65330

SCIARRINO & SHUBERT, PLLC

BROADCAST & MEDIA LEGAL SERVICES

Dawn M. Sciarrino	Lee W. Shubert	Christine McLaughlin*†	Shelley Sadowsky*†‡
dawn@sciarrinolaw.com	lee@sciarrinolaw.com	christine@sciarrinolaw.com	shelley@sciarrinolaw.com
(202) 350-9658	(202) 350-9658	(202) 375-9166	(202) 997-9392.

January 17, 2013

FILED/ACCEPTED

JAN 17 2013

Federal Communications Commission
Office of the Secretary

Via Hand Delivery

Marlene H. Dortch, Secretary
Federal Communications Commission
Washington, DC 20554

Re: KZDC(AM), San Antonio, TX (FIN: 65330)
FCC Form 302-AM
Amendment to File No. BMML-20121016ADO

Dear Ms. Dortch:

Transmitted herewith, on behalf of BMP San Antonio License Company, L.P., please find the original and three copies of its amendment to the above-referenced application, on FCC Form 302-AM.

Enclosed please also find an additional copy of this filing; please date-stamp that copy and return it to our courier, who is waiting.

If you have any questions or require additional information, kindly contact the undersigned.

Sincerely,

Dawn M. Sciarrino
Christine McLaughlin

5425 TREE LINE DR. CENTREVILLE, VA 20120-1676
703.991.7120 (FAX)

*Of Counsel • †Admitted in District of Columbia but not Virginia • ‡Admitted in Maryland

FILED/ACCEPTED

Federal Communications Commission
Washington, D. C. 20554

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

FOR FCC USE ONLY

JAN 17 2013

Federal Communications Commission
Office of the Secretary

FCC 302-AM
APPLICATION FOR AM BROADCAST STATION LICENSE

(Please read instructions before filling out form.

FOR COMMISSION USE ONLY
FILE NO. 20121016ADO

SECTION I - APPLICANT FEE INFORMATION

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

AMENDMENT TO APPLICATION - FILE NO. BMML-20121016ADO (TO COVER BP-20101206AAP)

MAILING ADDRESS (Line 1) (Maximum 35 characters)

MAILING ADDRESS (Line 2) (Maximum 35 characters)

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
TELEPHONE NUMBER (include area code)	CALL LETTERS KZDC	OTHER FCC IDENTIFIER (If applicable)

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
	0001	$	

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
	0001	$	

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

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT BMP SAN ANTONIO LICENSE COMPANY, L.P.		
MAILING ADDRESS 8750 NORTH CENTRAL EXPRESSWAY, SUITE 645		
CITY DALLAS	STATE TX	ZIP CODE 75231

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
KZDC (Night Site)	SAN ANTONIO, TX	BP-20101206AA[		September 14, 2014

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. E-1

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	
JOAN LEONARD		
Title SENIOR VICE PRESIDENT/CONTROLLER OF GENERAL PARTNER	Date	Telephone Number (214) 692-2000

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

BMP SAN ANTONIO LICENSE COMPANY, L.P.

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
KZDC	BP-20101206AAP	1250	UNLIMITED	0.92	25

2. Station location

State	City or Town
TEXAS	SAN ANTONIO

3. Transmitter location

State	County	City or Town	Street address (or other identification)
TX	BEXAR	SAN ANTONIO	4050 EISENHAUER RD.

4. Main studio location

State	County	City or Town	Street address (or other identification)
TX	BEXAR	SAN ANTONIO	4050 EISENHAUER RD.

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

State	County	City or Town	Street address (or other identification)
TX	BEXAR	SAN ANTONIO	4050 EISENHAUER RD.

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. E-1

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
4.53	N/A

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	N/A	0.0	N/A

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	+86.6	N/A	0.737	N/A	N/A	N/A
2	-3.6	N/A	1.046	N/A	N/A	N/A
3	-7.8	N/A	0.254	N/A	N/A	N/A
4	0.0	N/A	1.000	N/A	N/A	N/A

Manufacturer and type of antenna monitor: POTOMAC INSTRUMENTS 1904-4

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.
TOWER VERTICAL STEEL	121.9	124	125	Exhibit No. N/A

Excitation [✓] Series [ ] Shunt

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

North Latitude	West Longitude
29 ° 29 ' 49 "	98 ° 24 ' 57 "

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. E-1

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.

NEW NIGHTTIME SITE

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)
J. S. SELLMEYER, P.E.	J. S. Sellmeyer
Address (include ZIP Code) Sellmeyer Engineering 2 Pecan Grove Circle Lucas, TX 75002	Date 1/12/2013
	Telephone No. (Include Area Code) 972-542-2056

[ ] Technical Director

[✓] Registered Professional Engineer

[ ] Chief Operator

[ ] Technical Consultant

[ ] Other (specify)

STATE OF TEXAS
J. S. SELLMEYER
38535
REGISTERED PROFESSIONAL ENGINEER

SELLMEYER ENGINEERING
BROADCAST & COMMUNICATIONS CONSULTING ENGINEERS
2 Pecan Grove Circle
Lucas, Texas, 75002
MEMBER AFCCE

EXHIBIT E-1

FCC FORM 302-AM
AMENDMENT TO
APPLICATION FOR STATION LICENSE
FILE NO: BMML-20121016ADO
BMP SAN ANTONIO LICENSE COMPANY, L.P.
RADIO STATION KZDC
1250 KHZ, 0.92 KW, 25 KW-LS, DA-2 UNL
SAN ANTONIO, TEXAS
NIGHTTIME SITE
METHOD OF MOMENTS ADJUSTMENT
C.P. FILE NO: BP-20101206AAP
FACILTY ID: 65330

JANUARY. 2013

SELLMEYER ENGINEERING
BROADCAST & COMMUNICATIONS CONSULTING ENGINEERS
2 Pecan Grove Circle
Lucas, Texas, 75002
MEMBER AFCCE

EXHIBIT E-1

TABLE OF CONTENTS
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RADIO STATION KZDC
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Excitation ☑ Series ☐ Shunt

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

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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.

NEW NIGHTTIME SITE

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)
J. S. SELLMEYER, P.E.	J S Sellmeyer
Address (include ZIP Code) Sellmeyer Engineering 2 Pecan Grove Circle Lucas, TX 75002	Date 1/12/2013
	Telephone No. (Include Area Code) 972-542-2056

☐ Technical Director

☐ Chief Operator

☐ Other (specify)

☑ Registered Professional Engineer

☐ Technical Consultant

STATE OF TEXAS
J. S. SELLMEYER
38535
REGISTERED PROFESSIONAL ENGINEER

SELLMEYER ENGINEERING
BROADCAST & COMMUNICATIONS CONSULTING ENGINEERS
2 Pecan Grove Circle
Lucas, Texas, 75002
MEMBER AFCCE

ENGINEERING STATEMENT IN SUPPORT OF
AMENDMENT TO APPLICATION FOR STATION LICENSE
BMP SAN ANTONIO LICENSE COMPANY, L.P.
FILE NO: BMML-20121016ADO
RADIO STATION KZDC
1250 KHZ, 0.92 KW, 25 KW-LS, DA-2 UNL
SAN ANTONIO, TEXAS
NIGHTTIME SITE
METHOD OF MOMENTS ADJUSTMENT
C.P. FILE NO: BP-20101206AAP
FACILTY ID: 65330

This Firm represents BMP SAN ANTONIO LICENSE COMPANY, L.P. licensee and permittee of Radio Station KZDC. The instant amendment to the pending application covers the above listed Construction Permit and Items 1 – 4 of the November 15, 2012 deficiency letter from FCC Staff.

Shortly after filing the above listed application, detailed harmonic and spurious radiation measurements along with field reference point measurements were begun. Early in these measurement programs a stability problem with the new KZDC night array was discovered. Significant parameter drifts were noted, primarily in the tower-2 parameters. The measurements were suspended while a search for the cause of the problem was located.

Due to the extensive amount work required to locate and correct the problems with the KDZDC directional array and the uncertainty about possible re-radiation from the KTSA/KZDC array affecting the KLUP nighttime array, an informal request was filed on December 4, 2012 with Son Nguyen, Supervisory Engineer of the AM Branch to extend the time specified in the deficiency letter for a period of up to sixty days.

It had been noted initially that the self impedance of KZDC tower-2 (physical tower-3 of the five element array) was significantly lower than the other two which are of identical cross section. The base matrix measurements were repeated with identical results and no physical cause for anomaly was found.

During the initial adjustment of the KZDC array no indication of instability was noted. The cause was eventually traced to water trapped inside the envelope of the base insulator by use of an infrared thermometer which revealed significantly higher temperature readings on the subject insulator when compared to the other three identical insulators. The insulator was carefully drained after a drain hole was found and cleared of insect remains which apparently had plugged the drain hole many years prior to this becoming a problem. The KTSA array had been previously adjusted around the problem with no knowledge of its existence. The contaminated water inside the insulator envelope apparently manifested itself as a significant shunt capacitance across the tower base. This was significant at 1250 kilohertz due to the relatively high impedance of the 183 degree tower (approximately 660 ohms). The problem was not noticeable at 550 kilohertz since the impedance of this tower is much lower, on the order of 42 ohms. After the insulator was allowed to dry out, the base matrix measurements were repeated and new Method of Moments models were developed for

the five towers driven separately and the four element directive array model for KZDC was developed. The KZDC directive array was adjusted to the new parameters and a STA was requested. The system was then operated during daytime hours while the Harmonic and Spurious radiation measurements were made with KZDC and KTSA operating with their new nighttime facilities at full power. The array was then stable. Following completion of these measurements the Reference Point measurements for both stations were completed.

Subsequent to completion of the measurements a second attempt to complete the post construction measurements on the KLUP nighttime antenna system was made. A communications tower near the KLUP transmitter site was reported to be radiating an abnormally high field at the 930 kilohertz frequency which prevented the KZDC measurements from being completed. Out of an abundance of caution, the isolation filters for the KTSA/KZDC array were modified to effectively detune the five towers at the 930 kilohertz channel. All of the work has been completed and a Method of Moments model of the KLUP Array and the KTSA/KZDC array has been completed using the measured base loads at 930 kilohertz in the KTSA/KZDC portion of the model. A report appears in Section 9, Exhibit C-10, which demonstrates the KTSA/KZDC array has no significant adverse effect on the KUP nighttime radiation pattern. We ask that this exhibit be accepted in lieu of the magnetic measurements required by condition-9 on the C.P.

Items 1-4 of the deficiency letter are addressed in the balance of this Statement and the associated exhibits which replace the original Engineering Statement and associated exhibits in their entirety.

DESCRIPTION OF THE DIRECTIONAL ARRAY AND COMPLIANCE WITH C.P.

The new transmitter plant is diplexed into three of the four existing towers of co-owned station KTSA, 550 kilohertz also licensed to San Antonio, Texas. One additional tower was constructed to accommodate the pattern requirements of KZDC on the northern plat of land, north of Eisenhauer Road. As part of the project, all of the former overhead transmission, power and control lines were demolished following burial of all such lines for both stations. Construction of both stations is now complete and KZDC is operating under Program Test Authority granted on November 15, 2012.

The adjustment of the directional antenna system was accomplished with the use of Mininec modeling to determine the operating parameters for the new array. As described in the attached exhibits, each of the five towers was modeled in ACSModel, a version of Mininec 3.1, to calibrate the non-directional model for each tower and develop a base region model to match the measured base impedances of each of the five towers to the model, while accounting for stray capacitance and inductance in the RF feeder pipes of each tower. The resulting tower models and associated nodal analysis models for each base region were then applied to the Mininec model of the directional antenna array to determine the operating parameters required to produce the authorized pattern.

The Construction Permit contains 10 conditions which are addressed in Section-9 of this exhibit.

All work on this project was performed by me personally or under my direct supervision. Lyndon H. Willoughby assisted with the adjustment of the KZDC antenna system.

SELLMEYER ENGINEERING
BROADCAST & COMMUNICATION CONSULTING ENGINEERS
2 Pecan Grove Circle, Lucas, Texas 75002
MEMBER AFCCE

CERTIFICATION OF ENGINEER

I hereby state that:

I am President of Sellmeyer Engineering

The Firm of Sellmeyer Engineering has been retained by BMP San Antonio License Company, L.P. to prepare this Engineering Exhibit

I am a graduate of Arizona State University with the degree of Bachelor of Science in Engineering

I am a Registered Professional Engineer in the States of Ohio and Texas

My qualifications as an Engineer are a matter of record with the Federal Communications Commission

This Engineering Exhibit was prepared by me personally or under my direct supervision, and

All facts stated herein are true and correct to the best of my knowledge and belief.

J. S. Sellmeyer P. E.

October 13, 2012

Sellmeyer Engineering
2 Pecan Grove Circle
Lucas, Texas 75002
972-542-2056
jack@sellmeyereng.com
Texas Firm Number: F-004814

FEDERAL COMMUNICATIONS COMMISSION
445 12th STREET SW
WASHINGTON DC 20554

MEDIA BUREAU
AUDIO DIVISION
APPLICATION STATUS: (202) 418-2730
HOME PAGE: www.fcc.gov/mb/audio/

PROCESSING ENGINEER: Edward Lubetzky
TELEPHONE: (202) 418-2700
FACSIMILE: (202) 418-1410/11
MAIL STOP: 1800B2-EAL
INTERNET ADDRESS: Edward.Lubetzky@fcc.gov

NOV 15 2012

Dawn M. Sciarrino, Esq.
Sciarrino & Shubert, PLLC
5425 Tree Line Dr.
Centreville, VA 20120-1676

Re: BMP San Antonio License Co, L.P.
KZDC(AM), San Antonio, TX
Facility Id. Number: 65330
Construction Permit: BP-20101206AAP
License Application: BMML-20121016ADO
Program Test Authority ("PTA")

Dear Ms. Sciarrino:

This is in reference to the above-captioned license application and the request for program test authority for station KZDC(AM).

Authority is granted KZDC(AM) to conduct program tests in accordance with construction permit BP-20101206AAP and Section 73.1620 of the Commission's rules on 1250 kHz with a nighttime antenna nominal power of 920 watts. Program tests are authorized with a nighttime input power of 994 watts (common point current of 4.46 amperes) and with the antenna monitor parameters shown on Form 302-AM.

Program tests will expire **January 15, 2013**.

A preliminary review of the application reveals the following deficiencies:

1. KZDC(AM) did not take measurements at 1/8 wavelength above the open circuit resonant frequency closest to the carrier frequency to establish the characteristic impedance of the sample lines.[1] Consequently, KZDC(AM) did not show that the characteristic impedances of the sample lines are within 2 ohms of each other.

2. KZDC(AM) did not give the impedance measurements with the sampling device connected.

3. KZDC(AM) did not include at least 3 measurements on the null and main radiation lobe radials.

---

[1] The measurements should have been made at approximately 1655.8 kHz instead of 1050.082 kHz.

4. The calibrated model for tower #1 - #5 incorrectly slants the fifth tower instead of it being straight.

Further action on the subject application will be withheld for (30) thirty days from the date of this letter in order to provide BMP San Antonio License Co, L.P. an opportunity to file a curative amendment. Failure to respond or file an amendment within this time period will result in the dismissal of the application pursuant to Section 73.3568 of the rules.

Sincerely,

Son Nguyen
Supervisory Engineer
Audio Division
Media Bureau

cc: J.S. Sellmeyer
BMP San Antonio License Co, L.P.

United States of America

FEDERAL COMMUNICATIONS COMMISSION

AM BROADCAST STATION CONSTRUCTION PERMIT

Authorizing Official:

Official Mailing Address:

BMP SAN ANTONIO LICENSE COMPANY, L.P.
8750 NORTH CENTRAL EXPRESSWAY
SUITE 645
DALLAS TX 75231

Son Nguyen
Supervisory Engineer
Audio Division
Media Bureau

Grant Date: September 14, 2011

This permit expires 3:00 a.m. local time, 36 months after the grant date specified above.

Facility Id: 65330

Call Sign: KZDC

Permit File Number: BP-20101206AAP

Construction permit to move the nighttime transmitter site, change the nighttime directional antenna system and reduce the nighttime power.

Subject to the provisions of the Communications Act of 1934, as amended, subsequent acts and treaties, and all regulations heretofore or hereafter made by this Commission, and further subject to the conditions set forth in this permit, the permittee is hereby authorized to construct the radio transmitting apparatus herein described. Installation and adjustment of equipment not specifically set forth herein shall be in accordance with representations contained in the permittee's application for construction permit except for such modifications as are presently permitted, without application, by the Commission's Rules.

Commission rules which became effective on February 16, 1999, have a bearing on this construction permit. See Report & Order, Streamlining of Mass Media Applications, MM Docket No. 98-43, 13 FCC RCD 23056, Para. 77-90 (November 25, 1998); 63 Fed. Reg. 70039 (December 18, 1998). Pursuant to these rules, this construction permit will be subject to automatic forfeiture unless construction is complete and an application for license to cover is filed prior to expiration. See Section 73.3598.

Equipment and program tests shall be conducted only pursuant to Sections 73.1610 and 73.1620 of the Commission's Rules.

Hours of Operation: Unlimited

Average hours of sunrise and sunset:
Local Standard Time (Non-Advanced)

Jan.	7:30 AM	6:00 PM	Jul.	5:45 AM	7:30 PM
Feb.	7:15 AM	6:30 PM	Aug.	6:00 AM	7:15 PM
Mar.	6:45 AM	6:45 PM	Sep.	6:15 AM	6:45 PM
Apr.	6:15 AM	7:00 PM	Oct.	6:30 AM	6:00 PM
May	5:45 AM	7:15 PM	Nov.	7:00 AM	5:45 PM
Jun.	5:30 AM	7:30 PM	Dec.	7:15 AM	5:30 PM

Name of Permittee: BMP SAN ANTONIO LICENSE COMPANY, L.P.

Station Location: SAN ANTONIO, TX

Frequency (kHz): 1250

Station Class: B

Antenna Coordinates:

		Day		
Latitude:	N	29 Deg	17 Min	01 Sec
Longitude:	W	98 Deg	28 Min	28 Sec

		Night		
Latitude:	N	29 Deg	29 Min	49 Sec
Longitude:	W	98 Deg	24 Min	57 Sec

Transmitter(s): Type Accepted. See Sections 73.1660, 73.1665 and 73.1670 of the Commission's Rules.

Nominal Power (kW): Day: 25.0 Night: 0.92

Antenna Mode: Day: DA Night: DA

(DA=Directional Antenna, ND=Non-directional Antenna; CH=Critical Hours)

Antenna Registration Number(s):

Day:

Tower No.	ASRN	Overall Height (m)
1	1256063	
2	1256064	
3	1256065	
4	1256066	

Night:

Tower No.	ASRN	Overall Height (m)
1	1022082	
2	1022083	
3	1022084	
4	1278630	

DESCRIPTION OF DIRECTIONAL ANTENNA SYSTEM

Theoretical RMS (mV/m/km): Day: 1416.849 Night: 344

Standard RMS (mV/m/km): Day: 1488.618 Night: 361.46

Augmented RMS (mV/m/km):

Q Factor: Day: Night:

Theoretical Parameters:

Day Directional Antenna:

Tower No.	Field Ratio	Phasing (Deg.)	Spacing (Deg.)	Orientation (Deg.)	Tower Ref Switch *	Height (Deg.)
1	1.0000	0.000	0.0000	0.000	0	82.8
2	0.8950	-27.700	190.0000	46.100	0	89.2
3	1.1090	73.300	208.6000	71.200	0	89.2
4	0.7070	85.800	88.9000	133.300	0	82.8

* Tower Reference Switch
0 = Spacing and orientation from reference tower
1 = Spacing and orientation from previous tower

Theoretical Parameters:

Night Directional Antenna:

Tower No.	Field Ratio	Phasing (Deg.)	Spacing (Deg.)	Orientation (Deg.)	Tower Ref Switch *	Height (Deg.)
1	0.5010	89.500	0.0000	0.000	0	183.0
2	1.0000	0.000	199.1000	320.000	0	183.0
3	0.3860	-24.500	386.4000	334.100	0	183.0
4	0.9540	-0.400	277.9000	7.500	0	183.0

* Tower Reference Switch
0 = Spacing and orientation from reference tower
1 = Spacing and orientation from previous tower

Inverse Distance Field Strength:

The inverse distance field strength at a distance of one kilometer from the above antenna in the directions specified shall not exceed the following values:

Night:

Azimuth:	Radiation:	
15	126.7	mV/m
69	16.1	mV/m
104	49.2	mV/m
193.5	292.8	mV/m
234	200.7	mV/m

Special operating conditions or restrictions:

1 The permittee/licensee in coordination with other users of the site must reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic fields in excess of FCC guidelines.

2 The permittee must submit a proof of performance as set forth in either Section 73.151(a) or 73.151(c) of the rules before program tests are authorized.
A proof of performance based on field strength measurements, per Section 73.151(a), shall include a complete nondirectional proof of performance, in addition to a complete proof on the night directional antenna system. The nondirectional and directional field strength measurements must be made under similar environmental conditions. The proof of performance submitted to the Commission must contain all of the data specified in Section 73.186 of the rules.
Permittees who elect to submit a moment method proof of performance, as set forth in Section 73.151(c), must use series-fed radiators. In addition, the sampling system must be constructed as described in Section 73.151(c) (2) (i).

3 Permittee shall install a type accepted transmitter, or submit application (FCC Form 301) along with data prescribed in Section 73.1660(b) should non-type accepted transmitter be proposed.

4 A license application (FCC Form 302) to cover this construction permit must be filed with the Commission pursuant to Section 73.3536 of the Rules before the permit expires.

Special operating conditions or restrictions:

5 Before program tests are authorized, sufficient data shall be submitted to show that adequate filters, traps and other equipment has been installed and adjusted to prevent interaction, intermodulation and/or generation of spurious radiation products which may be caused by common usage of the same antenna system by Stations KZDC(AM), San Antonio Texas (FID#65330) and KTSA(AM), San Antonio, TX (FID# 71087) and there shall be filed with the license application copies of a firm agreement entered into by the two(2) stations involved clearly fixing the responsibility of each with regard to the installation and maintenance of such equipment. In addition, field observations shall be made to determine whether spurious emissions exist and any objectionable problems resulting therefrom shall be eliminated. Following construction, and prior to authorization of program test under this grant, Station KZDC(AM), San Antonio Texas (FID#65330) and KTSA(AM), San Antonio, TX (FID# 71087) shall each measure antenna or common point resistance and submit FCC Form 302 as application notifying the return to direct measurement of power.

6 Nighttime ground system consists of 120 equally spaced, buried, copper radials about the base of each tower, each 121.95 meters in length except where terminated by property boundaries or where intersecting radials are shortened and bonded to a transverse copper strap midway between adjacent towers, plus 120 interspersed radials 15.24 meters in length. Where radials intersect the right of way along Eisenhauer Road, they will be bonded to a copper strap which will be connected to the existing straps and /or radial wires which cross beneath the road.

7 Daytime ground system consists of 120 equally spaced, buried, copper radials about the base of each tower, each 60 meters in length except where terminated by property boundaries or where intersecting radials are shortened and bonded to a transverse copper strap midway between adjacent towers.

8 Permittee shall install RF warning signs around the fences of the nighttime towers.

9 Prior to construction of the tower(s) authorized herein, permittee shall notify AM Station KTSA(AM), San Antonio, TX (FID# 71087) so that station may determine operating power by a method described in Section 73.51(a)(1) or (d). Permittee shall be responsible for installation and continued maintenance of detuning apparatus necessary to prevent adverse effects upon the daytime radiation pattern of that station. Both prior to construction of the tower and subsequent to the installation of all appurtenances thereon, antenna impedance measurements of the AM station shall be made and sufficient field strength measurements, taken at a minimum of 10 locations along each of six equally spaced radials, shall be made to establish that the radiation pattern is essentially omnidirectional. Prior to or simultaneous with the filing of the application for license to cover this permit, the results of the field strength measurements and the impedance measurements shall be submitted to the Commission in an application on FCC Form 302 notifying of the AM station's return to the direct method of power determination. (See Section 73.45(c), FCC Rules).

Special operating conditions or restrictions:

10 Prior to construction of the tower authorized herein, permittee shall notify AM Station KTSA(AM), San Antonio, TX (FID#71087) and KLUP(AM), Terrell Hills, TX (Facility ID #34975) so that, if necessary that AM station: may
determine operating power by a method described in Section 73.51(a)(1) or (d), and/or request temporary authority from the Commission in Washington, D.C. to operate with parameters at variance in order to maintain monitoring point field strengths within authorized limits. Permittee shall be responsible for installation and continued maintenance of detuning apparatus necessary to prevent adverse effects upon the radiation pattern of the AM station. Both prior to construction of the tower and subsequent to the installation of all appurtenances thereon, a partial proof of performance, as defined by Section 73.154(a) of the Commission's Rules, shall be conducted to establish that the nighttime AM arrays have not been adversely affected and prior
to or simultaneous with the filing of the application for license to cover this permit, the results submitted to the Commission.

*** END OF AUTHORIZATION ***

SELLMEYER ENGINEERING
BROADCAST & COMMUNICATIONS CONSULTING ENGINEERS
2 Pecan Grove Circle
Lucas, Texas, 75002
MEMBER AFCCE

RADIO STATION KZDC
1250 KHZ, 0.92 KW, 25 KW-LS, DA-2
SAN ANTONIO, TEXAS, TWO SITE OPERATION
NIGHTTIME SITE
SECTION-1
Analysis of Measured Tower Impedance Data
For verification on Method of Moments Model

The KZDC Nighttime Directive Array is diplexed with the KTSA (550 kHz) array using three of the four KTSA towers and one additional tower of equal height and cross section. The towers, for purposes of the KZDC Construction Permit, are numbered 1 through 5 with Tower-5 being the KTSA Tower-1. This arrangement corresponds to the KZDC C.P. numbering convention. Tower-5 is detuned at the 1250 kHz channel and KZDC Tower-4, physical Tower-5 is detuned at the 550 kHz channel. A sample loop is located at the phase reversal location on each of these towers and is connected to a run of ½ inch Heliax cable which is terminated at the base of each tower to provide an null indication for system maintenance purposes. The electrical height of all five towers is 183.0 degrees at the 1250 kHz channel. The face widths are identical, although minor differences exist in the cross bracing details. For this reason Voltage Sampling is employed at the tower bases for the 1250 kHz Antenna Monitoring System.

