Law Office of
DENNIS J. KELLY
Post Office Box 41177
Washington, DC 20018

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

TELEPHONE: 888-322-5291
202-293-2300

TELECOPIER: 571-312-1601
E-MAIL: dkellyfcclaw1@comcast.net

December 7, 2012

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

Attention: Mr. Edward Lubetzky
Audio Division, Media Bureau

RE: KCEO(AM), Vista, California
FCC Facility ID # 67666
File No. BMML-20121016ADQ
Amendment

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 amendment to the above-referenced FCC Form 302-AM application for covering license.

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

Very truly yours,

Dennis J. Kelly

FILED/ACCEPTED

DEC 17 2012

Federal Communications Commission
Office of the Secretary

AMENDMENT

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

RE: KCEO(AM), Vista, California
FCC Facility ID # 67666
File No. BMML-20121016ADQ

Dear Madame Secretary:

The pending application of IHR Educational Broadcasting for a covering license for AM Broadcast Station KCEO, Vista, California, is hereby amended in accordance with the attached materials.

Very truly yours,

IHR EDUCATIONAL BROADCASTING

By _____
Douglas M. Sherman
President

DATED: December 7, 2012

KCEO FORM 302-AM AMENDMENT

12/7/2012

This amendment consists of the following three items:

1. A narrative statement by consulting engineer Mark Mueller responsive to the five questions raised in a December 4, 2012 e-mail from Edward Lubetzky of the FCC's Media Bureau, Audio Division.

2. Revised pages 4 and 5 to FCC Form 302-AM.

3. A revised engineering report documenting the "Directional Antenna Performance Verification" measurements.

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

Engineering Exhibit For
IHR Educational Broadcasting
K C E O (A M)
Vista, California
December 2012

This engineering exhibit was prepared in response to an FCC Staff email requesting the following additional information related to the application for covering license at KCEO, Vista, California (FCC Facility ID 67666, BMML-20121016ADQ).

1. *The as built location of tower #4 is 2.15 ^{0} from the reference tower specified in pending application BMP-20121016AAR for KCEO, Vista, CA or out of the 1.5 ^{0} location tolerance.*

The as-built survey indicates that tower 4 is 245.4 feet (89.78° at 1000 KHz) at 281.29° True. The construction permit modification application specifies a spacing of 89° at 280° true. It is being amended to 281° so that the absolute location of tower 4 is within 1.5° of the as-built. The Method of Moments model has been recalculated using 281° for the tower 4 bearing and the application for covering license modified as necessary. The resulting changes in operating parameters are less than 0.6° in phase and 0.4% ratio, well within the standard 3° and 5% limits.

2. *Typo mistake (re Resistance) for marker 1 found for the characteristic impedance of tower #4.*

The correct value for Resistance at marker 1 is 5.308 ohms. We apologize for the error.

3. *The manufacturer's accuracy of the current transformers was not provided.*

Delta Electronics states that the 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°

4. *Measurements were not made to show that the antenna monitor is calibrated.*

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

The monitor was refurbished, 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.

5. *The calibration date of FIM-41 s/n 1655 was not provided. It must be current (within 2 years) or details of a data comparison with a FS meter with a current calibration must be provided.*

The FIM-41 used for the daytime and nighttime measurements was last calibrated by the factory in 2004 but is compared to other similar meters at each station it is used at and has never been more than 1% different. The most recent comparison was in March 2012 with a FIM-41 last calibrated in February 2012. The meters agreed within 0.5%.

This engineering exhibit was prepared by me and is true and correct to the best of my knowledge and belief.

Mark A. Mueller

December 6, 2012

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-20040109AAF	1000	Unlimited	0.9	5.0

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	RF common point or antenna current (in amperes) without modulation for day system
4.41	10.39
Measured antenna or common point resistance (in ohms) at operating frequency	**Measured antenna or common point reactance (in ohms) at operating frequency**
Night: 50 Day: 50	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°	-113.0°	88.4%	59.1%		
2 (C) ASRN 1046150	0°	0°	100.0%	100.0%		
3 (N) ASRN 1046151	+128.8°	-1.7°	48.3%	51.0%		
4 (W) ASRN 1046153	-108.1°	-108.7°	40.5%	52.7%		

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	76.3	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. Tower 4 spacing changed to 89°.

