iHeart MEDIA

2625 S Memorial Drive
Suite A
Tulsa, OK 74129

o 918.664.4581
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www.iHeartMedia.com
www.iHeartRadio.com
#iheartradio

July 13, 2017

COURIER DELIVERY

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, DC 20554

RE: CC Licenses, LLC (FRN No. 0014042816)
Application (Form 302-AM) for New License
WREC (AM), 600 kHz, Memphis, TN; Facility ID No. 58396

Dear Ms. Dortch:

CC Licenses, LLC, the licensee of the above-referenced station, hereby submits an original and four copies of an application for a new license, submitted on FCC Form 302-AM.

Also enclosed is Form 159, Remittance Advice, with credit card payment of the $1,505.00 filing fee.

Please stamp and return the additional copy of this submission in the enclosed Federal Express envelope. Please direct communications concerning this application to the undersigned.

Respectfully submitted,

iHeartMedia, Inc.

By: _____

Stephen G. Davis
Senior Vice President, Real Estate, Facilities & Corporate Development

cc: WREC (AM) Public Inspection File

Federal Communications Commission
Washington, D. C. 20554

Approved by OMB
3060-0627
Expires 01/31/98

FOR FCC USE ONLY

FCC 302-AM
APPLICATION FOR AM BROADCAST STATION LICENSE

(Please read instructions before filling out form.

FOR COMMISSION USE ONLY
FILE NO. BL-20170713AIO

ACCEPTED/FILED
JUL 13 2017
Federal Communications Commission
Office of the Secretary

SECTION I - APPLICANT FEE INFORMATION

1. PAYOR NAME (Last, First, Middle Initial)
CC LICENSES, LLC

MAILING ADDRESS (Line 1) (Maximum 35 characters)
2625 SOUTH MEMORIAL DRIVE

MAILING ADDRESS (Line 2) (Maximum 35 characters)
SUITE A

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
TULSA	OK	74129

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
918-664-4611	WREC	58396

2. A. Is a fee submitted with this application? ☐ Yes ☐ No

B. If No, indicate reason for fee exemption (see 47 C.F.R. Section

☐ Governmental Entity ☐ Noncommercial educational licensee ☐ Other (Please explain):

C. If Yes, provide the following information:

Enter in Column (A) the correct Fee Type Code for the service you are applying for. Fee Type Codes may be found in the "Mass Media Services Fee Filing Guide." Column (B) lists the Fee Multiple applicable for this application. Enter fee amount due in Column (C).

(A) FEE TYPE CODE	(B) FEE MULTIPLE	(C) FEE DUE FOR FEE TYPE CODE IN COLUMN (A)	FOR FCC USE ONLY
MMR	0001	$ 700.00	

To be used only when you are requesting concurrent actions which result in a requirement to list more than one Fee Type Code.

(A)	(B)	(C)	FOR FCC USE ONLY
MOR	0001	$ 805.00	

ADD ALL AMOUNTS SHOWN IN COLUMN C, AND ENTER THE TOTAL HERE. THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE.	TOTAL AMOUNT REMITTED WITH THIS APPLICATION	FOR FCC USE ONLY
	$ 1,505.00	

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT CC LICENSES, LLC		
MAILING ADDRESS 2625 SOUTH MEMORIAL DRIVE SUITE A		
CITY TULSA	STATE OK	ZIP CODE 74129

2. This application is for:

☑ Commercial ☐ Noncommercial

☑ AM Directional ☐ AM Non-Directional

Call letters	Community of License	Construction Permit File No.	Modification of Construction Permit File No(s).	Expiration Date of Last Construction Permit
WREC	MEMPHIS, TN			

3. Is the station now operating pursuant to automatic program test authority in accordance with 47 C.F.R. Section 73.1620?

☐ Yes ☐ No

If No, explain in an Exhibit.

Exhibit No.

4. Have all the terms, conditions, and obligations set forth in the above described construction permit been fully met?

☐ Yes ☐ No

If No, state exceptions in an Exhibit.

Exhibit No.

5. Apart from the changes already reported, has any cause or circumstance arisen since the grant of the underlying construction permit which would result in any statement or representation contained in the construction permit application to be now incorrect?

☐ Yes ☑ No

If Yes, explain in an Exhibit.

Exhibit No.

6. Has the permittee filed its Ownership Report (FCC Form 323) or ownership certification in accordance with 47 C.F.R. Section 73.3615(b)?

☐ Yes ☐ No

☐ Does not apply

If No, explain in an Exhibit.

Exhibit No.

7. Has an adverse finding been made or an adverse final action been taken by any court or administrative body with respect to the applicant or parties to the application in a civil or criminal proceeding, brought under the provisions of any law relating to the following: any felony; mass media related antitrust or unfair competition; fraudulent statements to another governmental unit; or discrimination?

☐ Yes ☑ No

If the answer is Yes, attach as an Exhibit a full disclosure of the persons and matters involved, including an identification of the court or administrative body and the proceeding (by dates and file numbers), and the disposition of the litigation. Where the requisite information has been earlier disclosed in connection with another application or as required by 47 U.S.C. Section 1.65(c), the applicant need only provide: (i) an identification of that previous submission by reference to the file number in the case of an application, the call letters of the station regarding which the application or Section 1.65 information was filed, and the date of filing; and (ii) the disposition of the previously reported matter.

Exhibit No.

8. Does the applicant, or any party to the application, have a petition on file to migrate to the expanded band (1605-1705 kHz) or a permit or license either in the existing band or expanded band that is held in combination (pursuant to the 5 year holding period allowed) with the AM facility proposed to be modified herein?

☐ Yes ☐ No

If Yes, provide particulars as an Exhibit.

Exhibit No.

The APPLICANT hereby waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because use of the same, whether by license or otherwise, and requests and authorization in accordance with this application. (See Section 304 of the Communications Act of 1934, as amended).

The APPLICANT acknowledges that all the statements made in this application and attached exhibits are considered material representations and that all the exhibits are a material part hereof and are incorporated herein as set out in full in

CERTIFICATION

1. By checking Yes, the applicant certifies, that, in the case of an individual applicant, he or she is not subject to a denial of federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. Section 862, or, in the case of a non-individual applicant (e.g., corporation, partnership or other unincorporated association), no party to the application is subject to a denial of federal benefits that includes FCC benefits pursuant to that section. For the definition of a "party" for these purposes, see 47 C.F.R. Section 1.2002(b).

☑ Yes ☐ No

2. I certify that the statements in this application are true, complete, and correct to the best of my knowledge and belief, and are made in good faith.

Name	Signature	
STEPHEN G DAVIS		
Title	Date	Telephone Number
SVP, RE, FACILITIES & CORP DEVELOPMENT	7-13-2017	918-664-4581

WILLFUL FALSE STATEMENTS ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION

FCC NOTICE TO INDIVIDUALS REQUIRED BY THE PRIVACY ACT AND THE PAPERWORK REDUCTION ACT

The solicitation of personal information requested in this application is authorized by the Communications Act of 1934, as amended. The Commission will use the information provided in this form to determine whether grant of the application is in the public interest. In reaching that determination, or for law enforcement purposes, it may become necessary to refer personal information contained in this form to another government agency. In addition, all information provided in this form will be available for public inspection. If information requested on the form is not provided, the application may be returned without action having been taken upon it or its processing may be delayed while a request is made to provide the missing information. Your response is required to obtain the requested authorization.

