure 2 for Mechanical Details

Antenna Model	SCALA CA5-/FM/CP/RM
Pattern Type	Directional H/V Composite

Tabulation of Horizontal Azimuth Pattern
WWHN IRONDALE, IL

Azimuth	Rel Field	Azimuth	Rel Field
0	0.619	180	0.824
10	0.787	190	0.965
20	0.903	200	1.000
30	0.943	210	0.971
40	0.953	220	0.861
45	0.962	225	0.814
50	0.972	230	0.760
60	1.000	240	0.623
70	0.945	250	0.461
80	0.702	260	0.334
90	0.529	270	0.253
100	0.472	280	0.251
110	0.503	290	0.242
120	0.417	300	0.162
130	0.224	310	0.193
135	0.198	315	0.263
140	0.278	320	0.293
150	0.317	330	0.243
160	0.308	340	0.189
170	0.541	350	0.401

Tabulation of Vertical Azimuth Pattern
WWHN IRONDALE, IL

Azimuth	Rel Field	Azimuth	Rel Field
0	0.681	180	0.721
10	0.727	190	0.888
20	0.777	200	0.916
30	0.812	210	0.909
40	0.824	220	0.815
45	0.837	225	0.757
50	0.846	230	0.703
60	0.900	240	0.605
70	0.935	250	0.519
80	0.824	260	0.432
90	0.638	270	0.339
100	0.444	280	0.089
110	0.537	290	0.278
120	0.519	300	0.385
130	0.299	310	0.193
135	0.354	315	0.111
140	0.467	320	0.287
150	0.555	330	0.409
160	0.529	340	0.495
170	0.633	350	0.598

Tabulation of Composite Azimuth Pattern
WWHN IRONDALE, IL

Azimuth	Rel Field	Azimuth	Rel Field
0	0.681	180	0.824
10	0.787	190	0.965
20	0.903	200	1.000
30	0.943	210	0.971
40	0.953	220	0.861
45	0.962	225	0.814
50	0.972	230	0.760
60	1.000	240	0.623
70	0.945	250	0.519
80	0.824	260	0.432
90	0.638	270	0.339
100	0.472	280	0.251
110	0.537	290	0.278
120	0.519	300	0.385
130	0.299	310	0.193
135	0.354	315	0.263
140	0.467	320	0.293
150	0.555	330	0.409
160	0.529	340	0.495
170	0.633	350	0.598

Tabulation of FCC Directional Composite
WWHN IRONDALE, IL

Azimuth	Rel Field	Azimuth	Rel Field
0	0.800	180	0.950
10	0.900	190	1.000
20	0.950	200	1.000
30	1.000	210	1.000
40	1.000	220	0.950
50	1.000	230	0.867
60	1.000	240	0.690
70	1.000	250	0.548
80	1.000	260	0.478
90	0.930	270	0.428
100	0.800	280	0.420
110	0.636	290	0.400
120	0.550	300	0.410
130	0.550	310	0.420
140	0.550	320	0.440
150	0.620	330	0.460
160	0.745	340	0.515
170	0.870	350	0.645

Full Power to the 45° and 205° yagi
6 dB Attuation to the 100° Yagi
EQUAL PHASE to each yagi

