CLEAR CHANNEL RADIO

Technical & Capital Management
2625 South Memorial Drive, Suite A
Tulsa, OK 74129

Steve Davis
SVP, Engineering
and Capital Management
SteveDavis@clearchannel.com

December 8, 2011

Via WASHINGTON EXPRESS

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
Media Bureau Services
US Bank – Lockbox No. 979089
1002 Convention Plaza
SL-MO-C2-GL
Saint Louis, MO 63107-9000

RE: CAPSTAR TX LLC. (FRN No. 0019362953)
Application (Form 302-AM) for License
WERC (AM), 960 kHz, Birmingham, AL; Facility ID No. 2112

Dear Ms. Dortch:

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

Also enclosed is Form 159, Remittance Advice, with credit card payment of the $1,365.00 filing fee.

Please direct communications concerning this application to the undersigned.

Respectfully submitted,

CAPSTAR TX LLC

By: _____

Stephen G. Davis
Senior Vice President of Engineering and Capital Management

cc: WERC (AM) Public Inspection File

Troy Langham
FCC Engineering Supervisor
TroyLangham@clearchannel.com

FCCContact@clearchannel.com

Phone: (918) 664-4581

Billie Layman
FCC Administrator
BillieLayman@clearchannel.com

AWN

Federal Communications Commission
Washington, D. C. 20554

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

FOR FCC USE ONLY

Bnmk-20111212CVW 1/15/12 SNR

FCC 302-AM
APPLICATION FOR AM BROADCAST STATION LICENSE

(Please read instructions before filling out form.

FOR COMMISSION USE ONLY
FILE NO. BNMC-20111212

SECTION I - APPLICANT FEE INFORMATION

1. PAYOR NAME (Last, First, Middle Initial)

CAPSTAR TX LLC

MAILING ADDRESS (Line 1) (Maximum 35 characters)
2625 S 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) 664-4581	WERC	FAC ID: 2112

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
M M R	0 0 0 1	$ 635.00	

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
M O R	0 0 0 1	$ 730.00	

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
	$ 1,365.00	

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT CAPSTAR TX LLC		
MAILING ADDRESS 2625 S 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
WERC	BIRMINGHAM, AL			

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
Senior Vice President Engineering	12/12/11	(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
CAPSTAR TX, 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
WERC		960	Unlimited	5.0	5.0

2. Station location

State	City or Town
AL	Birmingham

3. Transmitter location

State	County	City or Town	Street address (or other identification)
AL	Jefferson	Birmingham	2400 Arkadelphia Rd.

4. Main studio location

State	County	City or Town	Street address (or other identification)
AL	Jefferson	Birmingham	600 Beacon Pkwy. W., Suite 400

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

State	County	City or Town	Street address (or other identification)
Al	Jefferson	Birmingham	600 Beacon Pkwy. W., Suite 400

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. ENGINEERING

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	10.0

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	-j5.0	-j5.0

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
Tower 1 (S) ASR 1059883	0	N/A	100	N/A		
Tower 2 (N) ASR 1059884	+87.4	N/A	111.9	N/A		

Manufacturer and type of antenna monitor: Potomac Instruments AM-19(204)

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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.
4-sided self supporting towers (2)	1-85.8, 2-84.6	1-86.0, 2-85.0	1-87.0, 2-85.6	Exhibit No.

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
33 ° 32 ' 02 "	86 ° 51 ' 07 "

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. ENGINEERING

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?
NONE

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

Daytime non-directional power determined at phasor common point meter.

No other change to Daytime non-directional operation from Tower 1(S), ASR 1059833.

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)
Randall L. Mullinax	
Address (include ZIP Code) 2859 Cascade Dr. Gainesville, GA 30504	Date December 7, 2011
	Telephone No. (Include Area Code) 770-534-1065

☑ Technical Director ☐ Registered Professional Engineer

☐ Chief Operator ☐ Technical Consultant

☐ Other (specify)

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ENGINEERING EXHIBIT
APPLICATION FOR DIRECT POWER MEASURMENT
CAPSTAR TX LLC
RADIO STATION WERC
BIRMINGHAM, ALBAMA

December 7, 2011

960 KHz 5.0 KW-U DA-N

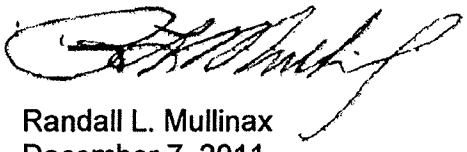
Table of Contents

Engineering Statement

This application is being filed to relicense the existing operations of WERC(AM), Birmingham, AL with the nighttime directional operation to be relicensed under the recent changes to 47 CFR 73.151 allowing performance verification by computer modeling and sampling system verification. The ground system and radiators remain as authorized in the current station license BZ-19930209AA. All measurements included in this application were made by the undersigned between June 29 and July 28, 2011 unless otherwise noted.