Each Tower was modeled in ACSModel, which uses a Mininec 3.1 core. Each tower is modeled using 20 wire segments. The segment radii are specified in meters. A nodal analysis program, WCAP, was used to correlate the modeled and measured base impedances, Voltages and Phases to the measured impedances at the output terminals of the VSU cabinets and the modeled base voltage and phases to the those at the VSU output terminals.

Each tower was adjusted individually to provide correlation of the model impedance, when corrected for stray capacitance and inductance introduced by the

series feeder pipes and shunting components such as the tower lighting chokes, base insulator feed through insulators and isocouplers, where applicable, to the measured impedances at the VSU, or ACU output terminals. Isocouplers are used for an FM antenna on Tower-5 and an STL antenna on Tower-1. All strays are included in the individual WCAP models.

The modeled tower height and equivalent radius are within the permitted height ranges of 75 to 125 percent of the physical height and within the permitted equivalent radius of 80 to 150 percent of the physical radius. The KZDC Table of Tower Physical and Modeled dimensions shows the height and radius of each element of the array. Note that Tower-5 is not used in the KZDC array and is detuned at the KZDC frequency.

Tower base impedance measurements were made at the output test jack ("J-Plug") of each of the Voltage Sampling Units ("VSU") using a Hewlett Packard 8753C network analyzer connected to an RF Power Amplifier, a resistive attenuator and a directional coupler in a calibrated measurement system. The other towers were short circuited across the base insulator with a four inch wide copper strap. Tower-5 (physical tower-1) has no VSU. The impedance measurements for this tower were made at the output J-Plug of the Antenna Coupling Unit ("ACU").

The reference point at each tower, except for Tower-5 (KTSA Twr-1) is the input Jack of the Voltage Sampling Unit (VSU) which is mounted on the tower base pier at KZDC Towers 1-4. This unit is connected directly to the tower feed point with a short length of ½ inch copper tubing. The base voltage at this point is measured by the VSU and transmitted to the Antenna Monitor through the sample line. There are no components in shunt with the VSU output except for the tower lighting choke, base insulator and other stray capacitances such as Isocouplers on KZDC Towers 1 and 5.

The measured reactance of the four wire tower lighting chokes was supplied by the manufacturer and incorporated in the Base Region Calibration model. All of the tower lighting choke reactances and stray capacitive reactances have been incorporated in the Base Region Models used in the calibration process. Circuit

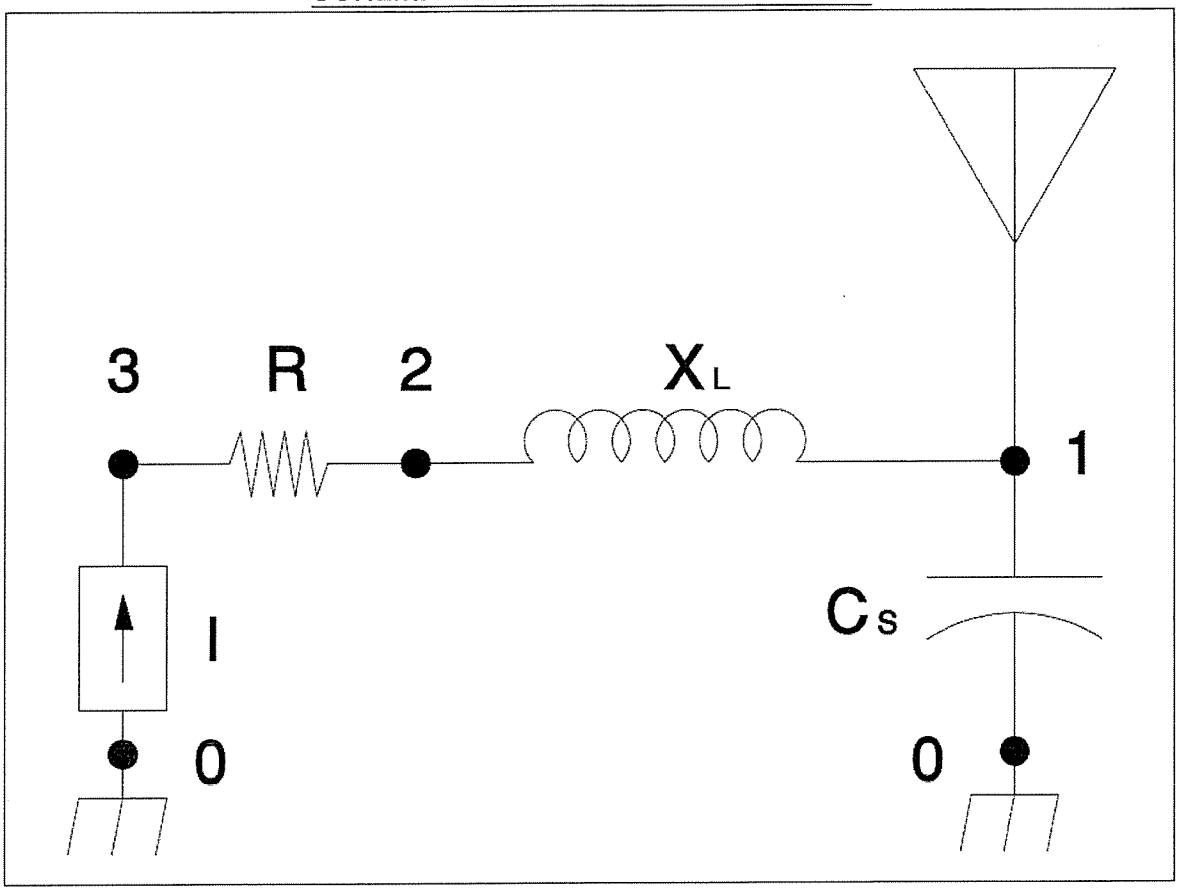
calculations were performed to relate the method of moments modeled impedances to the VSU input measurement (reference) points as shown on the following pages.

In addition to the page showing the schematic of the assumed circuit and tabulation of calculated values, pages showing the results of calculations using the WCAP network analysis program from Westberg Consulting are provided for each tower. WCAP performs such calculations using nodal analysis, as do other modern circuit analysis such as the commonly available ones based on SPICE software. In each of the WCAP tabulations, Node-2 represents the ACU reference point "the Output Jack" and Node-1 represents the tower feed point. Node 0 represents ground potential. The tower operating impedances are represented by complex loads from Node-1 to ground ($R_{1\text{-}0}$). It should be noted that the VSU Voltage and Phase at Node-1 is the modeled tower base voltage and phase from the MOM model for each of the four elements. The Node-2 Voltage and Phase are an exact translation of the Node-1 values to the input terminal of the associated VSU.

The calculated VSU input impedances appear after the "TO IMPEDANCE" columns of the WCAP Tabulations, following the phantom 1 ohm resistor (R 1-2) that is placed in series with the current source to provide calculation points for the impedances. The tower feed point impedances from the method of moments model are represented complex loads from Node-1 to ground (R 1-0). The assumed stray capacitances and the tower light choke reactances are listed as a specified capacitive reactance which combines the two quantities and appears across the output of the network in parallel with the tower bases.

The modeled and measured base impedances at the VSU input jacks with all the other towers short circuited across their base insulators agree within +/- 2 ohms and +/- 4 percent for resistance and reactance, as required by the Rules.

SCHEMATIC OF BASE REGION MODEL



KZDC NON-DIRECTIONAL BASE REGION MODEL TABULATION

TWR	BASE SHUNT C (pF)	FEEDER INDUCTANCE (uHy)	BASE IMPEDANCE FROM MOM MODEL (OHMS)	MEASURED BASE IMPEDANCE @ VSU FROM WCAP MODEL (OHMS)	MEASURED BASE IMPEDANCE Zb @ VSU (OHMS)
1	91.20	2.290	235.0-j423.9	136.01-j324.75	136.0-J324.8
2	76.00	1.915	221.4-J437.9	137.64-J346.54	137.8-J346.7
3	101.0	1.890	231.9-J434.9	125.84-325.72	126.0-J325.6
4	56.80	2.200	217.8-J418.3	153.65-J347.82	153.8-J348.0
5	93.50	1.800	214.9-J406.3	125.62-J314.06	125.6-J314.4

NOTES: BASES SHORTED EXCEPT FOR MEASURED TOWER; Zb MEASURED AT VSU/ACU OUPTPUT JACK
MANUFACTURER'S STATED INDUCTANCE OF 4 WIRE LIGHTING CHOKE: 429 uHy
TOWER-5 IS PHYSICAL TOWER-1

WCAP CIRCUIT ANALYSIS FILES APPEAR ON THE FOLLOWING PAGES

WCAP - KZDC TWR-1 ND
WCAP OUTPUT AT FREQUENCY: 1.250 MHz

NODE VOLTAGES

Node:	1	368.7320 ∠	-68.3545° V
Node:	2	352.0772 ∠	-67.2748° V
Node:	**3**	**352.4647 ∠**	**-67.1248° V**

	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
R	3→2	1.00000000	1.00 ∠	0.000° V	1.00 ∠	0.000° A
L	2→1	2.29000000	17.99 ∠	90.000° V	1.00 ∠	0.000° A
C	1→0	0.00009120	368.73 ∠	-68.354° V	0.26 ∠	21.646° A
R	1→0	235.00000000	368.73 ∠	-68.354° V	0.76 ∠	-7.357° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
R	3→2	1.00000000	137.01 - j	324.745	**136.01 - j**	**324.745**[2]
L	2→1	2.29000000	136.01 - j	324.745	136.01 - j	342.730
C	1→0	0.00009120	0.00 - j	1396.096	0.00 + j	0.000
R	1→0	235.00000000	**235.00 - j**	**423.900**[1]	0.00 + j	0.000

WCAP INPUT DATA:

	1.2500	0.00000000	0	
I	1.00000000	0	3	0.00000000
R	1.00000000	3	2	0.00000000
L	2.29000000	2	1	0.00000000
C	0.00009120	1	0	
R	235.00000000	1	0	-423.90000000

1: MODELED IMPEDANCE
2: MEASURED IMPEDANCE

WCAP - KZDC TWR-2 ND
WCAP OUTPUT AT FREQUENCY: 1.250 MHz

NODE VOLTAGES

Node:	1	386.8899 ∠	-69.1601° V
Node:	2	372.8719 ∠	-68.3379° V
Node:	3	373.2422 ∠	-68.1952° V

	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
R	3→2	1.00000000	1.00 ∠	0.000° V	1.00 ∠	0.000° A
L	2→1	1.91500000	15.04 ∠	90.000° V	1.00 ∠	0.000° A
C	1→0	0.00007600	386.89 ∠	-69.160° V	0.23 ∠	20.840° A
R	1→0	221.40000000	386.89 ∠	-69.160° V	0.79 ∠	-5.981° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
R	3→2	1.00000000	138.64 - j	346.538	**137.64 - j**	**346.538**[2]
L	2→1	1.91500000	137.64 - j	346.538	137.64 - j	361.579
C	1→0	0.00007600	0.00 - j	1675.315	0.00 + j	0.000
R	1→0	221.40000000	**221.40 - j**	**437.900**[1]	0.00 + j	0.000

WCAP INPUT DATA:

	1.2500	0.00000000	0	
I	1.00000000	0	3	0.00000000
R	1.00000000	3	2	0.00000000
L	1.91500000	2	1	0.00000000
C	0.00007600	1	0	
R	221.40000000	1	0	-437.90000000

1: MODELED IMPEDANCE
2: MEASURED IMPEDANE

WCAP - KZDC TWR-3 ND
WCAP OUTPUT AT FREQUENCY: 1.250 MHz

NODE VOLTAGES

Node:	1	363.0661 ∠	-69.7204° V
Node:	2	349.1801 ∠	-68.8761° V
Node:	3	349.5417 ∠	-68.7232° V

	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
R	3→2	1.00000000	1.00 ∠	0.000° V	1.00 ∠	0.000° A
L	2→1	1.89000000	14.84 ∠	90.000° V	1.00 ∠	0.000° A
C	1→0	0.00010100	363.07 ∠	-69.720° V	0.29 ∠	20.280° A
R	1→0	231.90000000	363.07 ∠	-69.720° V	0.74 ∠	-7.788° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
R	3→2	1.00000000	126.84 - j	325.716	**125.84 - j**	**325.716**[2]
L	2→1	1.89000000	125.84 - j	325.716	125.84 - j	340.560
C	1→0	0.00010100	-0.00 - j	1260.633	0.00 + j	0.000
R	1→0	231.90000000	**231.90 - j**	**434.900**[1]	0.00 + j	0.000

WCAP INPUT DATA:

	1.2500	0.00000000	0	
I	1.00000000	0	3	0.00000000
R	1.00000000	3	2	0.00000000
L	1.89000000	2	1	0.00000000
C	0.00010100	1	0	
R	231.90000000	1	0	-434.90000000

1: MODELED IMPEDANCE
2: MEASURED IMPEDANCE

WCAP - KZDC TWR-4 ND
WCAP OUTPUT AT FREQUENCY: 1.250 MHz

NODE VOLTAGES

Node:	1	396.1149 ∠	-67.1760° V
Node:	2	380.2481 ∠	-66.1660° V
Node:	3	380.6533 ∠	-66.0284° V

	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
R	3→2	1.00000000	1.00 ∠	0.000° V	1.00 ∠	0.000° A
L	2→1	2.20000000	17.28 ∠	90.000° V	1.00 ∠	0.000° A
C	1→0	0.00005680	396.11 ∠	-67.176° V	0.18 ∠	22.824° A
R	1→0	217.80000000	396.11 ∠	-67.176° V	0.84 ∠	-4.681° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
R	3→2	1.00000000	154.65 - j	347.821	**153.65 - j**	**347.821**[2]
L	2→1	2.20000000	153.65 - j	347.821	153.65 - j	365.099
C	1→0	0.00005680	0.00 - j	2241.619	0.00 + j	0.000
R	1→0	217.80000000	**217.80 - j**	**418.300**[1]	0.00 + j	0.000

WCAP INPUT DATA:

	1.2500	0.00000000	0	
I	1.00000000	0	3	0.00000000
R	1.00000000	3	2	0.00000000
L	2.20000000	2	1	0.00000000
C	0.00005680	1	0	
R	217.80000000	1	0	-418.30000000

1: MODELED IMPEDANCE
2: MEASURED IMPEDANCE

WCAP - KZDC TWR-5 ND
WCAP OUTPUT AT FREQUENCY: 1.250 MHz

NODE VOLTAGES

Node:	1	351.4220 ∠	-69.0548° V
Node:	2	338.2567 ∠	-68.1988° V
Node:	3	338.6294 ∠	-68.0417° V

	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
R	3→2	1.00000000	1.00 ∠	0.000° V	1.00 ∠	0.000° A
L	2→1	1.80000000	14.14 ∠	90.000° V	1.00 ∠	0.000° A
C	1→0	0.00009350	351.42 ∠	-69.055° V	0.26 ∠	20.945° A
R	1→0	214.90000000	351.42 ∠	-69.055° V	0.76 ∠	-6.930° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
R	3→2	1.00000000	126.62 - j	314.064	**125.62 - j**	**314.064**[2]
L	2→1	1.80000000	125.62 - j	314.064	125.62 - j	328.201
C	1→0	0.00009350	-0.01 - j	1361.754	0.00 + j	0.000
R	1→0	214.90000000	**214.90 - j**	**406.300**[1]	0.00 + j	0.000

WCAP INPUT DATA:

	1.2500	0.00000000	0	
I	1.00000000	0	3	0.00000000
R	1.00000000	3	2	0.00000000
L	1.80000000	2	1	0.00000000
C	0.00009350	1	0	
R	214.90000000	1	0	-406.30000000

1: MODELED IMPEDANCE
2: MEASURED IMPEDANCE

METHOD OF MOMENTS MODEL DETAILS FOR TOWERS DRIVEN INDIVIDUALLY

The KZDC array was modeled using ACSModel, (Mininec 3.1 Core). One wire was used to represent each tower. The top and bottom wire end points were specified in meters in the Cartesian coordinate system, as converted from the theoretical directional antenna specifications taking into account the carrier frequency wavelength, Each tower was modeled using 20 wire segments. As the towers are physically 183.0° in electrical height, each segment represents 9.15 electrical degrees.

The individual tower's physical characteristics were adjusted to provide a match of the modeled and measured impedances, when the stray capacitances, ACU tower lighting choke inductances and RF feed line hookup inductances that were measured at the output RF test jack in the VSU and antenna coupler enclosures while all of the other towers were short circuited across their bases. The method of moments model assumed loads at ground level having zero reactances while short circuited. The modeled reactances of the WCAP network analyses were used to match the modeled base impedances to the measured values on an individual bases leaving all other grounded. The individual tower models, thus generated, were used to determine the antenna monitor parameters from the MOM Directive Array modeled parameters.

Each tower's modeled height relative to its physical height falls within the range of 75 to 125 percent of the physical height and each tower's modeled equivalent radius falls within the required range of 80 percent to 150 percent of the radius of a circle having a circumference equal to the sum of the widths of the tower faces. The array consists of five uniform cross section towers having a face width of 36 inches.

TABLE OF MODELED TOWER HEIGHTS

TOWER	Electrical Height (Degrees)	Physical Height (meters)	Modeled Height (meters)	Modeled Percent of Height	Modeled Radius (meters)	Percent Equivalent Radius
1	186.6599	121.92	125.3570	102.00	0.4366	100.0
2	186.5750	121.92	124.9666	101.95	0.4366	100.0
3	186.7000	121.92	124.3837	101.95	0.4366	100.0
4	186.6599	121.92	121.3570	102.00	0.4366	100.0
5	188.4900	121.92	125.5763	103.00	0.4366	100.0

The modeled heights of the KZDC towers are within 75 to 125 percent of the physical heights. The modeled equivalent radius is 100 percent of the physical radius.

MEHOD OF MOMENTS MODELS

****
ACSModel
(MININEC 3.1 Core)
01-10-2013 12:31:02
****

KZDC
NON-DIRECTIONAL MODEL
TWR-1 ND

Frequency = 1.250 MHz Wavelength = 239.84000 Meters

No. of Wires: 5

Wire No. 1	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
0	0	0		-1	
0	0	124.357	0.4366	0	20

Wire No. 2	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
101.6118	-85.26246	0		-2	
101.6118	-85.26246	124.9666	0.4366	0	20

Wire No. 3	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
231.5716	-112.4451	0		-3	
231.5716	-112.4451	124.3837	0.4366	0	20

Wire No. 4	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
183.5592	24.16603	0		-4	
183.5592	24.16603	124.357	0.4366	0	20

Wire No. 5	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
-129.7462	27.57841	0		-5	
-129.7462	27.57841	125.5762	0.4366	0	20

**** ANTENNA GEOMETRY ****

Wire No. 1 Coordinates X	Y	Z	Radius	Connection End1	End2	Pulse No.
0	0	0	0.4366	-1	1	1
0	0	6.217852	0.4366	1	1	2
0	0	12.4357	0.4366	1	1	3
0	0	18.65355	0.4366	1	1	4
0	0	24.87141	0.4366	1	1	5
0	0	31.08926	0.4366	1	1	6
0	0	37.30711	0.4366	1	1	7
0	0	43.52496	0.4366	1	1	8
0	0	49.74282	0.4366	1	1	9
0	0	55.96067	0.4366	1	1	10
0	0	62.17852	0.4366	1	1	11
0	0	68.39638	0.4366	1	1	12
0	0	74.61422	0.4366	1	1	13
0	0	80.83208	0.4366	1	1	14
0	0	87.04993	0.4366	1	1	15
0	0	93.26778	0.4366	1	1	16
0	0	99.48563	0.4366	1	1	17
0	0	105.7035	0.4366	1	1	18
0	0	111.9213	0.4366	1	1	19
0	0	118.1392	0.4366	1	0	20

Wire No. 2 Coordinates X	Y	Z	Radius	Connection End1	End2	Pulse No.
101.6118	-85.26246	0	0.4366	-2	2	21
101.6118	-85.26246	6.248332	0.4366	2	2	22
101.6118	-85.26246	12.49666	0.4366	2	2	23
101.6118	-85.26246	18.745	0.4366	2	2	24
101.6118	-85.26246	24.99333	0.4366	2	2	25
101.6118	-85.26246	31.24166	0.4366	2	2	26
101.6118	-85.26246	37.48999	0.4366	2	2	27
101.6118	-85.26246	43.73832	0.4366	2	2	28
101.6118	-85.26246	49.98666	0.4366	2	2	29
101.6118	-85.26246	56.23499	0.4366	2	2	30
101.6118	-85.26246	62.48332	0.4366	2	2	31
101.6118	-85.26246	68.73165	0.4366	2	2	32
101.6118	-85.26246	74.97998	0.4366	2	2	33
101.6118	-85.26246	81.22832	0.4366	2	2	34
101.6118	-85.26246	87.47665	0.4366	2	2	35
101.6118	-85.26246	93.72498	0.4366	2	2	36
101.6118	-85.26246	99.97331	0.4366	2	2	37
101.6118	-85.26246	106.2216	0.4366	2	2	38
101.6118	-85.26246	112.47	0.4366	2	2	39
101.6118	-85.26246	118.7183	0.4366	2	0	40

Wire No. 3 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
231.5716	-112.4451	0	0.4366	-3	3	41
231.5716	-112.4451	6.219184	0.4366	3	3	42
231.5716	-112.4451	12.43837	0.4366	3	3	43
231.5716	-112.4451	18.65755	0.4366	3	3	44
231.5716	-112.4451	24.87674	0.4366	3	3	45
231.5716	-112.4451	31.09592	0.4366	3	3	46
231.5716	-112.4451	37.31511	0.4366	3	3	47
231.5716	-112.4451	43.53429	0.4366	3	3	48
231.5716	-112.4451	49.75348	0.4366	3	3	49
231.5716	-112.4451	55.97266	0.4366	3	3	50
231.5716	-112.4451	62.19184	0.4366	3	3	51
231.5716	-112.4451	68.41103	0.4366	3	3	52
231.5716	-112.4451	74.63021	0.4366	3	3	53
231.5716	-112.4451	80.8494	0.4366	3	3	54
231.5716	-112.4451	87.06859	0.4366	3	3	55
231.5716	-112.4451	93.28777	0.4366	3	3	56
231.5716	-112.4451	99.50695	0.4366	3	3	57
231.5716	-112.4451	105.7261	0.4366	3	3	58
231.5716	-112.4451	111.9453	0.4366	3	3	59
231.5716	-112.4451	118.1645	0.4366	3	0	60

Wire No. 4 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
183.5592	24.16603	0	0.4366	-4	4	61
183.5592	24.16603	6.217852	0.4366	4	4	62
183.5592	24.16603	12.4357	0.4366	4	4	63
183.5592	24.16603	18.65355	0.4366	4	4	64
183.5592	24.16603	24.87141	0.4366	4	4	65
183.5592	24.16603	31.08926	0.4366	4	4	66
183.5592	24.16603	37.30711	0.4366	4	4	67
183.5592	24.16603	43.52496	0.4366	4	4	68
183.5592	24.16603	49.74282	0.4366	4	4	69
183.5592	24.16603	55.96067	0.4366	4	4	70
183.5592	24.16603	62.17852	0.4366	4	4	71
183.5592	24.16603	68.39638	0.4366	4	4	72
183.5592	24.16603	74.61422	0.4366	4	4	73
183.5592	24.16603	80.83208	0.4366	4	4	74
183.5592	24.16603	87.04993	0.4366	4	4	75
183.5592	24.16603	93.26778	0.4366	4	4	76
183.5592	24.16603	99.48563	0.4366	4	4	77
183.5592	24.16603	105.7035	0.4366	4	4	78
183.5592	24.16603	111.9213	0.4366	4	4	79
183.5592	24.16603	118.1392	0.4366	4	0	80

Wire No. 5 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
-129.7462	27.57841	0	0.4366	-5	5	81
-129.7462	27.57841	6.278811	0.4366	5	5	82
-129.7462	27.57841	12.55762	0.4366	5	5	83
-129.7462	27.57841	18.83643	0.4366	5	5	84
-129.7462	27.57841	25.11525	0.4366	5	5	85
-129.7462	27.57841	31.39405	0.4366	5	5	86
-129.7462	27.57841	37.67287	0.4366	5	5	87
-129.7462	27.57841	43.95168	0.4366	5	5	88
-129.7462	27.57841	50.23049	0.4366	5	5	89
-129.7462	27.57841	56.5093	0.4366	5	5	90
-129.7462	27.57841	62.78811	0.4366	5	5	91
-129.7462	27.57841	69.06693	0.4366	5	5	92
-129.7462	27.57841	75.34573	0.4366	5	5	93
-129.7462	27.57841	81.62455	0.4366	5	5	94
-129.7462	27.57841	87.90336	0.4366	5	5	95
-129.7462	27.57841	94.18217	0.4366	5	5	96
-129.7462	27.57841	100.461	0.4366	5	5	97
-129.7462	27.57841	106.7398	0.4366	5	5	98
-129.7462	27.57841	113.0186	0.4366	5	5	99
-129.7462	27.57841	119.2974	0.4366	5	0	100

Sources: 1
Pulse No., Voltage Magnitude, Phase (Degrees): 1, 100.0, 0.0

Number of Loads: 4
Pulse No., Resistance, Reactance: 21 , 0 , 0
Pulse No., Resistance, Reactance: 41 , 0 , 0
Pulse No., Resistance, Reactance: 61 , 0 , 0
Pulse No., Resistance, Reactance: 81 , 0 , 0