45°
Full Power

100°
-6dB

3" Pole

205°
Full Power

TOP VIEW

132.75"
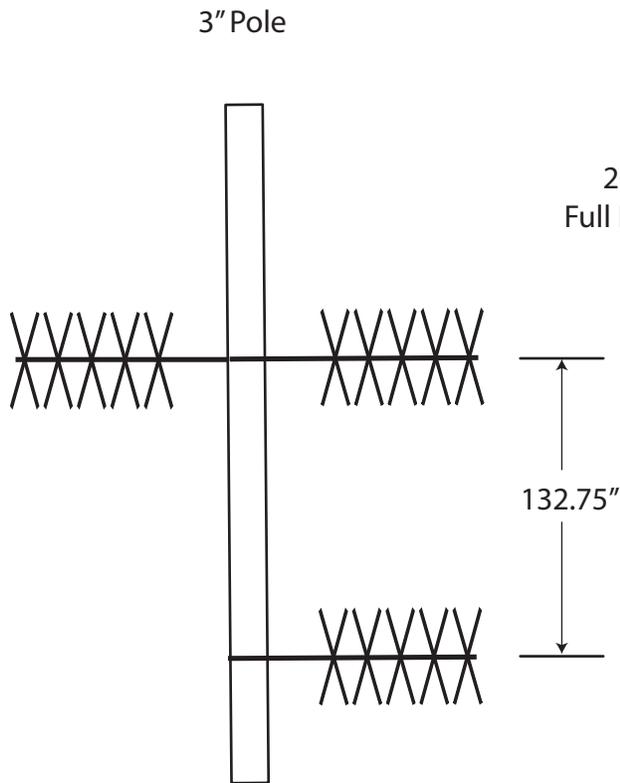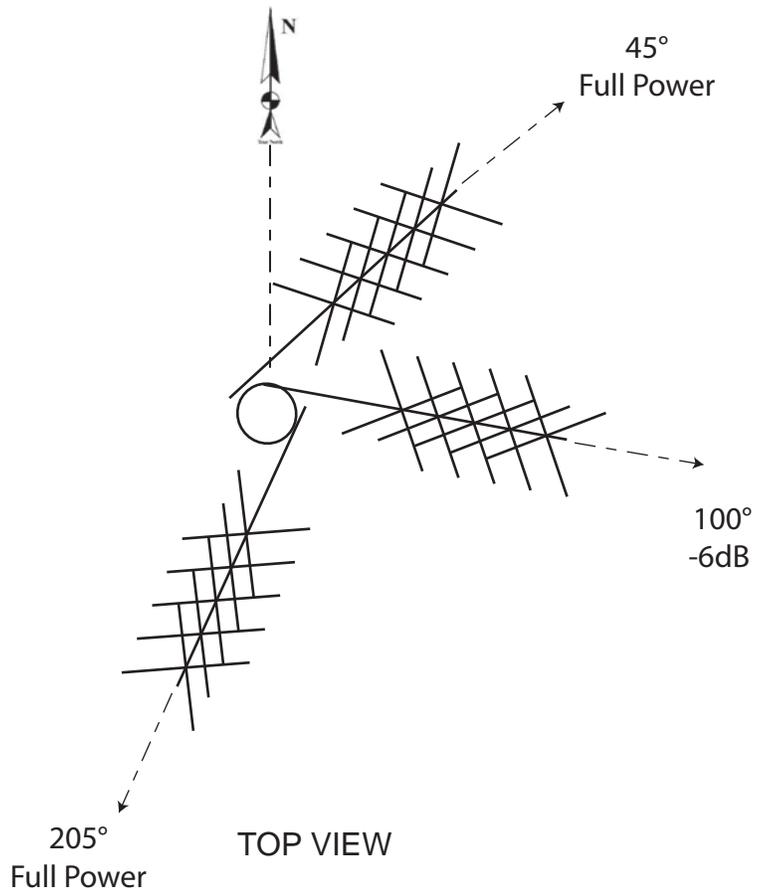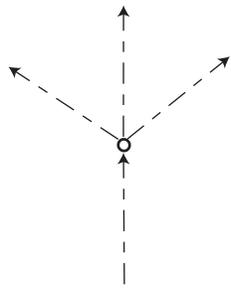
ELEVATION VIEW

SHIVELY LABS

DIV. HOWELL LABS   BRIDGTON, MAINE USA

FIGURE 2, SCALA CA5-FM/CP/RM,
88.9 MHz, WWHN

SIZE	CODE IDENT. NO.	DRAWING NO.		REV
A	26750	PL 09042014		—

SCALE			SHEET	
NONE		S/O 31967	1 OF 1	

Antenna Mfg.: Shively Labs **Date: 9/4/2014**
Antenna Type: Scala CA5-FM/CP/RM
Station: WWHN **Beam Tilt** **0**
Frequency: 88.9 **Gain (Max)** **1.350** **1.303 dB**
Channel #: 205 **Gain (Horizon)** **1.350** **1.303 dB**
Figure: Figure 3

Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field
-90	0.100	-44	0.724	0	1.000	46	0.697
-89	0.110	-43	0.736	1	0.999	47	0.684
-88	0.121	-42	0.748	2	0.998	48	0.671
-87	0.131	-41	0.760	3	0.998	49	0.658
-86	0.141	-40	0.772	4	0.997	50	0.645
-85	0.151	-39	0.783	5	0.996	51	0.630
-84	0.163	-38	0.794	6	0.994	52	0.616
-83	0.175	-37	0.805	7	0.992	53	0.602
-82	0.187	-36	0.815	8	0.990	54	0.588
-81	0.199	-35	0.826	9	0.987	55	0.574
-80	0.211	-34	0.835	10	0.985	56	0.559
-79	0.225	-33	0.845	11	0.982	57	0.544
-78	0.238	-32	0.854	12	0.978	58	0.529
-77	0.252	-31	0.864	13	0.975	59	0.514
-76	0.265	-30	0.873	14	0.971	60	0.499
-75	0.278	-29	0.881	15	0.967	61	0.484
-74	0.293	-28	0.889	16	0.962	62	0.469
-73	0.307	-27	0.897	17	0.957	63	0.454
-72	0.321	-26	0.905	18	0.952	64	0.439
-71	0.336	-25	0.912	19	0.947	65	0.424
-70	0.350	-24	0.919	20	0.942	66	0.409
-69	0.365	-23	0.925	21	0.936	67	0.394
-68	0.380	-22	0.932	22	0.930	68	0.379
-67	0.395	-21	0.938	23	0.923	69	0.364
-66	0.410	-20	0.945	24	0.917	70	0.349
-65	0.425	-19	0.949	25	0.910	71	0.334
-64	0.440	-18	0.954	26	0.902	72	0.320
-63	0.455	-17	0.959	27	0.894	73	0.306
-62	0.470	-16	0.964	28	0.887	74	0.291
-61	0.485	-15	0.969	29	0.879	75	0.277
-60	0.500	-14	0.973	30	0.871	76	0.264
-59	0.515	-13	0.976	31	0.861	77	0.250
-58	0.530	-12	0.980	32	0.852	78	0.237
-57	0.545	-11	0.983	33	0.843	79	0.223
-56	0.560	-10	0.987	34	0.834	80	0.210
-55	0.574	-9	0.989	35	0.824	81	0.198
-54	0.589	-8	0.991	36	0.813	82	0.186
-53	0.603	-7	0.993	37	0.803	83	0.174
-52	0.617	-6	0.995	38	0.792	84	0.162
-51	0.631	-5	0.997	39	0.781	85	0.150
-50	0.645	-4	0.997	40	0.771	86	0.140
-49	0.659	-3	0.998	41	0.759	87	0.130
-48	0.672	-2	0.999	42	0.747	88	0.119
-47	0.685	-1	0.999	43	0.735	89	0.109
-46	0.698	0	1.000	44	0.723	90	0.099
-45	0.712			45	0.711		