Public reporting burden for this collection of information is estimated to average 639 hours and 53 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, can be sent to the Federal Communications Commission, Records Management Branch, Paperwork Reduction Project (3060-0627), Washington, D. C. 20554. Do NOT send completed forms to this address.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), AND THE PAPERWORK REDUCTION ACT OF 1980, P.L. 96-511, DECEMBER 11, 1980, 44 U.S.C. 3507.

SECTION III - LICENSE APPLICATION ENGINEERING DATA

Name of Applicant
CC LICENSES, LLC

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
WREC		600	UNLIMITED	5.0	5.0

2. Station location

State	City or Town
TENNESSEE	MEMPHIS

3. Transmitter location

State	County	City or Town	Street address (or other identification)
TN	SHELBY	MEMPHIS	2531 N. Watkins St.

4. Main studio location

State	County	City or Town	Street address (or other identification)
TN	SHELBY	MEMPHIS	2650 Thousand Oaks Blvd

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

State	County	City or Town	Street address (or other identification)
TN	SHELBY	MEMPHIS	2650 Thousand Oaks Blvd

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.

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
10.39	10.39

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	50.0	-j7.0	-j7.0

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	0.0	0.0	1.0	1.0		
2	92.3	-7.8	1.056	.916		

Manufacturer and type of antenna monitor: Potomac Instruments AM-19

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.
Tapered, triangular, self supporting.	2 ea. 126.2	2 ea. 127.1	2 ea. 128	Exhibit No. Engineering Exhibit

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	West Longitude
35 ° 11 ' 41 "	90 ° 00 ' 36 "

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.

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

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

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

Replacement of directional antenna phasing and coupling system

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 (check appropriate box below)
Jacob Wyatt	Jacob Wyatt
Address (include ZIP Code)	Date
113 West 4th St Ogallala, NE 69153	6-27-2017
	Telephone No. (Include Area Code)
	308-289-1872

☑ Technical Director ☐ Registered Professional Engineer

☐ Chief Operator ☐ Technical Consultant

☐ Other (specify)

APPLICATION FOR LICENSE INFORMATION

RADIO STATION WREC

CC LICENSES, LLC

MEMPHIS, TENNESSEE

FID 58396

600 KHZ 5.0KW – U, DA2

June 27, 2017

APPLICATION FOR LICENSE INFORMATION
RADIO STATION WREC
MEMPHIS, TENNESSEE

600 KHZ 5.0KW – U, DA2

Table of Contents

EXECUTIVE SUMMARY

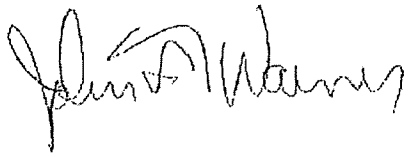
This engineering exhibit has been prepared in support of an application for licensing for radio station WREC, Memphis Tennessee, Facility ID #58396. Measurements included comply with the requirements of Rule Section 73.151c.

The towers and ground system remain as described in current license BL-20100513ALV. The antenna tuning units and phasing system have been replaced with new components of modern design and the system adjusted to operating parameters computed using the Moment Method process as described in Rule Section 73.151c. Mininec Broadcast Professional version 14.6 by EM Scientific Inc. was used in the analysis.

The system has been adjusted to produce directional antenna parameters within +/-5% in ratio and +/-3 degrees in phase of the modeled values as prescribed in the Rules.

All measurements contained in this report were made by Mr. Jacob Wyatt of the iHeart Media Corporate Engineering Staff or the undersigned.

Please refer any questions regarding this report to:



John F. Warner
johnwarner@iheartmedia.com
443-255-5299

Analysis of Tower Impedance Measurements to Verify Method of Moments Model

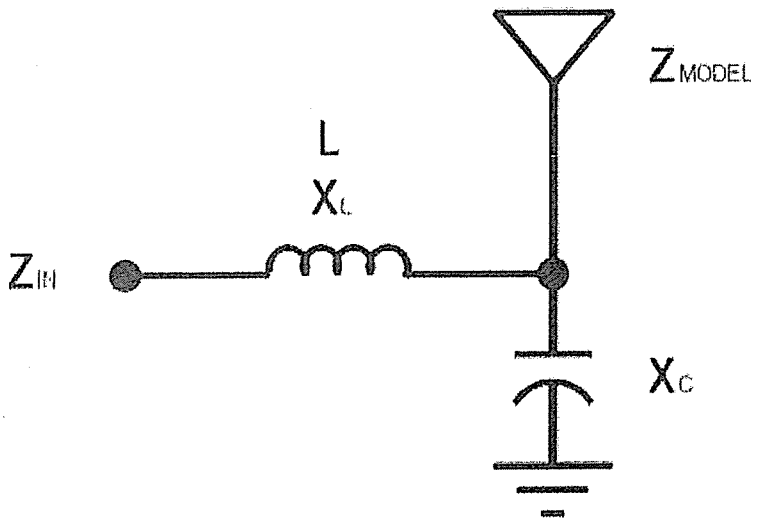
Impedance measurements were made of the individual towers with the other tower bases open. Measurements were made using a Hewlett-Packard 8753ES network analyzer and a Tunwall Radio directional coupler in a calibrated measurement system. Measurements were made immediately adjacent to the toroidal antenna sampling transformers, inside the antenna coupling units. These measured values were related to the modeled values obtained using the WCAP nodal analysis package. Heights of the towers were adjusted as permitted by Rule Section 73.151c(1). Towers are triangular, self-supporting, each leg fed from a common point (spider fed). The tower radii were modeled at their actual values. The towers were segmented so that each segment is less than ten (10) degrees in length.

Tower	Actual Height Degrees	Model Height Degrees	Model Percent of Height
1*	90.9	93.73	103.1
2*	90.9	98.28	108.1

*Towers incorporate an additional 4.1 degrees of top loading for a total of 95 degrees. Top loading consists of a 27 foot triangular cap affixed to the top each tower. Top loading remains unchanged and as previously licensed.

Method of Moments Model Details for Towers Driven Individually

The model was verified by comparison of modeled to measured tower impedances. The tower resistance and reactance were measured immediately adjacent to the toroidal base sampling transformers, inside the antenna tuning unit cabinets. The measured and modeled impedances were correlated using the Westberg Consulting WCAP Pro software program. WCAP is based on the SPICE nodal analysis program. The shunt capacitive reactance of the tower base insulator is represented in the drawing below as Xc. The series inductive reactance of the tower feed conductor is represented as Xl. Z model represents the modeled impedance of the tower and Zin represents the impedance measured at the sampling point. In the following WCAP tabulations, the modeled impedance is represented between nodes 2-0. The measured impedance is represented between nodes 3-0. Node 0 represents ground. The calculated reference point impedances appear under the "TO NODE IMPEDANCE" columns of the WCAP calculations, following the insignificantly short transmission line (TL 1-3) that was included in series with the drive current sources (I 0-1) to provide calculation points for the impedances.

