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MEMBER, DISTRICT OF COLUMBIA BAR ONLY;
PRACTICE LIMITED TO FEDERAL COURTS AND AGENCIES

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October 10, 2014

Honorable Marlene H. Dortch
Office of the Secretary
Federal Communications Commission
Washington, DC 20554

Attention: Audio Division, Media Bureau

RE: KCEO(AM), Vista, California
FCC Facility ID # 67666
Form 302-AM Application for License
to Cover File No. BP-20130520ADO

Dear Madame Secretary:

On behalf of our client IHR Educational Broadcasting, licensee of non-commercial educational AM Broadcast Station KCEO, Vista, California, there is transmitted herewith in triplicate an application on FCC Form 302-AM for a license to cover the changes to the facilities of station KCEO constructed pursuant to a construction permit, File No. BP-20130520ADO, granted January 14, 2014.

Pursuant to Section 73.1620(a)(4) of the FCC's Rules, IHR Educational Broadcasting hereby respectfully requests program test authority to operate the increased KCEO facilities.

As KCEO is a non-commercial educational station, this application is non-feeable pursuant to Section 1.1116(c) of the FCC's Rules.

Should additional information be desired in connection with the above matter, kindly communicate with this office.

Very truly yours,

Dennis J. Kelly

Accepted/Files

Federal Communications Commission
Washington, D. C. 20554

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

FOR FCC USE ONLY

OCT 10 2014

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. BMML-20141010ADV

SECTION I - APPLICANT FEE INFORMATION

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

IHR EDUCATIONAL BROADCASTING FRN: 0008-0922-72

MAILING ADDRESS (Line 1) (Maximum 35 characters)
3256 Penryn Road, Suite 100

MAILING ADDRESS (Line 2) (Maximum 35 characters)

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
Loomis	CA	95650-8052

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
916-535-0500	KCEO	67666

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: 0008092272

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 IHR Educational Broadcasting		
MAILING ADDRESS 3256 Penryn Road, Suite 100		
CITY Loomis	STATE CA	ZIP CODE 95650-8052

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
KCEO	Vista, California	BP-20130520ADO	n/a	January 14, 2017

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

PROGRAM TEST AUTHORITY REQUESTED

If No, explain in an Exhibit.

☐ Yes ☑ No

Exhibit No. E

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

If No, state exceptions in an Exhibit.

☑ Yes ☐ No

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?

If Yes, explain in an Exhibit.

☐ Yes ☑ No

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)?

If No, explain in an Exhibit.

☐ Yes ☐ No

☑ Does not apply

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?

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.

☐ Yes ☑ No

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	
Douglas M. Sherman		
Title	Date	Telephone Number
President	10/09/2014	916-535-0500

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
IHR Educational Broadcasting

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
KCEO	BP-20130520ADO	1000	Unlimited	0.9	10.0

2. Station location	
State	City or Town
California	Vista

3. Transmitter location			
State	County	City or Town	Street address (or other identification)
CA	San Diego	Oceanside	2766 North Santa Fe Avenue

4. Main studio location			
State	County	City or Town	Street address (or other identification)
CA	Placer	Loomis	3256 Penryn Rd, Suite 100

5. Remote control point location (specify only if authorized directional antenna)			
State	County	City or Town	Street address (or other identification)
CA	Placer	Loomis	3256 Penryn Rd, Suite 100

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. EE

8. Operating constants:	
RF common point or antenna current (in amperes) without modulation for night system: 4.41	RF common point or antenna current (in amperes) without modulation for day system: 14.51
Measured antenna or common point resistance (in ohms) at operating frequency — Night: 50 — Day: 50	Measured antenna or common point reactance (in ohms) at operating frequency — Night: 0 — Day: 0

Antenna indications for directional operation

Towers	Antenna monitor Phase reading(s) in degrees		Antenna monitor sample current ratio(s)		Antenna base currents	
	Night	Day	Night	Day	Night	Day
1 (S) ASRN 1046152	-146.0°	+132.7°	88.4%	32.4%		
2 (C) ASRN 1046150	0°	+111.9°	100.0%	51.0%		
3 (N) ASRN 1046151	+128.8°	+51.0°	48.3%	50.4%		
4 (W) ASRN 1046153	-108.1°	0°	40.5%	100.0%		

Manufacturer and type of antenna monitor: Potomac Instruments AM-19 (204) s/n 1570

SECTION III - Page 2

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

Type Radiator	Overall height in meters of radiator above base insulator, or above base, if grounded.	Overall height in meters above ground (without obstruction lighting)	Overall height in meters above ground (include obstruction lighting)	If antenna is either top loaded or sectionalized, describe fully in an Exhibit.
Vertical uniform cross section insulated guyed towers	76.2	1: 77.1 2: 76.5 3: 77.9 4: 77.7	1: 78.0 2: 77.4 3: 78.6 4: 78.0	Exhibit No. n/a

Excitation ☑ Series ☐ Shunt **This is a method of moments antenna proof.**

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

North Latitude	West Longitude
33 ° 13 ' 58 "	117 ° 16 ' 11 "

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. n/a

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

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

Tower 4 ground system radials shortened slightly at west property line.

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

Reconfiguration of phasing system to implement construction permit.

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 (che
Mark A. Mueller	Mark A. Mueller
Address (include ZIP Code) Mueller Broadcast Design 613 S. La Grange Rd. La Grange, IL 60525	Date October 9, 2014 Telephone No. (Include Area Code) (708) 352-2166 mark@muellerbroadcastdesign.com

☐ Technical Director

☐ Chief Operator

☐ Other (specify)

☐ Registered Professional Engineer

☑ Technical Consultant

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Engineering Report For
IHR Educational Broadcasting
K C E O (A M)
Vista, California
October 2014

This engineering report documents the Directional Antenna Performance Verification measurements for KCEO (AM), FCC facility ID number 67666, Vista, California. KCEO is authorized to operate on 1000 KHz with 10 KW using a four tower directional antenna daytime and 0.9 KW nighttime using the same four towers with a different pattern. This Verification is for the new daytime facility authorized by BP-20130520ADO and documents the required "model proof" in order to grant the covering license. All measurements were made personally by the writer in accordance with the FCC rules at 47 CFR 73.151(c).

Eligibility for 73.151(c) Processing

The KCEO antenna system consists of four conventional uniform cross-section insulated steel radiators, series-fed with no top loading. They are 91.5° tall at the KCEO frequency (1000 KHz) and are sampled at the base using Delta TCT-3 toroidal current transformers. The ground system is of standard design, consisting of 120 equally-spaced buried bare copper wire radials around each tower 75 meters long (90°) except for those which intersect or where they encounter a property boundary, with 4" copper straps terminating the radial intersections and interconnecting the towers. A 4" strap interconnects the towers to each other and to the phasor and transmitter.

Background

There is no change to the previously licensed KCEO nighttime antenna system and no changes to the towers or ground system were required to implement this daytime power increase. The antenna current sample elements are Delta Electronics TCT-3 current transformers and are located at the input to the series filters. There are no shunt elements between the filter and the

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tower except for the tower lighting choke which presents a very high impedance (more than 10 times the tower impedance) at 1000 KHz. Equal lengths of Andrew 3/8" LDF2-50J Heliax foam coaxial cable are used as sample lines. A Potomac Instruments AM-19 (204) antenna monitor is used to keep tabs on the array. The monitor was recalibrated and checked for proper operation. Prior to tuning the array, the monitor calibration was checked by the writer, with both zero degree and 180 degree phase indications verified as showing 0° and 180° as appropriate using the built-in calibration circuit. Feeding two channels at once from the same source verified that each channel indicated properly (equal ratio and phase) and a 90° delay inserted in each sample line in turn with the same source connected to the reference was used to verify proper mid-scale readings at both +90° and -90°. Finally, the ratio indications were verified using a field intensity meter to read the RF voltage on the sample lines while connected to the monitor, and manual calculations of the ratio confirmed proper operation.