Analysis of this antenna system was performed using the computer program Expert MININEC Broadcast Professional version 14.5 by EM Scientific Inc. The antenna model was tuned to produce the same matrix impedances as those measured by varying the electrical height of the radiators and by adding shunt capacitive loads and series inductance using the Westberg circuit analysis program WCAP.

Once the model was tuned to match the measured matrix impedances, the array synthesis module of the MININEC program was used to calculate the proper base drive voltages to generate the fields necessary to form the required pattern for nighttime operation. The current distribution was calculated for each radiator and given that the sampling system utilizes base current sampling devices the operating parameters calculated from the resulting currents as each base node.



Randall L. Mullinax
December 7, 2011

Description of Radiators

The WERC radiators are four-sided self supporting structures that taper in side width from the base as the height above ground increases. Both towers have a face width of 609.6 cm at the base decreasing to 54.6 cm at the top. The towers are physically similar differing slightly both in height and cross sectional area. The physical electrical height of Tower 1(S) is 98.8° at 960 kHz and Tower 2(N) is 97.5°. Each radiator has 4 base insulators which are assumed to have a nominal capacitance of 25pF each (for a total of 100pF per radiator).

Each radiator was modeled using 11 wire segments, with each segment representing 100% of the average physical radius at the height of the center of that segment. It should be noted however, that all radii are well within the required 80 to 150% of a circle radius having a circumference equal to the sum of the widths of the tower sides (4 in this case) at the bottom and top of each individual segment. The total modeled height and the modeled height of all segments for both radiators are also well within the 75 to 125% requirement, relative to the appropriate physical heights.

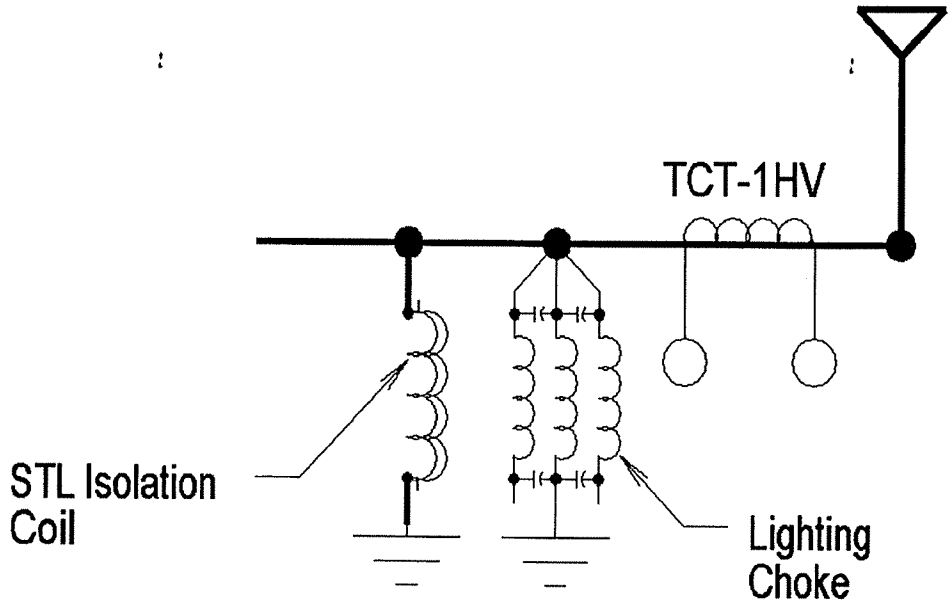
The "Problem Definition Evaluation" function of the MINIMEC program shows no errors for either radiator but does return several "warnings" as is typical with large base self supporting towers using the "wedding cake" type of modeling geometry. Based on previous filings these "warnings" are believed to have no impact upon the accuracy of the "method of moments" model (ref. WEXY, Wilton Manors, FL amendment BMML-20100317ABW).

Description of Sampling System

The sampling system consists of equal lengths of ½" solid outer jacket coaxial cable connected to a Delta Model TCT-1HV toroidal current transformer near the base of Tower 1(S) and a Delta Model TCT-1 toroidal current transformer near the base of Tower 2(N). The sample lines are buried over their entire length. The antenna monitor is a Potomac Instruments Model AM-19(204).