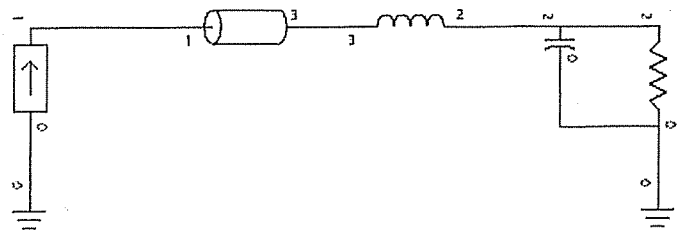


36.03+j13.263

Tower	L (uh)	Xl (+j)	Xc (-j)	Z Modeled	Z in Modeled	Z in Measured
1	5.6	21.11	-2122	35.88 –j8.14	35.6 +j12.4	36 +j12.5
2	2.65	10.0	-2122	44.43 +j5.52	44.64 +j14.59	44.6 +j14.6

44.3+j16

WCAP – **WREC Tower 1 Driven, others open**



WCAP OUTPUT AT FREQUENCY: 0.600 MHz

NODE VOLTAGES
Node: 1 3769.5271 ∠ 19.2104° V
Node: 2 3664.6013 ∠ -13.7473° V
Node: 3 3769.5207 ∠ 19.2101° V

	WCAP PART		CURRENT IN		CURRENT OUT	
TL	1→3	50.00000000	100.00 ∠	0.001° A	100.00 ∠	-0.000° A

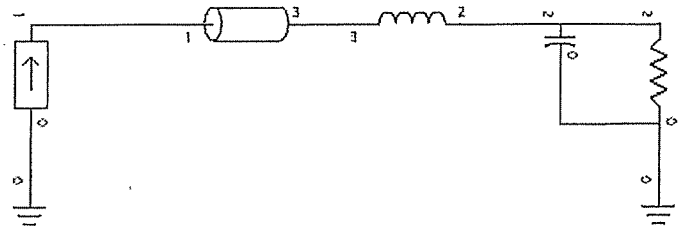
	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
R	2→0	35.88000000	3664.60 ∠	-13.747° V	99.60 ∠	-0.965° A
C	2→0	0.00012500	3664.60 ∠	-13.747° V	1.73 ∠	76.253° A
L	3→2	5.60000000	2111.15 ∠	90.000° V	100.00 ∠	-0.000° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
R	2→0	35.88000000	35.88 – j	8.140	0.00 + j	0.000
C	2→0	0.00012500	0.00 – j	2122.066	0.00 + j	0.000
L	3→2	5.60000000	35.60 + j	12.403	35.60 – j	8.708
TL	1→3	50.00000000	35.60 + j	12.403	**35.60 + j**	**12.403**

	WCAP PART		VSWR
TL	1→3	50.00000000	1.5633

WCAP INPUT DATA:
0.6000 0.00000000 0
R 35.88000000 2 0 -8.14000000
C 0.00012500 2 0
L 5.60000000 3 2 0.00000000
TL 50.00000000 1 3 100.00000000 0.00100000 0.00000000
I 100.00000000 0 1 0.00000000

WCAP – **WREC Tower 2 driven, others open**



WCAP OUTPUT AT FREQUENCY: 0.600 MHz

NODE VOLTAGES
Node: 1 4696.5401 ∠ 18.0956° V
Node: 2 4487.8519 ∠ 5.8794° V
Node: 3 4696.5341 ∠ 18.0954° V

	WCAP PART		CURRENT IN		CURRENT OUT	
TL	1→3	50.00000000	100.00 ∠	-0.000° A	100.00 ∠	-0.000° A

	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
R	2→0	44.43000000	4487.85 ∠	5.879° V	100.24 ∠	-1.203° A
C	2→0	0.00012500	4487.85 ∠	5.879° V	2.11 ∠	95.879° A
L	3→2	2.65000000	999.03 ∠	90.000° V	100.00 ∠	-0.000° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
R	2→0	44.43000000	44.43 + j	5.520	0.00 + j	0.000
C	2→0	0.00012500	0.00 – j	2122.066	0.00 + j	0.000
L	3→2	2.65000000	44.64 + j	14.588	44.64 + j	4.597
TL	1→3	50.00000000	44.64 + j	14.588	**44.64 + j**	**14.588**

	WCAP PART		VSWR
TL	1→3	50.00000000	1.3874

WCAP INPUT DATA:
0.6000 0.00000000 0
R 44.43000000 2 0 5.52000000
C 0.00012500 2 0
L 2.65000000 3 2 0.00000000
TL 50.00000000 1 3 100.00000000 0.00100000 0.00000000
I 100.00000000 0 1 0.00000000

Tower 1 driven, others open

IMPEDANCE
normalization = 50.

Freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
.6	35.877	-8.1425	36.789	347.2	1.4661	-14.471	-.15795

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	3.81	2
		0	0	26.47		
2	none	0	0	26.47	2.06	2
		0	0	52.94		
3	none	0	0	52.94	.305	6
		0	0	93.73		
4	none	0	0	93.73	.0254	2
		3.42	0	93.73		
5	none	0	0	93.73	.0254	2
		3.42	120.	93.73		
6	none	0	0	93.73	.0254	2
		3.42	240.	93.73		
7	none	3.42	0	93.73	.005	2
		3.42	120.	93.73		
8	none	3.42	120.	93.73	.005	2
		3.42	240.	93.73		
9	none	3.42	240.	93.73	.005	2
		3.42	0	93.73		
10	none	90.	24.	0	3.81	2
		90.	24.	27.76		
11	none	90.	24.	27.76	2.06	2
		90.	24.	55.51		
12	none	90.	24.	55.51	.305	6
		90.	24.	98.28		
13	none	90.	24.	98.28	.0254	2
		93.13	23.14	98.28		
14	none	90.	24.	98.28	.0254	2
		89.7	26.17	98.28		
15	none	90.	24.	98.28	.0254	2
		87.26	22.68	98.28		
16	none	93.13	23.14	98.28	.005	2
		89.7	26.17	98.28		
17	none	89.7	26.17	98.28	.005	2
		87.26	22.68	98.28		
18	none	87.26	22.68	98.28	.005	2
		93.13	23.14	98.28		

Number of wires = 18
current nodes = 50

Individual wires	minimum wire	minimum value	maximum wire	maximum value

	wire	value	wire	value
Individual wires	14	1.70798	10	13.88
segment length	7	5.E-03	1	3.81
radius				

ELECTRICAL DESCRIPTION

Frequencies (MHz)		no. of steps	segment length (wavelengths) minimum	maximum
	frequency			
no.	lowest	step		
1	.6	0	1	4.74E-03 .0385556

Sources					
source	node	sector	magnitude	phase	type
1	26	1	1.	0	voltage

Lumped loads		resistance	reactance	inductance	capacitance	
passive load circuit	node	(ohms)	(ohms)	(mH)	(uF)	
1	1	0	-2,122.	0	0	0

Tower 2 driven, others open

IMPEDANCE
normalization = 50.

Freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 26, sector 1							
.6	44.431	5.5211	44.772	7.1	1.1808	-21.628	-3.E-02

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	3.81	2
		0	0	26.47		
2	none	0	0	26.47	2.06	2
		0	0	52.94		
3	none	0	0	52.94	.305	6
		0	0	93.73		
4	none	0	0	93.73	.0254	2
		3.42	0	93.73		
5	none	0	0	93.73	.0254	2
		3.42	120.	93.73		
6	none	0	0	93.73	.0254	2
		3.42	240.	93.73		
7	none	3.42	0	93.73	.005	2
		3.42	120.	93.73		
8	none	3.42	120.	93.73	.005	2
		3.42	240.	93.73		
9	none	3.42	240.	93.73	.005	2
		3.42	0	93.73		
10	none	90.	24.	0	3.81	2
		90.	24.	27.76		
11	none	90.	24.	27.76	2.06	2
		90.	24.	55.51		
12	none	90.	24.	55.51	.305	6
		90.	24.	98.28		
13	none	90.	24.	98.28	.0254	2
		93.13	23.14	98.28		
14	none	90.	24.	98.28	.0254	2
		89.7	26.17	98.28		
15	none	90.	24.	98.28	.0254	2
		87.26	22.68	98.28		
16	none	93.13	23.14	98.28	.005	2
		89.7	26.17	98.28		
17	none	89.7	26.17	98.28	.005	2
		87.26	22.68	98.28		
18	none	87.26	22.68	98.28	.005	2
		93.13	23.14	98.28		

Number of wires = 18
current nodes = 50

minimum maximum

CURRENT NODES

wire	coordinates (degrees) X	Y	Z
1	0	0	0
1	0	0	13.235
2	0	0	26.47
2	0	0	39.705
3	0	0	52.94
3	0	0	59.7383
3	0	0	66.5367
3	0	0	73.335
3	0	0	80.1333
3	0	0	86.9317
4	0	0	93.73
4	1.71	0	93.73
5	0	-1.4809	93.73
5	-.855	0	93.73
6	0	1.4809	93.73
6	-.855	0	93.73
7	3.42	-1.4809	93.73
7	.855	-2.96181	93.73
7	-1.71	-2.96181	93.73
8	-1.71	-2.38E-07	93.73
8	-1.71	2.96181	93.73
8	-1.71	2.96181	93.73
9	-1.71	1.4809	93.73
9	.855	0	0
9	3.42	-36.6063	13.88
10	82.2191	-36.6063	27.76
10	82.2191	-36.6063	41.635
11	82.2191	-36.6063	55.51
11	82.2191	-36.6063	62.6383
12	82.2191	-36.6063	69.7667
12	82.2191	-36.6063	76.895
12	82.2191	-36.6063	84.0233
12	82.2191	-36.6063	91.1517
12	82.2191	-36.6063	98.28
12	82.2191	-36.6063	98.28
13	82.2191	-36.6022	98.28
13	83.9283	-36.6063	98.28
14	82.2191	-38.0836	98.28
14	81.362	-36.6063	98.28
15	82.2191	-35.1262	98.28
15	81.3658	-36.5982	98.28
16	85.6374	-38.0795	98.28
16	83.0711	-39.5609	98.28
16	80.5048	-39.5609	98.28
17	80.5048	-36.6035	98.28
17	80.5086	-33.646	98.28
17	80.5124	-33.646	98.28
18	80.5124	-35.1221	98.28
18	83.0749	-36.5982	
18	85.6374		

connections end1	end2	node no.
GND	1	1
1	END	2
1	2	3
2	END	4
2	3	5
3	3	6
3	3	7
3	3	8
3	3	9
3	END	10
3	4	11
4	END	12
3	5	13
5	END	14
3	6	15
6	END	16
4	7	17
7	7	18
7	-5	19
5	8	20
8	8	21
8	-6	22
6	9	23
9	9	24
9	-4	25
GND	10	26
10	END	27
10	11	28
11	END	29
11	12	30
12	12	31
12	12	32
12	12	33
12	12	34
12	END	35
12	13	36
13	END	37
12	14	38
14	END	39
12	15	40
15	END	41
13	16	42
16	16	43
16	-14	44
14	17	45
17	17	46
17	-15	47
15	18	48
18	18	49
18	-13	50

Derivation of Operating Parameters

Directional Array

Following verification of the moment method model of the individual array elements, by comparison of the measured and modeled base impedances, directional antenna array base parameters were calculated. Calculations were made to determine the complex voltage sources which when applied to the base of each array element produce current moment sums which when normalized, equate to the theoretical field parameters of the authorized directional pattern. Using these voltages, the tower currents were calculated. The currents at the ATU sampling points were related to those of the moment method model by using the WCAP Pro nodal analysis program from Westberg Consulting. The assumptions that were used for the single tower calculations were used in the directional array case as well. In the following WCAP calculations node 3 represents the reference point, node 2 represents the tower feed point, and node 0 represents ground. The tower operating impedance is represented from node 2 to ground (R 2-0). Additionally, a single tower lighting choke was installed on each tower and is represented from node 2 to ground (L 2-0). The current magnitude and phases at the sample point is represented following the insignificantly short transmission line (TL 1-3). The value shown at TL 1-3 has been rounded by the program. The actual current values shown as "I" in the "WCAP INPUT DATA" represent the values before rounding and were used in the calculation of antenna monitor amplitude and phase indications to yield greater accuracy.

In so much as the sample lines are equal in length and the sample torroids responses are identical, the antenna monitor amplitudes and phases have been calculated directly from the reference point currents and phases.

Calculated Nighttime Parameters

Tower	Model Pulse	Model Current Magnitude At Torroid, Amps	Model Current Phase at Torroid, Degrees	Modeled Antenna Monitor Ratio	Modeled Antenna Monitor Phase, Degrees
1	1	7.980	+11.38	1.000	0
2	26	8.428	+113.71	1.056	102.3

Calculated Daytime Parameters

Tower	Model Pulse	Model Current Magnitude At Torroid, Amps	Model Current Phase at Torroid, Degrees	Modeled Antenna Monitor Ratio	Modeled Antenna Monitor Phase, Degrees
1	1	6.824	+12.92	1.000	0
2	26	6.250	+15.08	0.916	2.2

Corrected Nighttime Parameters*

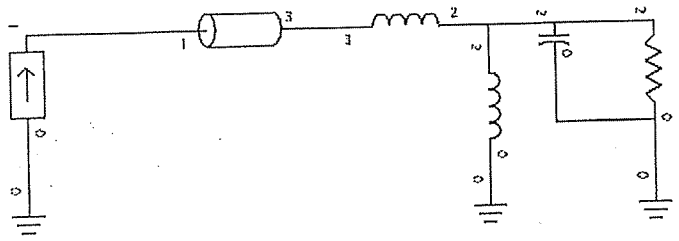
Tower	Model Pulse	Model Current Magnitude At Torroid, Amps	Model Current Phase at Torroid, Degrees	Modeled Antenna Monitor Ratio	Modeled Antenna Monitor Phase, Degrees
1	1	7.98	+11.38	1.000	0
2	26	8.428	+113.71	1.056	92.3

Corrected Daytime Parameters*

Tower	Model Pulse	Model Current Magnitude At Torroid, Amps	Model Current Phase at Torroid, Degrees	Modeled Antenna Monitor Ratio	Modeled Antenna Monitor Phase, Degrees
1	1	6.824	+12.92	1.000	0
2	26	6.250	+15.08	0.916	-7.8

***These parameters reflect the addition of a removable jumper consisting of an additional 10.0° of sampling line connected to the tower 2 sampling line to move the tower 2 daytime phase reading away from the vicinity of 0° to improve accuracy and reduce susceptibility to interference per the antenna monitor manufacturer.**

WCAP Circuit Diagram



WCAP – WREC T1 NIGHT

WCAP OUTPUT AT FREQUENCY: 0.600 MHz

NODE VOLTAGES
Node: 1 537.5939 ∠ 44.6645° V
Node: 2 466.8843 ∠ 27.1079° V
Node: 3 537.5931 ∠ 44.6644° V