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 13, 2012 (amended 12/7/2012) Telephone No. (Include Area Code) (708) 352-2166

mark@muellerbroadcastdesign.com

☐ Technical Director

☐ Registered Professional Engineer

☐ Chief Operator

☑ Technical Consultant

☐ Other (specify)

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

Engineering Report For IHR Educational Broadcasting K C E O (A M) Vista, California October 2012

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 5 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 facility authorized by BP-20040109AAF 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

The previously licensed KCEO antenna system used towers 1-3, and the fourth (west) tower was added in accordance with the construction permit. 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 tower except for the tower

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

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 refurbished, 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

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

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.

The physical tower survey turned up a discrepancy of +3° for the tower 4 spacing, 89° instead of 86° and a bearing error of 1°. The underlying CP is being modified to account for this difference and this report has been generated using the slightly modified nighttime parameters reflected in the CP Mod. These are less than +/-5% and +/-3° from the original construction permit.

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

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.

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

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

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

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

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

Tower Currents

Mode 1 - Daytime
Tower 1
0.000000 > 0.000000 - 91.50° above ground
1.003897 > -125.427277 - 82.35° above ground
1.823530 > -124.786992 - 73.20° above ground
2.549265 > -124.089035 - 64.05° above ground
3.175198 > -123.305195 - 54.90° above ground
3.690730 > -122.406916 - 45.75° above ground
4.084730 > -121.355834 - 36.60° above ground
4.347342 > -120.095041 - 27.45° above ground
4.470218 > -118.530141 - 18.30° above ground
4.445516 > -116.485624 - 9.15° above ground
4.218398 > -112.983008 - -0.00° above ground
Tower 2
0.000000 > 0.000000 - 91.50° above ground
1.448739 > -5.706176 - 82.35° above ground
2.662691 > -5.283025 - 73.20° above ground
3.766435 > -4.850034 - 64.05° above ground
4.749525 > -4.396323 - 54.90° above ground
5.594587 > -3.912684 - 45.75° above ground
6.283250 > -3.386650 - 36.60° above ground
6.798831 > -2.799702 - 27.45° above ground
7.127083 > -2.121507 - 18.30° above ground
7.255590 > -1.297023 - 9.15° above ground
7.138368 > 0.000000 - -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

Tower 3
0.000000 > 0.000000 - 91.50° above ground
0.757487 > -10.840878 - 82.35° above ground
1.384647 > -10.245675 - 73.20° above ground
1.949635 > -9.620040 - 64.05° above ground
2.448773 > -8.944941 - 54.90° above ground
2.874723 > -8.203460 - 45.75° above ground
3.219523 > -7.373500 - 36.60° above ground
3.475951 > -6.422983 - 27.45° above ground
3.637903 > -5.299796 - 18.30° above ground
3.700188 > -3.909678 - 9.15° above ground
3.641170 > -1.690293 - -0.00° above ground
Tower 4
0.000000 > 0.000000 - 91.50° above ground
0.927028 > -122.763994 - 82.35° above ground
1.680532 > -122.058444 - 73.20° above ground
2.344069 > -121.288536 - 64.05° above ground
2.912244 > -120.422514 - 54.90° above ground
3.375405 > -119.427532 - 45.75° above ground
3.723502 > -118.258900 - 36.60° above ground
3.947755 > -116.849769 - 27.45° above ground
4.040828 > -115.088627 - 18.30° above ground
3.995849 > -112.766788 - 9.15° above ground
3.758684 > -108.736688 - -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

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

TOWER DRIVE INFORMATION – DAY

	Field Ratios	Field Phase	Drive Imped. (Ω)	Current	Antenna Monitor*	Power (W)
Tower 1	0.6260	-117.4000	90.11 + j88.90	4.22 ∠ -112.98	59.1% ∠ -113.0°	1603.4997
Tower 2	1.0000	0.0000	31.40 + j38.32	7.14 ∠ 0.00	100.0% ∠ 0.0°	1599.8585
Tower 3	0.5020	-3.7000	54.70 + j37.58	3.64 ∠ -1.69	51.0% ∠ -1.7°	725.2572
Tower 4	0.5720	-114.2000	104.15 + j100.54	3.76 ∠ -108.74	52.7% ∠ -108.7°	1471.3845