********** SOURCE DATA **********
Pulse 1 Voltage = (100.0, 0.0j)
Current = (0.1, 0.1805j)
Impedance = **(234.992, -423.897j)**
Power = 5.0 Watts

********** CURRENT DATA **********

Wire No. 1 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
1	0.1	0.1805	0.2063	60.9978
2	0.0995	0.0672	0.1201	34.0327
3	0.0979	-0.0096	0.0984	-5.5983
4	0.0953	-0.0778	0.123	-39.2523
5	0.0917	-0.1395	0.1669	-56.6874
6	0.0872	-0.1947	0.2133	-65.8749
7	0.0819	-0.243	0.2564	-71.3663
8	0.076	-0.2836	0.2936	-75.0029
9	0.0695	-0.316	0.3235	-77.5978
10	0.0626	-0.3395	0.3452	-79.5544
11	0.0554	-0.3537	0.358	-81.0934
12	0.0482	-0.3583	0.3615	-82.345
13	0.0409	-0.3533	0.3557	-83.391
14	0.0339	-0.3388	0.3405	-84.2854
15	0.0272	-0.3152	0.3164	-85.0656
16	0.021	-0.2829	0.2836	-85.7581
17	0.0153	-0.2425	0.2429	-86.3827
18	0.0104	-0.1946	0.1949	-86.9549
19	0.0061	-0.14	0.1401	-87.4876
20	0.0027	-0.0783	0.0784	-87.9973
E	0.0	0.0	0.0	0.0

Wire No. 2 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
21	-0.0142	-0.0349	0.0377	-112.171
22	-0.0141	-0.0347	0.0375	-112.1348
23	-0.0138	-0.0342	0.0369	-112.025
24	-0.0133	-0.0332	0.0358	-111.8378
25	-0.0126	-0.0319	0.0343	-111.5665
26	-0.0117	-0.0302	0.0324	-111.2015
27	-0.0107	-0.0283	0.0303	-110.7293
28	-0.0096	-0.0262	0.0279	-110.1314
29	-0.0084	-0.0238	0.0253	-109.3834
30	-0.0071	-0.0214	0.0225	-108.4528
31	-0.0059	-0.0189	0.0197	-107.2959
32	-0.0046	-0.0163	0.0169	-105.8538
33	-0.0035	-0.0138	0.0142	-104.0455
34	-0.0024	-0.0114	0.0116	-101.7584
35	-0.0014	-0.0091	0.0092	-98.8338
36	-0.0006	-0.007	0.007	-95.0447
37	0.0	-0.0051	0.0051	-90.0676
38	0.0004	-0.0034	0.0035	-83.4522
39	0.0006	-0.002	0.0021	-74.6217
40	0.0005	-0.0009	0.001	-62.9034
E	0.0	0.0	0.0	0.0

Wire No. 3 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
41	0.0022	0.0272	0.0273	85.437
42	0.0021	0.0271	0.0272	85.5226
43	0.002	0.0266	0.0267	85.7816
44	0.0017	0.0259	0.026	86.2207
45	0.0014	0.0249	0.0249	86.8512
46	0.001	0.0237	0.0237	87.69
47	0.0005	0.0222	0.0222	88.76
48	0.0	0.0205	0.0205	90.0917
49	-0.0006	0.0187	0.0187	91.7248
50	-0.0011	0.0168	0.0169	93.7097
51	-0.0016	0.0148	0.0149	96.1103
52	-0.002	0.0128	0.013	99.0057
53	-0.0024	0.0109	0.0111	102.4919
54	-0.0027	0.0089	0.0093	106.6804
55	-0.0028	0.0071	0.0077	111.691
56	-0.0028	0.0054	0.0061	117.6331
57	-0.0027	0.0039	0.0048	124.5698
58	-0.0024	0.0026	0.0035	132.4668
59	-0.0019	0.0015	0.0024	141.1474
60	-0.0011	0.0007	0.0013	150.3678
E	0.0	0.0	0.0	0.0

Wire No. 4 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
61	-0.036	0.0014	0.036	177.8397
62	-0.0358	0.0013	0.0358	177.8934
63	-0.0352	0.0012	0.0352	178.0558
64	-0.0343	0.001	0.0343	178.331
65	-0.033	0.0007	0.033	178.726
66	-0.0314	0.0004	0.0314	179.251
67	-0.0295	0.0	0.0295	179.9202
68	-0.0273	-0.0004	0.0273	-179.2477
69	-0.025	-0.0008	0.025	-178.2282
70	-0.0225	-0.0012	0.0225	-176.9894
71	-0.0199	-0.0016	0.02	-175.4904
72	-0.0173	-0.0019	0.0174	-173.6782
73	-0.0147	-0.0022	0.0149	-171.4843
74	-0.0122	-0.0024	0.0124	-168.8204
75	-0.0098	-0.0025	0.0101	-165.5729
76	-0.0075	-0.0025	0.008	-161.5988
77	-0.0055	-0.0024	0.006	-156.7237
78	-0.0037	-0.0021	0.0043	-150.7497
79	-0.0022	-0.0016	0.0028	-143.4789
80	-0.001	-0.001	0.0014	-134.6913
E	0.0	0.0	0.0	0.0

Wire No. 5 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
81	-0.0126	-0.0423	0.0442	-106.5697
82	-0.0125	-0.0421	0.0439	-106.5177
83	-0.0121	-0.0414	0.0431	-106.36
84	-0.0116	-0.0402	0.0419	-106.092
85	-0.0109	-0.0387	0.0402	-105.7054
86	-0.01	-0.0367	0.038	-105.1882
87	-0.0089	-0.0344	0.0356	-104.5237
88	-0.0078	-0.0318	0.0328	-103.6894
89	-0.0065	-0.0291	0.0298	-102.6558
90	-0.0053	-0.0261	0.0266	-101.3841
91	-0.004	-0.0231	0.0234	-99.8234
92	-0.0028	-0.02	0.0202	-97.9067
93	-0.0016	-0.017	0.017	-95.5457
94	-0.0006	-0.014	0.014	-92.6235
95	0.0002	-0.0112	0.0113	-88.9871
96	0.0008	-0.0087	0.0087	-84.4394
97	0.0013	-0.0064	0.0065	-78.7396
98	0.0014	-0.0043	0.0046	-71.6247
99	0.0013	-0.0026	0.0029	-62.8746
100	0.0009	-0.0012	0.0015	-52.3574
E	0.0	0.0	0.0	0.0

********** BASE OPERATING PARAMETERS **********

Twr.	Ratio	Phase
1	1.000	0.0
2	0.183	-173.2
3	0.132	24.4
4	0.175	116.8
5	0.214	-167.6

****
ACSModel
(MININEC 3.1 Core)
11-17-2012 14:27:22
****

KZDC
NON-DIRECTIONAL MODEL
TWR-2 ND

Frequency = 1.250 MHz Wavelength = 239.84000 Meters

No. of Wires: 5

Wire No. 1 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
0	0	0		-1	
0	0	124.357	0.4366	0	20

Wire No. 2 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
101.6118	-85.26246	0		-2	
101.6118	-85.26246	124.9666	0.4366	0	20

Wire No. 3 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
231.5716	-112.4451	0		-3	
231.5716	-112.4451	124.3837	0.4366	0	20

Wire No. 4 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
183.5592	24.16603	0		-4	
183.5592	24.16603	124.357	0.4366	0	20

Wire No. 5 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
-129.7462	27.57841	0		-5	
-129.7462	27.57841	125.5762	0.4366	0	20

**** ANTENNA GEOMETRY ****

Wire No. 1 Coordinates X	Y	Z	Radius	Connection End1	End2	Pulse No.
0	0	0	0.4366	-1	1	1
0	0	6.217852	0.4366	1	1	2
0	0	12.4357	0.4366	1	1	3
0	0	18.65355	0.4366	1	1	4
0	0	24.87141	0.4366	1	1	5
0	0	31.08926	0.4366	1	1	6
0	0	37.30711	0.4366	1	1	7
0	0	43.52496	0.4366	1	1	8
0	0	49.74282	0.4366	1	1	9
0	0	55.96067	0.4366	1	1	10
0	0	62.17852	0.4366	1	1	11
0	0	68.39638	0.4366	1	1	12
0	0	74.61422	0.4366	1	1	13
0	0	80.83208	0.4366	1	1	14
0	0	87.04993	0.4366	1	1	15
0	0	93.26778	0.4366	1	1	16
0	0	99.48563	0.4366	1	1	17
0	0	105.7035	0.4366	1	1	18
0	0	111.9213	0.4366	1	1	19
0	0	118.1392	0.4366	1	0	20

Wire No. 2 Coordinates X	Y	Z	Radius	Connection End1	End2	Pulse No.
101.6118	-85.26246	0	0.4366	-2	2	21
101.6118	-85.26246	6.248332	0.4366	2	2	22
101.6118	-85.26246	12.49666	0.4366	2	2	23
101.6118	-85.26246	18.745	0.4366	2	2	24
101.6118	-85.26246	24.99333	0.4366	2	2	25
101.6118	-85.26246	31.24166	0.4366	2	2	26
101.6118	-85.26246	37.48999	0.4366	2	2	27
101.6118	-85.26246	43.73832	0.4366	2	2	28
101.6118	-85.26246	49.98666	0.4366	2	2	29
101.6118	-85.26246	56.23499	0.4366	2	2	30
101.6118	-85.26246	62.48332	0.4366	2	2	31
101.6118	-85.26246	68.73165	0.4366	2	2	32
101.6118	-85.26246	74.97998	0.4366	2	2	33
101.6118	-85.26246	81.22832	0.4366	2	2	34
101.6118	-85.26246	87.47665	0.4366	2	2	35
101.6118	-85.26246	93.72498	0.4366	2	2	36
101.6118	-85.26246	99.97331	0.4366	2	2	37
101.6118	-85.26246	106.2216	0.4366	2	2	38
101.6118	-85.26246	112.47	0.4366	2	2	39
101.6118	-85.26246	118.7183	0.4366	2	0	40

Wire No. 3 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
231.5716	-112.4451	0	0.4366	-3	3	41
231.5716	-112.4451	6.219184	0.4366	3	3	42
231.5716	-112.4451	12.43837	0.4366	3	3	43
231.5716	-112.4451	18.65755	0.4366	3	3	44
231.5716	-112.4451	24.87674	0.4366	3	3	45
231.5716	-112.4451	31.09592	0.4366	3	3	46
231.5716	-112.4451	37.31511	0.4366	3	3	47
231.5716	-112.4451	43.53429	0.4366	3	3	48
231.5716	-112.4451	49.75348	0.4366	3	3	49
231.5716	-112.4451	55.97266	0.4366	3	3	50
231.5716	-112.4451	62.19184	0.4366	3	3	51
231.5716	-112.4451	68.41103	0.4366	3	3	52
231.5716	-112.4451	74.63021	0.4366	3	3	53
231.5716	-112.4451	80.8494	0.4366	3	3	54
231.5716	-112.4451	87.06859	0.4366	3	3	55
231.5716	-112.4451	93.28777	0.4366	3	3	56
231.5716	-112.4451	99.50695	0.4366	3	3	57
231.5716	-112.4451	105.7261	0.4366	3	3	58
231.5716	-112.4451	111.9453	0.4366	3	3	59
231.5716	-112.4451	118.1645	0.4366	3	0	60

Wire No. 4 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
183.5592	24.16603	0	0.4366	-4	4	61
183.5592	24.16603	6.217852	0.4366	4	4	62
183.5592	24.16603	12.4357	0.4366	4	4	63
183.5592	24.16603	18.65355	0.4366	4	4	64
183.5592	24.16603	24.87141	0.4366	4	4	65
183.5592	24.16603	31.08926	0.4366	4	4	66
183.5592	24.16603	37.30711	0.4366	4	4	67
183.5592	24.16603	43.52496	0.4366	4	4	68
183.5592	24.16603	49.74282	0.4366	4	4	69
183.5592	24.16603	55.96067	0.4366	4	4	70
183.5592	24.16603	62.17852	0.4366	4	4	71
183.5592	24.16603	68.39638	0.4366	4	4	72
183.5592	24.16603	74.61422	0.4366	4	4	73
183.5592	24.16603	80.83208	0.4366	4	4	74
183.5592	24.16603	87.04993	0.4366	4	4	75
183.5592	24.16603	93.26778	0.4366	4	4	76
183.5592	24.16603	99.48563	0.4366	4	4	77
183.5592	24.16603	105.7035	0.4366	4	4	78
183.5592	24.16603	111.9213	0.4366	4	4	79
183.5592	24.16603	118.1392	0.4366	4	0	80

Wire No. 5 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
-129.7462	27.57841	0	0.4366	-5	5	81
-129.7462	27.57841	6.278811	0.4366	5	5	82
-129.7462	27.57841	12.55762	0.4366	5	5	83
-129.7462	27.57841	18.83643	0.4366	5	5	84
-129.7462	27.57841	25.11525	0.4366	5	5	85
-129.7462	27.57841	31.39405	0.4366	5	5	86
-129.7462	27.57841	37.67287	0.4366	5	5	87
-129.7462	27.57841	43.95168	0.4366	5	5	88
-129.7462	27.57841	50.23049	0.4366	5	5	89
-129.7462	27.57841	56.5093	0.4366	5	5	90
-129.7462	27.57841	62.78811	0.4366	5	5	91
-129.7462	27.57841	69.06693	0.4366	5	5	92
-129.7462	27.57841	75.34573	0.4366	5	5	93
-129.7462	27.57841	81.62455	0.4366	5	5	94
-129.7462	27.57841	87.90336	0.4366	5	5	95
-129.7462	27.57841	94.18217	0.4366	5	5	96
-129.7462	27.57841	100.461	0.4366	5	5	97
-129.7462	27.57841	106.7398	0.4366	5	5	98
-129.7462	27.57841	113.0186	0.4366	5	5	99
-129.7462	27.57841	119.2974	0.4366	5	0	100

Sources: 1
Pulse No., Voltage Magnitude, Phase (Degrees): 21, 100.0, 0.0

Number of Loads: 4
Pulse No., Resistance, Reactance: 1 , 0 , 0
Pulse No., Resistance, Reactance: 41 , 0 , 0
Pulse No., Resistance, Reactance: 61 , 0 , 0
Pulse No., Resistance, Reactance: 81 , 0 , 0

********** SOURCE DATA **********
Pulse 21 Voltage = (100.0, 0.0j)
Current = (0.092, 0.1819j)
Impedance = (**221.443, -437.913j**)
Power = 4.6 Watts

********** CURRENT DATA **********

Wire No. 1 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
1	-0.0142	-0.0349	0.0377	-112.171
2	-0.0141	-0.0348	0.0375	-112.1359
3	-0.0138	-0.0342	0.0369	-112.0292
4	-0.0133	-0.0332	0.0358	-111.8474
5	-0.0126	-0.0319	0.0343	-111.5843
6	-0.0118	-0.0303	0.0325	-111.2307
7	-0.0108	-0.0284	0.0304	-110.7739
8	-0.0097	-0.0263	0.028	-110.1967
9	-0.0085	-0.024	0.0254	-109.4763
10	-0.0072	-0.0215	0.0227	-108.5826
11	-0.006	-0.019	0.0199	-107.4751
12	-0.0048	-0.0165	0.0171	-106.0999
13	-0.0036	-0.014	0.0144	-104.3831
14	-0.0025	-0.0115	0.0118	-102.2231
15	-0.0015	-0.0093	0.0094	-99.4771
16	-0.0007	-0.0071	0.0072	-95.9429
17	-0.0001	-0.0052	0.0052	-91.3325
18	0.0003	-0.0036	0.0036	-85.2419
19	0.0005	-0.0021	0.0022	-77.1352
20	0.0004	-0.001	0.0011	-66.3165
E	0.0	0.0	0.0	0.0

Wire No. 2 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
21	0.092	0.1819	0.2038	63.1753
22	0.0915	0.0682	0.1141	36.7107
23	0.09	-0.0091	0.0904	-5.7663
24	0.0875	-0.0779	0.1172	-41.6754
25	0.0842	-0.1402	0.1635	-59.0203
26	0.08	-0.1961	0.2118	-67.8036
27	0.0751	-0.245	0.2563	-72.9591
28	0.0696	-0.2863	0.2946	-76.3422
29	0.0635	-0.3192	0.3255	-78.7438
30	0.0571	-0.3432	0.3479	-80.5492
31	0.0505	-0.3578	0.3614	-81.9664
32	0.0438	-0.3627	0.3653	-83.1176
33	0.0371	-0.3578	0.3598	-84.079
34	0.0306	-0.3433	0.3447	-84.9007
35	0.0245	-0.3195	0.3204	-85.6172
36	0.0188	-0.2868	0.2874	-86.2531
37	0.0136	-0.2459	0.2462	-86.8268
38	0.0091	-0.1974	0.1976	-87.3525
39	0.0053	-0.142	0.1421	-87.8421
40	0.0023	-0.0794	0.0795	-88.3107
E	0.0	0.0	0.0	0.0

Wire No. 3 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
41	-0.0186	-0.041	0.045	-114.4704
42	-0.0185	-0.0408	0.0448	-114.4326
43	-0.0181	-0.0401	0.044	-114.3184
44	-0.0175	-0.039	0.0428	-114.1241
45	-0.0166	-0.0376	0.0411	-113.8442
46	-0.0155	-0.0358	0.039	-113.47
47	-0.0143	-0.0337	0.0366	-112.9897
48	-0.0129	-0.0313	0.0338	-112.3879
49	-0.0114	-0.0287	0.0309	-111.6441
50	-0.0098	-0.0259	0.0277	-110.7318
51	-0.0082	-0.0231	0.0245	-109.6165
52	-0.0066	-0.0202	0.0212	-108.2531
53	-0.0051	-0.0173	0.018	-106.5823
54	-0.0037	-0.0145	0.0149	-104.5251
55	-0.0025	-0.0118	0.012	-101.9756
56	-0.0014	-0.0092	0.0094	-98.7916
57	-0.0006	-0.0069	0.0069	-94.781
58	0.0	-0.0048	0.0048	-89.6893
59	0.0004	-0.003	0.003	-83.1876
60	0.0004	-0.0014	0.0015	-74.8089
E	0.0	0.0	0.0	0.0

Wire No. 4 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
61	-0.0296	-0.0388	0.0488	-127.3693
62	-0.0294	-0.0386	0.0485	-127.3264
63	-0.0289	-0.038	0.0478	-127.1965
64	-0.028	-0.0371	0.0465	-126.9761
65	-0.0267	-0.0359	0.0447	-126.6591
66	-0.0251	-0.0343	0.0425	-126.2367
67	-0.0233	-0.0324	0.04	-125.697
68	-0.0213	-0.0304	0.0371	-125.024
69	-0.0191	-0.0281	0.0339	-124.1973
70	-0.0168	-0.0256	0.0306	-123.1907
71	-0.0144	-0.023	0.0272	-121.971
72	-0.012	-0.0204	0.0237	-120.4955
73	-0.0097	-0.0178	0.0203	-118.7098
74	-0.0076	-0.0152	0.017	-116.544
75	-0.0056	-0.0126	0.0138	-113.9089
76	-0.0038	-0.0102	0.0109	-110.6903
77	-0.0024	-0.0078	0.0082	-106.7449
78	-0.0012	-0.0057	0.0058	-101.8974
79	-0.0004	-0.0037	0.0037	-95.9415
80	0.0	-0.0019	0.0019	-88.5869
E	0.0	0.0	0.0	0.0

Wire No. 5 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
81	0.0076	0.0211	0.0225	70.1372
82	0.0076	0.021	0.0223	70.2125
83	0.0073	0.0207	0.0219	70.4402
84	0.007	0.0201	0.0213	70.8267
85	0.0065	0.0194	0.0204	71.3829
86	0.0059	0.0184	0.0194	72.1249
87	0.0053	0.0173	0.0181	73.0751
88	0.0045	0.0161	0.0167	74.2636
89	0.0037	0.0147	0.0152	75.7304
90	0.0029	0.0133	0.0136	77.5278
91	0.0021	0.0118	0.012	79.7244
92	0.0014	0.0103	0.0104	82.409
93	0.0007	0.0087	0.0088	85.6963
94	0.0	0.0073	0.0073	89.7309
95	-0.0005	0.0059	0.0059	94.6876
96	-0.0009	0.0045	0.0046	100.7591
97	-0.0011	0.0033	0.0035	108.1174
98	-0.0012	0.0023	0.0026	116.834
99	-0.001	0.0014	0.0017	126.7692
100	-0.0007	0.0006	0.0009	137.5877
E	0.0	0.0	0.0	0.0

********** BASE OPERATING PARAMETERS **********

Twr.	Ratio	Phase
1	0.185	-175.3
2	1.000	0.0
3	0.221	-177.6
4	0.240	-190.5
5	0.110	7.0

****
ACSModel
(MININEC 3.1 Core)
11-17-2012 14:28:13
****

KZDC
NON-DIRECTIONAL MODEL
TWR-3 ND

Frequency = 1.250 MHz Wavelength = 239.84000 Meters

No. of Wires: 5

Wire No. 1	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
0	0	0		-1	
0	0	124.357	0.4366	0	20

Wire No. 2	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
101.6118	-85.26246	0		-2	
101.6118	-85.26246	124.9666	0.4366	0	20

Wire No. 3	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
231.5716	-112.4451	0		-3	
231.5716	-112.4451	124.3837	0.4366	0	20

Wire No. 4	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
183.5592	24.16603	0		-4	
183.5592	24.16603	124.357	0.4366	0	20

Wire No. 5	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
-129.7462	27.57841	0		-5	
-129.7462	27.57841	125.5762	0.4366	0	20

**** ANTENNA GEOMETRY ****

Wire No. 1 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
0	0	0	0.4366	-1	1	1
0	0	6.217852	0.4366	1	1	2
0	0	12.4357	0.4366	1	1	3
0	0	18.65355	0.4366	1	1	4
0	0	24.87141	0.4366	1	1	5
0	0	31.08926	0.4366	1	1	6
0	0	37.30711	0.4366	1	1	7
0	0	43.52496	0.4366	1	1	8
0	0	49.74282	0.4366	1	1	9
0	0	55.96067	0.4366	1	1	10
0	0	62.17852	0.4366	1	1	11
0	0	68.39638	0.4366	1	1	12
0	0	74.61422	0.4366	1	1	13
0	0	80.83208	0.4366	1	1	14
0	0	87.04993	0.4366	1	1	15
0	0	93.26778	0.4366	1	1	16
0	0	99.48563	0.4366	1	1	17
0	0	105.7035	0.4366	1	1	18
0	0	111.9213	0.4366	1	1	19
0	0	118.1392	0.4366	1	0	20

Wire No. 2 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
101.6118	-85.26246	0	0.4366	-2	2	21
101.6118	-85.26246	6.248332	0.4366	2	2	22
101.6118	-85.26246	12.49666	0.4366	2	2	23
101.6118	-85.26246	18.745	0.4366	2	2	24
101.6118	-85.26246	24.99333	0.4366	2	2	25
101.6118	-85.26246	31.24166	0.4366	2	2	26
101.6118	-85.26246	37.48999	0.4366	2	2	27
101.6118	-85.26246	43.73832	0.4366	2	2	28
101.6118	-85.26246	49.98666	0.4366	2	2	29
101.6118	-85.26246	56.23499	0.4366	2	2	30
101.6118	-85.26246	62.48332	0.4366	2	2	31
101.6118	-85.26246	68.73165	0.4366	2	2	32
101.6118	-85.26246	74.97998	0.4366	2	2	33
101.6118	-85.26246	81.22832	0.4366	2	2	34
101.6118	-85.26246	87.47665	0.4366	2	2	35
101.6118	-85.26246	93.72498	0.4366	2	2	36
101.6118	-85.26246	99.97331	0.4366	2	2	37
101.6118	-85.26246	106.2216	0.4366	2	2	38
101.6118	-85.26246	112.47	0.4366	2	2	39
101.6118	-85.26246	118.7183	0.4366	2	0	40

Wire No. 3 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
231.5716	-112.4451	0	0.4366	-3	3	41
231.5716	-112.4451	6.219184	0.4366	3	3	42
231.5716	-112.4451	12.43837	0.4366	3	3	43
231.5716	-112.4451	18.65755	0.4366	3	3	44
231.5716	-112.4451	24.87674	0.4366	3	3	45
231.5716	-112.4451	31.09592	0.4366	3	3	46
231.5716	-112.4451	37.31511	0.4366	3	3	47
231.5716	-112.4451	43.53429	0.4366	3	3	48
231.5716	-112.4451	49.75348	0.4366	3	3	49
231.5716	-112.4451	55.97266	0.4366	3	3	50
231.5716	-112.4451	62.19184	0.4366	3	3	51
231.5716	-112.4451	68.41103	0.4366	3	3	52
231.5716	-112.4451	74.63021	0.4366	3	3	53
231.5716	-112.4451	80.8494	0.4366	3	3	54
231.5716	-112.4451	87.06859	0.4366	3	3	55
231.5716	-112.4451	93.28777	0.4366	3	3	56
231.5716	-112.4451	99.50695	0.4366	3	3	57
231.5716	-112.4451	105.7261	0.4366	3	3	58
231.5716	-112.4451	111.9453	0.4366	3	3	59
231.5716	-112.4451	118.1645	0.4366	3	0	60

Wire No. 4 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
183.5592	24.16603	0	0.4366	-4	4	61
183.5592	24.16603	6.217852	0.4366	4	4	62
183.5592	24.16603	12.4357	0.4366	4	4	63
183.5592	24.16603	18.65355	0.4366	4	4	64
183.5592	24.16603	24.87141	0.4366	4	4	65
183.5592	24.16603	31.08926	0.4366	4	4	66
183.5592	24.16603	37.30711	0.4366	4	4	67
183.5592	24.16603	43.52496	0.4366	4	4	68
183.5592	24.16603	49.74282	0.4366	4	4	69
183.5592	24.16603	55.96067	0.4366	4	4	70
183.5592	24.16603	62.17852	0.4366	4	4	71
183.5592	24.16603	68.39638	0.4366	4	4	72
183.5592	24.16603	74.61422	0.4366	4	4	73
183.5592	24.16603	80.83208	0.4366	4	4	74
183.5592	24.16603	87.04993	0.4366	4	4	75
183.5592	24.16603	93.26778	0.4366	4	4	76
183.5592	24.16603	99.48563	0.4366	4	4	77
183.5592	24.16603	105.7035	0.4366	4	4	78
183.5592	24.16603	111.9213	0.4366	4	4	79
183.5592	24.16603	118.1392	0.4366	4	0	80