Measurements

The KCEO system was modeled using Westberg Consulting's Phasor Professional 2.1.1 which calculates the tower matrix values as well as the proper operating parameters. The towers and sample lines were measured and documented using an Array Solutions PowerAIM-120 network analyzer serial number 1019 operated in accordance with the manufacturer's instructions. This analyzer has been used in several recent projects and exhibits excellent stability and field performance and since it operates "floating" via battery power and a Bluetooth radio connection to the associated computer no RF ground loop issues arise.

The four KCEO towers are essentially identical and are base sampled using toroidal current transformers. Each tower was disconnected from its ATU at the sample transformer and was measured at that point. The other towers were individually shorted and/or left floating for each measurement as required, plus additional measurements with the subject tower base

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insulator shorted to measure the feedline impedance and electrical length from the ATU to the tower as well as at the tower itself with the ATU disconnected. These measurements are documented below and show good agreement with the Westberg theoretical numbers. Each of the 91.5° electrical height towers is of a uniform-cross-section standard triangular construction with three 12" faces.

The nighttime pattern model data is included herein for reference purposes but is unchanged from the 2012 license filing.

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Theoretical Data:

TOWER MODEL INFORMATION

TOWER INFORMATION						
	Tower Height (°)	Spacing (°)	Orientation	Face Width (in.)	Radius (in.)	Velocity Factor
Tower 1	91.5000	80.0000	190.0000	12.0000 / 12.0000	5.5426 / 5.5426	0.960000
Tower 2	91.5000	0.0000	0.0000	12.0000 / 12.0000	5.5426 / 5.5426	0.935000
Tower 3	91.5000	80.0000	10.0000	12.0000 / 12.0000	5.5426 / 5.5426	0.955000
Tower 4	91.5000	89.0000	281.0000	12.0000 / 12.0000	5.5426 / 5.5426	0.955000

MATRIX INFORMATION [47 CFR 73.151(c)(1)]

MATRIX INFORMATION		
	Impedance (other towers open)	Impedance (measured)
Tower 1	47.79 + j54.05	47.2 + j56.8
Tower 2	49.77 + j67.54	49.2 + j67.7
Tower 3	48.61 + j57.17	48.4 + j54.4
Tower 4	47.33 + j57.87	45.6 + j54.6

The Westberg Phasor Professional method-of-moments model fully complies with all FCC requirements for tower radius, height, segment length, and calculation references points. No shunt capacitance was used. Towers were adjusted by varying the propagation velocity as shown above. The measured impedances agree with the model within +/- 2 ohms +/- 4%. Westberg's Phasor Professional uses a single wire of the desired effective radius divided into segments or no more than 10° electrical length each to model the tower.

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DETUNED TOWER CURRENTS from Westberg Phasor Professional

Tower 1
0.000000 > 0.000000 - 91.50° above ground
0.090995 > -115.891931 - 82.35° above ground
0.143911 > -116.575367 - 73.20° above ground
0.168775 > -117.308825 - 64.05° above ground
0.165109 > -118.137681 - 54.90° above ground
0.132097 > -119.233694 - 45.75° above ground
0.069030 > -121.743035 - 36.60° above ground
0.025572 > 72.617114 - 27.45° above ground
0.151295 > 63.105673 - 18.30° above ground
0.313061 > 61.755207 - 9.15° above ground
0.560419 > 60.961294 - -0.00° above ground

Tower 2
0.000000 > 0.000000 - 91.50° above ground
0.094486 > -114.454782 - 82.35° above ground
0.149709 > -115.221517 - 73.20° above ground
0.175829 > -116.082418 - 64.05° above ground
0.172248 > -117.095063 - 54.90° above ground
0.138036 > -118.479025 - 45.75° above ground
0.072419 > -121.697698 - 36.60° above ground
0.026723 > 76.864061 - 27.45° above ground
0.157733 > 64.499126 - 18.30° above ground
0.326632 > 62.708043 - 9.15° above ground
0.584166 > 61.629246 - -0.00° above ground

Tower 3
0.000000 > 0.000000 - 91.50° above ground
0.064040 > 167.562034 - 82.35° above ground
0.100833 > 168.080879 - 73.20° above ground
0.117667 > 168.613520 - 64.05° above ground
0.114433 > 169.215277 - 54.90° above ground
0.090798 > 170.037023 - 45.75° above ground
0.046496 > 172.023743 - 36.60° above ground
0.019049 > -18.498169 - 27.45° above ground
0.105868 > -11.755675 - 18.30° above ground
0.216754 > -10.695672 - 9.15° above ground
0.385363 > -10.036953 - -0.00° above ground

Tower 4
0.000000 > 0.000000 - 91.50° above ground
0.074511 > -155.160599 - 82.35° above ground
0.117850 > -155.011696 - 73.20° above ground
0.138182 > -154.879364 - 64.05° above ground
0.135115 > -154.747540 - 54.90° above ground
0.107993 > -154.583902 - 45.75° above ground
0.056226 > -154.210340 - 36.60° above ground
0.020744 > 23.625488 - 27.45° above ground
0.123912 > 25.051704 - 18.30° above ground
0.256174 > 25.251303 - 9.15° above ground
0.458099 > 25.368896 - -0.00° above ground

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MATRIX CALCULATIONS from Westberg Phasor Professional

ZMatrix			
47.79 + j54.05	28.39 - j19.41	-8.22 - j23.47	8.61 - j26.46
28.39 - j19.41	49.77 + j67.54	28.61 - j19.66	23.53 - j23.23
-8.22 - j23.47	28.61 - j19.66	48.61 + j57.17	9.65 - j26.66
8.61 - j26.46	23.53 - j23.23	9.65 - j26.66	47.33 + j57.87

YMatrix			
0.006963 - j0.008150	0.002399 + j0.004268	0.000775 + j0.000331	0.002215 + j0.002092
0.002399 + j0.004268	0.002143 - j0.006983	0.002355 + j0.004109	0.001428 + j0.003831
0.000775 + j0.000331	0.002355 + j0.004109	0.006551 - j0.007950	0.002203 + j0.002105
0.002215 + j0.002092	0.001428 + j0.003831	0.002203 + j0.002105	0.006374 - j0.007326

HMatrix - [I] = [H] X [F]			
0.017732 + j0.001371	0.000391 + j0.000871	0.000649 - j0.000064	0.000673 + j0.000385
0.000405 + j0.000912	0.016827 + j0.001428	0.000405 + j0.000912	0.000501 + j0.000805
0.000655 - j0.000064	0.000394 + j0.000878	0.017552 + j0.001382	0.000672 + j0.000414
0.000679 + j0.000389	0.000486 + j0.000776	0.000673 + j0.000414	0.017552 + j0.001384

HMatrix-inverse - [F] = $[H]^{-1}$ X [I]			
56.127627 - j4.158273	-1.610693 - j2.457474	-2.023891 + j0.738984	-2.272733 - j0.729989
-1.672993 - j2.576574	58.812236 - j4.538401	-1.698238 - j2.597090	-2.043370 - j2.130859
-2.042670 + j0.746111	-1.647399 - j2.500464	56.686115 - j4.269959	-2.310255 - j0.828876
-2.294501 - j0.737035	-1.977711 - j2.052890	-2.311322 - j0.829193	56.747411 - j4.159175