A small STL antenna is mounted on Tower 1(S) and is isolated using a coaxial isolation coil that is located inside the ATU cabinet. The coax to the STL antenna is bonded to the tower feed and runs through the Delta Electronics Model TCT-1HV toroidal current transformer as does the tower light wiring. Since both the isolation coil and the lighting choke are connected in the circuit prior to the TCT-1HV sample toroid, they do not impact the sample current that is sensed by the toroid. To facilitate all measurements, the STL coax was removed from the isolation coil and the tower light wiring was removed from the lighting choke (both were floating). There are no antennas mounted on Tower 2(N) but again, the tower light wiring runs through the Delta Electronics Model TCT-1 toroidal current transformer with the tower feed and the tower light wiring was disconnected from the lighting choke for all measurements.

Tower 1(S) TCT-1HV Detail

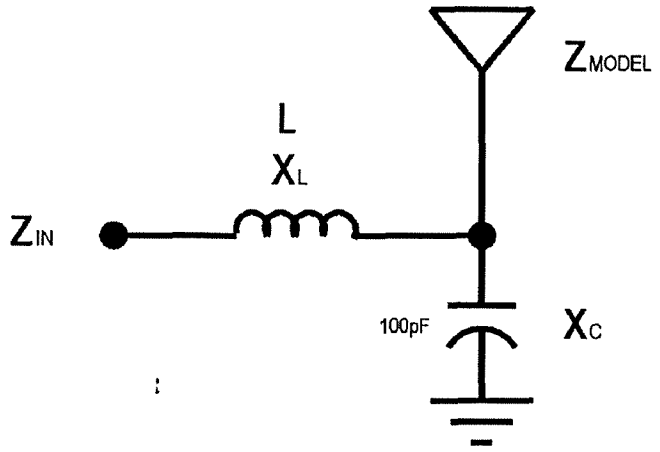


Measured Matrix Impedances and WCAP Corrections

Tower 1(S) driven with Tower 2(N) floated 51.4 +j29.6Ω

Tower 2(N) driven with Tower 1(S) floated 44.3 +j28.3Ω

TOWER	Z_{MODEL}	Z_{IN} (MODEL)	Z_{IN} (MEASURED)	L(μH)	X_L	X_C
1(S)	50.7 +j12.8	51.5 +j29.6	51.4 +j29.6	3.04	+j18.34	-j1658
2(N)	44.0 +j6.3	44.3 +j28.3	44.3 +j28.3	3.85	+j23.22	-j1658



All measurements were made with an Agilent Technologies Model 4396B vector network analyzer with external directional coupler in a calibrated measurement system.

Calculated Impedances and WCAP Calculations

Calculated Impedance Tower 1(S) Driven with Tower 2(N) Floated

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	3.5887	1
		0	0	9.45		
2	none	0	0	9.45	3.0046	1
		0	0	18.9		
3	none	0	0	18.9	2.4204	1
		0	0	28.35		
4	none	0	0	28.35	1.9326	1
		0	0	37.8		
5	none	0	0	37.8	1.6235	1
		0	0	47.25		
6	none	0	0	47.25	1.3964	1
		0	0	56.7		
7	none	0	0	56.7	1.1695	1
		0	0	66.15		
8	none	0	0	66.15	.9424	1
		0	0	75.6		
9	none	0	0	75.6	.7154	1
		0	0	85.05		
10	none	0	0	85.05	.4748	1
		0	0	94.5		
11	none	0	0	94.5	.3477	1
		0	0	103.95		
12	none	110.7	10.	0	3.5776	1
		110.7	10.	9.22		
13	none	110.7	10.	9.22	2.9713	1
		110.7	10.	18.44		
14	none	110.7	10.	18.44	2.4327	1
		110.7	10.	27.66		
15	none	110.7	10.	27.66	2.0637	1
		110.7	10.	36.88		
16	none	110.7	10.	36.88	1.7964	1
		110.7	10.	46.1		
17	none	110.7	10.	46.1	1.5291	1
		110.7	10.	55.32		
18	none	110.7	10.	55.32	1.2618	1
		110.7	10.	64.54		
19	none	110.7	10.	64.54	.9945	1
		110.7	10.	73.76		
20	none	110.7	10.	73.76	.7272	1
		110.7	10.	82.98		
21	none	110.7	10.	82.98	.4706	1
		110.7	10.	92.2		
22	none	110.7	10.	92.2	.3477	1
		110.7	10.	101.42		

```
Number of wires          =  22
          current nodes  =  22

                          minimum                  maximum
Individual wires       wire    value             wire  value
segment length          21     9.21999            9    9.45001
radius                  11     .3477              1    3.5887


ELECTRICAL DESCRIPTION
Frequencies (MHz)
     frequency                 no. of  segment length (wavelengths)
 no. lowest       step          steps   minimum        maximum
 1   .96          0              1      .0256111       .02625

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

Lumped loads
             resistance    reactance     inductance  capacitance passive
load  node   (ohms)        (ohms)        (mH)        (uF)        circuit
 1     12    0             -1,658.       0           0            0

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18-2011   18:38:58
     !                                              !
IMPEDANCE
   normalization = 50.
freq      resist    react     imped     phase     VSWR     S11       S12
(MHz)     (ohms)    (ohms)    (ohms)    (deg)              dB        dB
source =  1; node 1, sector 1
.96       50.749    12.794    52.337    14.1      1.2888   -17.9
```