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.**

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

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	49.7 +j3.3 ohms
Tower 2 (C):	2003	50.1 +j2.8 ohms
Tower 3 (N):	1986	49.8 +j2.9 ohms
Tower 4 (W):	1919	49.9 +j2.6 ohms

(Current Transformers are matched 0.4 ohm resistance and j0.7 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°

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

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

Tower 1:	1.000/ +0.5°
Tower 3:	0.990/ +0.3°
Tower 4:	1.000/ +0.5°

(Current Transformers are matched within 0.1% 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 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.

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

Tower 1 Closest Odd ¼ wave Resonant Frequency: 1.062111 MHz (611.46 feet)
254.21° at 1000 KHz

Tower 2 Closest Odd ¼ wave Resonant Frequency: 1.061915 MHz (611.57 feet)
254.26° at 1000 KHz

Tower 3 Closest Odd ¼ wave Resonant Frequency: 1.060435 MHz (612.43 feet)
254.62° at 1000 KHz

Tower 4 Closest Odd ¼ wave Resonant Frequency: 1.062329 MHz (611.34 feet)
254.16° at 1000 KHz

Maximum Difference in Electrical Length: 1.09 feet, 0.45° at 1000 KHz

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

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

Tower 1 Sample Line Mean Zmag:	51.2880 ohms
Tower 2 Sample Line Mean Zmag:	50.6772 ohms
Tower 3 Sample Line Mean Zmag:	50.1409 ohms
Tower 4 Sample Line Mean Zmag:	50.2305 ohms

Maximum Variation in Sample Line Impedance: 1.1471 ohms

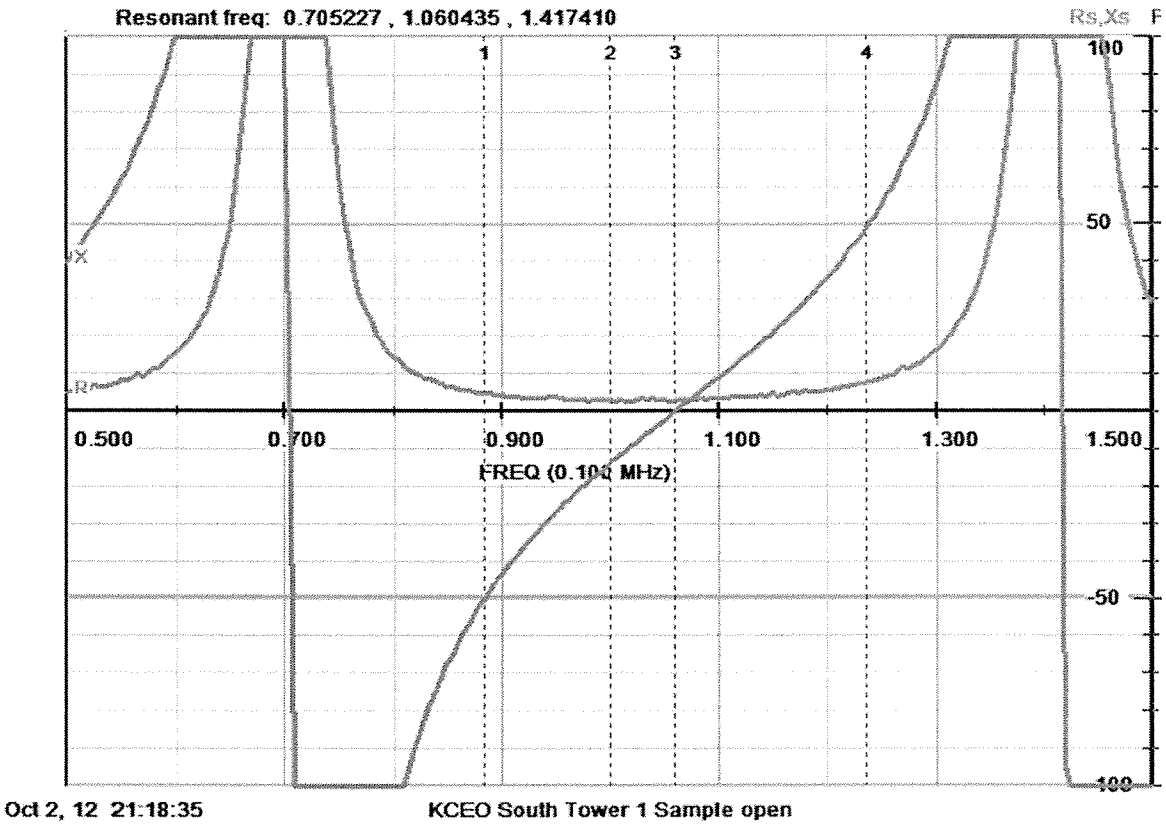
Sample Impedance From Monitor End (with sample element connected, see graph data):