Wire No. 5 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
-129.7462	27.57841	0	0.4366	-5	5	81
-129.7462	27.57841	6.278811	0.4366	5	5	82
-129.7462	27.57841	12.55762	0.4366	5	5	83
-129.7462	27.57841	18.83643	0.4366	5	5	84
-129.7462	27.57841	25.11525	0.4366	5	5	85
-129.7462	27.57841	31.39405	0.4366	5	5	86
-129.7462	27.57841	37.67287	0.4366	5	5	87
-129.7462	27.57841	43.95168	0.4366	5	5	88
-129.7462	27.57841	50.23049	0.4366	5	5	89
-129.7462	27.57841	56.5093	0.4366	5	5	90
-129.7462	27.57841	62.78811	0.4366	5	5	91
-129.7462	27.57841	69.06693	0.4366	5	5	92
-129.7462	27.57841	75.34573	0.4366	5	5	93
-129.7462	27.57841	81.62455	0.4366	5	5	94
-129.7462	27.57841	87.90336	0.4366	5	5	95
-129.7462	27.57841	94.18217	0.4366	5	5	96
-129.7462	27.57841	100.461	0.4366	5	5	97
-129.7462	27.57841	106.7398	0.4366	5	5	98
-129.7462	27.57841	113.0186	0.4366	5	5	99
-129.7462	27.57841	119.2974	0.4366	5	0	100

Sources: 1
Pulse No., Voltage Magnitude, Phase (Degrees): 41, 100.0, 0.0

Number of Loads: 4
Pulse No., Resistance, Reactance: 1 , 0 , 0
Pulse No., Resistance, Reactance: 21 , 0 , 0
Pulse No., Resistance, Reactance: 61 , 0 , 0
Pulse No., Resistance, Reactance: 81 , 0 , 0

********** SOURCE DATA **********
Pulse 41 Voltage = (100.0, 0.0j)
Current = (0.0955, 0.1791j)
Impedance = (231.864, -434.862j)
Power = 4.77 Watts

********** CURRENT DATA **********

Wire No. 1 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
1	0.0022	0.0272	0.0273	85.437
2	0.0021	0.0271	0.0272	85.5313
3	0.0019	0.0266	0.0267	85.817
4	0.0017	0.0259	0.0259	86.3019
5	0.0013	0.0248	0.0249	86.9997
6	0.0009	0.0236	0.0236	87.9307
7	0.0003	0.022	0.022	89.1228
8	-0.0002	0.0204	0.0204	90.613
9	-0.0008	0.0185	0.0185	92.4496
10	-0.0014	0.0166	0.0166	94.6941
11	-0.0019	0.0146	0.0147	97.4245
12	-0.0024	0.0125	0.0127	100.7364
13	-0.0028	0.0105	0.0109	104.7435
14	-0.0031	0.0086	0.0091	109.5717
15	-0.0032	0.0068	0.0075	115.3431
16	-0.0032	0.0051	0.006	122.1406
17	-0.003	0.0036	0.0047	129.9531
18	-0.0027	0.0024	0.0036	138.6137
19	-0.0021	0.0013	0.0025	147.7814
20	-0.0013	0.0005	0.0014	157.082
E	0.0	0.0	0.0	0.0

Wire No. 2 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
21	-0.0186	-0.041	0.045	-114.4703
22	-0.0185	-0.0408	0.0448	-114.4268
23	-0.0181	-0.0401	0.044	-114.2948
24	-0.0174	-0.039	0.0427	-114.0705
25	-0.0165	-0.0376	0.041	-113.747
26	-0.0154	-0.0358	0.0389	-113.3143
27	-0.0141	-0.0336	0.0365	-112.7585
28	-0.0127	-0.0312	0.0337	-112.0613
29	-0.0111	-0.0286	0.0307	-111.1985
30	-0.0095	-0.0258	0.0275	-110.1387
31	-0.0078	-0.023	0.0243	-108.8407
32	-0.0062	-0.02	0.021	-107.2508
33	-0.0047	-0.0172	0.0178	-105.2981
34	-0.0033	-0.0143	0.0147	-102.8891
35	-0.002	-0.0117	0.0118	-99.8992
36	-0.001	-0.0091	0.0092	-96.1642
37	-0.0002	-0.0068	0.0068	-91.4707
38	0.0004	-0.0048	0.0048	-85.5538
39	0.0006	-0.0029	0.003	-78.1133
40	0.0005	-0.0014	0.0015	-68.7952
E	0.0	0.0	0.0	0.0

Wire No. 3 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
41	0.0955	0.1791	0.2029	61.9339
42	0.095	0.0658	0.1155	34.7124
43	0.0934	-0.011	0.0941	-6.7273
44	0.0909	-0.0793	0.1206	-41.0838
45	0.0875	-0.141	0.1659	-58.163
46	0.0833	-0.1962	0.2131	-67.0028
47	0.0782	-0.2444	0.2566	-72.251
48	0.0726	-0.285	0.2941	-75.7168
49	0.0664	-0.3174	0.3243	-78.1864
50	0.0598	-0.3409	0.3461	-80.0472
51	0.053	-0.355	0.3589	-81.5101
52	0.0461	-0.3596	0.3625	-82.6995
53	0.0392	-0.3545	0.3567	-83.6932
54	0.0325	-0.34	0.3415	-84.5428
55	0.0261	-0.3162	0.3173	-85.2835
56	0.0201	-0.2838	0.2845	-85.9409
57	0.0147	-0.2432	0.2437	-86.5336
58	0.01	-0.1953	0.1955	-87.0764
59	0.0059	-0.1404	0.1405	-87.5816
60	0.0027	-0.0786	0.0786	-88.0647
E	0.0	0.0	0.0	0.0

Wire No. 4 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
61	-0.0275	-0.0388	0.0475	-125.3374
62	-0.0273	-0.0386	0.0473	-125.2874
63	-0.0268	-0.038	0.0465	-125.1361
64	-0.0259	-0.0371	0.0452	-124.8793
65	-0.0246	-0.0358	0.0435	-124.5101
66	-0.0231	-0.0342	0.0413	-124.0182
67	-0.0213	-0.0324	0.0388	-123.3893
68	-0.0193	-0.0302	0.0359	-122.6047
69	-0.0172	-0.0279	0.0328	-121.6399
70	-0.015	-0.0254	0.0295	-120.4634
71	-0.0127	-0.0228	0.0261	-119.0343
72	-0.0104	-0.0202	0.0227	-117.3
73	-0.0082	-0.0175	0.0194	-115.1928
74	-0.0062	-0.0149	0.0161	-112.625
75	-0.0044	-0.0123	0.0131	-109.4841
76	-0.0028	-0.0099	0.0103	-105.6277
77	-0.0015	-0.0076	0.0077	-100.881
78	-0.0005	-0.0055	0.0055	-95.0434
79	0.0001	-0.0035	0.0035	-87.9089
80	0.0003	-0.0018	0.0018	-79.2426
E	0.0	0.0	0.0	0.0

Wire No. 5 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
81	-0.0057	-0.0173	0.0182	-108.3841
82	-0.0057	-0.0172	0.0181	-108.2924
83	-0.0055	-0.0169	0.0177	-108.014
84	-0.0052	-0.0164	0.0172	-107.5381
85	-0.0047	-0.0157	0.0164	-106.8461
86	-0.0042	-0.0148	0.0154	-105.9097
87	-0.0036	-0.0138	0.0143	-104.6882
88	-0.003	-0.0127	0.013	-103.1249
89	-0.0023	-0.0114	0.0117	-101.1414
90	-0.0015	-0.0101	0.0103	-98.6298
91	-0.0008	-0.0088	0.0089	-95.4413
92	-0.0002	-0.0075	0.0075	-91.3736
93	0.0004	-0.0062	0.0062	-86.1579
94	0.0009	-0.005	0.005	-79.4625
95	0.0013	-0.0038	0.004	-70.9469
96	0.0016	-0.0028	0.0032	-60.4301
97	0.0017	-0.0019	0.0025	-48.1954
98	0.0016	-0.0011	0.002	-35.2049
99	0.0013	-0.0006	0.0015	-22.7921
100	0.0009	-0.0002	0.0009	-11.8796
E	0.0	0.0	0.0	0.0

********** BASE OPERATING PARAMETERS **********

Twr.	Ratio	Phase
1	0.135	23.5
2	0.222	-176.4
3	1.000	0.0
4	0.234	-187.3
5	0.090	-170.3

****
ACSModel
(MININEC 3.1 Core)
11-17-2012 14:29:11
****

KZDC
NON-DIRECTIONAL MODEL
TWR-4 ND

Frequency = 1.250 MHz Wavelength = 239.84000 Meters

No. of Wires: 5

Wire No. 1	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
0	0	0		-1	
0	0	124.357	0.4366	0	20

Wire No. 2	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
101.6118	-85.26246	0		-2	
101.6118	-85.26246	124.9666	0.4366	0	20

Wire No. 3	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
231.5716	-112.4451	0		-3	
231.5716	-112.4451	124.3837	0.4366	0	20

Wire No. 4	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
183.5592	24.16603	0		-4	
183.5592	24.16603	124.357	0.4366	0	20

Wire No. 5	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
-129.7462	27.57841	0		-5	
-129.7462	27.57841	125.5762	0.4366	0	20

**** ANTENNA GEOMETRY ****

Wire No. 1 Coordinates X	Y	Z	Radius	Connection End1	End2	Pulse No.
0	0	0	0.4366	-1	1	1
0	0	6.217852	0.4366	1	1	2
0	0	12.4357	0.4366	1	1	3
0	0	18.65355	0.4366	1	1	4
0	0	24.87141	0.4366	1	1	5
0	0	31.08926	0.4366	1	1	6
0	0	37.30711	0.4366	1	1	7
0	0	43.52496	0.4366	1	1	8
0	0	49.74282	0.4366	1	1	9
0	0	55.96067	0.4366	1	1	10
0	0	62.17852	0.4366	1	1	11
0	0	68.39638	0.4366	1	1	12
0	0	74.61422	0.4366	1	1	13
0	0	80.83208	0.4366	1	1	14
0	0	87.04993	0.4366	1	1	15
0	0	93.26778	0.4366	1	1	16
0	0	99.48563	0.4366	1	1	17
0	0	105.7035	0.4366	1	1	18
0	0	111.9213	0.4366	1	1	19
0	0	118.1392	0.4366	1	0	20

Wire No. 2 Coordinates X	Y	Z	Radius	Connection End1	End2	Pulse No.
101.6118	-85.26246	0	0.4366	-2	2	21
101.6118	-85.26246	6.248332	0.4366	2	2	22
101.6118	-85.26246	12.49666	0.4366	2	2	23
101.6118	-85.26246	18.745	0.4366	2	2	24
101.6118	-85.26246	24.99333	0.4366	2	2	25
101.6118	-85.26246	31.24166	0.4366	2	2	26
101.6118	-85.26246	37.48999	0.4366	2	2	27
101.6118	-85.26246	43.73832	0.4366	2	2	28
101.6118	-85.26246	49.98666	0.4366	2	2	29
101.6118	-85.26246	56.23499	0.4366	2	2	30
101.6118	-85.26246	62.48332	0.4366	2	2	31
101.6118	-85.26246	68.73165	0.4366	2	2	32
101.6118	-85.26246	74.97998	0.4366	2	2	33
101.6118	-85.26246	81.22832	0.4366	2	2	34
101.6118	-85.26246	87.47665	0.4366	2	2	35
101.6118	-85.26246	93.72498	0.4366	2	2	36
101.6118	-85.26246	99.97331	0.4366	2	2	37
101.6118	-85.26246	106.2216	0.4366	2	2	38
101.6118	-85.26246	112.47	0.4366	2	2	39
101.6118	-85.26246	118.7183	0.4366	2	0	40

Wire No. 3 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
231.5716	-112.4451	0	0.4366	-3	3	41
231.5716	-112.4451	6.219184	0.4366	3	3	42
231.5716	-112.4451	12.43837	0.4366	3	3	43
231.5716	-112.4451	18.65755	0.4366	3	3	44
231.5716	-112.4451	24.87674	0.4366	3	3	45
231.5716	-112.4451	31.09592	0.4366	3	3	46
231.5716	-112.4451	37.31511	0.4366	3	3	47
231.5716	-112.4451	43.53429	0.4366	3	3	48
231.5716	-112.4451	49.75348	0.4366	3	3	49
231.5716	-112.4451	55.97266	0.4366	3	3	50
231.5716	-112.4451	62.19184	0.4366	3	3	51
231.5716	-112.4451	68.41103	0.4366	3	3	52
231.5716	-112.4451	74.63021	0.4366	3	3	53
231.5716	-112.4451	80.8494	0.4366	3	3	54
231.5716	-112.4451	87.06859	0.4366	3	3	55
231.5716	-112.4451	93.28777	0.4366	3	3	56
231.5716	-112.4451	99.50695	0.4366	3	3	57
231.5716	-112.4451	105.7261	0.4366	3	3	58
231.5716	-112.4451	111.9453	0.4366	3	3	59
231.5716	-112.4451	118.1645	0.4366	3	0	60

Wire No. 4 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
183.5592	24.16603	0	0.4366	-4	4	61
183.5592	24.16603	6.217852	0.4366	4	4	62
183.5592	24.16603	12.4357	0.4366	4	4	63
183.5592	24.16603	18.65355	0.4366	4	4	64
183.5592	24.16603	24.87141	0.4366	4	4	65
183.5592	24.16603	31.08926	0.4366	4	4	66
183.5592	24.16603	37.30711	0.4366	4	4	67
183.5592	24.16603	43.52496	0.4366	4	4	68
183.5592	24.16603	49.74282	0.4366	4	4	69
183.5592	24.16603	55.96067	0.4366	4	4	70
183.5592	24.16603	62.17852	0.4366	4	4	71
183.5592	24.16603	68.39638	0.4366	4	4	72
183.5592	24.16603	74.61422	0.4366	4	4	73
183.5592	24.16603	80.83208	0.4366	4	4	74
183.5592	24.16603	87.04993	0.4366	4	4	75
183.5592	24.16603	93.26778	0.4366	4	4	76
183.5592	24.16603	99.48563	0.4366	4	4	77
183.5592	24.16603	105.7035	0.4366	4	4	78
183.5592	24.16603	111.9213	0.4366	4	4	79
183.5592	24.16603	118.1392	0.4366	4	0	80

Wire No. 5 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
-129.7462	27.57841	0	0.4366	-5	5	81
-129.7462	27.57841	6.278811	0.4366	5	5	82
-129.7462	27.57841	12.55762	0.4366	5	5	83
-129.7462	27.57841	18.83643	0.4366	5	5	84
-129.7462	27.57841	25.11525	0.4366	5	5	85
-129.7462	27.57841	31.39405	0.4366	5	5	86
-129.7462	27.57841	37.67287	0.4366	5	5	87
-129.7462	27.57841	43.95168	0.4366	5	5	88
-129.7462	27.57841	50.23049	0.4366	5	5	89
-129.7462	27.57841	56.5093	0.4366	5	5	90
-129.7462	27.57841	62.78811	0.4366	5	5	91
-129.7462	27.57841	69.06693	0.4366	5	5	92
-129.7462	27.57841	75.34573	0.4366	5	5	93
-129.7462	27.57841	81.62455	0.4366	5	5	94
-129.7462	27.57841	87.90336	0.4366	5	5	95
-129.7462	27.57841	94.18217	0.4366	5	5	96
-129.7462	27.57841	100.461	0.4366	5	5	97
-129.7462	27.57841	106.7398	0.4366	5	5	98
-129.7462	27.57841	113.0186	0.4366	5	5	99
-129.7462	27.57841	119.2974	0.4366	5	0	100

Sources: 1
Pulse No., Voltage Magnitude, Phase (Degrees): 61, 100.0, 0.0

Number of Loads: 4
Pulse No., Resistance, Reactance: 1 , 0 , 0
Pulse No., Resistance, Reactance: 21 , 0 , 0
Pulse No., Resistance, Reactance: 41 , 0 , 0
Pulse No., Resistance, Reactance: 81 , 0 , 0

********** SOURCE DATA **********
Pulse 61 Voltage = (100.0, 0.0j)
Current = (0.0979, 0.1881j)
Impedance = (217.844, -418.273j)
Power = 4.9 Watts

********** CURRENT DATA **********

Wire No. 1 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
1	-0.036	0.0014	0.036	177.8397
2	-0.0358	0.0013	0.0358	177.8999
3	-0.0352	0.0012	0.0353	178.0818
4	-0.0343	0.001	0.0343	178.3897
5	-0.033	0.0007	0.033	178.8311
6	-0.0314	0.0003	0.0314	179.4168
7	-0.0295	-0.0001	0.0295	-179.8382
8	-0.0274	-0.0005	0.0274	-178.9144
9	-0.0251	-0.001	0.0251	-177.7862
10	-0.0226	-0.0014	0.0227	-176.4211
11	-0.0201	-0.0018	0.0202	-174.7774
12	-0.0175	-0.0022	0.0176	-172.8025
13	-0.0149	-0.0025	0.0151	-170.4298
14	-0.0124	-0.0027	0.0127	-167.5759
15	-0.01	-0.0028	0.0104	-164.1379
16	-0.0077	-0.0028	0.0082	-159.9929
17	-0.0057	-0.0026	0.0063	-155.0019
18	-0.0039	-0.0023	0.0045	-149.0243
19	-0.0023	-0.0018	0.0029	-141.9432
20	-0.0011	-0.0011	0.0015	-133.636
E	0.0	0.0	0.0	0.0

Wire No. 2 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
21	-0.0296	-0.0388	0.0488	-127.3693
22	-0.0294	-0.0386	0.0485	-127.3278
23	-0.0289	-0.038	0.0478	-127.2023
24	-0.028	-0.0371	0.0465	-126.9892
25	-0.0267	-0.0358	0.0447	-126.6826
26	-0.0251	-0.0342	0.0425	-126.2735
27	-0.0233	-0.0324	0.0399	-125.75
28	-0.0213	-0.0303	0.037	-125.0962
29	-0.0191	-0.0279	0.0338	-124.2916
30	-0.0167	-0.0255	0.0305	-123.3097
31	-0.0144	-0.0229	0.027	-122.1168
32	-0.012	-0.0203	0.0236	-120.6696
33	-0.0097	-0.0176	0.0201	-118.9121
34	-0.0076	-0.015	0.0168	-116.7725
35	-0.0056	-0.0124	0.0136	-114.1573
36	-0.0038	-0.01	0.0107	-110.9461
37	-0.0024	-0.0077	0.008	-106.9854
38	-0.0012	-0.0056	0.0057	-102.0839
39	-0.0004	-0.0036	0.0036	-96.0122
40	0.0	-0.0018	0.0018	-88.4492
E	0.0	0.0	0.0	0.0

Wire No. 3 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
41	-0.0275	-0.0388	0.0475	-125.3374
42	-0.0273	-0.0386	0.0473	-125.2907
43	-0.0268	-0.038	0.0465	-125.1492
44	-0.0259	-0.0371	0.0452	-124.9092
45	-0.0247	-0.0358	0.0435	-124.5639
46	-0.0231	-0.0342	0.0413	-124.1034
47	-0.0214	-0.0323	0.0387	-123.5143
48	-0.0194	-0.0301	0.0359	-122.7784
49	-0.0173	-0.0278	0.0327	-121.8724
50	-0.0151	-0.0253	0.0294	-120.7657
51	-0.0128	-0.0227	0.0261	-119.4188
52	-0.0106	-0.02	0.0226	-117.7802
53	-0.0084	-0.0174	0.0193	-115.7831
54	-0.0064	-0.0147	0.016	-113.34
55	-0.0045	-0.0122	0.013	-110.3364
56	-0.0029	-0.0097	0.0101	-106.624
57	-0.0016	-0.0074	0.0076	-102.0144
58	-0.0006	-0.0053	0.0054	-96.2797
59	0.0	-0.0034	0.0034	-89.1668
60	0.0003	-0.0017	0.0017	-80.3693
E	0.0	0.0	0.0	0.0

Wire No. 4 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
61	0.0979	0.1881	0.212	62.4887
62	0.0974	0.0748	0.1228	37.5099
63	0.0958	-0.0021	0.0958	-1.2791
64	0.0932	-0.0706	0.1169	-37.1521
65	0.0895	-0.1325	0.1599	-55.9517
66	0.085	-0.188	0.2064	-65.6671
67	0.0797	-0.2367	0.2498	-71.3818
68	0.0738	-0.2778	0.2874	-75.1264
69	0.0673	-0.3106	0.3178	-77.7799
70	0.0604	-0.3346	0.34	-79.7719
71	0.0532	-0.3493	0.3534	-81.3345
72	0.046	-0.3545	0.3575	-82.6033
73	0.0389	-0.3501	0.3522	-83.6632
74	0.032	-0.3361	0.3377	-84.5696
75	0.0254	-0.313	0.314	-85.3608
76	0.0193	-0.2811	0.2818	-86.064
77	0.0139	-0.2412	0.2416	-86.6994
78	0.0092	-0.1938	0.194	-87.2827
79	0.0053	-0.1394	0.1395	-87.8271
80	0.0022	-0.0781	0.0781	-88.3493
E	0.0	0.0	0.0	0.0

Wire No. 5 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
81	0.0225	-0.0029	0.0227	-7.4357
82	0.0223	-0.0029	0.0225	-7.3431
83	0.0219	-0.0027	0.0221	-7.0623
84	0.0213	-0.0025	0.0214	-6.5848
85	0.0204	-0.0021	0.0205	-5.8953
86	0.0193	-0.0017	0.0194	-4.9714
87	0.0181	-0.0012	0.0181	-3.7814
88	0.0166	-0.0007	0.0166	-2.2829
89	0.0151	-0.0001	0.0151	-0.4193
90	0.0134	0.0004	0.0134	1.8837
91	0.0117	0.001	0.0118	4.7227
92	0.01	0.0014	0.0101	8.2208
93	0.0084	0.0019	0.0086	12.5308
94	0.0068	0.0022	0.0071	17.8302
95	0.0053	0.0024	0.0058	24.2991
96	0.0039	0.0024	0.0046	32.0654
97	0.0027	0.0024	0.0036	41.1066
98	0.0017	0.0021	0.0027	51.1396
99	0.0009	0.0017	0.0019	61.6032
100	0.0003	0.001	0.0011	71.8957
E	0.0	0.0	0.0	0.0

********** BASE OPERATING PARAMETERS **********

Twr.	Ratio	Phase
1	1.590	185.3
2	2.154	-119.9
3	2.099	-117.9
4	9.360	69.9
5	1.000	0.0

****
ACSModel
(MININEC 3.1 Core)
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KZDC
NON-DIRECTIONAL MODEL
TWR-5 ND

Frequency = 1.250 MHz Wavelength = 239.84000 Meters

No. of Wires: 5

Wire No. 1 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
0	0	0		-1	
0	0	124.357	0.4366	0	20

Wire No. 2 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
101.6118	-85.26246	0		-2	
101.6118	-85.26246	124.9666	0.4366	0	20

Wire No. 3 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
231.5716	-112.4451	0		-3	
231.5716	-112.4451	124.3837	0.4366	0	20

Wire No. 4 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
183.5592	24.16603	0		-4	
183.5592	24.16603	124.357	0.4366	0	20

Wire No. 5 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
-129.7462	27.57841	0		-5	
-129.7462	27.57841	125.5762	0.4366	0	20

**** ANTENNA GEOMETRY ****

Wire No. 1 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
0	0	0	0.4366	-1	1	1
0	0	6.217852	0.4366	1	1	2
0	0	12.4357	0.4366	1	1	3
0	0	18.65355	0.4366	1	1	4
0	0	24.87141	0.4366	1	1	5
0	0	31.08926	0.4366	1	1	6
0	0	37.30711	0.4366	1	1	7
0	0	43.52496	0.4366	1	1	8
0	0	49.74282	0.4366	1	1	9
0	0	55.96067	0.4366	1	1	10
0	0	62.17852	0.4366	1	1	11
0	0	68.39638	0.4366	1	1	12
0	0	74.61422	0.4366	1	1	13
0	0	80.83208	0.4366	1	1	14
0	0	87.04993	0.4366	1	1	15
0	0	93.26778	0.4366	1	1	16
0	0	99.48563	0.4366	1	1	17
0	0	105.7035	0.4366	1	1	18
0	0	111.9213	0.4366	1	1	19
0	0	118.1392	0.4366	1	0	20

Wire No. 2 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
101.6118	-85.26246	0	0.4366	-2	2	21
101.6118	-85.26246	6.248332	0.4366	2	2	22
101.6118	-85.26246	12.49666	0.4366	2	2	23
101.6118	-85.26246	18.745	0.4366	2	2	24
101.6118	-85.26246	24.99333	0.4366	2	2	25
101.6118	-85.26246	31.24166	0.4366	2	2	26
101.6118	-85.26246	37.48999	0.4366	2	2	27
101.6118	-85.26246	43.73832	0.4366	2	2	28
101.6118	-85.26246	49.98666	0.4366	2	2	29
101.6118	-85.26246	56.23499	0.4366	2	2	30
101.6118	-85.26246	62.48332	0.4366	2	2	31
101.6118	-85.26246	68.73165	0.4366	2	2	32
101.6118	-85.26246	74.97998	0.4366	2	2	33
101.6118	-85.26246	81.22832	0.4366	2	2	34
101.6118	-85.26246	87.47665	0.4366	2	2	35
101.6118	-85.26246	93.72498	0.4366	2	2	36
101.6118	-85.26246	99.97331	0.4366	2	2	37
101.6118	-85.26246	106.2216	0.4366	2	2	38
101.6118	-85.26246	112.47	0.4366	2	2	39
101.6118	-85.26246	118.7183	0.4366	2	0	40