WCAP PART		CURRENT IN	CURRENT OUT
TL	1→3 50.00000000	7.98 ∠ 11.380° A	7.98 ∠ 11.380° A

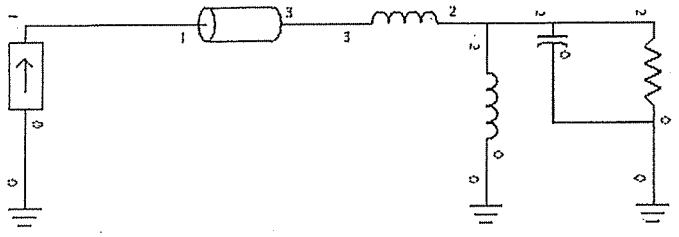
WCAP PART		BRANCH VOLTAGE	BRANCH CURRENT
R	2→0 56.76000000	466.88 ∠ 27.108° V	**7.95 ∠ 12.201°** A
C	2→0 0.00012500	466.88 ∠ 27.108° V	0.22 ∠ 117.108° A
L	3→2 5.60000000	168.47 ∠ 101.380° V	7.98 ∠ 11.380° A
L	2→0 366.00000000	466.88 ∠ 27.108° V	0.34 ∠ -62.892° A

WCAP PART		FROM IMPEDANCE	TO IMPEDANCE
R	2→0 56.76000000	56.76 + j 15.110	0.00 + j 0.000
C	2→0 0.00012500	0.00 – j 2122.066	0.00 + j 0.000
L	3→2 5.60000000	56.32 + j 36.971	56.32 + j 15.860
TL	1→3 50.00000000	56.32 + j 36.971	56.32 + j 36.971
L	2→0 366.00000000	-0.01 + j 1379.787	0.00 + j 0.000

WCAP PART		VSWR
TL	1→3 50.00000000	1.999

WCAP INPUT DATA:
0.6000 0.00000000 0
R 56.76000000 2 0 15.11000000
C 0.00012500 2 0
L 5.60000000 3 2 0.00000000
TL 50.00000000 1 3 100.00000000 0.00100000 0.00000000
I **7.98000000 0 1 11.38000000**
L 366.00000000 2 0 0.00000000

WCAP Circuit Diagram



WCAP – WREC T2 NIGHT

WCAP OUTPUT AT FREQUENCY: 0.600 MHz

NODE VOLTAGES
Node: 1 170.7872 ∠ 124.5490° V
Node: 2 175.6399 ∠ 96.4605° V
Node: 3 170.7869 ∠ 124.5485° V

WCAP PART		CURRENT IN	CURRENT OUT
TL	1→3 50.00000000	8.43 ∠ 113.710° A	8.43 ∠ 113.710° A

WCAP PART		BRANCH VOLTAGE	BRANCH CURRENT
R	2→0 19.84000000	175.64 ∠ 96.461° V	**8.44 ∠ 113.999°** A
C	2→0 0.00012500	175.64 ∠ 96.461° V	0.08 ∠ -173.539° A
L	3→2 2.65000000	84.20 ∠ -156.290° V	8.43 ∠ 113.710° A
L	2→0 366.00000000	175.64 ∠ 96.461° V	0.13 ∠ 6.461° A

WCAP PART		FROM IMPEDANCE	TO IMPEDANCE
R	2→0 19.84000000	19.84 – j 6.270	0.00 + j 0.000
C	2→0 0.00012500	0.00 – j 2122.066	0.00 + j 0.000
L	3→2 2.65000000	19.90 + j 3.811	19.90 – j 6.180
TL	1→3 50.00000000	19.90 + j 3.811	19.90 + j 3.811
L	2→0 366.00000000	0.00 + j 1379.787	0.00 + j 0.000

WCAP PART		VSWR
TL	1→3 50.00000000	2.5295

WCAP INPUT DATA:
0.6000 0.00000000 0
R 19.84000000 2 0 -6.27000000
C 0.00012500 2 0
L 2.65000000 3 2 0.00000000
TL 50.00000000 1 3 100.00000000 0.00100000 0.00000000
I **8.42800000 0 1 113.71000000**
L 366.00000000 2 0 0.00000000

NIGHT TIME MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = .6 MHz

tower	field ratio magnitude	phase (deg)
1	1.	0
2	1.	109.

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	466.888	27.1	7.94865	12.2
26	175.653	96.5	8.44122	114.

Sum of square of source currents = 268.871
Total power = 5,000. Watts

TOWER ADMITTANCE MATRIX

admittance	real (mhos)	imaginary (mhos)
Y(1, 1)	.0219097	-.00461534
Y(1, 2)	-.00451895	.0138
Y(2, 1)	-.00451967	.013801
Y(2, 2)	.015711	-.00966919

TOWER IMPEDANCE MATRIX

impedance	real (ohms)	imaginary (ohms)
Z(1, 1)	36.263	-8.26354
Z(1, 2)	17.5814	-23.4114
Z(2, 1)	17.5793	-23.41
Z(2, 2)	44.8163	5.40511

IMPEDANCE
normalization = 50.

Freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
.6	56.761	15.112	58.738	14.9	1.3628	-16.276	-.10361
source = 2; node 26, sector 1							
.6	19.842	-6.2712	20.809	342.5	2.5669	-7.1451	-.9311

CURRENT MOMENTS(amp-degrees) rms

Frequency = .6 MHz
Input power = 5,000. Watts

wire	magnitude	phase (deg)	vertical current moment magnitude	phase (deg)
1	412.565	4.8	412.565	4.8
2	345.917	358.2	345.917	358.2
3	284.522	355.1	284.522	355.1
4	2.48542	353.9	0	0
5	2.48074	353.9	0	0
6	2.48378	354.	0	0

7	3.86E-03	59.3	0	0
8	3.62E-03	132.7	0	0
9	6.06E-03	251.8	0	0
10	433.951	111.2	433.951	111.2
11	339.763	108.2	339.763	108.2
12	267.266	106.4	267.266	106.4
13	2.12661	105.5	0	0
14	2.12566	105.6	0	0
15	2.07135	105.6	0	0
16	3.93E-03	148.7	0	0
17	.0342004	108.9	0	0
18	.0370459	292.6	0	0

Medium wave array vertical current moment (amps-degrees), when normalized, equals the theoretical pattern parameters in phase and magnitude.

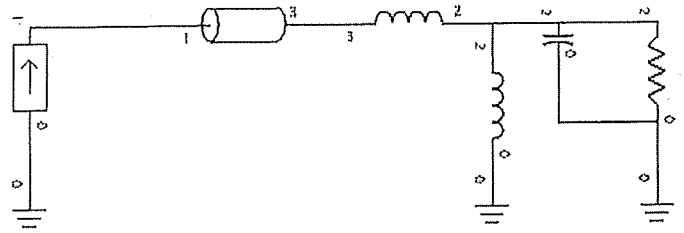
Tower	magnitude	phase (deg)
1	1,040.34	0.0
2	1,040.34	109.