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Tower Currents

Mode 1 - Daytime
Tower 1
0.000000 > 0.000000 - 91.50° above ground
0.767933 > 138.025352 - 82.35° above ground
1.401583 > 137.784462 - 73.20° above ground
1.970241 > 137.508721 - 64.05° above ground
2.469962 > 137.186159 - 54.90° above ground
2.893037 > 136.804440 - 45.75° above ground
3.231098 > 136.347487 - 36.60° above ground
3.476485 > 135.792229 - 27.45° above ground
3.622521 > 135.101429 - 18.30° above ground
3.662976 > 134.207643 - 9.15° above ground
3.567764 > 132.719193 - -0.00° above ground
Tower 2
0.000000 > 0.000000 - 91.50° above ground
1.019368 > 109.484411 - 82.35° above ground
1.887750 > 109.767557 - 73.20° above ground
2.691531 > 110.038725 - 64.05° above ground
3.423198 > 110.300229 - 54.90° above ground
4.070252 > 110.552668 - 45.75° above ground
4.619342 > 110.797804 - 36.60° above ground
5.058264 > 111.039294 - 27.45° above ground
5.376861 > 111.283958 - 18.30° above ground
5.567483 > 111.544576 - 9.15° above ground
5.623501 > 111.903077 - -0.00° above ground

Mode 2 - Nighttime
Tower 1
0.000000 > 0.000000 - 91.50° above ground
0.967282 > -150.386909 - 82.35° above ground
1.761191 > -150.154254 - 73.20° above ground
2.468228 > -149.902235 - 64.05° above ground
3.082362 > -149.620899 - 54.90° above ground
3.592892 > -149.300471 - 45.75° above ground
3.988405 > -148.927999 - 36.60° above ground
4.258458 > -148.484389 - 27.45° above ground
4.393686 > -147.937977 - 18.30° above ground
4.384487 > -147.229730 - 9.15° above ground
4.174282 > -146.026057 - -0.00° above ground
Tower 2
0.000000 > 0.000000 - 91.50° above ground
1.058837 > -1.152913 - 82.35° above ground
1.936569 > -1.055763 - 73.20° above ground
2.724508 > -0.959378 - 64.05° above ground
3.414443 > -0.861611 - 54.90° above ground
3.993114 > -0.760798 - 45.75° above ground
4.446603 > -0.654586 - 36.60° above ground
4.762234 > -0.539324 - 27.45° above ground
4.928761 > -0.408807 - 18.30° above ground
4.935008 > -0.251368 - 9.15° above ground
4.721464 > 0.000000 - -0.00° above ground

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Tower 3
0.000000 > 0.000000 - 91.50° above ground
1.086972 > 39.813832 - 82.35° above ground
1.996733 > 40.520642 - 73.20° above ground
2.825307 > 41.271090 - 64.05° above ground
3.566504 > 42.088652 - 54.90° above ground
4.208924 > 42.994058 - 45.75° above ground
4.740382 > 44.013710 - 36.60° above ground
5.149988 > 45.185130 - 27.45° above ground
5.428989 > 46.568359 - 18.30° above ground
5.571078 > 48.270436 - 9.15° above ground
5.560879 > 50.947320 - -0.00° above ground

Tower 4
0.000000 > 0.000000 - 91.50° above ground
2.529642 > -10.545801 - 82.35° above ground
4.605732 > -9.947070 - 73.20° above ground
6.454453 > -9.306513 - 64.05° above ground
8.060707 > -8.600909 - 54.90° above ground
9.397445 > -7.807604 - 45.75° above ground
10.436058 > -6.896269 - 36.60° above ground
11.150915 > -5.822111 - 27.45° above ground
11.520003 > -4.511266 - 18.30° above ground
11.522557 > -2.827398 - 9.15° above ground
11.031174 > 0.000000 - -0.00° above ground

Tower 3
0.000000 > 0.000000 - 91.50° above ground
0.458121 > 122.327971 - 82.35° above ground
0.842423 > 122.823798 - 73.20° above ground
1.192571 > 123.324780 - 64.05° above ground
1.505183 > 123.844022 - 54.90° above ground
1.774636 > 124.392541 - 45.75° above ground
1.994956 > 124.985061 - 36.60° above ground
2.160700 > 125.643106 - 27.45° above ground
2.267216 > 126.401418 - 18.30° above ground
2.310503 > 127.322210 - 9.15° above ground
2.276446 > 128.772533 - -0.00° above ground

Tower 4
0.000000 > 0.000000 - 91.50° above ground
0.439092 > -112.265753 - 82.35° above ground
0.799907 > -112.067964 - 73.20° above ground
1.121615 > -111.846176 - 64.05° above ground
1.401511 > -111.590773 - 54.90° above ground
1.634773 > -111.292068 - 45.75° above ground
1.816260 > -110.937366 - 36.60° above ground
1.941271 > -110.508063 - 27.45° above ground
2.005605 > -109.973334 - 18.30° above ground
2.005003 > -109.275693 - 9.15° above ground
1.914906 > -108.088623 - -0.00° above ground

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TOWER DRIVE INFORMATION – DAY

	Field Ratios	Field Phase	Drive Imped. (Ω)	Current	Antenna Monitor*	Power (W)
Tower 1	0.3100	142.0000	-37.47 + j52.95	3.57 ∠ 132.72	32.4% ∠ +132.7°	-476.8935
Tower 2	0.4600	117.0000	8.22 + j2.43	5.62 ∠ 111.90	51.0% ∠ +111.9°	260.0431
Tower 3	0.4600	51.0000	65.19 + j17.25	5.56 ∠ 50.95	50.4% ∠ +51.0°	2015.7661
Tower 4	1.0000	0.0000	71.75 + j76.57	11.03 ∠ 0.00	100.0% ∠ 0.00°	8731.0843

TOWER DRIVE INFORMATION – NIGHT

	Field Ratios	Field Phase	Drive Imped. (Ω)	Current	Antenna Monitor*	Power (W)
Tower 1	0.8730	-148.0000	30.87 + j86.45	4.17 ∠ -146.03	88.4% ∠ -146.0°	537.9509
Tower 2	1.0000	0.0000	6.21 + j78.30	4.72 ∠ 0.00	100.0% ∠ 0.0°	138.3973
Tower 3	0.4430	126.0000	35.62 + j36.90	2.28 ∠ 128.77	48.3% ∠ 128.8°	184.5925
Tower 4	0.4000	-110.0000	30.29 + j81.48	1.91 ∠ -108.09	40.5% ∠ -108.1°	111.0594

*** = These are the pattern parameters used to tune the array and are on the Form 302.**

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Sample System Verification [47 CFR 73.151(c)(2)]

Sample Lines: Andrew 3/8" LDF2-50J foam dielectric Heliax coaxial cable

88% velocity factor, 50 +/-1 ohms

Lines were cut to equal electrical length and terminated with proper connectors. An additional short (one foot) flexible cable connects the 3/8"Heliax to the antenna monitor. These jumpers are identical and are accounted for in the data which follows.

Sample Element Type: Delta Electronics TCT-3 Toroidal Current Transformers

Location: At output of antenna tuning network on lead to tower.