Tower 1 (South) Sample Impedance:	52.656 -j2.701 ohms
Tower 2 (Center) Sample Impedance:	53.527 -j3.056ohms
Tower 3 (North) Sample Impedance:	52.749 -j2.479 ohms
Tower 4 (West) Sample Impedance:	52.736 -j2.879 ohms

Maximum Variation in Sample Resistance: 0.871 ohms
Maximum Variation in Sample Reactance: j0.577 ohms

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

Tower 1 (South) Sample Line (open circuit)



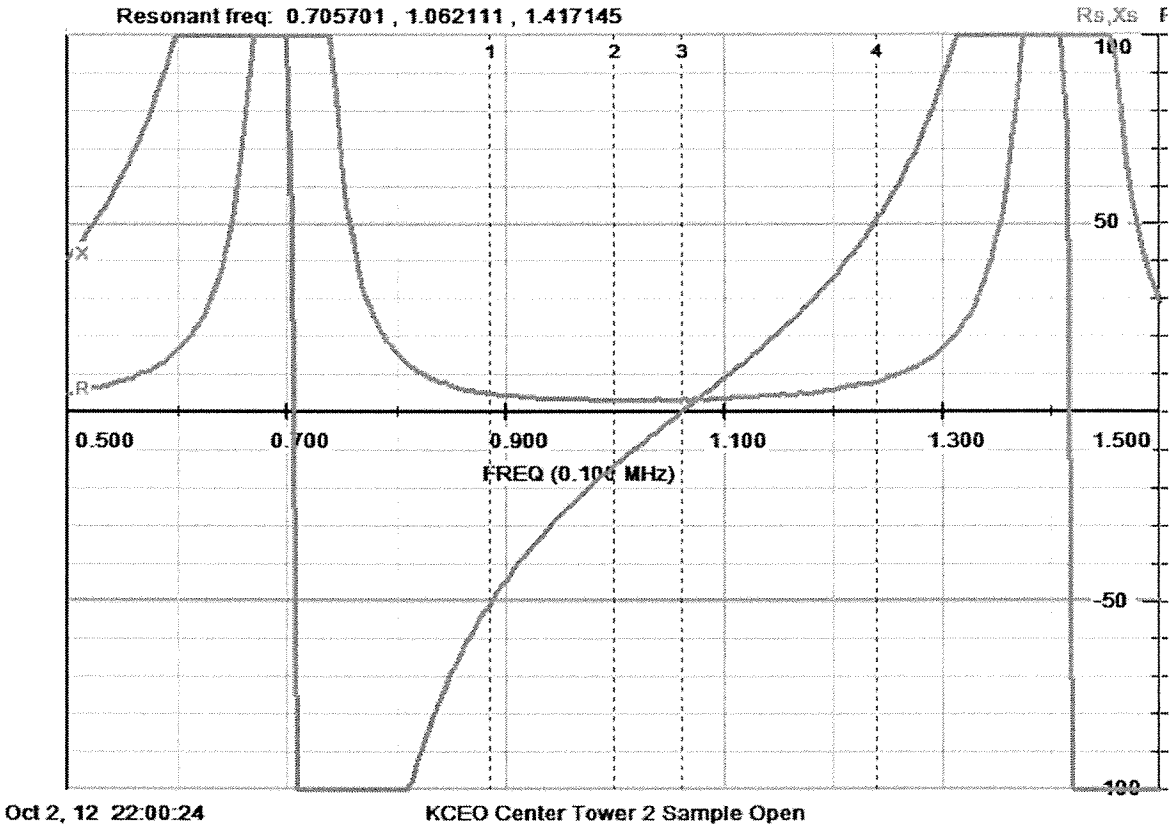
Marker	Freq	Rs	Xs	Zmag
[1]	0.883693	4.892	-50.301	50.538
[2]	1.000000	3.177	-13.328	
[3]	1.060435	2.879	-0.000	
[4]	1.237174	7.678	49.151	49.747