VALIDATION OF TOTAL POWER GAIN CALCULATION

WWHN　IRONDALE, IL

MODEL　SCALA CA5-/FM/CP/RM

Elevation Gain of Antenna　0.55

Horizontal RMS value divided by the Vertical RMS value equals the Horiz. - Vert. Ratio

H RMS　0.638969　V RMS　0.637426　H/V Ratio　1.002

Elevation Gain of Horizontal Component　0.551

Elevation Gain of Vertical Component　0.549

Horizontal Azimuth Gain equals $1/(RMS)^2$.　2.449

Vertical Azimuth Gain equals $1/(RMS/Max\ Vert)^2$.　2.152
Max. Vertical　0.935

*Total Horizontal Power Gain is the Elevation Gain Times the Azimuth Gain

Total Horizontal Power Gain =　**1.350**

*Total Vertical Power Gain is the Elevation Gain Times the Azimuth Gain

Total Vertical Power Gain =　**1.181**

===

ERP divided by Horizontal Power Gain equals Antenna Input Power

0.1　kW ERP　Divided by H Gain　1.350　equals　0.074　kW H Antenna Input Power

Antenna Input Power times Vertical Power Gain equals Vertical ERP

0.074　kW　Times V Gain　1.181　equals　0.087　kW V ERP

Maximum Value of the Vertical Component squared times the Maximum ERP equals the Vertical ERP

$(0.935)^2$　Times　0.10　Equals　0.087　kW Vertical ERP

NOTE: Calculating the ERP of the Vertical Component by two methods validates the total power gain calculations

Letterhead

Date: 9/18/14

To: Ramona Lewis, President, Hawkins Communications Company

From: KEVIN WESTERKAMP

Re: Alignment of transmitting antennas for WWHN FM FCC Construction Permit BMPED-20140725AAX

This will certified that the undersigned has examined the installation of the transmitting antennas for WWHN, Irondale, IL, as specified by the antenna manufacturer and the range test proof of performance.

The site was examined on September 16, 2014 and again on September 17 for final evaluation and found to be in compliance with the proposed specifications.

Sincerely,

Signature : Kevin M. Westerkamp
_____

Stamp

STATE OF ILLINOIS
★ KEVIN M. WESTERKAMP 2643 ★
LAND SURVEYOR

COUNTY OF COOK)
STATE OF ILLINOIS)
SS)

Leonard C Watson, first being duly sworn, deposes and says that he is a broadcast technical consultant located at Chicago, Illinois and that he is a Certified Senior Broadcast Engineer by the Society of Broadcast Engineers, holder of First Class Master certification by the National Association of Radio and Telecommunications Engineers, and holder of FCC General Class (formerly First Class) License with Radar Endorsement # PG 18 27223.

Further, he states that he has prepared and found acceptable by the commission multiple applications and reports for broadcast facilities.

Further, he states that, as consultant to WWHN-FM Radio, he has overseen the installation of the transmission system including the transmitter, transmission line, and the antenna system assembly and mounting according to Shively Labs S.O. 31967.

Further, he states that this information and data are true and accurate to the best of his knowledge and belief.
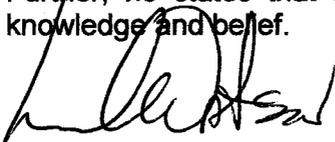
Leonard C. Watson, AFFIANT
Subscribed and sworn before me this the 25TH day of SEPT, 2014

Notary Public
(seal)
My Commission Expires:
9/29/14