Calculated Impedance Tower 2(N) Driven with Tower 1(S) Floated

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	3.5887	1
		0	0	9.45		
2	none	0	0	9.45	3.0046	1
		0	0	18.9		
3	none	0	0	18.9	2.4204	1
		0	0	28.35		
4	none	0	0	28.35	1.9326	1
		0	0	37.8		
5	none	0	0	37.8	1.6235	1
		0	0	47.25		
6	none	0	0	47.25	1.3964	1
		0	0	56.7		
7	none	0	0	56.7	1.1695	1
		0	0	66.15		
8	none	0	0	66.15	.9424	1
		0	0	75.6		
9	none	0	0	75.6	.7154	1
		0	0	85.05		
10	none	0	0	85.05	.4748	1
		0	0	94.5		
11	none	0	0	94.5	.3477	1
		0	0	103.95		
12	none	110.7	10.	0	3.5776	1
		110.7	10.	9.22		
13	none	110.7	10.	9.22	2.9713	1
		110.7	10.	18.44		
14	none	110.7	10.	18.44	2.4327	1
		110.7	10.	27.66		
15	none	110.7	10.	27.66	2.0637	1
		110.7	10.	36.88		
16	none	110.7	10.	36.88	1.7964	1
		110.7	10.	46.1		
17	none	110.7	10.	46.1	1.5291	1
		110.7	10.	55.32		
18	none	110.7	10.	55.32	1.2618	1
		110.7	10.	64.54		
19	none	110.7	10.	64.54	.9945	1
		110.7	10.	73.76		
20	none	110.7	10.	73.76	.7272	1
		110.7	10.	82.98		
21	none	110.7	10.	82.98	.4706	1
		110.7	10.	92.2		
22	none	110.7	10.	92.2	.3477	1
		110.7	10.	101.42		

```
Number of wires          =  22
          current nodes  =  22

                          minimum                    maximum
Individual wires       wire    value              wire  value
segment length          21     9.21999             9    9.45001
radius                  11     .3477               1    3.5887


ELECTRICAL DESCRIPTION
Frequencies (MHz)
     frequency                  no. of  segment length (wavelengths)
 no. lowest       step          steps   minimum        maximum
 1   .96          0              1      .0256111       .02625

Sources
source node    sector  magnitude      phase          type
 1      12      1       1.             0              voltage

Lumped loads
             resistance    reactance     inductance  capacitance passive
load  node   (ohms)        (ohms)        (mH)        (uF)        circuit
 1     1     0             -1,658.       0           0            0

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IMPEDANCE
   normalization = 50.     :                                                 :
freq      resist    react     imped     phase     VSWR     S11       S12
(MHz)     (ohms)    (ohms)    (ohms)    (deg)              dB        dB
source =  1; node 12, sector 1
.96       44.013    6.2509    44.455    8.1       1.2023   -20.737   -3.7E-02
```

WCAP Calculations - Tower 1(S) Driven with Tower 2(N) Floated

```
WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WERC1D2O.TXT

I     1.0000    0    1    0.0000    0.0000    0.0000
R     1.0000    1    2    0.0000    0.0000    0.0000
L     3.0400    2    3    0.0000    0.0000    0.0000
C     0.0001    3    0    0.0000    0.0000    0.0000
R    50.7490    3    0   12.7940    0.0000    0.0000
EX    0.0000    0    0    0.0000    0.0000    0.0000


FREQ = 0.960

  NODE       VOLT MAG      VOLT PHASE
   1         60.2835         29.4529
   2         59.4147         29.9271
   3         52.7188         12.3827
                          BRANCH VOLTAGE       BRANCH CURRENT FROM NODE IMPEDANCE  TO NODE IMPEDANCE
                          MAG      PHASE       MAG      PHASE RESISTANCE REACTANCE RESISTANCE REACTANCE
        VSWR
R    1-  2     1.000      1.00      0.000      1.00      0.000      52.49     29.64     51.49     29.64
L    2-  3     3.040     18.34     90.000      1.00      0.000      51.49     29.64     51.49     11.30
C    3-  0     0.000     52.72     12.383      0.03    102.383       0.00  -1657.86      0.00  -1657.86
R    3-  0    50.749     52.72     12.383      1.01     -1.767      50.75     12.79     50.75     12.79
```