Operating Potential: Grounded

Antenna Monitor: Potomac Instruments AM-19 (204) s/n 1570

TCT-3 Serial Numbers & Z at 1000 KHz:

Tower 1 (S):	2019	49.8 +j3.0 ohms
Tower 2 (C):	2003	50.0 +j3.1 ohms
Tower 3 (N):	1986	49.6 +j3.0 ohms
Tower 4 (W):	1919	49.7 +j2.9 ohms

(Current Transformers are matched 0.4 ohm resistance and j0.2 ohms reactance)

Delta Electronics states that the accuracy of their TCT-3 current transformers—the industry standard for this type of antenna monitor system—is:

Absolute Magnitude Accuracy:	±2%
Absolute Phase Accuracy:	±3°
Magnitude Tracking Accuracy:	±1%
Phase Tracking Accuracy:	±1°

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TCT-3 Phase and Ratio Test (Tower 2 is reference):

Tower 1:	1.000/ +0.5°
Tower 3:	1.000/ +0.3°
Tower 4:	1.000/ +0.5°

(Current Transformers are matched within 0.0% ratio and 0.5° phase)

The phase and ratio calibration test was done with transformers removed from the ACUs and configured in pairs with the #2 transformer adjacent to each other at the phasor reading RF current to tower #2 in night pattern at 250 watts. The cables used to connect the TCTs to the monitor are identical in electrical length and characteristic impedance and are maintained by the writer for this purpose.

Open Circuit Sample Line Length Test (see graph data which follows):

Tower 1 Closest Odd ¼ wave Resonant Frequency: 1.061564 MHz (611.78 feet)
254.34° at 1000 KHz

Tower 2 Closest Odd ¼ wave Resonant Frequency: 1.062711 MHz (611.12 feet)
254.07° at 1000 KHz

Tower 3 Closest Odd ¼ wave Resonant Frequency: 1.062510 MHz (611.23 feet)
254.12° at 1000 KHz

Tower 4 Closest Odd ¼ wave Resonant Frequency: 1.060468 MHz (612.41 feet)
254.60° at 1000 KHz

Manufacturer's stated propagation velocity for this coaxial cable is 88%.

Maximum Difference in Electrical Length: 0.53° at 1000 KHz

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Open Circuit Sample Line Impedance Test (see graph data which follows):

Tower 1 Sample Line Mean Zmag:	50.349 ohms
Tower 2 Sample Line Mean Zmag:	51.222 ohms
Tower 3 Sample Line Mean Zmag:	50.626 ohms
Tower 4 Sample Line Mean Zmag:	50.261 ohms

Maximum Variation in Sample Line Impedance: 0.961 ohms

Sample line characteristic impedance was determined by finding the closest odd quarter-wavelength frequency to the operating frequency and then measuring the impedance +/- 1/8 wavelength from that frequency per 47 CFR 73.151(c)(2)(i).

Sample Impedance From Monitor End (with sample element connected, see graph data):

Tower 1 (South) Sample Impedance:	52.606 -j2.586 ohms
Tower 2 (Center) Sample Impedance:	53.626 –j2.662 ohms
Tower 3 (North) Sample Impedance:	52.880 -j2.239 ohms
Tower 4 (West) Sample Impedance:	52.285 -j2.649 ohms

Maximum Variation in Sample Resistance: 1.341 ohms
Maximum Variation in Sample Reactance: j0.423 ohms

Impedance measurements were taken at the authorized operating frequency (1000 KHz).

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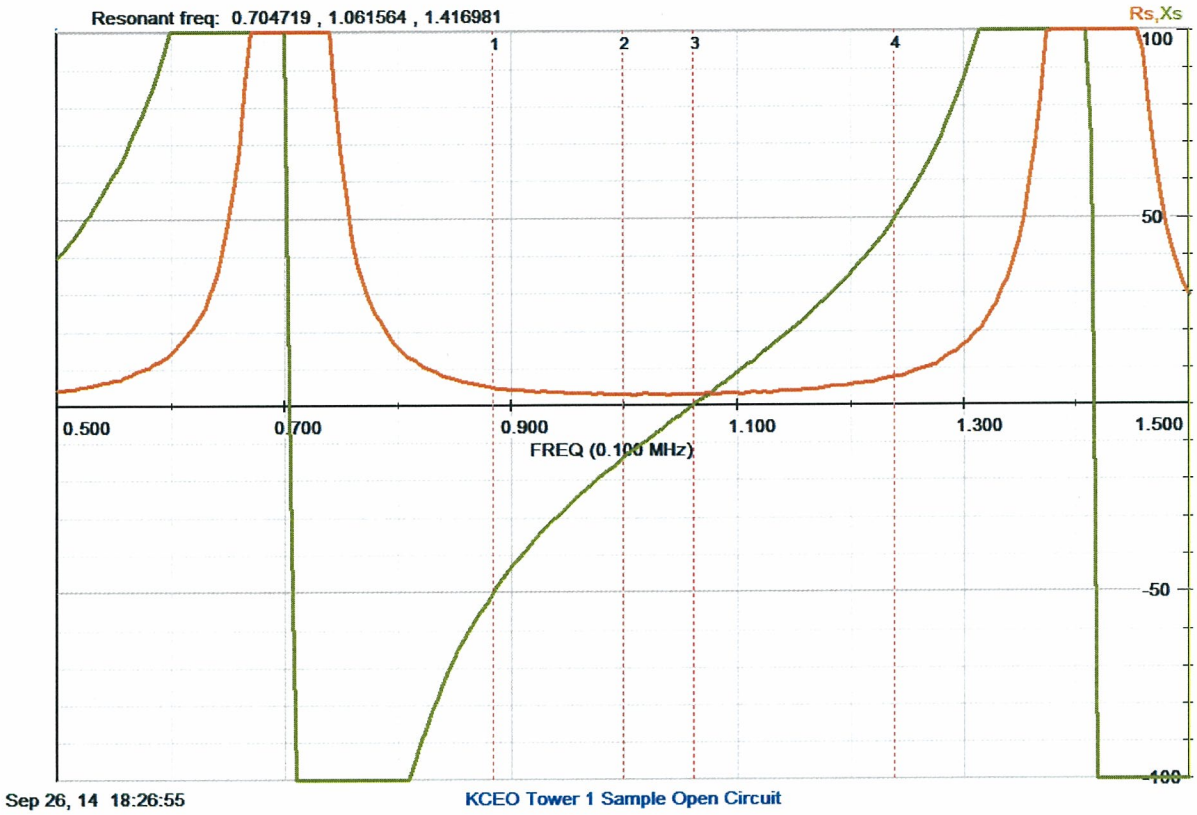
Tower 1 (South) Sample Line (open circuit)



Marker	Freq	Rs	Xs	Zmag
[1]	0.884637	5.111	-50.260	50.519
[2]	1.000000	3.222	-14.419	
[3]	1.061564	3.118	-0.000	
[4]	1.238491	7.729	49.581	50.180

Markers: [1] = closest odd quarter wave minus 1/8 wavelength
[2] = operating frequency
[3] = closest odd quarter wave
[4] = closest odd quarter wave plus 1/8 wavelength