CURRENT rms
Frequency = .6 MHz
Input power = 5,000. Watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	7.94862	12.2	7.76976	1.67671
2	0	0	13.235	8.14699	3.5	8.13152	.501839
END	0	0	26.47	7.61568	0.0	7.61568	9.36E-04
2J1	0	0	26.47	7.61568	0.0	7.61568	9.36E-04
4	0	0	39.705	6.81852	358.	6.81453	-.233144
END	0	0	52.94	5.38546	356.1	5.37318	-.363391
2J2	0	0	52.94	5.38546	356.1	5.37318	-.363391
6	0	0	59.7383	4.93771	355.7	4.92391	-.368887
7	0	0	66.5367	4.35439	355.3	4.33959	-.358782
8	0	0	73.335	3.6772	354.9	3.6624	-.329672
9	0	0	80.1333	2.91944	354.5	2.90586	-.281325
10	0	0	86.9317	2.09259	354.1	2.08161	-.214099
END	0	0	93.73	1.29783	353.9	1.29052	-.137579
2J3	0	0	93.73	.432937	353.8	.430419	-.0466189
12	1.71	0	93.73	.374718	353.9	.372564	-.0401165
END	3.42	0	93.73	.298579	353.9	.296894	-.0316756
2J3	0	0	93.73	.432226	353.9	.4298	-.0457265
14	-.855	-1.4809	93.73	.374015	354.	.371935	-.0393883
END	-1.71	-2.96181	93.73	.297904	353.9	.29624	-.0314384
2J3	0	0	93.73	.432673	354.	.430302	-.0452336
16	-.855	1.4809	93.73	.374468	354.	.372431	-.0390081
END	-1.71	2.96181	93.73	.298368	354.	.296713	-.031376
2J4	3.42	0	93.73	.149315	353.8	.148442	-.016128
18	.855	-1.4809	93.73	4.62E-04	67.6	1.76E-04	4.27E-04
END	-1.71	-2.96181	93.73	.149022	173.7	-.148116	.0164149
2J5	-1.71	-2.96181	93.73	.148885	354.2	.148125	-.0150235
21	-1.71	-2.38E-07	93.73	3.78E-04	122.7	-2.04E-04	3.18E-04
END	-1.71	2.96181	93.73	.149346	174.1	-.14856	.0153008
2J6	-1.71	2.96181	93.73	.149023	353.8	.148154	-.0160752
24	.855	1.4809	93.73	7.48E-04	256.4	-1.76E-04	-7.27E-04

END	3.42	0	93.73	.149265	174.	-.148453	.0155475
GND	82.2191	-36.6063	0	8.44122	114.	-3.43688	7.70987
27	82.2191	-36.6063	13.88	8.07315	110.7	-2.85723	7.55063
END	82.2191	-36.6063	27.76	7.28388	109.1	-2.38545	6.88219
2J10	82.2191	-36.6063	27.76	7.28388	109.1	-2.38545	6.88219
29	82.2191	-36.6063	41.635	6.37452	108.1	-1.98143	6.05875
END	82.2191	-36.6063	55.51	4.91963	107.	-1.44017	4.70411
2J11	82.2191	-36.6063	55.51	4.91963	107.	-1.44017	4.70411
31	82.2191	-36.6063	62.6383	4.48101	106.8	-1.29281	4.29046
32	82.2191	-36.6063	69.7667	3.92136	106.5	-1.11314	3.76005
33	82.2191	-36.6063	76.895	3.28337	106.2	-.917103	3.15269
34	82.2191	-36.6063	84.0233	2.58074	106.	-.709603	2.48127
35	82.2191	-36.6063	91.1517	1.82464	105.7	-.494381	1.75639
END	82.2191	-36.6063	98.28	1.10184	105.6	-.295577	1.06146
2J12	82.2191	-36.6063	98.28	.369845	105.5	-.0986704	.356441
37	83.9283	-36.6022	98.28	.320798	105.5	-.0857346	.309129
END	85.6374	-36.5982	98.28	.256318	105.6	-.0687167	.246935
2J12	82.2191	-36.6063	98.28	.370019	105.6	-.0993195	.356441
39	81.362	-38.0836	98.28	.320927	105.6	-.0862493	.30912
END	80.5048	-39.5609	98.28	.256212	105.6	-.0688233	.246796
2J12	82.2191	-36.6063	98.28	.361979	105.6	-.0975871	.348577
41	81.3658	-35.1262	98.28	.312782	105.7	-.0844031	.301179
END	80.5124	-33.646	98.28	.247773	105.6	-.0666402	.238644
2J13	85.6374	-36.5982	98.28	.126634	105.5	-.0337414	.122056
43	83.0711	-38.0795	98.28	4.66E-04	151.1	-4.08E-04	2.25E-04
END	80.5048	-39.5609	98.28	.126303	285.3	.0334023	-.121806
2J14	80.5048	-39.5609	98.28	.129912	105.8	-.035421	.12499
46	80.5086	-36.6035	98.28	3.01E-03	110.3	-1.04E-03	2.82E-03
END	80.5124	-33.646	98.28	.124146	285.7	.0336977	-.119485
2J15	80.5124	-33.646	98.28	.123629	105.5	-.0329425	.119159
49	83.0749	-35.1221	98.28	3.35E-03	295.3	1.43E-03	-3.03E-03
END	85.6374	-36.5982	98.28	.129685	285.6	.0349753	-.124879

WCAP Circuit Diagram



WCAP – WREC T1 DAY

WCAP OUTPUT AT FREQUENCY: 0.600 MHz

NODE VOLTAGES
Node: 1 371.5781 ∠ 5.1404° V
Node: 2 416.3139 ∠ -14.9112° V
Node: 3 371.5783 ∠ 5.1402° V

	WCAP PART		CURRENT IN		CURRENT OUT	
TL	1→3	50.00000000	6.82 ∠	12.920° A	6.82 ∠	12.920° A

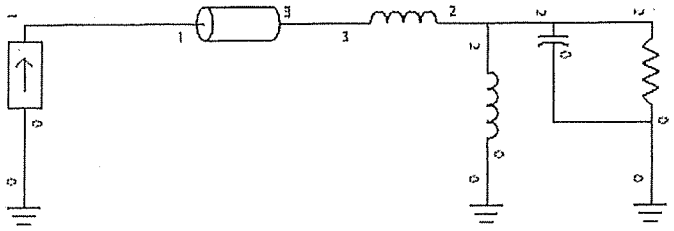
	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
R	2→0	53.17000000	416.31 ∠	-14.911° V	**6.87 ∠**	**13.698° A**
C	2→0	0.00012500	416.31 ∠	-14.911° V	0.20 ∠	75.089° A
L	3→2	5.60000000	144.06 ∠	102.920° V	6.82 ∠	12.920° A
L	2→0	366.00000000	416.31 ∠	-14.911° V	0.30 ∠	-104.911° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
R	2→0	53.17000000	53.17 – j	29.000	0.00 + j	0.000
C	2→0	0.00012500	0.00 – j	2122.066	0.00 + j	0.000
L	3→2	5.60000000	53.95 – j	7.371	53.95 – j	28.482
TL	1→3	50.00000000	53.95 – j	7.371	53.95 – j	7.371
L	2→0	366.00000000	0.00 + j	1379.787	0.00 + j	0.000

	WCAP PART		VSWR
TL	1→3	50.00000000	1.1745

WCAP INPUT DATA:
0.6000 0.00000000 0
R 53.17000000 2 0 -29.00000000
C 0.00012500 2 0
L 5.60000000 3 2 0.00000000
TL 50.00000000 1 3 100.00000000 0.00100000 0.00000000
I **6.82400000 0 1 12.92000000**
L 366.00000000 2 0 0.00000000

WCAP Circuit Diagram



WCAP – WREC T2 DAY

WCAP OUTPUT AT FREQUENCY: 0.600 MHz

NODE VOLTAGES
Node: 1 402.8640 ∡ 6.1017° V
Node: 2 417.1922 ∡ -2.3997° V
Node: 3 402.8642 ∡ 6.1015° V