WCAP Calculations - Tower 2(N) Driven with Tower 1(S) Floated

```
WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WERC2D1O.TXT

I     1.0000    0    1    0.0000    0.0000    0.0000
R     1.0000    1    2    0.0000    0.0000    0.0000
L     3.8500    2    3    0.0000    0.0000    0.0000
C     0.0001    3    0    0.0000    0.0000    0.0000
R    44.0130    3    0    6.2509    0.0000    0.0000
EX    0.0000    0    0    0.0000    0.0000    0.0000


FREQ = 0.960

  NODE       VOLT MAG      VOLT PHASE
   1         53.4349         32.0001
   2         52.5895         32.5775
   3         44.6071          6.5568
                          BRANCH VOLTAGE       BRANCH CURRENT FROM NODE IMPEDANCE  TO NODE IMPEDANCE
                          MAG      PHASE       MAG      PHASE RESISTANCE REACTANCE RESISTANCE REACTANCE
        VSWR
R    1-  2     1.000      1.00      0.000      1.00      0.000      45.32     28.32     44.32     28.32
L    2-  3     3.850     23.22     90.000      1.00      0.000      44.32     28.32     44.32      5.09
C    3-  0     0.000     44.61      6.557      0.03     96.557       0.00  -1657.86      0.00  -1657.86
R    3-  0    44.013     44.61      6.557      1.00     -1.526      44.01      6.25     44.01      6.25
```

Nighttime Directional Operating Parameters
Derived from Modeled Currents

TOWER	Model Current Pulse	Model Current Magnitude (amperes)	Model Current Phase (degrees)	Model Drive Impedance (ohms)	Model Drive Power (watts)
1(S)	1	6.89	+23.6	84.3 +j17.5	4002
2(N)	12	7.64	+113.4	17.0 +j1.2	992

TOWER	Drive Impedance At Toroid (ohms)	Current Magnitude At Toroid (amperes)	Current Phase At Toroid (degrees)	Antenna Monitor Ratio	Antenna Monitor Phase (degrees)
1(S)	85.9 +j31.6	6.83	+26.543	100	0
2(N)	17.0 +j24.3	7.64	+113.987	111.9	+87.4

Nighttime Directional Calculated Voltages and Currents

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MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = .96 MHz

tower	field ratio magnitude	phase (deg)
1	1.	0
2	.91	107.8

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	593.822	35.3	6.89398	23.6
12	130.097	117.5	7.6396	113.3

Sum of square of source currents = 211.781
Total power = 5,000. watts

TOWER ADMITTANCE MATRIX

admittance	real (mhos)	imaginary (mhos)
Y(1, 1)	.0133087	-.00301443
Y(1, 2)	.00178959	.0091828
Y(2, 1)	.00178884	.00918209
Y(2, 2)	.0159368	-.00184176

TOWER IMPEDANCE MATRIX

impedance	real (ohms)	imaginary (ohms)
Z(1, 1)	50.911	12.2533
Z(1, 2)	4.82956	-30.15
Z(2, 1)	4.82806	-30.153
Z(2, 2)	44.1735	5.7078

ELECTRICAL DESCRIPTION
Frequencies (MHz)

no.	frequency lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	.96	0	1	.0256111	.02625

Sources

source	node	sector	magnitude	phase	type
1	1	1	839.792	35.3	voltage
2	12	1	183.985	117.5	voltage

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
.96	84.347	17.457	86.135	11.7	1.7948	-10.922	-.36628
source = 2; node 12, sector 1							
.96	16.985	1.2306	17.029	4.1	2.9458	-6.1407	-1.2101