Mean Tower 1 Sample Line Zmag: 50.349 ohms

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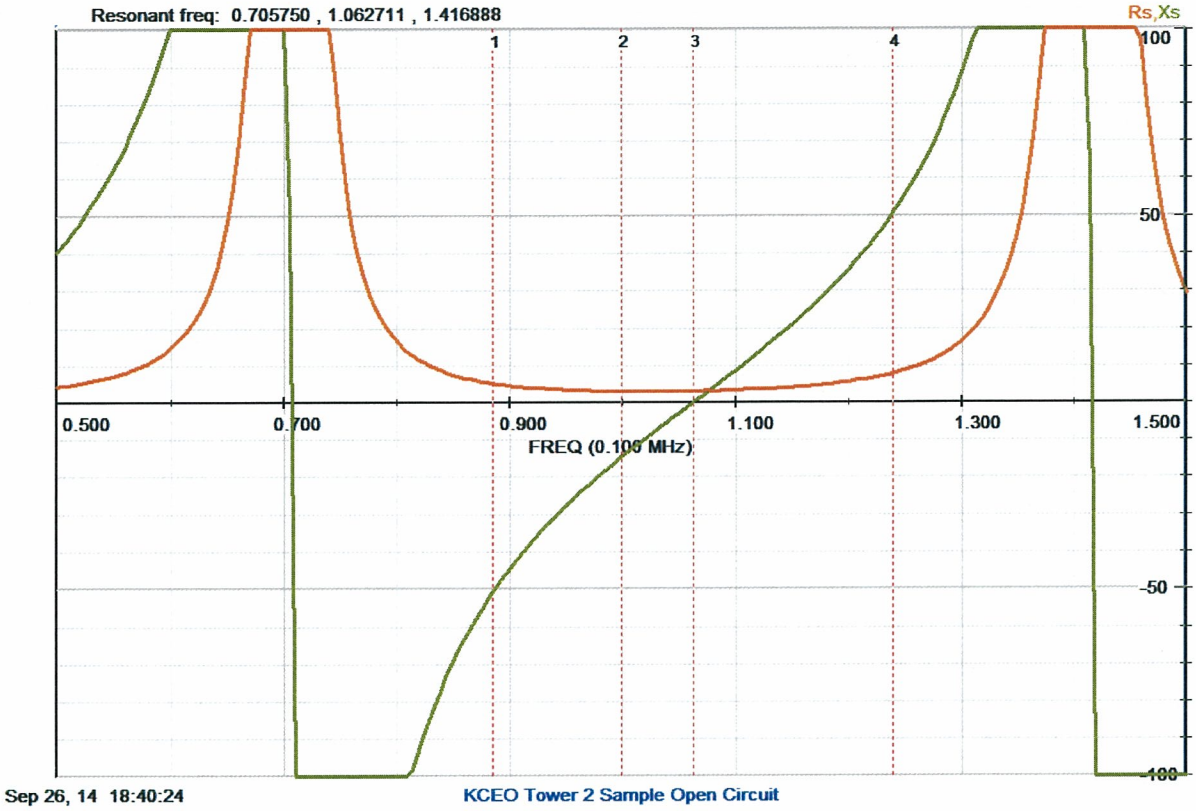
Tower 2 (Center) Sample Line (open circuit)



Marker	Freq	Rs	Xs	Zmag
[1]	0.885593	5.186	-50.885	51.149
[2]	1.000000	3.088	-14.612	
[3]	1.062711	3.240	0.000	
[4]	1.239830	7.844	50.692	51.295

Markers: [1] = closest odd quarter wave minus 1/8 wavelength
[2] = operating frequency
[3] = closest odd quarter wave
[4] = closest odd quarter wave plus 1/8 wavelength

Mean Tower 2 Sample Line Zmag: 51.222 ohms

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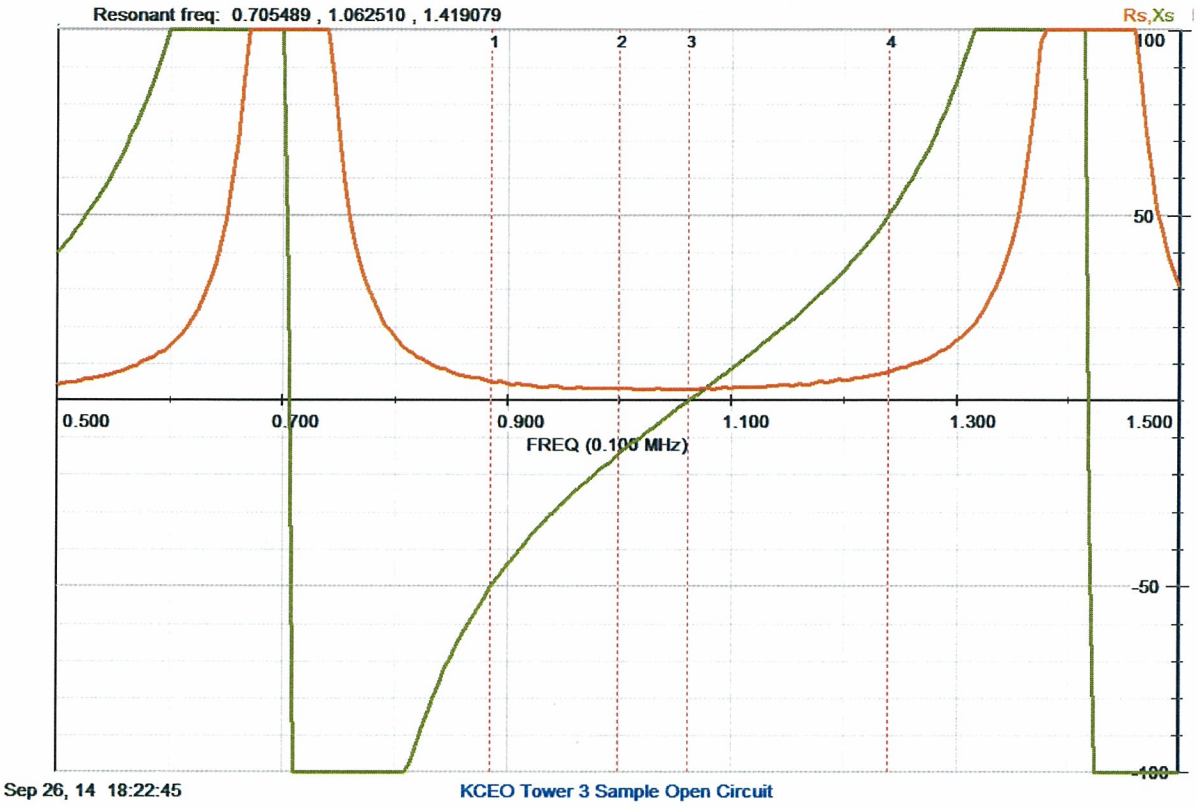
Tower 3 (North) Sample Line (open circuit)



Marker	Freq	Rs	Xs	Zmag
[1]	0.885422	5.266	-50.432	50.706
[2]	1.000000	3.332	-14.420	
[3]	1.062510	3.225	0.000	
[4]	1.239595	7.814	49.939	50.546

Markers: [1] = closest odd quarter wave minus 1/8 wavelength
[2] = operating frequency
[3] = closest odd quarter wave
[4] = closest odd quarter wave plus 1/8 wavelength