	WCAP PART		CURRENT IN		CURRENT OUT	
TL	1→3	50.00000000	6.25 ∡	15.080° A	6.25 ∡	15.080° A

	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
R	2→0	63.01000000	417.19 ∡	-2.400° V	**6.28 ∡**	**16.000° A**
C	2→0	0.00012500	417.19 ∡	-2.400° V	0.20 ∡	87.600° A
L	3→2	2.65000000	62.44 ∡	105.080° V	6.25 ∡	15.080° A
L	2→0	366.00000000	417.19 ∡	-2.400° V	0.30 ∡	-92.400° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
R	2→0	63.01000000	63.01 – j	20.960	0.00 + j	0.000
C	2→0	0.00012500	0.00 – j	2122.066	0.00 + j	0.000
L	3→2	2.65000000	63.67 – j	10.059	63.67 – j	20.050
TL	1→3	50.00000000	63.67 – j	10.059	63.67 – j	10.059
L	2→0	366.00000000	0.00 + j	1379.787	0.00 + j	0.000

	WCAP PART		VSWR
TL	1→3	50.00000000	1.3494

WCAP INPUT DATA:
0.6000 0.00000000 0
R 63.01000000 2 0 -20.96000000
C 0.00012500 2 0
L 2.65000000 3 2 0.00000000
TL 50.00000000 1 3 100.00000000 0.00100000 0.00000000
I **6.25000000 0 1 15.08000000**
L 366.00000000 2 0 0.00000000

DAY TIME MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = .6 MHz

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

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	416.348	345.1	6.87411	13.7
26	417.221	357.6	6.28289	16.

Sum of square of source currents = 173.456
Total power = 5,000. Watts

TOWER ADMITTANCE MATRIX

admittance	real (mhos)	imaginary (mhos)
Y(1, 1)	.0219097	-.00461534
Y(1, 2)	-.00451895	.0138
Y(2, 1)	-.00451967	.013801
Y(2, 2)	.015711	-.00966919

TOWER IMPEDANCE MATRIX

impedance	real (ohms)	imaginary (ohms)
Z(1, 1)	36.263	-8.26354
Z(1, 2)	17.5814	-23.4114
Z(2, 1)	17.5793	-23.41
Z(2, 2)	44.8163	5.40511

IMPEDANCE
normalization = 50.

Freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
.6	53.174	-29.	60.568	331.4	1.748	-11.302	-.33435
source = 2; node 26, sector 1							
.6	63.012	-20.958	66.406	341.6	1.5466	-13.366	-.20481

CURRENT MOMENTS(amp-degrees) rms

Frequency = .6 MHz
Input power = 5,000. Watts

wire	magnitude	phase (deg)	vertical current moment magnitude	phase (deg)
1	321.411	6.1	321.411	6.1
2	244.24	357.6	244.24	357.6
3	192.44	352.9	192.44	352.9
4	1.65231	351.	0	0
5	1.65207	351.	0	0

6	1.65601	351.	0	0
7	3.72E-03	342.5	0	0
8	3.88E-04	247.9	0	0
9	5.28E-03	161.	0	0
10	315.169	7.	315.169	7.
11	246.983	357.3	246.983	357.3
12	196.882	352.2	196.882	352.2
13	1.58405	350.1	0	0
14	1.57887	350.1	0	0
15	1.53542	350.1	0	0
16	2.02E-03	153.5	0	0
17	.0224511	351.1	0	0
18	.0205331	172.8	0	0

Medium wave array vertical current moment (amps-degrees), when normalized, equals the theoretical pattern parameters in phase and magnitude.

Tower	magnitude	phase (deg)
1	754.608	360.
2	754.604	0.0

CURRENT rms
Frequency = .6 MHz
Input power = 5,000. Watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	6.87409	13.7	6.67791	1.63056
2	0	0	13.235	6.22328	4.5	6.20377	.492342
END	0	0	26.47	5.5197	0.0	5.5197	4.47E-03
2J1	0	0	26.47	5.5197	0.0	5.5197	4.47E-03
4	0	0	39.705	4.80144	357.3	4.79616	-.225244
END	0	0	52.94	3.69119	354.5	3.67404	-.355371
2J2	0	0	52.94	3.69119	354.5	3.67404	-.355371
6	0	0	59.7383	3.36504	353.8	3.3456	-.361179
7	0	0	66.5367	2.94985	353.2	2.92879	-.351825
8	0	0	73.335	2.47736	352.5	2.45611	-.323791
9	0	0	80.1333	1.95702	351.9	1.93735	-.27674
10	0	0	86.9317	1.39665	351.3	1.38063	-.210932
END	0	0	93.73	.863934	351.	.8532	-.135765
2J3	0	0	93.73	.287652	351.	.284096	-.0450912
12	1.71	0	93.73	.249093	351.	.246044	-.0388507
END	3.42	0	93.73	.198702	351.	.196259	-.0310656
2J3	0	0	93.73	.287789	351.	.284212	-.0452369
14	-.855	-1.4809	93.73	.249114	351.	.24605	-.0389529
END	-1.71	-2.96181	93.73	.198375	351.	.195931	-.0310399
2J3	0	0	93.73	.288493	350.9	.284893	-.0454367
16	-.855	1.4809	93.73	.249738	351.	.246655	-.0391224
END	-1.71	2.96181	93.73	.198775	351.	.196324	-.0311223
2J4	3.42	0	93.73	.0991545	351.	.097942	-.0154587
18	.855	-1.4809	93.73	4.23E-04	341.7	4.01E-04	-1.33E-04
END	-1.71	-2.96181	93.73	.0987231	171.1	-.0975241	.0153392
2J5	-1.71	-2.96181	93.73	.0996519	350.9	.0984073	-.0157007
21	-1.71	-2.38E-07	93.73	7.34E-05	310.5	4.77E-05	-5.58E-05
END	-1.71	2.96181	93.73	.0997939	171.	-.098553	.0156886

2J6	-1.71	2.96181	93.73	.0989816	351.	.0977709	-.0154337
24	.855	1.4809	93.73	6.22E-04	160.3	-5.85E-04	2.09E-04
END	3.42	0	93.73	.0995478	171.	-.0983168	.0156069
GND	82.2191	-36.6063	0	6.2829	16.	6.03908	1.73332
27	82.2191	-36.6063	13.88	5.84951	5.3	5.82488	.536306
END	82.2191	-36.6063	27.76	5.27547	.1	5.27547	8.56E-03
2J10	82.2191	-36.6063	27.76	5.27547	.1	5.27547	8.56E-03
29	82.2191	-36.6063	41.635	4.63508	357.	4.62877	-.241745
END	82.2191	-36.6063	55.51	3.60435	353.9	3.58386	-.383818
2J11	82.2191	-36.6063	55.51	3.60435	353.9	3.58386	-.383818
31	82.2191	-36.6063	62.6383	3.28994	353.2	3.2667	-.390395
32	82.2191	-36.6063	69.7667	2.88626	352.4	2.86113	-.380061
33	82.2191	-36.6063	76.895	2.42298	351.7	2.3977	-.349103
34	82.2191	-36.6063	84.0233	1.90947	351.	1.88619	-.297226
35	82.2191	-36.6063	91.1517	1.35344	350.4	1.33465	-.224758
END	82.2191	-36.6063	98.28	.818781	350.	.806465	-.14148
2J12	82.2191	-36.6063	98.28	.275684	350.	.271517	-.0477521
37	83.9283	-36.6022	98.28	.239008	350.1	.235433	-.0411854
END	85.6374	-36.5982	98.28	.190616	350.1	.187769	-.0328222
2J12	82.2191	-36.6063	98.28	.274867	350.1	.270735	-.0474792
39	81.362	-38.0836	98.28	.238349	350.1	.234803	-.0409661
END	80.5048	-39.5609	98.28	.190328	350.1	.18749	-.0327451
2J12	82.2191	-36.6063	98.28	.26823	350.1	.264213	-.0462485
41	81.3658	-35.1262	98.28	.231768	350.1	.228332	-.0397634
END	80.5124	-33.646	98.28	.183927	350.1	.181188	-.0316251
2J13	85.6374	-36.5982	98.28	.0944995	350.1	.09308	-.016318
43	83.0711	-38.0795	98.28	2.72E-04	154.6	-2.45E-04	1.16E-04
END	80.5048	-39.5609	98.28	.0946425	170.	-.0932115	.0163958
2J14	80.5048	-39.5609	98.28	.0956856	350.2	.0942785	-.0163493
46	80.5086	-36.6035	98.28	1.86E-03	351.6	1.84E-03	-2.71E-04
END	80.5124	-33.646	98.28	.0916756	170.1	-.0903215	.0156981
2J15	80.5124	-33.646	98.28	.0922513	350.1	.090866	-.015927
49	83.0749	-35.1221	98.28	1.61E-03	174.4	-1.6E-03	1.57E-04
END	85.6374	-36.5982	98.28	.0961162	170.1	-.0946886	.0165042