Wire No. 3 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
231.5716	-112.4451	0	0.4366	-3	3	41
231.5716	-112.4451	6.219184	0.4366	3	3	42
231.5716	-112.4451	12.43837	0.4366	3	3	43
231.5716	-112.4451	18.65755	0.4366	3	3	44
231.5716	-112.4451	24.87674	0.4366	3	3	45
231.5716	-112.4451	31.09592	0.4366	3	3	46
231.5716	-112.4451	37.31511	0.4366	3	3	47
231.5716	-112.4451	43.53429	0.4366	3	3	48
231.5716	-112.4451	49.75348	0.4366	3	3	49
231.5716	-112.4451	55.97266	0.4366	3	3	50
231.5716	-112.4451	62.19184	0.4366	3	3	51
231.5716	-112.4451	68.41103	0.4366	3	3	52
231.5716	-112.4451	74.63021	0.4366	3	3	53
231.5716	-112.4451	80.8494	0.4366	3	3	54
231.5716	-112.4451	87.06859	0.4366	3	3	55
231.5716	-112.4451	93.28777	0.4366	3	3	56
231.5716	-112.4451	99.50695	0.4366	3	3	57
231.5716	-112.4451	105.7261	0.4366	3	3	58
231.5716	-112.4451	111.9453	0.4366	3	3	59
231.5716	-112.4451	118.1645	0.4366	3	0	60

Wire No. 4 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
183.5592	24.16603	0	0.4366	-4	4	61
183.5592	24.16603	6.217852	0.4366	4	4	62
183.5592	24.16603	12.4357	0.4366	4	4	63
183.5592	24.16603	18.65355	0.4366	4	4	64
183.5592	24.16603	24.87141	0.4366	4	4	65
183.5592	24.16603	31.08926	0.4366	4	4	66
183.5592	24.16603	37.30711	0.4366	4	4	67
183.5592	24.16603	43.52496	0.4366	4	4	68
183.5592	24.16603	49.74282	0.4366	4	4	69
183.5592	24.16603	55.96067	0.4366	4	4	70
183.5592	24.16603	62.17852	0.4366	4	4	71
183.5592	24.16603	68.39638	0.4366	4	4	72
183.5592	24.16603	74.61422	0.4366	4	4	73
183.5592	24.16603	80.83208	0.4366	4	4	74
183.5592	24.16603	87.04993	0.4366	4	4	75
183.5592	24.16603	93.26778	0.4366	4	4	76
183.5592	24.16603	99.48563	0.4366	4	4	77
183.5592	24.16603	105.7035	0.4366	4	4	78
183.5592	24.16603	111.9213	0.4366	4	4	79
183.5592	24.16603	118.1392	0.4366	4	0	80

Wire No. 5 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
-129.7462	27.57841	0	0.4366	-5	5	81
-129.7462	27.57841	6.278811	0.4366	5	5	82
-129.7462	27.57841	12.55762	0.4366	5	5	83
-129.7462	27.57841	18.83643	0.4366	5	5	84
-129.7462	27.57841	25.11525	0.4366	5	5	85
-129.7462	27.57841	31.39405	0.4366	5	5	86
-129.7462	27.57841	37.67287	0.4366	5	5	87
-129.7462	27.57841	43.95168	0.4366	5	5	88
-129.7462	27.57841	50.23049	0.4366	5	5	89
-129.7462	27.57841	56.5093	0.4366	5	5	90
-129.7462	27.57841	62.78811	0.4366	5	5	91
-129.7462	27.57841	69.06693	0.4366	5	5	92
-129.7462	27.57841	75.34573	0.4366	5	5	93
-129.7462	27.57841	81.62455	0.4366	5	5	94
-129.7462	27.57841	87.90336	0.4366	5	5	95
-129.7462	27.57841	94.18217	0.4366	5	5	96
-129.7462	27.57841	100.461	0.4366	5	5	97
-129.7462	27.57841	106.7398	0.4366	5	5	98
-129.7462	27.57841	113.0186	0.4366	5	5	99
-129.7462	27.57841	119.2974	0.4366	5	0	100

Sources: 1
Pulse No., Voltage Magnitude, Phase (Degrees): 81, 100.0, 0.0

Number of Loads: 4
Pulse No., Resistance, Reactance: 1 , 0 , 0
Pulse No., Resistance, Reactance: 21 , 0 , 0
Pulse No., Resistance, Reactance: 41 , 0 , 0
Pulse No., Resistance, Reactance: 61 , 0 , 0

********** SOURCE DATA **********
Pulse 81 Voltage = (100.0, 0.0j)
Current = (0.1017, 0.1923j)
Impedance = (214.87, -406.312j)
Power = 5.09 Watts

********** CURRENT DATA **********

Wire No. 1 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
1	-0.0126	-0.0423	0.0442	-106.5697
2	-0.0125	-0.0421	0.0439	-106.5183
3	-0.0122	-0.0414	0.0431	-106.3625
4	-0.0116	-0.0402	0.0419	-106.0976
5	-0.0109	-0.0387	0.0402	-105.7154
6	-0.01	-0.0367	0.038	-105.204
7	-0.0089	-0.0344	0.0356	-104.5466
8	-0.0078	-0.0318	0.0328	-103.7209
9	-0.0065	-0.0291	0.0298	-102.6973
10	-0.0053	-0.0261	0.0266	-101.4367
11	-0.004	-0.0231	0.0234	-99.8882
12	-0.0028	-0.02	0.0202	-97.9839
13	-0.0017	-0.0169	0.017	-95.6343
14	-0.0007	-0.014	0.014	-92.7205
15	0.0002	-0.0112	0.0112	-89.0853
16	0.0008	-0.0087	0.0087	-84.5254
17	0.0013	-0.0063	0.0065	-78.7896
18	0.0014	-0.0043	0.0045	-71.6002
19	0.0013	-0.0026	0.0029	-62.7221
20	0.0009	-0.0012	0.0015	-52.0151
E	0.0	0.0	0.0	0.0

Wire No. 2 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
21	0.0076	0.0211	0.0225	70.1372
22	0.0076	0.021	0.0223	70.2079
23	0.0073	0.0206	0.0219	70.4224
24	0.007	0.0201	0.0212	70.7875
25	0.0065	0.0193	0.0203	71.3152
26	0.0059	0.0183	0.0192	72.0235
27	0.0053	0.0171	0.0179	72.938
28	0.0045	0.0158	0.0164	74.0936
29	0.0037	0.0144	0.0149	75.5377
30	0.0029	0.0129	0.0132	77.3345
31	0.0021	0.0113	0.0115	79.5712
32	0.0013	0.0098	0.0099	82.3662
33	0.0006	0.0082	0.0082	85.8804
34	0.0	0.0067	0.0067	90.3294
35	-0.0006	0.0053	0.0053	95.9917
36	-0.0009	0.004	0.0041	103.194
37	-0.0012	0.0029	0.0031	112.2337
38	-0.0012	0.0019	0.0022	123.1838
39	-0.0011	0.0011	0.0015	135.6171
40	-0.0007	0.0004	0.0008	148.6232
E	0.0	0.0	0.0	0.0

Wire No. 3 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
41	-0.0057	-0.0173	0.0182	-108.3842
42	-0.0057	-0.0172	0.0181	-108.2891
43	-0.0055	-0.0169	0.0178	-108.0009
44	-0.0052	-0.0164	0.0172	-107.5101
45	-0.0048	-0.0158	0.0165	-106.7998
46	-0.0042	-0.015	0.0155	-105.8454
47	-0.0037	-0.014	0.0145	-104.6118
48	-0.003	-0.0129	0.0133	-103.0511
49	-0.0023	-0.0118	0.012	-101.0995
50	-0.0016	-0.0105	0.0107	-98.6718
51	-0.0009	-0.0093	0.0093	-95.6559
52	-0.0003	-0.008	0.008	-91.9068
53	0.0003	-0.0067	0.0067	-87.2435
54	0.0008	-0.0055	0.0056	-81.4551
55	0.0012	-0.0043	0.0045	-74.3341
56	0.0015	-0.0033	0.0036	-65.7569
57	0.0016	-0.0023	0.0028	-55.8214
58	0.0015	-0.0015	0.0022	-44.9756
59	0.0013	-0.0009	0.0016	-33.975
60	0.0008	-0.0004	0.0009	-23.5238
E	0.0	0.0	0.0	0.0

Wire No. 4 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
61	0.0225	-0.0029	0.0227	-7.4357
62	0.0223	-0.0029	0.0225	-7.3578
63	0.022	-0.0027	0.0221	-7.1216
64	0.0213	-0.0025	0.0215	-6.7203
65	0.0205	-0.0022	0.0206	-6.1416
66	0.0194	-0.0018	0.0195	-5.3674
67	0.0181	-0.0014	0.0182	-4.3722
68	0.0167	-0.0009	0.0168	-3.1219
69	0.0152	-0.0004	0.0152	-1.5705
70	0.0136	0.0001	0.0136	0.3428
71	0.0119	0.0006	0.0119	2.6981
72	0.0102	0.001	0.0103	5.6007
73	0.0086	0.0014	0.0087	9.1872
74	0.007	0.0017	0.0072	13.6308
75	0.0055	0.0019	0.0058	19.138
76	0.0041	0.002	0.0045	25.9271
77	0.0029	0.0019	0.0035	34.1633
78	0.0018	0.0018	0.0025	43.8373
79	0.001	0.0014	0.0017	54.6282
80	0.0004	0.0009	0.001	65.9724
E	0.0	0.0	0.0	0.0

Wire No. 5 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
81	0.1017	0.1923	0.2176	62.1287
82	0.1012	0.0783	0.1279	37.7274
83	0.0995	0.0004	0.0995	0.248
84	0.0968	-0.0691	0.1189	-35.5122
85	0.093	-0.1321	0.1616	-54.8422
86	0.0884	-0.1888	0.2085	-64.9101
87	0.0829	-0.2386	0.2526	-70.8311
88	0.0768	-0.2808	0.2911	-74.7025
89	0.0701	-0.3146	0.3223	-77.4386
90	0.063	-0.3394	0.3452	-79.4869
91	0.0556	-0.3548	0.3591	-81.089
92	0.0482	-0.3603	0.3636	-82.3861
93	0.0408	-0.3561	0.3584	-83.4663
94	0.0336	-0.3421	0.3437	-84.3873
95	0.0268	-0.3186	0.3197	-85.1888
96	0.0205	-0.2862	0.287	-85.8988
97	0.0149	-0.2455	0.246	-86.5382
98	0.0099	-0.1972	0.1975	-87.1232
99	0.0058	-0.1419	0.142	-87.6674
100	0.0025	-0.0794	0.0794	-88.1875
E	0.0	0.0	0.0	0.0

********** BASE OPERATING PARAMETERS **********

Twr.	Ratio	Phase
1	1.949	-99.1
2	0.991	77.6
3	0.804	-100.9
4	1.000	0.0
5	9.604	69.6

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MEMBER AFCCE

SECTION-2
DETERMINATION OF OPERATING PARAMETERS
FOR KZDC NIGHTTIME DIRECTIONAL ANTENNA

The calibrated Method of Moments model used for the individual KZDC towers was run with all four towers driven and with Tower-5 detuned to obtain the Operating Parameters for the nighttime directional antenna. All towers were modeled at the same heights and equivalent radii as the non-directional models. The complex voltages required at the sources located at ground level at the base of each tower to produce the current moment sums, when normalized, are equal to the theoretical field parameters calculated by the DA Model. The tower drive voltages were calculated from these voltages.

The voltages which are sampled by the antenna monitor system at the Voltage Sampling Units were calculated from the Method of Moments directional antenna model. The sampling lines are electrically identical in composition and length within the tolerances permitted by the Rules. Therefore, the antenna monitor parameters required to produce the theoretical parameters can be calculated from the modeled voltages and phases which correspond to the location of the Voltage Sampling Units at the bases of the four towers. Method of Moments model and circuit calculation details are included in this report. Section-3 contains the calibration details of sample system and the derivation of the operating parameters.

TABLE OF MODELED PARAMETERS AT TOWER BASES

TWR	MODEL CURRENT PULSE	MODEL VOLTAGE MAGNITUDE (VOLTS)	MODEL VOLTAGE PHASE (DEGREES)	MODEL DRIVE IMPEDANCE (OHMS)	MODEL DRIVE POWER (WATTS)
1	1	775.3	168.9°	91.9-j371.2	188.81
2	21	1067.1	78.3°	390.1-j530.1	512.61
3	41	247.8	76.4°	-307.3+j295.1	-51.97
4	61	1014.2	82.4°	350.8-j737.4	270.55

TABLE OF MODELED PARAMETERS AT VOLTAGE SAMPLING UNITS

TWR	MODEL CURRENT PULSE	VOLTAGE MAGNITUDE AT VSU (VOLTS)	VOLTAGE PHASE AT VSU (DEGREES)	DRIVE IMPEDANCE AT VSU (OHMS)	NORMALIZED RATIO/PHASE (TO SECTION-3)
1	1	730.0	+169.6°	57.2-J278.2	0.741/+86.7
2	21	1038.0	+79.1°	218.2-J426.3	1.051/-3.8
3	41	250.9	+75.0°	-475.8+J248.8	0.255/-7.9
4	61	985.7	+82.9°	135.5-J474.2	1.000/00.0

The KZDC Directive array is adjusted to within +/-5 percent and +/-3 degrees of the calibrated Antenna Monitor Parameters listed on page 3 of Section-3.

METHOD OF MOMENTS MODELS FOR KZDC DIRECTIVE ARRAY

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          (MININEC 3.1 Core)
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KZDC
NIGHT DA MODEL (FINAL)

Frequency = 1.250 MHz Wavelength = 239.84000 Meters

No. of Wires: 5

Wire No. 1	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
0	0	0		-1	
0	0	124.357	0.4366	0	20

Wire No. 2	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
101.6118	-85.26246	0		-2	
101.6118	-85.26246	124.9666	0.4366	0	20

Wire No. 3	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
231.5716	-112.4451	0		-3	
231.5716	-112.4451	124.3837	0.4366	0	20

Wire No. 4	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
183.5592	24.16603	0		-4	
183.5592	24.16603	124.357	0.4366	0	20

Wire No. 5	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
-129.7462	27.57841	0		-5	
-129.7462	27.57841	125.5762	0.4366	0	20

**** ANTENNA GEOMETRY ****

Wire No. 1 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
0	0	0	0.4366	-1	1	1
0	0	6.217852	0.4366	1	1	2
0	0	12.4357	0.4366	1	1	3
0	0	18.65355	0.4366	1	1	4
0	0	24.87141	0.4366	1	1	5
0	0	31.08926	0.4366	1	1	6
0	0	37.30711	0.4366	1	1	7
0	0	43.52496	0.4366	1	1	8
0	0	49.74282	0.4366	1	1	9
0	0	55.96067	0.4366	1	1	10
0	0	62.17852	0.4366	1	1	11
0	0	68.39638	0.4366	1	1	12
0	0	74.61422	0.4366	1	1	13
0	0	80.83208	0.4366	1	1	14
0	0	87.04993	0.4366	1	1	15
0	0	93.26778	0.4366	1	1	16
0	0	99.48563	0.4366	1	1	17
0	0	105.7035	0.4366	1	1	18
0	0	111.9213	0.4366	1	1	19
0	0	118.1392	0.4366	1	0	20

Wire No. 2 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
101.6118	-85.26246	0	0.4366	-2	2	21
101.6118	-85.26246	6.248332	0.4366	2	2	22
101.6118	-85.26246	12.49666	0.4366	2	2	23
101.6118	-85.26246	18.745	0.4366	2	2	24
101.6118	-85.26246	24.99333	0.4366	2	2	25
101.6118	-85.26246	31.24166	0.4366	2	2	26
101.6118	-85.26246	37.48999	0.4366	2	2	27
101.6118	-85.26246	43.73832	0.4366	2	2	28
101.6118	-85.26246	49.98666	0.4366	2	2	29
101.6118	-85.26246	56.23499	0.4366	2	2	30
101.6118	-85.26246	62.48332	0.4366	2	2	31
101.6118	-85.26246	68.73165	0.4366	2	2	32
101.6118	-85.26246	74.97998	0.4366	2	2	33
101.6118	-85.26246	81.22832	0.4366	2	2	34
101.6118	-85.26246	87.47665	0.4366	2	2	35
101.6118	-85.26246	93.72498	0.4366	2	2	36
101.6118	-85.26246	99.97331	0.4366	2	2	37
101.6118	-85.26246	106.2216	0.4366	2	2	38
101.6118	-85.26246	112.47	0.4366	2	2	39
101.6118	-85.26246	118.7183	0.4366	2	0	40

Wire No. 3 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
231.5716	-112.4451	0	0.4366	-3	3	41
231.5716	-112.4451	6.219184	0.4366	3	3	42
231.5716	-112.4451	12.43837	0.4366	3	3	43
231.5716	-112.4451	18.65755	0.4366	3	3	44
231.5716	-112.4451	24.87674	0.4366	3	3	45
231.5716	-112.4451	31.09592	0.4366	3	3	46
231.5716	-112.4451	37.31511	0.4366	3	3	47
231.5716	-112.4451	43.53429	0.4366	3	3	48
231.5716	-112.4451	49.75348	0.4366	3	3	49
231.5716	-112.4451	55.97266	0.4366	3	3	50
231.5716	-112.4451	62.19184	0.4366	3	3	51
231.5716	-112.4451	68.41103	0.4366	3	3	52
231.5716	-112.4451	74.63021	0.4366	3	3	53
231.5716	-112.4451	80.8494	0.4366	3	3	54
231.5716	-112.4451	87.06859	0.4366	3	3	55
231.5716	-112.4451	93.28777	0.4366	3	3	56
231.5716	-112.4451	99.50695	0.4366	3	3	57
231.5716	-112.4451	105.7261	0.4366	3	3	58
231.5716	-112.4451	111.9453	0.4366	3	3	59
231.5716	-112.4451	118.1645	0.4366	3	0	60

Wire No. 4 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
183.5592	24.16603	0	0.4366	-4	4	61
183.5592	24.16603	6.217852	0.4366	4	4	62
183.5592	24.16603	12.4357	0.4366	4	4	63
183.5592	24.16603	18.65355	0.4366	4	4	64
183.5592	24.16603	24.87141	0.4366	4	4	65
183.5592	24.16603	31.08926	0.4366	4	4	66
183.5592	24.16603	37.30711	0.4366	4	4	67
183.5592	24.16603	43.52496	0.4366	4	4	68
183.5592	24.16603	49.74282	0.4366	4	4	69
183.5592	24.16603	55.96067	0.4366	4	4	70
183.5592	24.16603	62.17852	0.4366	4	4	71
183.5592	24.16603	68.39638	0.4366	4	4	72
183.5592	24.16603	74.61422	0.4366	4	4	73
183.5592	24.16603	80.83208	0.4366	4	4	74
183.5592	24.16603	87.04993	0.4366	4	4	75
183.5592	24.16603	93.26778	0.4366	4	4	76
183.5592	24.16603	99.48563	0.4366	4	4	77
183.5592	24.16603	105.7035	0.4366	4	4	78
183.5592	24.16603	111.9213	0.4366	4	4	79
183.5592	24.16603	118.1392	0.4366	4	0	80

Wire No. 5 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
-129.7462	27.57841	0	0.4366	-5	5	81
-129.7462	27.57841	6.278811	0.4366	5	5	82
-129.7462	27.57841	12.55762	0.4366	5	5	83
-129.7462	27.57841	18.83643	0.4366	5	5	84
-129.7462	27.57841	25.11525	0.4366	5	5	85
-129.7462	27.57841	31.39405	0.4366	5	5	86
-129.7462	27.57841	37.67287	0.4366	5	5	87
-129.7462	27.57841	43.95168	0.4366	5	5	88
-129.7462	27.57841	50.23049	0.4366	5	5	89
-129.7462	27.57841	56.5093	0.4366	5	5	90
-129.7462	27.57841	62.78811	0.4366	5	5	91
-129.7462	27.57841	69.06693	0.4366	5	5	92
-129.7462	27.57841	75.34573	0.4366	5	5	93
-129.7462	27.57841	81.62455	0.4366	5	5	94
-129.7462	27.57841	87.90336	0.4366	5	5	95
-129.7462	27.57841	94.18217	0.4366	5	5	96
-129.7462	27.57841	100.461	0.4366	5	5	97
-129.7462	27.57841	106.7398	0.4366	5	5	98
-129.7462	27.57841	113.0186	0.4366	5	5	99
-129.7462	27.57841	119.2974	0.4366	5	0	100

Sources: 4
Pulse No., Voltage Magnitude, Phase (Degrees): 1, 775.3, 168.9
Pulse No., Voltage Magnitude, Phase (Degrees): 21, 1067.1, 78.3
Pulse No., Voltage Magnitude, Phase (Degrees): 41, 247.8, 76.4
Pulse No., Voltage Magnitude, Phase (Degrees): 61, 1014.2, 82.4

Number of Loads: 1
Pulse No., Resistance, Reactance: 81 , 0 , 156

********** SOURCE DATA **********

Pulse 1
Voltage = (-760.9465, 148.6076j)
Current = (-0.8552, -1.8382j)
Impedance = (91.868, -371.221j)
Power = 188.81 Watts

Pulse 21
Voltage = (217.289, 1044.6946j)
Current = (-1.0828, 1.2066j)
Impedance = (390.064, -530.143j)
Power = 512.61 Watts

Pulse 41
Voltage = (58.1238, 240.8891j)
Current = (0.2932, -0.5022j)
Impedance = (-307.343, 295.148j)
Power = -51.970279 Watts

Pulse 61
Voltage = (133.7176, 1005.3598j)
Current = (-1.0415, 0.6767j)
Impedance = (350.762, -737.396j)
Power = 270.55 Watts

Total Power = 920.000 Watts

********** CURRENT DATA **********

Wire No. 1 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
1	-0.8552	-1.8382	2.0274	-114.9504
2	-0.6834	-0.9738	1.1896	-125.0602
3	-0.5587	-0.3816	0.6766	-145.6617
4	-0.4399	0.1505	0.4649	161.1105
5	-0.3245	0.6371	0.715	116.9889
6	-0.2129	1.0789	1.0997	101.1614
7	-0.1065	1.4716	1.4755	94.1382
8	-0.0071	1.8096	1.8096	90.2244
9	0.0834	2.087	2.0887	87.7129
10	0.163	2.2988	2.3046	85.9447
11	0.2301	2.4409	2.4517	84.6156
12	0.2831	2.5106	2.5265	83.5662
13	0.3209	2.5066	2.5271	82.705
14	0.3425	2.4292	2.4532	81.9754
15	0.3473	2.2802	2.3065	81.3406
16	0.335	2.0625	2.0896	80.7753
17	0.3056	1.7805	1.8065	80.2612
18	0.2593	1.4387	1.4618	79.7845
19	0.196	1.0407	1.0589	79.3337
20	0.1149	0.5855	0.5967	78.8941
E	0.0	0.0	0.0	0.0

Wire No. 2 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
21	-1.0828	1.2066	1.6212	131.9059
22	0.1001	0.9555	0.9608	84.0198
23	0.8943	0.7754	1.1836	40.9287
24	1.5916	0.6059	1.7031	20.8394
25	2.2128	0.4431	2.2567	11.3234
26	2.7596	0.2875	2.7745	5.947
27	3.2274	0.1408	3.2305	2.4982
28	3.61	0.0055	3.61	0.0873
29	3.901	-0.116	3.9028	-1.7033
30	4.0954	-0.2214	4.1014	-3.0942
31	4.1895	-0.3086	4.2009	-4.2125
32	4.1818	-0.3759	4.1986	-5.1366
33	4.0725	-0.4221	4.0943	-5.9176
34	3.864	-0.4464	3.8897	-6.5904
35	3.5608	-0.4485	3.589	-7.1794
36	3.169	-0.4286	3.1979	-7.7027
37	2.696	-0.3872	2.7237	-8.1738
38	2.1495	-0.3252	2.1739	-8.6034
39	1.5356	-0.2432	1.5547	-9.0006
40	0.8537	-0.141	0.8653	-9.3771
E	0.0	0.0	0.0	0.0

Wire No. 3 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
41	0.2932	-0.5022	0.5815	-59.7251
42	0.5628	-0.5642	0.7969	-45.0696
43	0.7382	-0.5973	0.9496	-38.976
44	0.8869	-0.6181	1.081	-34.8734
45	1.0138	-0.6282	1.1926	-31.7843
46	1.1197	-0.6283	1.2839	-29.3002
47	1.2038	-0.619	1.3537	-27.2131
48	1.2653	-0.6009	1.4007	-25.4029
49	1.3031	-0.5745	1.4241	-23.7936
50	1.3165	-0.5408	1.4232	-22.3343
51	1.3051	-0.5007	1.3979	-20.989
52	1.2692	-0.4552	1.3484	-19.7312
53	1.2092	-0.4056	1.2754	-18.5408
54	1.1262	-0.353	1.1802	-17.4018
55	1.0214	-0.2987	1.0642	-16.3011
56	0.8967	-0.2441	0.9293	-15.2276
57	0.754	-0.1904	0.7776	-14.171
58	0.5951	-0.1387	0.6111	-13.1215
59	0.4215	-0.0901	0.4311	-12.0674
60	0.2327	-0.0452	0.237	-10.9841
E	0.0	0.0	0.0	0.0

Wire No. 4 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
61	-1.0415	0.6767	1.242	146.9846
62	0.0934	0.5235	0.5317	79.8866
63	0.8541	0.4153	0.9497	25.93
64	1.5218	0.315	1.554	11.6942
65	2.1163	0.2201	2.1277	5.9375
66	2.6395	0.1306	2.6428	2.8332
67	3.0873	0.0475	3.0877	0.8814
68	3.4536	-0.0281	3.4537	-0.4662
69	3.7326	-0.0949	3.7338	-1.457
70	3.9193	-0.1519	3.9222	-2.2189
71	4.0103	-0.1979	4.0152	-2.8251
72	4.0041	-0.2323	4.0108	-3.3202
73	3.9008	-0.2545	3.909	-3.7334
74	3.7026	-0.2644	3.7121	-4.0843
75	3.4137	-0.2619	3.4238	-4.3867
76	3.0398	-0.2473	3.0499	-4.6507
77	2.5877	-0.2211	2.5971	-4.8838
78	2.0647	-0.184	2.0728	-5.0917
79	1.4763	-0.1364	1.4826	-5.2793
80	0.8216	-0.0784	0.8253	-5.4521
E	0.0	0.0	0.0	0.0

Wire No. 5 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
81	0.2645	0.8358	0.8766	72.4425
82	0.2155	0.6836	0.7168	72.5003
83	0.178	0.572	0.599	72.716
84	0.1404	0.4647	0.4854	73.1885
85	0.1023	0.3597	0.3739	74.1213
86	0.0641	0.2574	0.2653	76.0222
87	0.0264	0.1593	0.1615	80.5931
88	-0.0099	0.0671	0.0678	98.3703
89	-0.0438	-0.0173	0.0471	-158.3942
90	-0.0744	-0.0922	0.1185	-128.9062
91	-0.1009	-0.156	0.1858	-122.909
92	-0.1225	-0.2072	0.2407	-120.5885
93	-0.1383	-0.2447	0.2811	-119.4714
94	-0.1478	-0.2677	0.3058	-118.8958
95	-0.1505	-0.2758	0.3142	-118.6119
96	-0.146	-0.2688	0.3059	-118.5054
97	-0.1341	-0.2468	0.2809	-118.5176
98	-0.1147	-0.2102	0.2394	-118.6158
99	-0.0874	-0.1591	0.1815	-118.7816
100	-0.0517	-0.0932	0.1066	-119.0085
E	0.0	0.0	0.0	0.0

********** BASE OPERATING PARAMETERS **********

Twr.	Ratio	Phase
1	3.486	-55.2
2	2.788	191.6
3	1.000	0.0
4	2.136	206.7
5	1.507	132.2

The Ratio and Phase parameters were derived from the same set of Base Region Circuit Models used in the Non-Directional Model Calibration with the exception that the modeled input data was taken from the Directional Antenna Model. The input voltage magnitudes and phases appearing at Node-1 for each of the four towers of the array were matched in Voltage Magnitude and Phase to the Base Driving Voltages of the Mininec DA Model by adjustment of the magnitude and phase of the current source for each WCAP tower model. The resulting Magnitude and Phase of the Node-2 Voltages are the exact operating parameters for each tower. When normalized to tower-4, they represent the operating parameters for the array subject to any variations in the Antenna Monitoring System. The tables below, in conjunction with the following individual tower printouts clearly show the derivation of the Operating Parameters. See the table on page-3 of Section-3 for the Antenna Monitor parameters which include the Sampling System Deviations.