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	3.5887	1
		0	0	9.45		
2	none	0	0	9.45	3.0046	1
		0	0	18.9		
3	none	0	0	18.9	2.4204	1
		0	0	28.35		
4	none	0	0	28.35	1.9326	1
		0	0	37.8		
5	none	0	0	37.8	1.6235	1
		0	0	47.25		
6	none	0	0	47.25	1.3964	1
		0	0	56.7		
7	none	0	0	56.7	1.1695	1
		0	0	66.15		
8	none	0	0	66.15	.9424	1
		0	0	75.6		
9	none	0	0	75.6	.7154	1
		0	0	85.05		
10	none	0	0	85.05	.4748	1
		0	0	94.5		
11	none	0	0	94.5	.3477	1
		0	0	103.95		
12	none	110.7	10.	0	3.5776	1
		110.7	10.	9.22		
13	none	110.7	10.	9.22	2.9713	1
		110.7	10.	18.44		
14	none	110.7	10.	18.44	2.4327	1
		110.7	10.	27.66		
15	none	110.7	10.	27.66	2.0637	1
		110.7	10.	36.88		
16	none	110.7	10.	36.88	1.7964	1
		110.7	10.	46.1		
17	none	110.7	10.	46.1	1.5291	1
		110.7	10.	55.32		
18	none	110.7	10.	55.32	1.2618	1
		110.7	10.	64.54		
19	none	110.7	10.	64.54	.9945	1
		110.7	10.	73.76		
20	none	110.7	10.	73.76	.7272	1
		110.7	10.	82.98		
21	none	110.7	10.	82.98	.4706	1
		110.7	10.	92.2		
22	none	110.7	10.	92.2	.3477	1
		110.7	10.	101.42		

Number of wires = 22
current nodes = 22

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	21	9.21999	9	9.45001
radius	11	.3477	1	3.5887

CURRENT rms
Frequency = .96 MHz
Input power = 5,000. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
1	0	0	0	6.89352	23.6	6.31664	2.76056
END	0	0	9.45	7.61356	6.3	7.56704	.840362
2J1	0	0	9.45	7.61356	6.3	7.56704	.840362
END	0	0	18.9	7.5986	2.9	7.58861	.389435
2J2	0	0	18.9	7.5986	2.9	7.58861	.389435
END	0	0	28.35	7.39595	.1	7.39594	.013536
2J3	0	0	28.35	7.39595	.1	7.39594	.013536
END	0	0	37.8	6.97929	358.1	6.97541	-.232683
2J4	0	0	37.8	6.97929	358.1	6.97541	-.232683
END	0	0	47.25	6.36817	356.5	6.35607	-.392332
2J5	0	0	47.25	6.36817	356.5	6.35607	-.392332
END	0	0	56.7	5.57492	355.1	5.55455	-.476165
2J6	0	0	56.7	5.57492	355.1	5.55455	-.476165
END	0	0	66.15	4.63313	353.9	4.60712	-.490205
2J7	0	0	66.15	4.63313	353.9	4.60712	-.490205
END	0	0	75.6	3.57827	352.9	3.55084	-.442251
2J8	0	0	75.6	3.57827	352.9	3.55084	-.442251
END	0	0	85.05	2.44842	352.	2.42453	-.341155
2J9	0	0	85.05	2.44842	352.	2.42453	-.341155
END	0	0	94.5	1.31142	351.2	1.29598	-.200644
2J10	0	0	94.5	1.31142	351.2	1.29598	-.200644
END	0	0	103.95	0	0	0	0
12	109.018	-19.2228	0	7.63892	113.4	-3.02842	7.01297
END	109.018	-19.2228	9.22	7.59172	109.5	-2.5404	7.15406
2J12	109.018	-19.2228	9.22	7.59172	109.5	-2.5404	7.15406
END	109.018	-19.2228	18.44	7.33491	108.7	-2.35089	6.94796
2J13	109.018	-19.2228	18.44	7.33491	108.7	-2.35089	6.94796
END	109.018	-19.2228	27.66	6.92814	107.9	-2.13096	6.59228
2J14	109.018	-19.2228	27.66	6.92814	107.9	-2.13096	6.59228
END	109.018	-19.2228	36.88	6.37447	107.3	-1.89518	6.08622
2J15	109.018	-19.2228	36.88	6.37447	107.3	-1.89518	6.08622
END	109.018	-19.2228	46.1	5.6795	106.8	-1.63762	5.43828
2J16	109.018	-19.2228	46.1	5.6795	106.8	-1.63762	5.43828
END	109.018	-19.2228	55.32	4.86944	106.3	-1.36526	4.67414
2J17	109.018	-19.2228	55.32	4.86944	106.3	-1.36526	4.67414
END	109.018	-19.2228	64.54	3.97118	105.9	-1.08479	3.82015
2J18	109.018	-19.2228	64.54	3.97118	105.9	-1.08479	3.82015
END	109.018	-19.2228	73.76	3.01522	105.5	-.803744	2.90612
2J19	109.018	-19.2228	73.76	3.01522	105.5	-.803744	2.90612
END	109.018	-19.2228	82.98	2.03768	105.1	-.530841	1.96732
2J20	109.018	-19.2228	82.98	2.03768	105.1	-.530841	1.96732
END	109.018	-19.2228	92.2	1.08471	104.8	-.276699	1.04883
2J21	109.018	-19.2228	92.2	1.08471	104.8	-.276699	1.04883
END	109.018	-19.2228	101.42	0	0	0	0