Sampling System Measurements

The following calculations confirm that the sample system as installed complies with Rule Section 73.151©(2)(1) in all respects. The sample torroids are Delta model TCT3 and their outputs are in agreement within the manufacturer's specification of +/-2% and +/-2º. The antenna monitor is a Potomac Instruments model 19. The monitor's calibration was checked against an Agilent 8753ES network analyzer and found to be operating within the manufacturer's specifications. Additionally, the sample lines consist of coaxial cables which are constructed of a copper clad aluminum center conductor, polyethylene foam dielectric, solid, corrugated outer conductor with a black polyethylene jacket. The cables are equal in length within 1º as required. All cables have been buried so as to be exposed to the same environmental conditions. The length of the cables was confirmed by measuring the impedance, looking into the line with the far end opened. The lines were found to be ¾ wavelength long at the frequencies listed. These frequencies were used to calculate the electrical lengths of the lines at the operating frequency of 600 kHz. Frequencies were calculated at which the lines were +/- 45º the length of the resonate frequency. The impedance was then calculated using the following formula:

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

Sample Line Length Calculation

Tower	Resonate Frequency At 270º, kHz	Electrical Length at 600 kHz, Degrees
1	1301.38	124.48
2	1303.63	124.27

Sample Line Impedance Calculation

Tower	270º Resonant Frequency kHz	45º Above Resonant Frequency kHz	Resistance Ohms	Reactance Ohms	45º Below Resonant Frequency kHz	Resistance Ohms	Reactance Ohms	Characteristic Impedance Ohms
1	1301.38	1518.27	5.02	50.26	1084.48	3.31	-50.00	50.31
2	1303.63	1520.90	7.35	49.05	1086.36	4.94	-48.84	49.34

The sample torroid calibration was confirmed by passing a common conductor through the torroids. The common conductor was driven by a Hewlett-Packard 8753ES vector network analyzer that was properly calibrated for response measurement. The output from the tower #1 torroid was fed to the reference receiver of the analyzer and the other output was alternately fed to the B input. The output of the tower 2 torroid was compared to that of the tower 1 torroid and the results noted in the chart below.

Sample Torroid Calibration Verification

Tower	Serial Number	Indicated Ratio	Indicated Phase
1	18237	1.00	0.0º
2	18238	1.003	-0.4º

Sample Lines Terminated By Torroids

Tower	Serial Number	Impedance at Input to Sample Line with Torroid Connected
1	18237	49.0 –j1.92
2	18238	52.0 –j1.48

Item 5

Direct Measurement of Power

The common point network in the nighttime phasor was adjusted to provide the proper operating resistance of 50 ohms and a reactance of 0 (zero) ohms to the transmitter output. In order to compensate for hookup inductance between the power measurement point and the transmitter the common point reactance was set for a value of –j7 at the measurement point. The nighttime operating powers were calculated by adding 8.0% to both the daytime and nighttime nominal operating power of 5.0kW. The common point current was then calculated as indicated below.

Pattern	Nominal Power Watts	Operating Power Watts	Operating Common Point Current, Amps
Night	5000	5400	10.39
Day	5000	5400	10.39

No day reference points were performed per an understanding between the Commission Staff and iHeart AM Engineering. The understanding is that the day pattern is essentially non-directional and there were no pre-existing day monitor points on the current license.

WREC DA-Night

Reference Field Strength Measurements

Point #	Distance /km	Field Strength mv/m	Location Description	GPS Coordinates NAD 27
024-1	1.62	126.00	Intersection of Whitney Ave and Birchdale Dr. In traffic island.	N35° 12' 29.46" W90° 00' 9.18"
024-2	2.77	61.20	South west corner of Frayser Blvd and Frayser View Dr. On sidewalk.	N35° 13' 1.91" W89° 59' 49.80"
024-3	3.75	38.50	Overton Crossing St and Corning Ave. 5 meters east of stop sign.	N35° 13' 31.57" W89° 59' 34.72"
62-1	1.29	57.30	10 meters south 2743 Woodlawn Terrace. East side of the street.	N35° 12' 0.73" W89° 59' 50.44"
62-2	2.73	27.70	2958 Mountain Terrace St. North side of driveway on sidewalk.	N35° 12' 22.51" W89° 59' 0.59"
62-3	3.72	14.80	East side of intersection Bayview Cove and Bayview Dr.	N35° 12' 37.50" W89° 58' 25.81"
204-1	2.43	361.00	100 meters west of intersection of Coker St and Smith Ave. South side.	N35° 10' 28.03" W90° 01' 13.32"
204-2	3.18	152.00	Intersection of Chelsea Ave and Decatur St. Sidewalk 1049 Decatur.	N35° 10' 6.71" W90° 01' 25.69"
204-3	3.67	121.00	Curbside 925 Jehl Place.	N35° 09' 52.49" W90° 01' 33.96"
346-1	1.62	61.10	5 Meters West of driveway to Whitney Manor on Whitney Ave.	N35° 12' 32.40" W90° 00' 49.25"
346-2	2.43	32.80	Sidewalk 1442 Paullus Ave.	N35° 12' 57.97" W90° 00' 57.05"
346-3	3.13	22.10	Intersection of Obion Dr. and Madewell. South curbside.	N35° 13' 19.98" W90° 01' 3.47"

All measurements were taken August 24, 2016 with Potomac Instruments FIM-4100 field strength meter with serial number 133. The meter was calibrated by its manufacturer on May 19, 2015.

Item 7

RFR Compliance

Operation of WREC at 5.0 kW daytime and 5.0 kW nighttime will not result in exposure of workers or the general public to RF radiation in excess of levels specified in 47CFR 1.1310. Fences have been installed around all tower bases to comply with the minimum distance which exceeds the distances specified in OET Bulletin 65 for this frequency, calculated power levels in the towers and tower height to prevent electric and magnetic exposure greater than permissible levels. These fences limit access by the general public. If it becomes necessary for workers to enter the tower base areas for maintenance, the station will either reduce power or cease operation to provide RFR safety for the workers.

Item 8

Ground System Description

The ground system at WREC remains as previously licensed and consists of 120 buried radial wires equally spaced around each tower, each wire 125 meters long except where they overlap.

Item 9

Tower Top Loading Detail