The individual WCAP circuit files appear on the following pages.

WCAP - KZDC TWR-1 DA-N
WCAP OUTPUT AT FREQUENCY: 1.250 MHz

NODE VOLTAGES

Node:	1	775.3056 ∠ 168.9000° V	BASE VOLTAGE/PHASE
Node:	2	729.9744 ∠ 169.5875° V	VSU VOLTAGE/PHASE
Node:	3	730.4960 ∠ 169.7850° V	

	WCAP PART		BRANCH VOLTAGE	BRANCH CURRENT
R	3→2	1.00000000	2.57 ∠ -112.024° V	2.57 ∠ -112.024° A
L	2→1	2.29000000	46.22 ∠ -22.024° V	2.57 ∠ -112.024° A
C	1→0	0.00009120	775.31 ∠ 168.900° V	0.56 ∠ -101.100° A
R	1→0	91.86800000	775.31 ∠ 168.900° V	2.03 ∠ -115.000° A

	WCAP PART		FROM IMPEDANCE	TO IMPEDANCE
R	3→2	1.00000000	58.17 - j 278.233	57.17 - j 278.233[2]
L	2→1	2.29000000	57.17 - j 278.233	57.17 - j 296.219
C	1→0	0.00009120	0.00 - j 1396.096	0.00 + j 0.000
R	1→0	91.86800000	91.87 - j 371.221[1]	0.00 + j 0.000

WCAP INPUT DATA:

	1.2500	0.00000000	0		
I	2.56991000	0	3	247.97560000	1: MODELED BASE IMPEDANCE
R	1.00000000	3	2	0.00000000	2: MODELED VSU IMPEDANCE
L	2.29000000	2	1	0.00000000	
C	0.00009120	1	0		
R	91.86800000	1	0	-371.22100000	

WCAP - KZDC TWR-2 DA-N
WCAP OUTPUT AT FREQUENCY: 1.250 MHz

NODE VOLTAGES

Node:	1	1067.1203 ∠ 78.3000° V	BASE VOLTAGE/PHASE
Node:	2	1037.9992 ∠ 79.0977° V	VSU VOLTAGE/PHASE
Node:	3	1038.9888 ∠ 79.2041° V	

	WCAP PART		BRANCH VOLTAGE	BRANCH CURRENT
R	3→2	1.00000000	2.17 ∠ 141.985° V	2.17 ∠ 141.985° A
L	2→1	1.91500000	32.60 ∠ -128.015° V	2.17 ∠ 141.985° A
C	1→0	0.00007600	1067.12 ∠ 78.300° V	0.64 ∠ 168.300° A
R	1→0	390.06400000	1067.12 ∠ 78.300° V	1.62 ∠ 131.955° A

	WCAP PART		FROM IMPEDANCE	TO IMPEDANCE
R	3→2	1.00000000	219.25 - j 426.268	218.25 - j 426.268[2]
L	2→1	1.91500000	218.25 - j 426.268	218.25 - j 441.309
C	1→0	0.00007600	0.00 - j 1675.315	0.00 + j 0.000
R	1→0	390.06400000	390.06 - j 530.143[1]	0.00 + j 0.000

WCAP INPUT DATA:

	1.2500	0.00000000	0		
I	2.16750000	0	3	141.98520000	1: MODELED BASE IMPEDANCE
R	1.00000000	3	2	0.00000000	2: MODELED VSU IMPEDANCE
L	1.91500000	2	1	0.00000000	
C	0.00007600	1	0		
R	390.06400000	1	0	-530.14300000	

WCAP - KZDC TWR-3 DA-N
WCAP OUTPUT AT FREQUENCY: 1.250 MHz

NODE VOLTAGES

Node: 1	247.7974 ∠ 76.4174° V	BASE VOLTAGE/PHASE
Node: 2	250.9360 ∠ 74.9956° V	VSU VOLTAGE/PHASE
Node: 3	250.5219 ∠ 74.9461° V	

	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
R	3→2	1.00000000	0.47 ∠	-77.400° V	0.47 ∠	-77.400° A
L	2→1	1.89000000	6.94 ∠	12.600° V	0.47 ∠	-77.400° A
C	1→0	0.00010100	247.80 ∠	76.417° V	0.20 ∠	166.417° A
R	1→0	-307.34300000	247.80 ∠	76.417° V	0.58 ∠	-59.742° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
R	3→2	1.00000000	-474.76 + j	248.769	-475.76 + j	248.769[2]
L	2→1	1.89000000	-475.76 + j	248.769	-475.76 + j	233.925
C	1→0	0.00010100	-0.00 - j	1260.633	0.00 + j	0.000
R	1→0	-307.34300000	-307.34 + j	295.148[1]	0.00 + j	0.000

WCAP INPUT DATA:

	1.2500	0.00000000	0		
I	0.46740000	0	3	282.60000000	1: MODELED BASE IMPEDANCE
R	1.00000000	3	2	0.00000000	2: MODELED VSU IMPEDANCE
L	1.89000000	2	1	0.00000000	
C	0.00010100	1	0		
R	-307.34300000	1	0	295.14800000	

WCAP - KZDC TWR-4 DA-N
WCAP OUTPUT AT FREQUENCY: 1.250 MHz

NODE VOLTAGES

Node: 1	1014.2308 ∠ 82.3993° V	BASE VOLTAGE/PHASE
Node: 2	985.6704 ∠ 82.8597° V	VSU VOLTAGE/PHASE
Node: 3	986.2213 ∠ 82.9713° V	

	WCAP PART		BRANCH VOLTAGE		BRANCH CURRENT	
R	3→2	1.00000000	2.00 ∠	156.917° V	2.00 ∠	156.917° A
L	2→1	1.89000000	29.67 ∠	-113.083° V	2.00 ∠	156.917° A
C	1→0	0.00010100	1014.23 ∠	82.399° V	0.80 ∠	172.399° A
R	1→0	350.76200000	1014.23 ∠	82.399° V	1.24 ∠	146.960° A

	WCAP PART		FROM IMPEDANCE		TO IMPEDANCE	
R	3→2	1.00000000	136.46 - j	474.188	135.46 - j	474.188[2]
L	2→1	1.89000000	135.46 - j	474.188	135.46 - j	489.032
C	1→0	0.00010100	0.00 - j	1260.633[1]	0.00 + j	0.000
R	1→0	350.76200000	350.76 - j	737.396	0.00 + j	0.000

WCAP INPUT DATA:

	1.2500	0.00000000	0		
I	1.99870000	0	3	156.91700000	1: MODELED BASE IMPEDANCE
R	1.00000000	3	2	0.00000000	2: MODELED VSU IMPEDANCE
L	1.89000000	2	1	0.00000000	
C	0.00010100	1	0		
R	350.76200000	1	0	-737.39600000	

****
ACSModel
(MININEC 3.1 Core)
01-11-2013 13:58:35
****

KZDC DETUNING MODEL
KZDC TWR-5 (PHYSICAL TWR-1)

Frequency = 1.250 MHz Wavelength = 239.84000 Meters

No. of Wires: 1

Wire No. 1 Coordinates X	Y	Z	Radius	End Connection	No. of Segments
0	0	0		-1	
0	0	124.2438	0.4366	0	20

**** ANTENNA GEOMETRY ****

Wire No. 1 Coordinates X	Y	Z	Radius	Connection End1	End2	Pulse No.
0	0	0	0.4366	-1	1	1
0	0	6.212189	0.4366	1	1	2
0	0	12.42438	0.4366	1	1	3
0	0	18.63657	0.4366	1	1	4
0	0	24.84876	0.4366	1	1	5
0	0	31.06095	0.4366	1	1	6
0	0	37.27314	0.4366	1	1	7
0	0	43.48532	0.4366	1	1	8
0	0	49.69751	0.4366	1	1	9
0	0	55.90971	0.4366	1	1	10
0	0	62.12189	0.4366	1	1	11
0	0	68.33408	0.4366	1	1	12
0	0	74.54627	0.4366	1	1	13
0	0	80.75846	0.4366	1	1	14
0	0	86.97065	0.4366	1	1	15
0	0	93.18284	0.4366	1	1	16
0	0	99.39503	0.4366	1	1	17
0	0	105.6072	0.4366	1	1	18
0	0	111.8194	0.4366	1	1	19
0	0	118.0316	0.4366	1	0	20

Sources: 1
Pulse No., Voltage Magnitude, Phase (Degrees): 1, 26.2, 28.8

Number of Loads: 0

********** SOURCE DATA **********
Pulse 1 Voltage = (22.9189, 12.5998j)
Current = (0.0014, 0.0559j)
Impedance = (**236.001, -404.151j**)
Power = 0.37 Watts

********** CURRENT DATA **********

Wire No. 1 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
1	0.0014	0.0559	0.0559	88.5175
2	0.0156	0.0298	0.0337	62.4444
3	0.0249	0.012	0.0276	25.8657
4	0.0328	-0.0039	0.033	-6.8438
5	0.0397	-0.0185	0.0438	-25.0482
6	0.0455	-0.0318	0.0555	-34.9285
7	0.0503	-0.0436	0.0665	-40.8911
8	0.054	-0.0537	0.0761	-44.8515
9	0.0564	-0.062	0.0838	-47.6792
10	0.0577	-0.0683	0.0894	-49.811
11	0.0578	-0.0726	0.0928	-51.4867
12	0.0566	-0.0747	0.0937	-52.8485
13	0.0542	-0.0746	0.0922	-53.9858
14	0.0507	-0.0723	0.0883	-54.9576
15	0.0461	-0.0678	0.082	-55.8047
16	0.0405	-0.0613	0.0735	-56.556
17	0.0341	-0.053	0.063	-57.2334
18	0.0269	-0.0428	0.0505	-57.8535
19	0.019	-0.0309	0.0363	-58.4307
20	0.0105	-0.0174	0.0203	-58.9825
E	0.0	0.0	0.0	0.0

DETUNED CURRENT DISTRIBUTION

Wire No. 5 :

Pulse No.	Real (Amps)	Imaginary (Amps)	Magnitude (Amps)	Phase (Degrees)
81	0.2645	0.8358	0.8766	72.4425
82	0.2155	0.6836	0.7168	72.5003
83	0.178	0.572	0.599	72.716
84	0.1404	0.4647	0.4854	73.1885
85	0.1023	0.3597	0.3739	74.1213
86	0.0641	0.2574	0.2653	76.0222
87	0.0264	0.1593	0.1615	80.5931
88	-0.0099	0.0671	0.0678	98.3703
89	**-0.0438**	**-0.0173**	**0.0471**	**-158.3942** I_{min}
90	-0.0744	-0.0922	0.1185	-128.9062
91	-0.1009	-0.156	0.1858	-122.909
92	-0.1225	-0.2072	0.2407	-120.5885
93	-0.1383	-0.2447	0.2811	-119.4714
94	-0.1478	-0.2677	0.3058	-118.8958
95	-0.1505	-0.2758	0.3142	-118.6119
96	-0.146	-0.2688	0.3059	-118.5054
97	-0.1341	-0.2468	0.2809	-118.5176
98	-0.1147	-0.2102	0.2394	-118.6158
99	-0.0874	-0.1591	0.1815	-118.7816
100	-0.0517	-0.0932	0.1066	-119.0085
E	0.0	0.0	0.0	0.0

CALCULATED DETUNING REACTANCE: +j162 OHMS

The above listed value is the value calculated at the tower base. The adjusted value at the KZDC TWR-5 (Physical Tower-1) ACU output test jack is +j156 Ohms. The value differs slightly from the calculated value due to the

series reactance of the RF Feeder Pipe to the tower base and the associated stray capacitance in the base region. The value is within 3.7 percent of the calculated value and was measured following adjustment of the associated detuning network for a sharp null at the sample loop jack at the tower base.

The adjustment procedure uses a Potomac Instruments model FIM-41 field intensity meter strapped to the tower structure with a BNC TEE connector attached to the External Input Jack of the instrument. One side of the adaptor is terminated in a 50 ohm resistance and the other side is connected to the sample line jack located in a weatherproof box at the base of the tower. The J-PLUG output is first shorted to ground and the instrument is tuned to 1250 kilohertz, the GAIN is adjusted to calibrate the instrument to 0 dB. The J-PLUG is then restored to the normal operating position and the 1250 KHZ detuning Inductor is adjusted for the best null. The resulting reactance is then measured at the output terminal of the network at the J-PLUG.

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SECTION-3

ANTENNA MONITORING AND SAMPLING SYSTEM

The Antenna Monitoring System uses a Potomac Instruments model 1901 Antenna Monitor. The monitor was purchased new for this project and has filters installed to reject interference from Station KTSA which is diplexed into three of the towers. The Certificate of Calibration is attached to this exhibit. Prior to beginning adjustment of the KZDC Directional Antenna System, the monitor was tested using the self check features of the instrument and was determined to be operating properly.

The antenna monitor is connected to Kintronic Laboratories Voltage Sampling Units located at the base of each of the four tower bases. The VSU's are connected to the Antenna Monitor by underground runs of Andrew LDF-4-50A foam filled solid outer conductor coaxial cables of equal electrical length within the tolerances permitted by the Rules. The cables have factory installed connectors on each end of the run where they terminate at the Voltage Sampling Unit connectors at the towers and on a bulkhead panel in the transmitter room. In the transmitter room, a short length of RG-214/U cable is used to connect the cables to the Antenna Monitor. The sample lines are buried in carefully prepared trenches at a depth of approximately thirty inches below grade level atop a washed sand base, six inches in depth with the associated transmission, control and power lines. An additional six inches of washed sand was placed atop the lines prior to backfilling with excavated dirt from the site. Where the lines traverse Eisenhauer Road, they do so at a depth of ten feet below grade level in separate PVC conduits by function. The conduits are installed inside a fourteen inch steel pipe beneath the roadbed and extend to a distance of ten feet either side of the road for protection. The pipes then taper upward to the trench level over a distance of thirty feet from the end of each pipe.

The cables as a system were individually measured with the distant end open circuited to determine the electrical length and impedance using an Array Solutions model PA-120 Vector Impedance Analyzer. The system was set to sweep from 100 kilohertz to 2.5 megahertz allowing inspection of the line characteristics to determine the relevant odd multiples of ninety electrical degrees, the series resonant zero crossings, nearest the operating frequency of 1250 kilohertz. The 450 degree series resonant zero crossing was determined to be the nearest frequency to the carrier frequency.

The following tables tabulate the electrical length and impedance of each of the Sampling

Lines used in the system.

SAMPLE LINE LENGTH MEASUREMENTS

TOWER	RESONANCE BELOW 1250 KHZ (F-1) (270°)	RESONANCE ABOVE 1250 KHZ (F-2) (450°)	RATIO 1250/F-2	CALCULATED ELECTRICAL LENGTH (DEG)	DEVIATION REFERENCE: TOWER-4 (DEG)
1	901.723	1506.202	0.8299	373.46	-0.16
2	901.379	1505.875	0.8301	373.54	-0.08
3	901.587	1506.583	0.8297	373.36	-0.26
4	900.777	1505.528	0.8303	373.62	0.00

SAMPLE LINE IMPEDANCE MEASUREMENTS

Tower	-45 Degree Offset Frequency (KHZ)	-45 Degree Measured Impedance (OHMS)	+45 Degree Offset Frequency (KHZ)	+45 Degree Measured Impedance (OHMS)	Calculated Characteristic Impedance (OHMS)
1	1356.557	5.40-j49.34	1656.557	7.01+j50.06	50.09
2	1356.557	5.54-j49.16	1656.557	7.04+j50.07	50.01
3	1356.557	5.54-j49.48	1656.557	6.99+j49.79	50.03
4	1356.557	5.34-j48.86	1656.557	7.11+j51.42	50.51

The sample lines comply with the requirements of the Rule with respect to differential lengths and impedance.

The Kintronic Laboratories Voltage Sampling Units (VSU's) were set up in a permanent test fixture constructed in the KZDC Transmitter shelter to permit consistent calibration data. The Tower-4 VSU was set up as the "Reference" unit and each of the other three VSU's was placed in the "Unknown" position to allow measurements of the Ratio and Phase differences to be measured by the Hewlett Packard 8753C Network Analyzer. The VSU's were driven in parallel from a broadband power amplifier connected to the network analyzer.

VSU CALIBRATION VERIFICATION

TOWER	VSU-1 S/N	VSU-1 RATIO	VSU-1 PHASE (DEGREES)	SAMPLE LINE - Z TERMINATED BY VSU
1	TX60612-02	1.006	0.05	3.0+j11.1
2	TX60612-03	1.005	0.29	3.1+j9.7
3	TX60612-04	1.004	0.31	3.0+j10.6
4	TX60612-01	1.000	0.00	3.4+j9.4

The Voltage Sampling Units are within the KTL specified ratings of +/- 2 percent magnitude and +/-2 degrees phase.

The Antenna Monitoring System, including the VSU's, the sample lines and the flexible pigtails at the Antenna Monitor end of the sample lines are listed in the table below to determine the total monitoring system ratio and phase deviations:

SAMPLE SYSTEM PERFORMANCE

TOWER	VSU RATIO DEVIATION (RATIO)	VSU DEVIATION (DEGREES)	SAMPLE LINE DEVIATION (DEGREES)	SYSTEM DEVIATION (RATIO/PHASE)
1	1.006	0.05	-0.16	1.006/-0.1°
2	1.005	0.29	-0.08	1.005/+0.2°
3	1.004	0.31	-0.26	1.004/+0.1°
4	1.000	0.00	0.00	1.000/0.00°

ANTENNA MONITOR PARAMETERS

TOWER	MONITOR SYSTEM DEVIATION (RATIO/DEG)	CORRECTION FACTOR	NORMALIZED TOWER PARAMETERS (From Sect-2)	CALIBRATED ANTENNA MONITOR PARAMETERS
1	1.006/-0.1°	0.994/-0.1°	0.741/+86.7°	0.737/+86.6°
2	1.005/+0.2°	0.995/+0.2°	1.051/-3.8°	1.046/-3.6°
3	1.004/+0.1°	0.996/+0.1°	0.255/-7.9°	0.254/-7.8°
4	1.000/0.00°	1.000/00.0°	1.000/0.00°	1.000/0.00°

The KZDC Directive array is adjusted to within +/-5 percent and +/-3 degrees of the listed Antenna Monitor Parameters.

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SECTION-4

DIRECT MEASUREMENT OF POWER – NIGHTTIME DIRECTIVE ARRAY

Common Point Impedance measurements were made at the input terminals to the Delta Electronics Common Point Impedance Bridge in the phasing cabinet. An RF test Jack is located adjacent to the current transformer for the Common Point Ammeter at this location. The impedance was measured using a Hewlett Packard model 8253C network analyzer which was utilized for all of the system impedance measurements. The input impedance was adjusted to 50 ohms +j0 at this location. The Phase Rotation Network and the 550 Kilohertz Shunt Reject Filter Network are housed in the Phasing Cabinet and are electrically connected between the transmitter input contactor and the Common Point Bridge input Jack. The Phase Rotation Network is adjusted to provide the proper load to the transmitters.

The Common Point power for the authorized nighttime directional antenna system is 920 watts plus the eight percent adjustment factor for system losses of the phasing and coupling equipment.

The Operating Power into the array is 994 watts plus the power dissipated in the dummy load from Tower-3, a negative tower, used to stabilize the pattern bandwidth of the system. The input resistance of the dummy load connected to the Tower-3 network was measured with the network analyzer system and found to be 50.0 ohms at the input test jack for the Tower-3 Network. The Tower-3 RF Ammeter is physically located atop the Phasing Cabinet. The load is connected to the Tower-3 network housed in the phasing cabinet via a short length of flexible transmission line. The load is enclosed in a vented enclosure mounted near the ceiling of the transmitter building. The Tower-3 Ratio and Phase controls are located in the Phasing Cabinet.

The ratio of the Common Point Current and the current into the Tower-3 load was determined directly from the meters with no audio applied to the transmitter. With the nighttime directional array adjusted to the antenna monitor parameters shown herein, the Tower-3 Load Current was found to be 0.18 times the Common Point Current.

As the Common Point Resistance was set to 50.0 ohms:

$$(Icp)^2\ (50.0) - (0.18)^2\ (Icp)^2\ (50.0) = 994 \text{ Watts}$$

$$(Icp)^2\ [1-(0.18)^2](50.0) = 994 \text{ Watts}$$

$$(Icp)^2 = 994/[1-(0.18)^2] \times 50.0$$

$$(Icp)^2 = 994/0.9676X50 = 20.546$$

Therefore:

$$Icp = 4.53 \text{ A}$$

NIGHTTIME ANTENNA INPUT POWER = $(4.53)^2$ X 50.0 = 1,026 Watts

Dissipated Power= 1,026 W – 994 W = 32 Watts

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SECTION-5

SPURIOUS & HARMONIC RADIATION
RADIO STATIONS KTSA & KZDC NIGHTTIMESITE

The nighttime transmitting site of Station KZDC is diplexed with Station KTSA 550 kilohertz. The KTSA nighttime directional antenna uses the four original towers on this site, numbered as Physical Towers 1 through 4. Physical Tower-5, the new tower, is detuned at the KTSA frequency. Three of the four towers of the KTSA nighttime directive array are also used by KZDC as is Physical Tower-5, which was constructed forthe exclusive use of KZDC during nighttime hours. Tower-1 of the KTSA array is detuned at the KZDC frequency. Filters are installed in all five sets of Antenna Couplers and shunt reject filters are installed in the input circuitry of the two transmission systems to prevent entry of radio frequency energy from the other station into the output circuitry of the final amplifiers of the transmitters.

Two Nautel XR-12 transmitters are installed in the KTSA transmitter room for alternate main use by the station. These transmitters feed shunt reject filters tuned to 1250 kHz in the KTSA antenna system input circuitry.

Two Nautel J-1000 transmitters are installed in the KZDC transmitter shelter for alternate main use by the station. These transmitters feed shunt reject filters tuned to 550 kHz in the KZDC antenna system input circuitry.

Preliminary measurements were made at the transmitter site using a spectrum analyzer for observation of potential two station intermodulation and other spurious products which could be generated in the KTSA and KZDC transmitters. None exceeding -80 dBc were observed. Field measurements were made at two locations within the main lobes of the KTSA and KZDC directive arrays. The locations are described below for each station along with tables of related Harmonic Levels and potential spurious frequencies and their levels generated by intermodulation products of the two stations. In most instances the harmonic and spurious levels were at the noise floor of the Potomac Instruments Field Intensity Meter used for the measurements. The specific frequencies could be identified by a slight change in the audible character of the noise. In no case, other than the on frequency measurement was clearly discernable audio heard from either station. No spurious products were heard on frequencies other than the calculated harmonic and intermodulation frequencies identified in the attached tables.

The KZDC measurements were made on October 31, 2012 on a bearing of 249 degrees at 1.24 kM from the array center on East Sunbelt Road.