Nighttime WCAP Calculations

Tower 1(S)

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WERC1NIT.NIT

I	6.8300	0	1	26.5430	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	3.0400	2	3	0.0000	0.0000	0.0000
C	0.0001	3	0	0.0000	0.0000	0.0000
R	84.3470	3	0	17.4570	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 0.960

NODE	VOLT MAG	VOLT PHASE
1	631.6187	46.4985
2	625.2031	46.7121
3	593.7753	35.2928

		VSWR	BRANCH VOLTAGE MAG	BRANCH VOLTAGE PHASE	BRANCH CURRENT FROM NODE IMPEDANCE MAG	BRANCH CURRENT FROM NODE IMPEDANCE PHASE	FROM NODE IMPEDANCE RESISTANCE	FROM NODE IMPEDANCE REACTANCE	TO NODE IMPEDANCE RESISTANCE	TO NODE IMPEDANCE REACTANCE
R	1- 2	1.000	6.83	26.543	6.83	26.543	86.92	31.56	**85.92**	**31.56**
L	2- 3	3.040	125.24	116.543	6.83	26.543	85.92	31.56	85.92	13.22
C	3- 0	0.000	593.78	35.293	0.36	125.293	0.00	-1657.86	0.00	-1657.86
R	3- 0	84.347	593.78	35.293	**6.89**	**23.600**	84.35	17.46	84.35	17.46

Tower 2(N)

WESTBERG CIRCUIT ANALYSIS PROGRAM

FILE NAME = WERC2NIT.NIT

I	7.6380	0	1	113.9870	0.0000	0.0000
R	1.0000	1	2	0.0000	0.0000	0.0000
L	3.8500	2	3	0.0000	0.0000	0.0000
C	0.0001	3	0	0.0000	0.0000	0.0000
R	16.9850	3	0	1.2306	0.0000	0.0000
EX	0.0000	0	0	0.0000	0.0000	0.0000

FREQ = 0.960

NODE	VOLT MAG	VOLT PHASE
1	230.8916	167.4225
2	226.4246	168.9750
3	130.1613	117.5435

		VSWR	BRANCH VOLTAGE MAG	BRANCH VOLTAGE PHASE	BRANCH CURRENT FROM NODE IMPEDANCE MAG	BRANCH CURRENT FROM NODE IMPEDANCE PHASE	FROM NODE IMPEDANCE RESISTANCE	FROM NODE IMPEDANCE REACTANCE	TO NODE IMPEDANCE RESISTANCE	TO NODE IMPEDANCE REACTANCE
R	1- 2	1.000	7.64	113.987	7.64	113.987	18.01	24.28	**17.01**	**24.28**
L	2- 3	3.850	177.37	-156.013	7.64	113.987	17.01	24.28	17.01	1.06
C	3- 0	0.000	130.16	117.544	0.08	-152.456	0.00	-1657.86	0.00	-1657.86
R	3- 0	16.985	130.16	117.544	**7.64**	**113.400**	16.98	1.23	16.98	1.23

Measured and Calculated Sampling Line Characteristics

Measured open circuit resonant frequency at odd multiple of ¼ wavelength nearest the carrier frequency:

Tower 1(S) 572.4 kHz ¼ λ(90°)

Tower 2 (N) 571.9 kHz ¼ λ(90°)

Measured impedance 1/8 wavelength above and below open circuit resonant frequency:

Tower 1(S)	858.60 kHz	3.23 +j50.10 Ω	+1/8 λ
	286.20 kHz	0.44 –j50.40 Ω	-1/8 λ
Tower 2 (N)	857.85 kHz	3.22 +j50.09 Ω	+1/8 λ
	285.95 kHz	0.45 –j50.64 Ω	-1/8 λ

Calculated characteristic impedance using formula $Z_o = ((R_1^2 + X_1^2)^{1/2} * (R_2^2 + X_2^2)^{1/2})^{1/2}$:

Tower 1(S) 50.31 Ω

Tower 2(N) 50.42 Ω

Calculated electrical length at $f_{carrier}$:

Tower 1(S) $L = (f_{carrier} / f_{resonant}) * 90° = (960 \text{ kHz} / 572.40 \text{ kHz}) * 90° = 150.94°$

Tower 2 (N) $L = (f_{carrier} / f_{resonant}) * 90° = (960 \text{ kHz} / 571.90 \text{ kHz}) * 90° = 151.08°$

Measured impedance at $f_{carrier}$ at the input of the sampling line with the sampling device connected:

Tower 1(S) 48.7 +j0.0Ω

Tower 2 (N) 49.0 –j0.2Ω

All measurements above made with an Agilent Model 4396B vector network analyzer with an external directional coupler in a calibrated measurement system.