Mean Tower 3 Sample Line Zmag: 50.626 ohms

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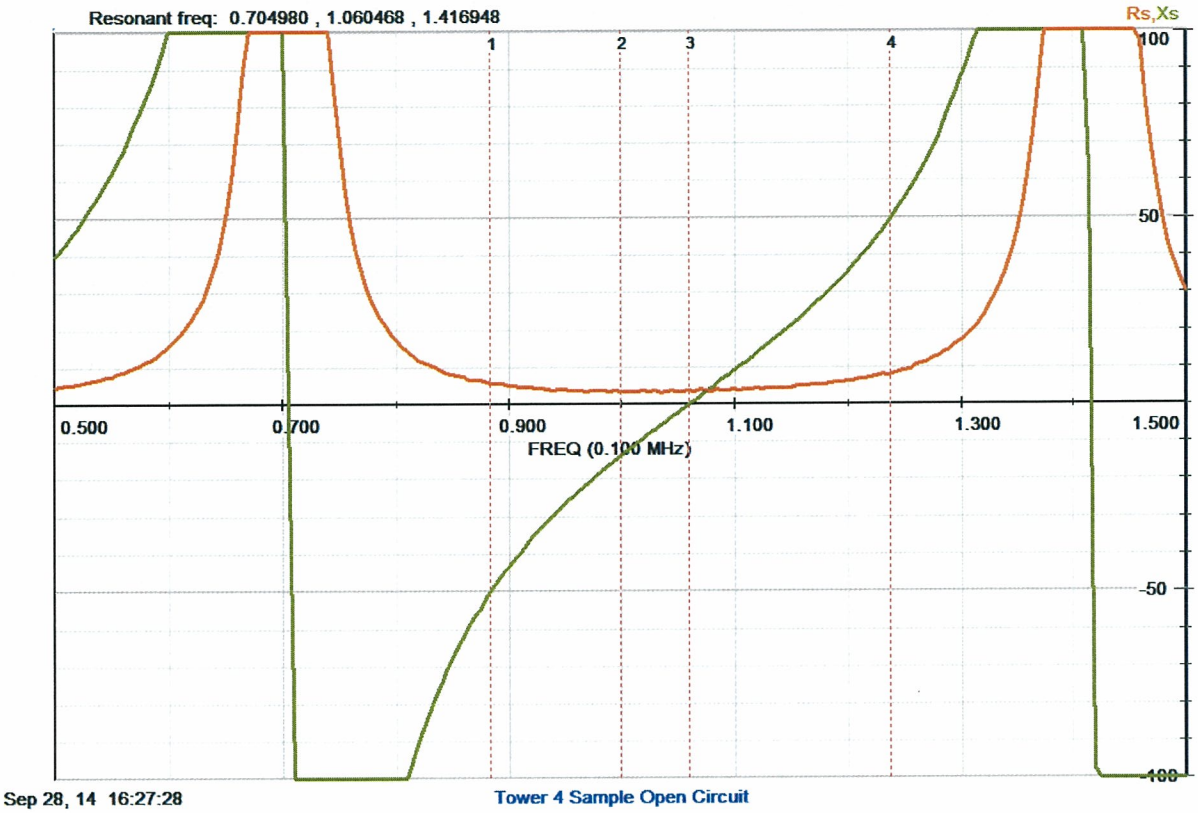
Tower 4 (West) Sample Line (open circuit)



Marker	Freq	Rs	Xs	Zmag
[1]	0.883723	5.682	-50.091	50.413
[2]	1.000000	3.584	-13.998	
[3]	1.060468	3.584	0.000	
[4]	1.237213	7.924	49.479	50.109

Markers: [1] = closest odd quarter wave minus 1/8 wavelength
[2] = operating frequency
[3] = closest odd quarter wave
[4] = closest odd quarter wave plus 1/8 wavelength

Mean Tower 4 Sample Line Zmag: 50.261 ohms

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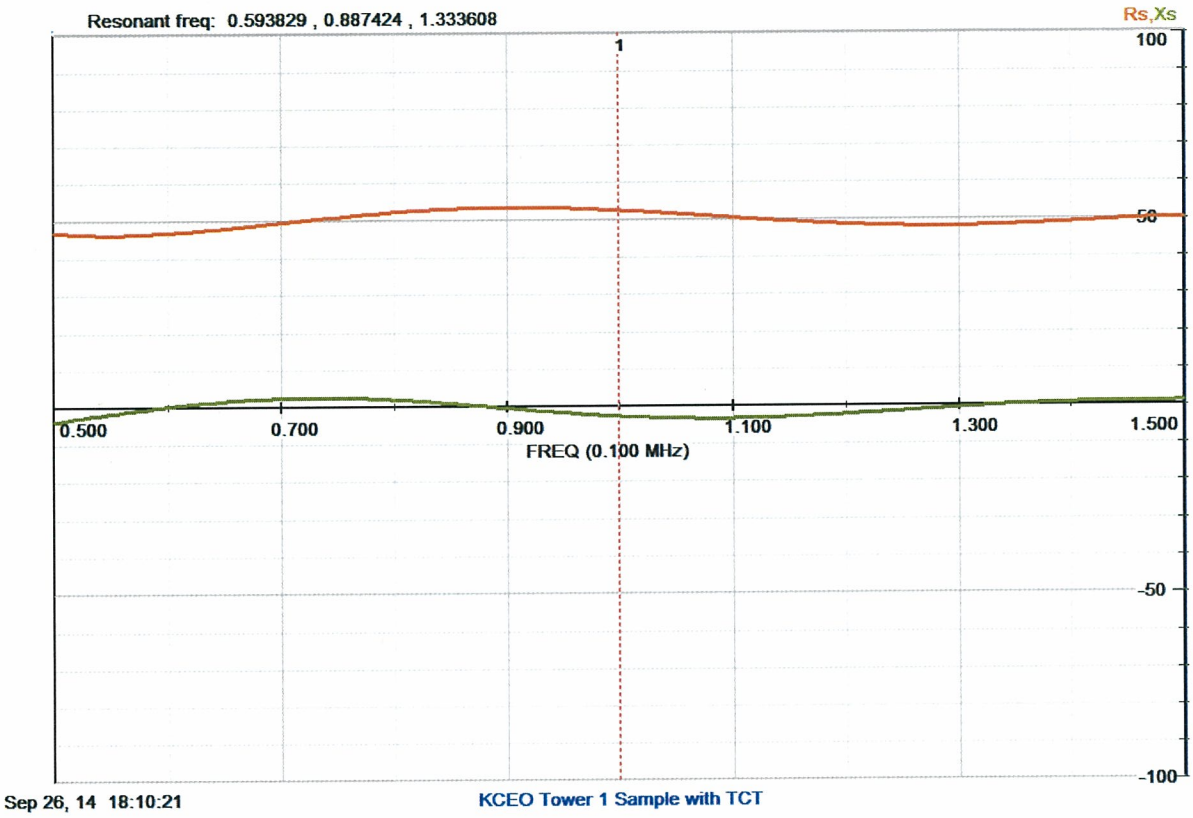
Sample lines from antenna monitor end with TCT-3s connected at towers as normal:

Tower 1 (South)



Impedance of Tower 1 line at 1000 KHz, monitor end with transformer connected at other end:

52.606 -j2.586ohms

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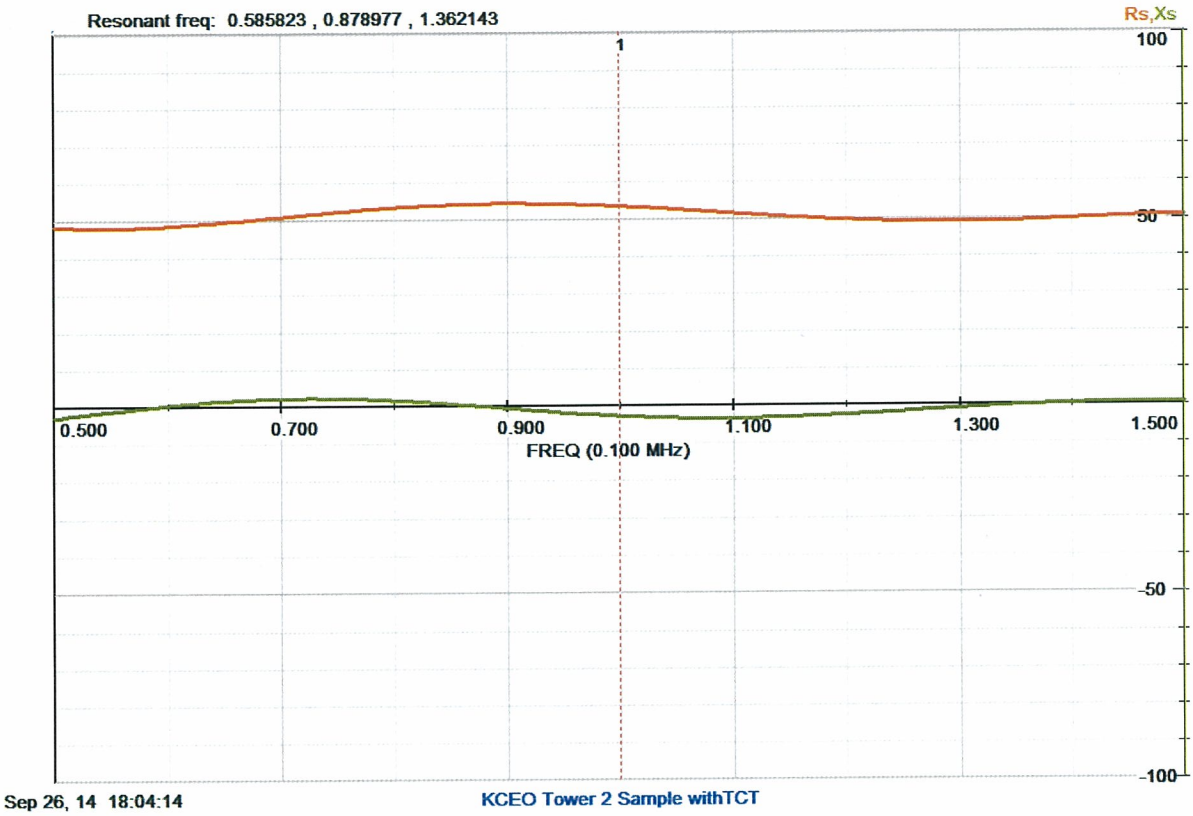
Tower 2 (Center)



Impedance of Tower 2 line at 1000 KHz, monitor end with transformer connected at other end:

53.626 –j2.662 ohms

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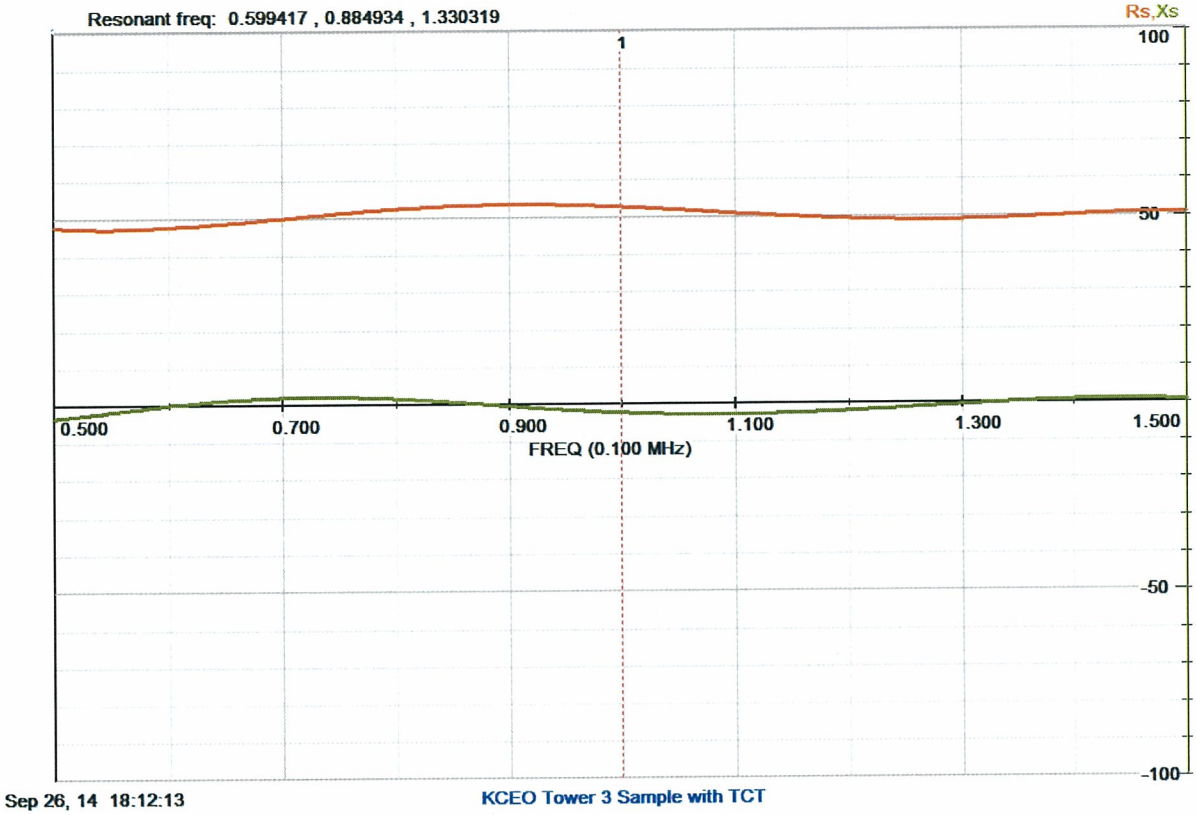
Tower 3 (North)



Impedance of Tower 3 line at 1000 KHz, monitor end with transformer connected at other end:

52.880 -j2.239 ohms

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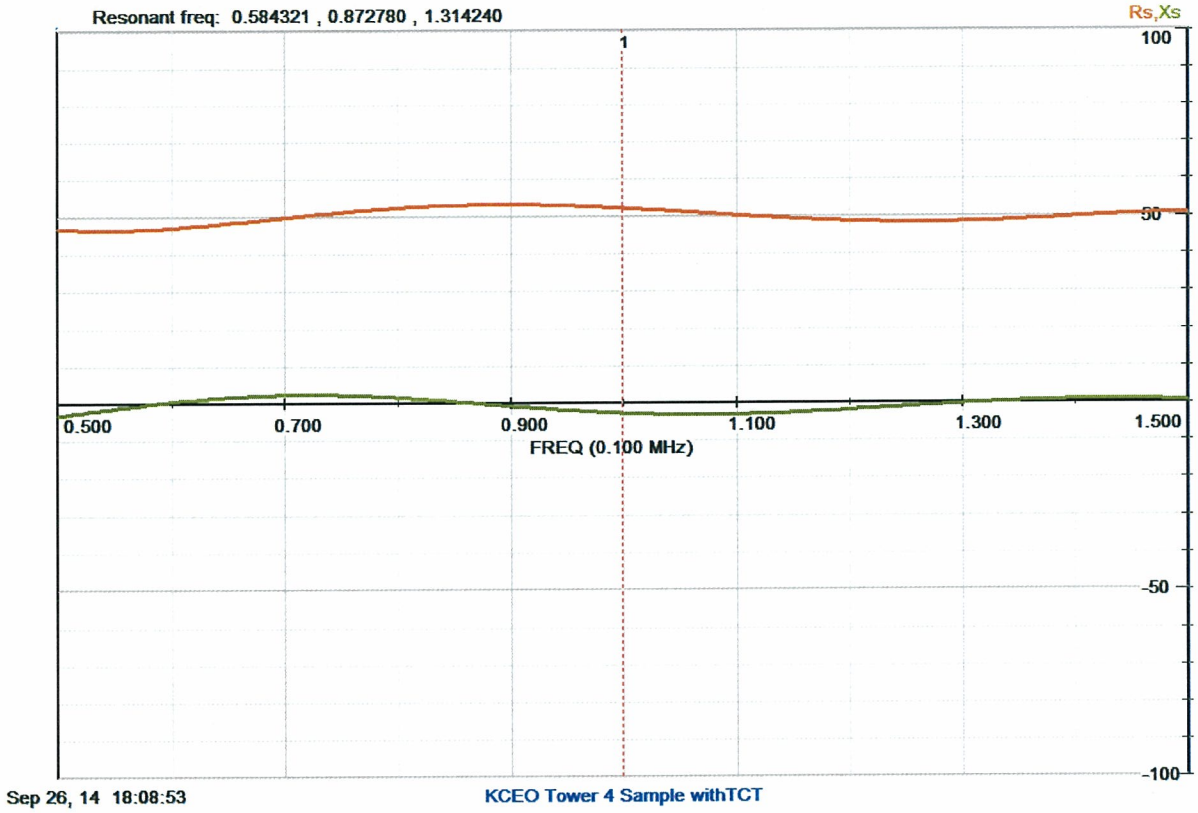
Tower 4 (West)