All measurements were made with a Potomac Instruments model FIM-4100 Field Intensity

Meter, last calibrated by the manufacturer on May 11, 2011. All measurements were made by Lyndon H. Willoughby, a reputable Technical Consultant whose qualifications are a matter of record with the Federal Communications Commission.

KZDC HARMONIC STUDY

FREQUENCY (kHz)	MEASURED LEVEL (mV/m)	ATENUATION RELATIVE TO CARRIER (dB)	OBSERVED ADUIO
1250	704	REF	KZDC PGM
2500	0.0306	-87.2 dBc	NOISE
3750	0.0045	-103.9 dBc	NOISE
5000	0.0047	-103.5 dBc	NOISE
Notes: Measured with Potomac Instruments FIM-4100, Calibrated May 5, 2011; Req'd Attenuation: -73.2 dBc			

KZDC INTERMODUALTION STUDY

All potential intermodulation frequencies between KTSA (550 kHz) and KZDC (1250 kHz) within the range of the Potomac Instruments FIM-4100 Field Intensity Meter were studied in the field at the location chosen for the Harmonic measurements. These frequencies take the form of $2F_1 +/- F_2$.. The spectrum from 520 kHz through 5.0 mHz was carefully scanned for other products which might appear with none found. The spectrum had been scanned in the transmitter room with both stations on the nighttime pattern, the worst case due to common use of three of the five towers using a spectrum analyzer scanning from 200 kHz through 10 mHz. No significant attributable products were found. The following table lists the frequencies which were identified and their levels recorded in the field.

FREQUENCY (kHz)	MEASURED LEVEL (mV/m)	ATENUATION RELATIVE TO CARRIER (dB)	OBSERVED ADUIO
1250	704	REF	KZDC PGM
1950	0.0933	-78.0 dBc	NOISE
3050	0.0822	-79.1 dBc	NOISE
3200	0.0055	-102.6 dBc	NOISE
4300	0.0048	-103.3 dBc	NOISE
4450	0.0048	-103.3 dBc	NOISE
Notes: Measured with Potomac Instruments FIM-4100, Calibrated May 50, 2011; Req'd Attenuation: 73.2 dBc			
Location: 0.745 kM on Bearing of 318 Degrees True on Ira Lee Drive at NAD-83 Coordinates: NL: 29-30-07.2/WL: 98/25/15.4			

KTSA HARMONIC RADIATION STUDY

FREQUENCY (kHz)	MEASURED LEVEL (mV/m)	ATENUATION RELATIVE TO CARRIER (dB)	OBSERVED ADUIO
550	1190.0	REF	KTSA PGM
1100	117.0	KDRY Fundamental	KDRY PGM (KTSA 2ND Harmonic)
1650	0.0373	-90.08 dBc	NOISE
2200	0.0089	-102.5 dBc	NOISE
2750	0.0350	-90.6 dBc	NOISE
3300	0.0060	-105.9 dBc	NOISE
3850	0.0053	-107.0 dBc	NOISE
4400	0.0053	-107.0 dBc	NOISE
4950	0.0053	-107.0 dBc	NOISE
Notes: Measured with Potomac Instruments FIM-4100, Calibrated May 5, 2011; Required Attenuation: -80 dBc			

KTSA INTERMODULATION STUDY

All potential intermodulation frequencies between KTSA (550 kHz) and KZDC (1250 kHz) within the range of the Potomac Instruments FIM-4100 Field Intensity Meter were studied in the field at the location chosen for the Harmonic measurements. These frequencies take the form of $2F_1 +/- F_2$.. The spectrum from 520 kHz through 5.0 mHz was carefully scanned for other products which might appear with none found. The spectrum had been scanned in the transmitter room with both stations on the nighttime pattern, the worst case due to common use of three of the five towers using a spectrum analyzer scanning from 200 kHz through 10 mHz. No significant attributable products were found. The following table lists the frequencies which were identified and their levels recorded in the field.

FREQUENCY (kHz)	MEASURED LEVEL (mV/m)	ATENUATION RELATIVE TO CARRIER (dB)	OBSERVED ADUIO
550	1190.0	REF	KTSA PGM
400	0.0116	-100.2 dBc	NOISE
950	0.0370	-90.1 dBc	NOISE
2350	0.0083	-103.1 dBc	NOISE
2900	0.0350	-90.6 dBc	NOISE
3450	0.0171	-96.9 dBc	NOISE
Notes: Measured with Potomac Instruments FIM-4100, Calibrated May 5, 2011; Required Attenuation: -80 dBc			
Location: 1.24 kM on Bearing of 249 Degrees True; NAD-83 Coordinates: NL: 29-29-32.5/WL: 98/25/38.1			

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SECTION-6

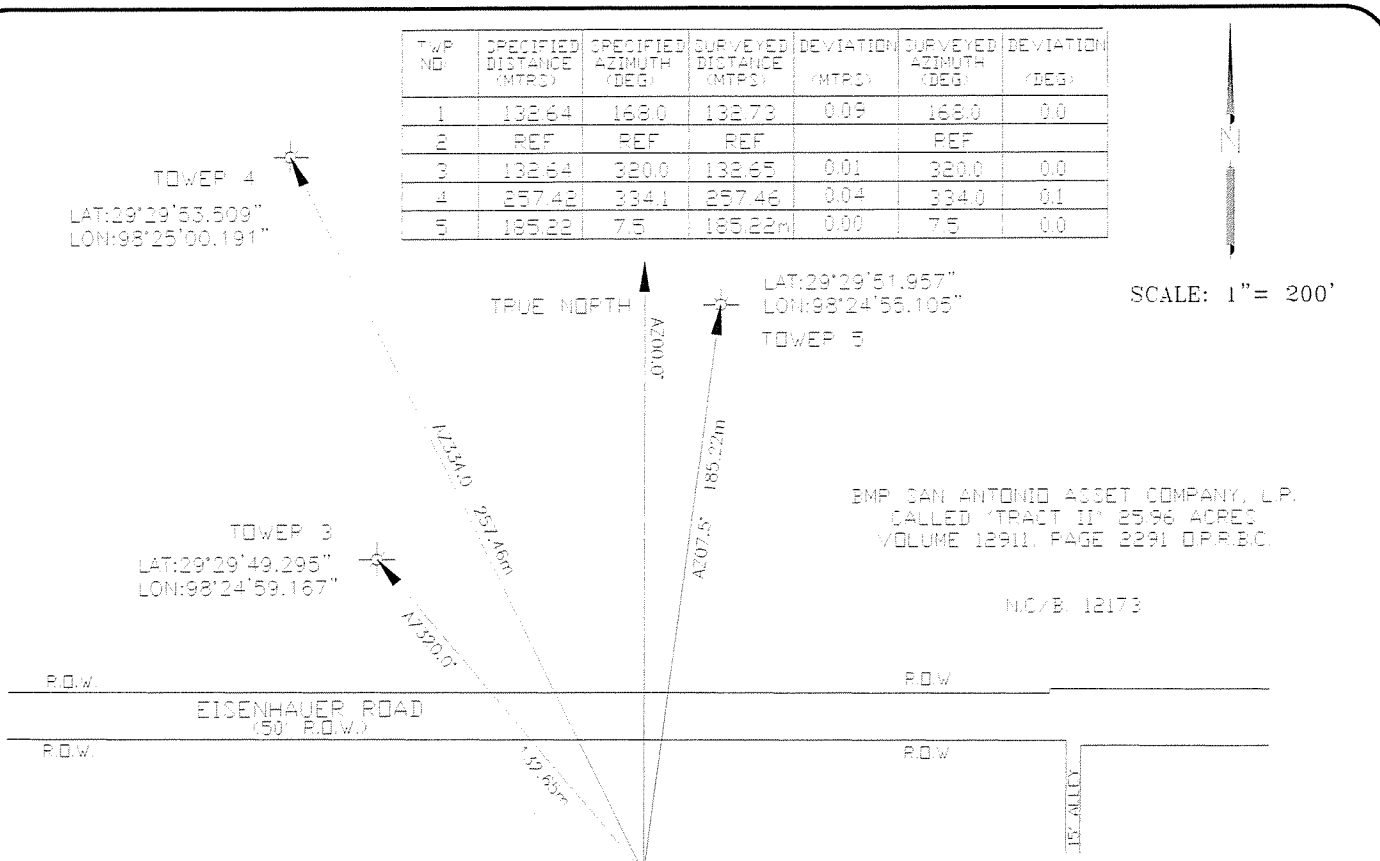
POST CONSTRUCTION DISTANCE & BEARING SURVEY

A post-construction Distance and Bearing Survey was conducted by Rods Surveying, Inc. a Registered Land Surveyor in the State of Texas of the KTSA/KZDC transmitter site. The survey shows the location of all five towers on the property owned by BMP, San Antonio License Company, L.P. including the new Tower-5 for KZDC.

A table of distances and bearings appears at the top of the survey showing that the deviations in the distances and bearings from the design values are well within the one electrical degree limit required for Method of Moments DA Proofs of Performance.

The survey appears on the following page.

TWP NO:	SPECIFIED DISTANCE (MTPO)	SPECIFIED AZIMUTH (DEG)	SURVEYED DISTANCE (MTPO)	DEVIATION (MTPO)	SURVEYED AZIMUTH (DEG)	DEVIATION (DEG)
1	132.64	168.0	132.73	0.09	168.0	0.0
2	REF	REF	REF		REF	
3	132.64	320.0	132.65	0.01	320.0	0.0
4	257.42	334.1	257.46	0.04	334.0	0.1
5	185.22	7.5	185.22m	0.00	7.5	0.0



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NOTES:

1. BEARING BASIS: BEARINGS ARE REFERENCED TO THE MERIDIAN THROUGH CONTROL PT# 2 AS DERIVED BY SOLAR OBSERVATION ON NOVEMBER 11, 2011. FOR TEXAS STATE PLANE SOUTH CENTRAL ZONE BEARING, APPLY A CONVERGENCE OF 00° 17' 13".

2. LATITUDES AND LONGITUDES SHOWN ARE BASED ON NAD83 PROJECTIONS.

STATE OF TEXAS
REGISTERED
JOHN DAVID KENNEY
2080
PROFESSIONAL
LAND SURVEYOR

SURVEY PLAT OF:

A DISTANCE AND BEARING SURVEY RESULTS, RADION STATION KZDC, 1250 KHZ, 0.92 KW, 25 KW-LS, DA-2, UNL, FACILITY ID: 65330, BMP SAN ANTONIO LICENCE COMPANY, LP.

STATE OF TEXAS
COUNTY OF BEXAR

I HEREBY CERTIFY THAT THIS IS A TRUE AND CORRECT PLAT BASED ON A GROUND SURVEY MADE UNDER MY SUPERVISION ON THIS 4TH DAY OF OCTOBER, 2012.

JOHN DAVID KENNEY, PPLS NO. 2080

RODS
Surveying, Inc.

1540 PLEASANTON RD.
SAN ANTONIO, TX 78221
PH. 210-922-9092
FX. 210-922-9095
www.rods.cc

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SECTION-7
RFR PROTECTION INFORMATION
TOWER REGISTRATION & SIGNAGE
RADIO STATIONS KTSA & KZDC NIGHT SITE

The KZDC nighttime transmitting site is co-located with station KTSA (550 kHz) and uses three of the four towers utilized by the KTSA nighttime directive array with one additional tower of the same height and face width. The Power Distribution for each tower with contributions from each station is listed in the table below:

TOWER	ASR NUMBER	KTSA		KZDC	TOTAL POWER (WATTS)	OET[1] MINIMUM (METERS)	FENCE[2] DISTANCE (METERS
		DAY[3] WATTS	NIGHT[3] WATTS	NIGHT[4] WATTS			
1	1022081	5000	850	DETUNED	5000	2 TO 10 KW	2.13
2	1022082	-	-2900	200	3100	2 TO 10 KW	2.13
3	1022083	-	6000	500	6500	2 TO 10 KW	2.13
4	1022084	-	1000	-55	1055	2 TO 10 KW	2.13
5	1278630	-	DETUNED	300	300	2 TO 10 KW	>2.13

NOTES:

1: OET-65, EDITION 97-01, MINIMUM REQUIRED DISTANCE FROM TOWER STEEL TO NEAREST FENCE SURFACE

2: MINIMUM CONSTRUCTED FENCE DISTANCE FROM TOWER STEEL TO NEAREST FENCE SURFACE

3: POWER AT 550 KHZ INTO AN 80.5 DEGREE TOWER

4: POWER AT 1250 KHZ INTO A 183 DEGREE TOWER

The minimum distance from tower steel to the nearest point on the tower fence is 2.13 meters (7 Feet). The minimum required distance for a station operating at 550 kilohertz with up to one kilowatt of power with a one quarter wave tower is 1 meter. The minimum required distance for a station operating at 550 kilohertz with up to ten kilowatts of power with a one quarter wave tower is 2 meters. The minimum required distance for a station operating at 1250 kilohertz with up to ten kilowatts of power with a half wave tower is 2 meters.

It is evident that the worst case condition rests with Tower-3 operating at night with 6000 watts from KTSA and 500 watts from KZDC for a total of 6500 watts. For this condition, the minimum required distance from tower steel to a fence for powers of ten kilowatts is 2 meters. The total operating power of this tower is approximately 65 percent of ten kilowatts and the fence at

this tower and Towers 1 through 4 is 2.13 meters from the nearest tower steel. Further, towers 3, 4 and 5 are also enclosed by a perimeter fence around the entire 25 acre plot of land which has two locked gates to prevent entry of the general public. This fenced area is a Controlled Access area limited to personnel with knowledge of RF Exposure areas. The general public is restricted from the area.

The tower fences have installed on the their faces, bi-lingual signs in English and Spanish warning of high radio frequency fields within the fenced areas. The antenna couplers are enclosed in aluminum housings located within cinderblock buildings with locked access doors for towers 1 through 4 and a locked weatherproof aluminum housing within a secure chain link fence at tower 5.

Tower registration signs are located at eye level on the doors of the antenna coupler buildings at towers 1 through 4 and attached to the door of the antenna coupler at tower 5.

It is the opinion of the undersigned that the KTSA/KZDC Transmitter Plant is in full compliance with the RFR requirements outlined in OET Bulletin 65, Edition 97-01 and the Rules of the Commission.

SECTION-8 FIELD REFERENCE POINT MEASUREMENTS RADIO STATION KZDC 1250 KHz NIGHTTIME SITE							
Radial	GPS #	Distance (km)	Field (mV/m)	Time & Date	Coordinates (NAD-27)		Description
15°	1	3.25	37.0	1150 10/31/12	29-31-30.5	98-24-25.3	Driveway 4319 Summer Sun Ln
	2	4.5	28.5	1206 10/31/12	29-32-09.6	98-24-12.1	NW end Clinton Heights St @ intersection with Buzzi Way
	3	5.93	20.7	1220 10/31/12	29-32-54.6	98-23-58.8	N side 11900 block Alamo Blanco St at middle of wood fence
	4	7.57	16.1	1019 10/31/12	29-33-45.9	98-23-42.9	4906 Teasdale@ mailbox
	5	8.06	13.8	0915 10/31/12	29-34-01.3	98-23-37.7	Calvary Church @ mailbox 13875 Higgins
69°	1	3.65	11.4	0950 11/2/12	29-30-30.8	98-22-50.1	Northeast corner sidewalk around SACU
	2	4.46	15.8	1021 11/2/12	29-30-39.6	98-22-21.6	West side of Episcopal Church(in 5700 block of Montgomery Rd, on brick memorial Labyrinth (patio)
	3	5.43	9.4	1159 11/2/12	29-30-51.3	98-21-48.5	8508 (number on fence) Northmont St
	4	6.48	10.1	1145 11/2/12	29-31-03.6	98-21-12.0	Brown mailbox front of 6730 Glen Fair Dr
	5	7.67	6.0	1131 11/2/12	29-31-17.6	98-20-30.8	Electric transformer in curve on E side of BentbridgeDr
104°	1	3.27	10.0	1408 11/2/12	29-29-22.2	98-22-55.7	4832 Castle Lance on sidewalk
	2	4.29	11.9	1338 11/2/12	29-29-15.0	98-22-22.6	5855 Castle Lake Dr driveway
	3	5.62	6.4	1431 11/2/12	29-29-03.8	98-21-34.7	East side Woodlake Center Rd 50 yds S of Railway D (no visual reference so use GPS)
	4	6.46	6.0	1313 11/2/12	29-28-57.8	98-21-04.6	6200 block of Wood Glen Dr at TARGET sign

Radial	GPS #	Distance (km)	Field (mV/m)	Time & Date	Coordinates (NAD-27)	Description	Radial
147.5°	1	4.32	125	1457 11/1/12	29-27-47.6	98-23-27.8	SE corner Diadem Dr&KazenDr
	2	4.85	132	1507 11/1/12	29-27-33.1	98-23-17.1	5215 Happiness Ln mailbox
	3	5.69	96	1538 11/1/12	29-27-09.3	98-23-00.1	5418 Boaatman Rd mailbox
	4	6.74	87	1555 11/1/12	29-26-40.5	98-22-37.2	fence around big property N side of 5700 block of Bicentennial Dr
193.2°	1	4.61	96	1419 11/1/12	29-27-19.3	98-25-36.0	In apt complex S off Binz-Englemn and W between garages to end of driveway, few steps west of driveway into clear
	2	5.18	36	1400 11/1/12	29-27-00.2	98-25-41.7	1802 Shipman front of loading dock #10
	3	5.85	35	1355 11/1/12	29-26-39.1	98-25-48.5	N side of Copeland Dr. at locked gate to large lot("Perros" sign on gate)
	4	6.37	25	1317 11/1/12	29-26-22.1	98-25-51.6	3402 Chateau pink mailbox
	5	7.88	26	1307 11/1/12	29-25-33.3	98-26-05.0	1371 parking space AT&T Center
234°	1	3.20	75	1139 11/1/12	29-28-45.9	98-26-35.0	In driveway of 804 Ivy Ln
	2	3.81	64	1131 11/1/12	29-28-34.2	98-26-54.4	W side 200 block of Valley View Ave opp metal gate
	3	4.81	37	1120 11/1/12	29-28-14.4	98-27-25.1	W side of 100 block of Cross Ln front of new apt bldgs Under construction
	4	5.61	60.5	1052 11/1/12	29-27-58.8	98-27-49.8	Guard house(southmost driveway to W off Broadway St into Incarnate Word University)
313°	1	3.28	130	1548 1031/12	29-31-03.8	98-26-28.5	2903 Chisholm Trail mailbox
	2	3.61	130	1556 10/31/12	29-31-11.0	98-26-38.1	Mailbox 2803 Old Moss Rd
	3	4.98	71	1500 10/31/12	29-31-42.5	98-27-15.4	Inside side rear entrance to northeast off Chipley Circle into Focus Co parking lot, just inside lot and slight to right
	4	7.66	64	1444 10/31/12	29-32-42.4	98-28-31.4	11503 Jones Maltsberger Rd pkg lot

Measurements made by Dick S. Pickens of Microcom, Inc. on the dates indicated using Potomac Instruments model FIM-41 Field Intensity Meter, S/N: 2000, recently compared with FIM-4100 calibrated in 2010 and found to be within manufacturer's specifications.

SECTION-9

CONSTRUCTION PERMIT CONDITIONS

RADIO STATION KZDC

NIGHTTIME SITE

COND NO.	SUBJECT MATTER
1	Coordination with other users: The site is that of co-owned station KTSA. As the stations are co-owned, the technical personnel serve both stations and are, thus, in compliance with this condition.
2	DA Proof of Performance: The attached report complies with this condition.
3	Type accepted main and alternate transmitters have been installed. Both are Nautel J-1000, 1 KW AM transmitters.
4	The instant Form 302-AM application, which is timely filed, complies with this condition.
5	This condition pertains to the installation and maintenance of the combining filters used in the antenna couplers and filters and traps used in the phasing equipment of each station and the responsibility for maintenance of proper adjustment. The stations are co-owned and the same technical personnel are responsible for proper maintenance of the combining filters. Field observations of Harmonics and Spurious Emissions have been made on both stations and the reports appear as exhibits in each of the Form 302 applications. The required Antenna and Common Point impedance measurements of both stations are included in the respective Form 302 applications.
6	The ground systems for all five towers and the associated transmitter buildings are installed in accordance with the terms of the construction permit and station license in the case of Station KTSA. A new ground system was installed for each of the five towers which replaced all of the old KTSA ground system with the exception of the portion of the system which is buried beneath Eisenhauer Road. The conductor which joins the underground cables crossing the road was intercepted across the northern periphery of Eisenhauer Road and

bonded to the north plat ground system radials of physical tower-3, the ground systems of the transmitter building for Station KZDC and physical tower-5.

The conductor which joins the underground cables crossing the road was intercepted across the southern periphery of Eisenhauer Road and bonded to the south plat ground system of physical tower-2, which is also bonded to the ground system of physical tower-1 (South) and the KTSA transmitter building ground system.

Each tower ground system consists of 120 number 10 soft drawn copper wire radials, each 122 meters in length plus120 number 10 soft drawn copper wire radials, each 19 meters in length interspersed at 1.5 degree intervals about the base of each tower. Where the radials intersect those of another tower or a transmitter building, they are bonded to a two inch wide copper strap at the interface. Where they intersect a building, the building ground system is bonded to the copper strap at appropriate intervals.

7 This condition apparently applies to the daytime ground system for Station KTSA; As such it is not applicable for the simple reason that all towers share a common ground system as described in paragraph-6.

8 RF Warning signs are installed on all Antenna Coupler Buildings and on tower fences on accordance with the applicable Rules and policies.

9 This condition requires operation of Station KTSA under terms of an STA during construction. The existing STA has been in effect since construction was started.

The condition also requires a non-directional Proof of Performance following completion of construction of the new facilities. Since both Station KZDC and Station KTSA have been adjusted in accordance with the terms of Section 73.151(c), the "Method of Moments" provision of the Rules, we feel it is inappropriate to be required to make a separate magnetic measurement proof of performance for the KTSA daytime Non-Directional operation.

We respectfully request that the attached Method of Moments model, Exhibit C-9, of the KTSA/KZDC array which uses the measured non-directional termination impedances at 550 kHz present at the four unused tower bases be accepted in lieu of the field measurements.

10 This condition applies to Station KLUP, facility ID: 71087, a station located approximately 1.6 kilometers north-northeast of the KTSA/KZDC site using a two element directional nighttime array operating on 930 kHz. Pre-construction field measurements were made during March, 2012 on the KLUP nighttime array in accordance with this condition. Following construction of the new tower (5) for station KZDC and the installation of the antenna coupling equipment, the measurements were repeated. Analysis of the measurements revealed anomalies in the data for the ten degree radial of station KLUP which were unexpected. It was learned following the post construction measurements that the field at the KLUP 10 degree monitor point had been abnormally high prior to the construction of the additional tower at KTSA. The station had been investigating the apparent high monitor point for some time and had located a nearby communications tower which was re-radiating an abnormally high level field at 930 kilohertz. A follow-up visit was made by the undersigned to the KLUP site as a courtesy to assist in locating the source of re-radiation. I accompanied the KLUP Technician to the monitor point and found that the field was below the limit for that location. I then authorized a re-measurement of the monitored radials which took place one week later. At that time in, early September, 2012, the measured fields at the monitor point and along the radial were somewhat lower than the earlier measurements, but were still unacceptably high.

Subsequently, the filter networks in the KTSA/KZDC towers were modified to effectively detune the five towers at the KLUP frequency of 930 kHz. A Method of Moments model, Exhibit C-10, of the KLUP array and the KTSA towers using the measured reflected load reactances of the each of the five KTSA/KZDC towers at the 930 kHz channel has been developed. The study demonstrates that the KTSA/KZDC, array when operating in the nighttime mode, does not cause excessive radiated fields to be radiated by the KLUP nighttime array. It is the opinion of the undersigned that a Method of Moments model based on measured load reactances at 930 kHz across the bases of the towers in the KTSA/KZDC array is a more repeatable method of determining compliance with this condition than magnetic field measurements in the "forest of communications towers" which surround the KLUP transmitter site.

We respectfully request that the Method of Moments study attached hereto be accepted in lieu of field measurements specified in Condition 10.