Sampling Transformer Calibration

Calibration of the toroidal current transformers was confirmed using two different methods. In both cases, the transformers were set up adjacent to each other on a common conductor. The results of both measurements are listed below.

In Method 1, the signal from the generator output of the vector network analyzer (Agilent model 4396B) was connected to a conductor running through both transformers which was then terminated with a 50Ω load. The network analyzer was set to measure in "transmission" mode and the output of the Tower 1(S) reference toroidal current transformer (Delta Model TCT-1HV) was connected to the network analyzer "B" receiver input. A "response" calibration was performed, calibrating the network analyzer for the amplitude and phase characteristics of the reference transformer. The output of the Tower 2(N) toroidal current transformer (Delta Model TCT-1) was then connected to the input of the "B" receiver of the analyzer and the amplitude and phase characteristics were recorded.

In Method 2, both toroidal current transformers were connected between the output of the transmitter and the input to the phasor common point. The outputs of the transformers were connected to the input of the antenna monitor (Potomac Instruments Model AM-19(204) using short equal lengths of transmission line. The amplitude and phase relationship between the transformers was measured by the antenna monitor in conventional fashion with the transmitter operating at a power level of approximately 5 kW.

	Method 1		Method 2	
	Indicated Phase	Indicated Radio	Indicated Phase	Indicated Radio
Tower 1 (S)	0°	100.0	0°	100.0
Tower 2 (N)	-0.04°	100.1	0°	100.2

The manufacturer specifies these devices to be accurate to within +/- 2% absolute magnitude and +/- 2° absolute phase.

Environmental Statement

The WERC radiators are surrounded by a secured fences restricting access by unauthorized personnel and signs are posted in the vicinity of the radiators, warning of potential radio frequency hazards at the site. The minimum distance to the fence for each radiator is 4.3 meters. Based on the charts and graphs supplied in Supplement A, Edition 97-01 to OET bulletin 65, Edition 97-01 the applicant certifies that the distance to the fences from the radiators complies with FCC OET65 regarding human exposure to non-ionizing electromagnetic radiation.

Reference Point Data

Reference Points were measured by Michael Golchert on August 4-5, 2011 using Potomac Instruments Model FIM-4100, serial number 133, field intensity meter.

Azimuth	Description	Distance	Coordinates	Measurement
10°T	Daniel Payne Dr. & Danied Payne Ind. Drive, NW corner at Fiber optic Marker	3.18km	N33°33'43.3" W86°50'45.5"	65.1 mV/m
	Across from 3509 Walker Chapel Rd., South side	8.91km	N33°36'46.1" W86°50'06.6"	7.50 mV/m
	Across from 865 Odum Circle, South side	12.87km	N33°38'52.8" W86°49'39.6"	3.31 mV/m
60°T	6 meters South of RR tracks on 25th St. N, in front of R & M Equipment Rental	3.40km	N33°32'57.1" W86°49'12.5"	46.3 mV/m
	32nd St N & Shuttlesworth Dr, North edge of crosswalk	5.23km	N33°33'26.9" W86°48'11.1"	14.3 mV/m
	Across from 4316 Jackson, North side	7.46km	N33°34'02.7" W86°46'55.9"	14.2 mV/m
190°T	In front of 1212 4th Ave. W	3.12km	N33°30'22.4" W86°51'28.0"	211 mV/m
	In front of 1433 Woodland	4.34km	N33°29'43.4" W86°51'36.3"	162 mV/m
	In front of 1280 Mims St.	6.49km	N33°28'34.8" W86°51'50.1"	57.9 mV/m
320°T	808 Brandy Lane, Driveway apron	4.23km	N33°33'47.1" W86°52'52.7"	12.1 mV/m
	Across from 652 Forestwood Road	5.20km	N33°34'10.8" W86°53'17.0"	11.0 mV/m
	10 meters West of mailbox at 520 Collette, South side under tree	7.38km	N33°34'50.3" W86°53'56.3"	7.38 mV/m

WERC, Birmingham, AL

Tower 1(S) Vertical Sketch

ASR No. 1059883

Not to Scale