Impedance of Tower 4 line at 1000 KHz, monitor end with transformer connected at other end:

52.285 -j2.649 ohms

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KCEO Daytime Reference Field Strength Measurements

[47 CFR 73.151(c)(3)]

Point	Distance	mv/m	Coordinates (NAD 83)	Description
100° True (Minima, monitor point radial)				
1:	1.02 km	92	33.2313571-117.2602094	2188 Willowbrook Drive
2:	1.82	37	33.2301173,-117.2518517	Museum Way at museum gate
3:	2.37	38	33.2292517,-117.2460098	Paso Del Sol at gate
180° True (Maxima)				
1:	1.17	575	33.2223874,-117.2710241	1433 Temple Heights Drive
2:	1.36	510	33.2206695,-117.2710295	4762 Jasmine Street
3:	1.67	438	33.2179191,-117.2710241	4829 Rising Glen Drive
196.5° True (Minima, monitor point radial)				
1:	1.21	620	33.2225024,-117.2747095	1393 Panorama Ridge Road
2:	1.58	445	33.2193191,-117.2758320	1570 Boulder Creek Road
3:	1.93	360	33.2162451,-117.2769169	1650 Boulder Creek Road
305° True (Maxima)				
1:	1.47	920	33.2421257,-117.2839845	5191 Silver Bluff Drive
2:	1.77	760	33.2421257,-117.2866077	717 Corona Drive
3:	1.99	790	33.2432436,-117.2885121	5010 Caspian Drive

Daytime pattern measurements taken 2:30 PM – 3:20 PM PDT, September 26, 2014 by the writer using Potomac Instruments FIM-41 s/n 1655 last calibrated June 26, 2013.

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Tower Survey [47 CFR 73.151(c)(1)(ix)]

Please note that the surveyor swapped the numbering between towers 1 and 3. The proper numbering is used below. The three KCEO towers were surveyed on October 5, 2012 by Mathew J. Muckerman a licensed Professional Land Surveyor in the state of California (license number 7603) of Excel Engineering, Escondido, California and were found to be as follows:

Tower 2 (C) to 1 (S): 218.7 feet (80.01°) at 191.10° True (theo. = 80.0° at 190.0° T)

Tower 2 (C) to 3 (N): 218.3 feet (79.87°) at 11.00° True (theo. =80.0° at 10.0° T)

Tower 2 (C) to 4 (W): 245.4 feet (89.78°) at 281.29° True (theo. = 89.0° at 281.0° T)

A copy of the survey report is attached. This corresponds to a maximum relative spacing error of 0.78° and absolute bearing error of 1.1°. The theoretical tower spacings and orientation were used in the model.

EXCEL ENGINEERING

LEVIN & DENTINO INC. D.B.A. EXCEL ENGINEERING

ESCONDIDO: 440 State Place • Escondido, CA 92029
(760)745-8118 • Fax (760)745-8134

Geodetic Coordinate Certification

KCEO-AM Radio Towers

Oceanside, California

	NORTHING (Y)	EASTING (X)
TOWER 1 (NORTHERLY TOWER)	2030100.9	6249622.2
TOWER 2 (CENTER TOWER)	2029886.3	6249582.2
TOWER 3 (SOUTHERLY TOWER	2029671.3	6249542.2
TOWER 4 (WESTERLY TOWER)	2029932.0	6249341.1

ALL NORTHINGS AND EASTINGS ARE CA STATE PLANE, ZONE 6 COORDINATES

DATUM: NAD83

	BEARING FROM TOWER 2	DISTANCE FROM TOWER 2
TOWER 1	N 11°07'00" E	218.3'
TOWER 3	S 11°05'51" W	218.7'
TOWER 4	N 78°42'27" W	245.4'

ALL BEARINGS USE TRUE NORTH PER SPC CA 6

NOTE: TO CONVERT GRID NORTH TO TRUE NORTH, ADD 00°33'22.77"

PER THE FIELD SURVEY COMPLETED ON 10/5/2012 I HEREBY CERTIFY THAT THE STATE PLANE COORDINATES SHOWN HEREON ARE ACCURATE TO PLUS OR MINUS THREE (3) FEET HORIZONTALLY AND THAT RELATIVE TOWER BEARINGS AND DISTANCES ARE PLUS OR MINUS THREE (3) MINUTES AND PLUS OR MINUS 0.5 FEET RESPECTIVELY.

MATHEW J. MUCKERMAN

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Construction Permit Conditions:

1 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 (day) and (night) directional antenna system. The nondirectional and directional field strength measurements must be made under similar environmental conditions. The proof(s) 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).

The KCEO antenna system was verified using the "model proof" rules at 47 CFR 73.151(c). The towers are series-fed and the sample system meets the requirements of 47 CFR 73.151(c)(2)(1). This is the required report and filing.

2 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.

KCEO has installed a Nautel XR-12 which the transmitter manufacturer states is type accepted for the power levels and intended service.

3 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.

This is the required application for covering license and is being filed prior to the January 14, 2017 expiration date.

4 Licensee shall be responsible for satisfying all reasonable complaints of blanketing interference within the 1 V/m contour as required by Section 73.88 of the Commission's rules.

The transmitter site has been used as such for decades and any new blanketing interference complaints inside the 1 V/m contour are expected to be few in number. The permittee will satisfy all reasonable complaints which might arise in the first year of operation.

5 Day and night arrays consist of towers South, Center, North and West, referenced in that order.

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The tower numbering in this report and on the FCC Form 302-AM are 1 (South), 2 (Center), 3 (North) and 4 (West) as specified in the construction permit.

6 Ground system consists of 120 equally spaced, buried, copper radials about the base of each tower, each 75 meters in length except where intersecting radials are shortened and bonded to a transverse copper strap midway between adjacent towers.

The ground system is as described. Some tower 4 radials are shortened at the property line.

7 The 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 regulations.

There are no other site users, and the licensee will comply with all applicable EMR exposure rules. The towers are fenced with locked gates and warning signs are posted.

Preparer's Certification

This engineering report was prepared by me from data personally collected on site using equipment owned and maintained by me for this purpose. It is true and correct to the best of my knowledge and belief. The KCEO antenna system is properly constructed and adjusted and program test authority is hereby requested.

October 9, 2014

Mark A. Mueller