EXHIBIT C-9

METHOD OF MOMENTS STUDY DEMONSTRATING COMPLIANCE WITH CONDITION-9 ON KZDC CONSTRUCTION PERMIT

****

ACSModel

(MININEC 3.1 Core)

01-08-2013 08:54:28

****

KTSA
DAYTIME SYMMETERY STUDY, TOWER-1 DRIVEN-LOSSLESS CASE
UNUSED TWRS TERMINATED IN MEASURED LOADS

Frequency = 0.550 MHz Wavelength = 545.09090 Meters

No. of Wires: 5

Wire No. 1	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
0	0	0		-1	
0	0	121.8884	0.3466	0	20

Wire No. 2	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
129.7403	-27.57715	0		-2	
129.7403	-27.57715	121.8884	0.3466	0	20

Wire No. 3	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
231.3532	-112.8385	0		-3	
231.3532	-112.8385	121.8884	0.3466	0	20

Wire No. 4	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
361.2464	-140.1182	0		-4	
361.2464	-140.1182	121.8884	0.3466	0	20

Wire No. 5	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
313.4555	-3.282618	0		-5	
313.4555	-3.282618	121.8884	0.3466	0	20

**** ANTENNA GEOMETRY ****

Wire No. 1 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
0	0	0	0.3466	-1	1	1
0	0	6.094419	0.3466	1	1	2
0	0	12.18884	0.3466	1	1	3
0	0	18.28326	0.3466	1	1	4
0	0	24.37768	0.3466	1	1	5
0	0	30.4721	0.3466	1	1	6
0	0	36.56652	0.3466	1	1	7
0	0	42.66093	0.3466	1	1	8
0	0	48.75535	0.3466	1	1	9
0	0	54.84977	0.3466	1	1	10
0	0	60.94419	0.3466	1	1	11
0	0	67.03861	0.3466	1	1	12
0	0	73.13303	0.3466	1	1	13
0	0	79.22745	0.3466	1	1	14
0	0	85.32187	0.3466	1	1	15
0	0	91.41628	0.3466	1	1	16
0	0	97.5107	0.3466	1	1	17
0	0	103.6051	0.3466	1	1	18
0	0	109.6995	0.3466	1	1	19
0	0	115.794	0.3466	1	0	20

Wire No. 2 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
129.7403	-27.57715	0	0.3466	-2	2	21
129.7403	-27.57715	6.094419	0.3466	2	2	22
129.7403	-27.57715	12.18884	0.3466	2	2	23
129.7403	-27.57715	18.28326	0.3466	2	2	24
129.7403	-27.57715	24.37768	0.3466	2	2	25
129.7403	-27.57715	30.4721	0.3466	2	2	26
129.7403	-27.57715	36.56652	0.3466	2	2	27
129.7403	-27.57715	42.66093	0.3466	2	2	28
129.7403	-27.57715	48.75535	0.3466	2	2	29
129.7403	-27.57715	54.84977	0.3466	2	2	30
129.7403	-27.57715	60.94419	0.3466	2	2	31
129.7403	-27.57715	67.03861	0.3466	2	2	32
129.7403	-27.57715	73.13303	0.3466	2	2	33
129.7403	-27.57715	79.22745	0.3466	2	2	34
129.7403	-27.57715	85.32187	0.3466	2	2	35
129.7403	-27.57715	91.41628	0.3466	2	2	36
129.7403	-27.57715	97.5107	0.3466	2	2	37
129.7403	-27.57715	103.6051	0.3466	2	2	38
129.7403	-27.57715	109.6995	0.3466	2	2	39
129.7403	-27.57715	115.794	0.3466	2	0	40

Wire No. 3 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
231.3532	-112.8385	0	0.3466	-3	3	41
231.3532	-112.8385	6.094419	0.3466	3	3	42
231.3532	-112.8385	12.18884	0.3466	3	3	43
231.3532	-112.8385	18.28326	0.3466	3	3	44
231.3532	-112.8385	24.37768	0.3466	3	3	45
231.3532	-112.8385	30.4721	0.3466	3	3	46
231.3532	-112.8385	36.56652	0.3466	3	3	47
231.3532	-112.8385	42.66093	0.3466	3	3	48
231.3532	-112.8385	48.75535	0.3466	3	3	49
231.3532	-112.8385	54.84977	0.3466	3	3	50
231.3532	-112.8385	60.94419	0.3466	3	3	51
231.3532	-112.8385	67.03861	0.3466	3	3	52
231.3532	-112.8385	73.13303	0.3466	3	3	53
231.3532	-112.8385	79.22745	0.3466	3	3	54
231.3532	-112.8385	85.32187	0.3466	3	3	55
231.3532	-112.8385	91.41628	0.3466	3	3	56
231.3532	-112.8385	97.5107	0.3466	3	3	57
231.3532	-112.8385	103.6051	0.3466	3	3	58
231.3532	-112.8385	109.6995	0.3466	3	3	59
231.3532	-112.8385	115.794	0.3466	3	0	60

Wire No. 4 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
361.2464	-140.1182	0	0.3466	-4	4	61
361.2464	-140.1182	6.094419	0.3466	4	4	62
361.2464	-140.1182	12.18884	0.3466	4	4	63
361.2464	-140.1182	18.28326	0.3466	4	4	64
361.2464	-140.1182	24.37768	0.3466	4	4	65
361.2464	-140.1182	30.4721	0.3466	4	4	66
361.2464	-140.1182	36.56652	0.3466	4	4	67
361.2464	-140.1182	42.66093	0.3466	4	4	68
361.2464	-140.1182	48.75535	0.3466	4	4	69
361.2464	-140.1182	54.84977	0.3466	4	4	70
361.2464	-140.1182	60.94419	0.3466	4	4	71
361.2464	-140.1182	67.03861	0.3466	4	4	72
361.2464	-140.1182	73.13303	0.3466	4	4	73
361.2464	-140.1182	79.22745	0.3466	4	4	74
361.2464	-140.1182	85.32187	0.3466	4	4	75
361.2464	-140.1182	91.41628	0.3466	4	4	76
361.2464	-140.1182	97.5107	0.3466	4	4	77
361.2464	-140.1182	103.6051	0.3466	4	4	78
361.2464	-140.1182	109.6995	0.3466	4	4	79
361.2464	-140.1182	115.794	0.3466	4	0	80

Wire No. 5 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
313.4555	-3.282618	0	0.3466	-5	5	81
313.4555	-3.282618	6.094419	0.3466	5	5	82
313.4555	-3.282618	12.18884	0.3466	5	5	83
313.4555	-3.282618	18.28326	0.3466	5	5	84
313.4555	-3.282618	24.37768	0.3466	5	5	85
313.4555	-3.282618	30.4721	0.3466	5	5	86
313.4555	-3.282618	36.56652	0.3466	5	5	87
313.4555	-3.282618	42.66093	0.3466	5	5	88
313.4555	-3.282618	48.75535	0.3466	5	5	89
313.4555	-3.282618	54.84977	0.3466	5	5	90
313.4555	-3.282618	60.94419	0.3466	5	5	91
313.4555	-3.282618	67.03861	0.3466	5	5	92
313.4555	-3.282618	73.13303	0.3466	5	5	93
313.4555	-3.282618	79.22745	0.3466	5	5	94
313.4555	-3.282618	85.32187	0.3466	5	5	95
313.4555	-3.282618	91.41628	0.3466	5	5	96
313.4555	-3.282618	97.5107	0.3466	5	5	97
313.4555	-3.282618	103.6051	0.3466	5	5	98
313.4555	-3.282618	109.6995	0.3466	5	5	99
313.4555	-3.282618	115.794	0.3466	5	0	100

Sources: 1
Pulse No., Voltage Magnitude, Phase (Degrees): 1, 799.5, -45.0

Number of Loads: 4
Pulse No., Resistance, Reactance: 21 , 0 , 490
Pulse No., Resistance, Reactance: 41 , 0 , 525
Pulse No., Resistance, Reactance: 61 , 0 , 495
Pulse No., Resistance, Reactance: 81 , 0 , 575

********** SOURCE DATA **********
Pulse 1 Voltage = (565.3481, -565.3481j)
Current = (18.5235, 0.8353j)
Impedance = (29.085, -31.832j)
Power = 4999.99 Watts

********** FAR FIELD **********

Zenith Angle : Initial, Increment, Number: 90.0, 0.0, 1
Azimuth Angle: Initial, Increment, Number: 0.0, 5.0, 72

********** PATTERN DATA **********
Radial Distance = 1000 Meters
Power Level = 4999.989 Watts

Elev. Angle	Azimuth Angle	RMS E(Theta) Mag(mV/m)	Phase (Deg)
0.0	0.0	681.3371	90.5
0.0	5.0	682.0309	90.6
0.0	10.0	683.0119	90.6
0.0	15.0	684.3167	90.7
0.0	20.0	685.9591	90.8
0.0	25.0	687.9165	90.9
0.0	30.0	690.1206	90.9
0.0	35.0	692.4552	90.9
0.0	40.0	694.7642	90.8
0.0	45.0	696.8715	90.7
0.0	50.0	698.6101	90.6
0.0	55.0	699.8526	90.5
0.0	60.0	700.5384	90.3
0.0	65.0	700.6862	90.1
0.0	70.0	700.3900	90.0
0.0	75.0	699.7971	89.9
0.0	80.0	699.0757	89.8
0.0	85.0	698.3794	89.8
0.0	90.0	697.8206	89.8
0.0	95.0	697.4572	89.8
0.0	100.0	697.2945	89.8
0.0	105.0	697.2991	89.8
0.0	110.0	697.4176	89.8
0.0	115.0	697.5939	89.8
0.0	120.0	697.7812	89.7
0.0	125.0	697.9484	89.7
0.0	130.0	698.0797	89.7
0.0	135.0	698.1721	89.7
0.0	140.0	698.2308	89.6
0.0	145.0	698.2652	89.6
0.0	150.0	698.2858	89.6
0.0	155.0	698.3016	89.6
0.0	160.0	698.3186	89.6
0.0	165.0	698.3391	89.6
0.0	170.0	698.3605	89.6
0.0	175.0	698.3755	89.6

Elev. Angle	Azimuth Angle	E(Theta) Mag(mV/m)	Phase (Deg)	
0.0	180.0	698.3727	89.6	
0.0	185.0	698.3381	89.6	
0.0	190.0	698.2593	89.6	
0.0	195.0	698.1301	89.6	
0.0	200.0	697.9570	89.6	
0.0	205.0	697.7648	89.7	
0.0	210.0	697.6001	89.7	
0.0	215.0	697.5281	89.7	
0.0	220.0	697.6235	89.6	
0.0	225.0	697.9523	89.6	
0.0	230.0	698.5499	89.6	
0.0	235.0	699.4000	89.6	
0.0	240.0	700.4219	89.7	
0.0	245.0	701.4739	89.7	
0.0	250.0	702.3727	89.9	
0.0	255.0	702.9269	90.0	
0.0	260.0	**702.9749**	90.2	HIGHEST FIELD
0.0	265.0	702.4185	90.4	
0.0	270.0	701.2407	90.6	
0.0	275.0	699.5075	90.7	
0.0	280.0	697.3509	90.8	
0.0	285.0	694.9423	90.9	
0.0	290.0	692.4612	90.9	
0.0	295.0	690.0684	90.9	
0.0	300.0	687.8876	90.9	
0.0	305.0	685.9969	90.8	
0.0	310.0	684.4304	90.7	
0.0	315.0	683.1857	90.6	
0.0	320.0	682.2353	90.6	
0.0	325.0	681.5385	90.5	
0.0	330.0	681.0516	90.4	
0.0	335.0	680.7360	90.4	
0.0	340.0	680.5650	90.4	
0.0	345.0	**680.5265**	90.4	LOWEST FIELD
0.0	350.0	680.6256	90.4	
0.0	355.0	680.8838	90.4	

WORST CASE PATTERN SYMMETRY DEVIATION

HIGHEST FIELD: 702.9749 mV/m +0.14 dB

LOWEST FIELD: 680.5265 mV/m -0.14 dB

MEDIAN FIELD: 691.6596 mV/m

EXHIBIT C-10

MOM STUDY SHOWING EFFECTS OF KTSA/KZDC TOWERS ON THE NIGHTTIME PATTERN OF STATION KLUP

****

ACSModel

(MININEC 3.1 Core)

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KLUP

RE-RADIATION STUDY

TOWERS TERMINATED WITH MEASURED 930 KHZ LOADS AT ACU OUTPUT J-PLUGS

Frequency = 0.930 MHz Wavelength = 322.36559 Meters

No. of Wires: 7

Wire No. 1	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
0	0	0		-1	
0	0	81.75549	0.25	0	20

Wire No. 2	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
88.18559	15.5495	0		-2	
88.18559	15.5495	81.75549	0.25	0	20

Wire No. 3	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
-2592.938	-1079.336	0		-3	
-2592.938	-1079.336	121.8721	0.3466	0	20

Wire No. 4	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
-2465.216	-1102.745	0		-4	
-2465.216	-1102.745	121.8721	0.3466	0	20

Wire No. 5	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
-2361.617	-1192.939	0		-5	
-2361.617	-1192.939	121.8721	0.3466	0	20

Wire No. 6	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
-2233.433	-1217.707	0		-6	
-2233.433	-1217.707	121.8721	0.3466	0	20

Wire No. 7	Coordinates			End	No. of
X	Y	Z	Radius	Connection	Segments
-2263.808	-1094.368	0		-7	
-2263.808	-1094.368	121.8721	0.3466	0	20

**** ANTENNA GEOMETRY ****

Wire No. 1 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
0	0	0	0.25	-1	1	1
0	0	4.087775	0.25	1	1	2
0	0	8.17555	0.25	1	1	3
0	0	12.26332	0.25	1	1	4
0	0	16.3511	0.25	1	1	5
0	0	20.43887	0.25	1	1	6
0	0	24.52665	0.25	1	1	7
0	0	28.61442	0.25	1	1	8
0	0	32.7022	0.25	1	1	9
0	0	36.78997	0.25	1	1	10
0	0	40.87775	0.25	1	1	11
0	0	44.96552	0.25	1	1	12
0	0	49.0533	0.25	1	1	13
0	0	53.14107	0.25	1	1	14
0	0	57.22884	0.25	1	1	15
0	0	61.31662	0.25	1	1	16
0	0	65.4044	0.25	1	1	17
0	0	69.49217	0.25	1	1	18
0	0	73.57994	0.25	1	1	19
0	0	77.66772	0.25	1	0	20

Wire No. 2 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
88.18559	15.5495	0	0.25	-2	2	21
88.18559	15.5495	4.087775	0.25	2	2	22
88.18559	15.5495	8.17555	0.25	2	2	23
88.18559	15.5495	12.26332	0.25	2	2	24
88.18559	15.5495	16.3511	0.25	2	2	25
88.18559	15.5495	20.43887	0.25	2	2	26
88.18559	15.5495	24.52665	0.25	2	2	27
88.18559	15.5495	28.61442	0.25	2	2	28
88.18559	15.5495	32.7022	0.25	2	2	29
88.18559	15.5495	36.78997	0.25	2	2	30
88.18559	15.5495	40.87775	0.25	2	2	31
88.18559	15.5495	44.96552	0.25	2	2	32
88.18559	15.5495	49.0533	0.25	2	2	33
88.18559	15.5495	53.14107	0.25	2	2	34
88.18559	15.5495	57.22884	0.25	2	2	35
88.18559	15.5495	61.31662	0.25	2	2	36
88.18559	15.5495	65.4044	0.25	2	2	37
88.18559	15.5495	69.49217	0.25	2	2	38
88.18559	15.5495	73.57994	0.25	2	2	39
88.18559	15.5495	77.66772	0.25	2	0	40

Wire No. 3 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
-2592.938	-1079.336	0	0.3466	-3	3	41
-2592.938	-1079.336	6.093605	0.3466	3	3	42
-2592.938	-1079.336	12.18721	0.3466	3	3	43
-2592.938	-1079.336	18.28082	0.3466	3	3	44
-2592.938	-1079.336	24.37442	0.3466	3	3	45
-2592.938	-1079.336	30.46802	0.3466	3	3	46
-2592.938	-1079.336	36.56163	0.3466	3	3	47
-2592.938	-1079.336	42.65524	0.3466	3	3	48
-2592.938	-1079.336	48.74884	0.3466	3	3	49
-2592.938	-1079.336	54.84245	0.3466	3	3	50
-2592.938	-1079.336	60.93605	0.3466	3	3	51
-2592.938	-1079.336	67.02966	0.3466	3	3	52
-2592.938	-1079.336	73.12326	0.3466	3	3	53
-2592.938	-1079.336	79.21687	0.3466	3	3	54
-2592.938	-1079.336	85.31047	0.3466	3	3	55
-2592.938	-1079.336	91.40408	0.3466	3	3	56
-2592.938	-1079.336	97.49768	0.3466	3	3	57
-2592.938	-1079.336	103.5913	0.3466	3	3	58
-2592.938	-1079.336	109.6849	0.3466	3	3	59
-2592.938	-1079.336	115.7785	0.3466	3	0	60

Wire No. 4 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
-2465.216	-1102.745	0	0.3466	-4	4	61
-2465.216	-1102.745	6.093605	0.3466	4	4	62
-2465.216	-1102.745	12.18721	0.3466	4	4	63
-2465.216	-1102.745	18.28082	0.3466	4	4	64
-2465.216	-1102.745	24.37442	0.3466	4	4	65
-2465.216	-1102.745	30.46802	0.3466	4	4	66
-2465.216	-1102.745	36.56163	0.3466	4	4	67
-2465.216	-1102.745	42.65524	0.3466	4	4	68
-2465.216	-1102.745	48.74884	0.3466	4	4	69
-2465.216	-1102.745	54.84245	0.3466	4	4	70
-2465.216	-1102.745	60.93605	0.3466	4	4	71
-2465.216	-1102.745	67.02966	0.3466	4	4	72
-2465.216	-1102.745	73.12326	0.3466	4	4	73
-2465.216	-1102.745	79.21687	0.3466	4	4	74
-2465.216	-1102.745	85.31047	0.3466	4	4	75
-2465.216	-1102.745	91.40408	0.3466	4	4	76
-2465.216	-1102.745	97.49768	0.3466	4	4	77
-2465.216	-1102.745	103.5913	0.3466	4	4	78
-2465.216	-1102.745	109.6849	0.3466	4	4	79
-2465.216	-1102.745	115.7785	0.3466	4	0	80

Wire No. 5 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
-2361.617	-1192.939	0	0.3466	-5	5	81
-2361.617	-1192.939	6.093605	0.3466	5	5	82
-2361.617	-1192.939	12.18721	0.3466	5	5	83
-2361.617	-1192.939	18.28082	0.3466	5	5	84
-2361.617	-1192.939	24.37442	0.3466	5	5	85
-2361.617	-1192.939	30.46802	0.3466	5	5	86
-2361.617	-1192.939	36.56163	0.3466	5	5	87
-2361.617	-1192.939	42.65524	0.3466	5	5	88
-2361.617	-1192.939	48.74884	0.3466	5	5	89
-2361.617	-1192.939	54.84245	0.3466	5	5	90
-2361.617	-1192.939	60.93605	0.3466	5	5	91
-2361.617	-1192.939	67.02966	0.3466	5	5	92
-2361.617	-1192.939	73.12326	0.3466	5	5	93
-2361.617	-1192.939	79.21687	0.3466	5	5	94
-2361.617	-1192.939	85.31047	0.3466	5	5	95
-2361.617	-1192.939	91.40408	0.3466	5	5	96
-2361.617	-1192.939	97.49768	0.3466	5	5	97
-2361.617	-1192.939	103.5913	0.3466	5	5	98
-2361.617	-1192.939	109.6849	0.3466	5	5	99
-2361.617	-1192.939	115.7785	0.3466	5	0	100

Wire No. 6 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
-2233.433	-1217.707	0	0.3466	-6	6	101
-2233.433	-1217.707	6.093605	0.3466	6	6	102
-2233.433	-1217.707	12.18721	0.3466	6	6	103
-2233.433	-1217.707	18.28082	0.3466	6	6	104
-2233.433	-1217.707	24.37442	0.3466	6	6	105
-2233.433	-1217.707	30.46802	0.3466	6	6	106
-2233.433	-1217.707	36.56163	0.3466	6	6	107
-2233.433	-1217.707	42.65524	0.3466	6	6	108
-2233.433	-1217.707	48.74884	0.3466	6	6	109
-2233.433	-1217.707	54.84245	0.3466	6	6	110
-2233.433	-1217.707	60.93605	0.3466	6	6	111
-2233.433	-1217.707	67.02966	0.3466	6	6	112
-2233.433	-1217.707	73.12326	0.3466	6	6	113
-2233.433	-1217.707	79.21687	0.3466	6	6	114
-2233.433	-1217.707	85.31047	0.3466	6	6	115
-2233.433	-1217.707	91.40408	0.3466	6	6	116
-2233.433	-1217.707	97.49768	0.3466	6	6	117
-2233.433	-1217.707	103.5913	0.3466	6	6	118
-2233.433	-1217.707	109.6849	0.3466	6	6	119
-2233.433	-1217.707	115.7785	0.3466	6	0	120

Wire No. 7 Coordinates				Connection		Pulse
X	Y	Z	Radius	End1	End2	No.
-2263.808	-1094.368	0	0.3466	-7	7	121
-2263.808	-1094.368	6.093605	0.3466	7	7	122
-2263.808	-1094.368	12.18721	0.3466	7	7	123
-2263.808	-1094.368	18.28082	0.3466	7	7	124
-2263.808	-1094.368	24.37442	0.3466	7	7	125
-2263.808	-1094.368	30.46802	0.3466	7	7	126
-2263.808	-1094.368	36.56163	0.3466	7	7	127
-2263.808	-1094.368	42.65524	0.3466	7	7	128
-2263.808	-1094.368	48.74884	0.3466	7	7	129
-2263.808	-1094.368	54.84245	0.3466	7	7	130
-2263.808	-1094.368	60.93605	0.3466	7	7	131
-2263.808	-1094.368	67.02966	0.3466	7	7	132
-2263.808	-1094.368	73.12326	0.3466	7	7	133
-2263.808	-1094.368	79.21687	0.3466	7	7	134
-2263.808	-1094.368	85.31047	0.3466	7	7	135
-2263.808	-1094.368	91.40408	0.3466	7	7	136
-2263.808	-1094.368	97.49768	0.3466	7	7	137
-2263.808	-1094.368	103.5913	0.3466	7	7	138
-2263.808	-1094.368	109.6849	0.3466	7	7	139
-2263.808	-1094.368	115.7785	0.3466	7	0	140

Sources: 2
Pulse No., Voltage Magnitude, Phase (Degrees): 1, 369.4, 37.6
Pulse No., Voltage Magnitude, Phase (Degrees): 21, 115.8, 95.6

Number of Loads: 5
Pulse No., Resistance, Reactance: 41 , 0 , **309.9 ADJUSTED LOADS**
Pulse No., Resistance, Reactance: 61 , 0 , **310.8 AT KTSA/KZDC**
Pulse No., Resistance, Reactance: 81 , 0 , **306.9 TOWER BASES, AT**
Pulse No., Resistance, Reactance: 101 , 0 , **310.4 930 KHZ**
Pulse No., Resistance, Reactance: 121 , 0 , **305.9**

********** SOURCE DATA **********
Pulse 1 Voltage = (292.5754, 225.4502j)
Current = (4.6684, 0.5457j)
Impedance = (67.395, 40.414j)
Power = 744.45 Watts

Pulse 21 Voltage = (-11.3267, 115.2717j)
Current = (0.5744, 4.4903j)
Impedance = (24.94, 5.713j)
Power = 255.55 Watts

Total Power = 1000.000 Watts

********** FAR FIELD **********

Zenith Angle : Initial, Increment, Number: 90.0, 0.0, 1
Azimuth Angle: Initial, Increment, Number: 0.0, 5.0, 72

********** PATTERN DATA **********

Radial Distance = 1000 Meters

Power Level = 1000.000 Watts

Elev. Angle	Azimuth Angle	RMS E(Theta) Mag(mV/m)	Phase(Deg)	LIMIT
0.0	0.0	**23.1449**	102.9	**26.09**
0.0	5.0	**22.3171**	93.5	**25.47**
0.0	10.0	**22.4757**	90.6	**25.43**
0.0	15.0	**22.7201**	93.7	**25.47**
0.0	20.0	**23.3951**	103.2	**26.09**
0.0	25.0	**25.9650**	117.5	**28.59**
0.0	30.0	**31.8908**	131.7	**34.37**
0.0	35.0	**41.6180**	142.5	**43.99**
0.0	40.0	**54.7696**	149.2	**57.33**
0.0	45.0	**70.7748**	152.8	**73.60**
0.0	50.0	**89.2925**	154.1	**92.66**
0.0	55.0	110.2095	153.9	
0.0	60.0	132.8867	152.9	
0.0	65.0	156.6888	151.0	
0.0	70.0	181.8620	148.6	
0.0	75.0	207.1676	145.7	
0.0	80.0	232.9574	142.5	
0.0	85.0	258.1922	138.9	
0.0	90.0	282.5572	135.3	
0.0	95.0	306.0192	131.4	
0.0	100.0	327.7787	127.5	
0.0	105.0	347.4889	123.5	
0.0	110.0	365.1923	119.5	
0.0	115.0	380.7808	115.5	
0.0	120.0	393.8959	111.6	
0.0	125.0	404.3813	107.8	
0.0	130.0	412.7338	104.2	
0.0	135.0	419.2247	100.7	
0.0	140.0	423.3492	97.4	
0.0	145.0	425.8287	94.4	
0.0	150.0	427.3735	91.6	
0.0	155.0	427.1148	89.1	
0.0	160.0	426.8403	86.9	
0.0	165.0	425.3321	85.0	
0.0	170.0	424.4425	83.4	
0.0	175.0	422.6903	82.2	
0.0	180.0	421.8315	81.2	
0.0	185.0	421.4172	80.7	
0.0	190.0	420.8861	80.6	
0.0	195.0	420.8608	80.7	
0.0	200.0	421.5087	81.2	
0.0	205.0	422.5908	82.1	
0.0	210.0	423.8739	83.4	
0.0	215.0	425.2265	85.0	
0.0	220.0	426.5734	86.9	
0.0	225.0	427.5482	89.1	
0.0	230.0	427.2839	91.6	
0.0	235.0	425.7586	94.4	
0.0	240.0	423.4664	97.5	

Elev. Angle	Azimuth Angle	E(Theta) Mag(mV/m)	Phase(Deg)	LIMIT
0.0	245.0	419.0655	100.7	
0.0	250.0	412.8006	104.2	
0.0	255.0	404.5201	107.8	
0.0	260.0	393.7475	111.6	
0.0	265.0	380.6800	115.5	
0.0	270.0	365.4150	119.5	
0.0	275.0	347.4304	123.5	
0.0	280.0	327.6773	127.4	
0.0	285.0	306.0780	131.4	
0.0	290.0	282.6237	135.3	
0.0	295.0	258.1163	138.9	
0.0	300.0	232.9343	142.4	
0.0	305.0	207.2545	145.7	
0.0	310.0	181.7554	148.5	
0.0	315.0	156.8330	151.0	
0.0	320.0	132.7269	152.9	
0.0	325.0	110.2814	153.9	
0.0	330.0	**89.3764**	154.1	92.66
0.0	335.0	**70.7200**	152.6	73.60
0.0	340.0	**54.6534**	149.3	57.23
0.0	345.0	**41.4839**	142.4	43.99
0.0	350.0	**31.6602**	132.3	34.37
0.0	355.0	**26.0133**	117.8	28.59

The KTSA/KZDC Nighttime directive array has no significant effect on the nighttime pattern of station KLUP when adjusted as described in this exhibit.