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: 50.1409 ohms

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

Tower 2 (Center) Sample Line (open circuit)



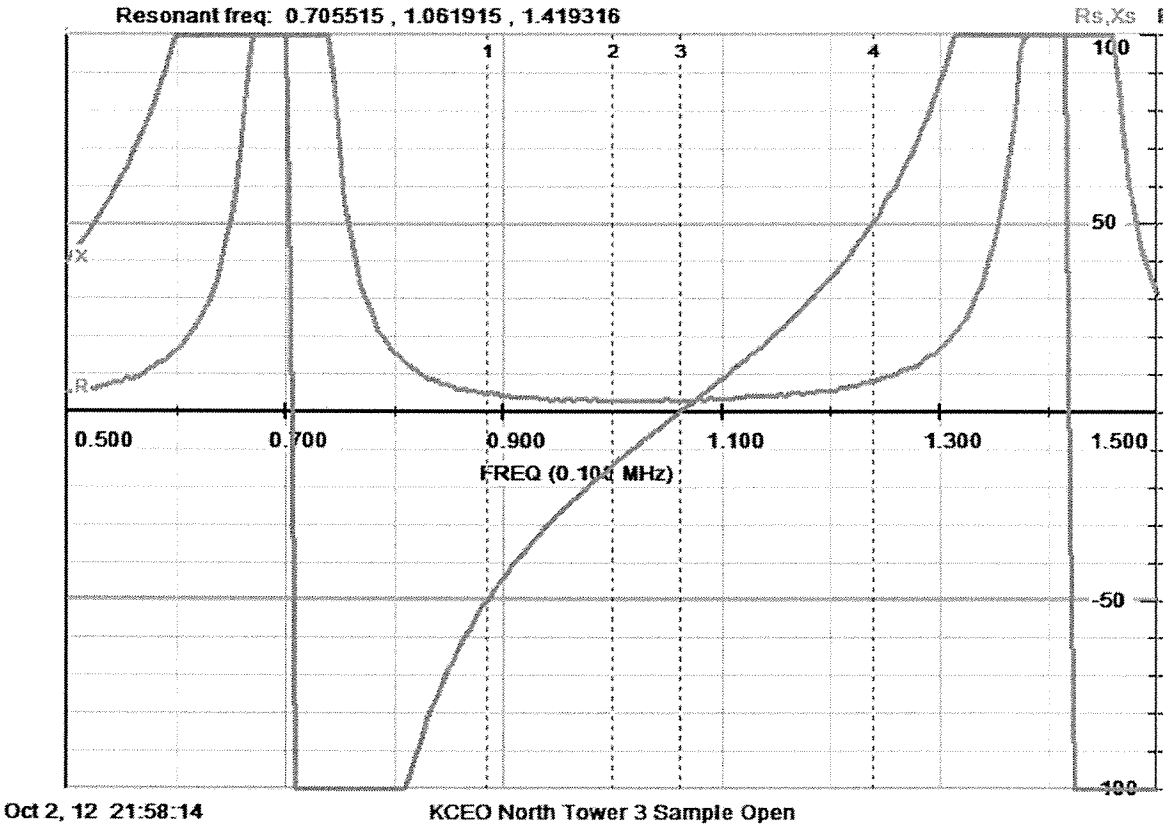
Marker	Freq	Rs	Xs	Zmag
[1]	0.885092	4.993	-51.088	51.331
[2]	1.000000	3.221	-14.424	
[3]	1.062111	3.368	0.000	
[4]	1.239129	7.868	50.638	51.245

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: 51.2880 ohms

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

Tower 3 (North) Sample Line (open circuit)



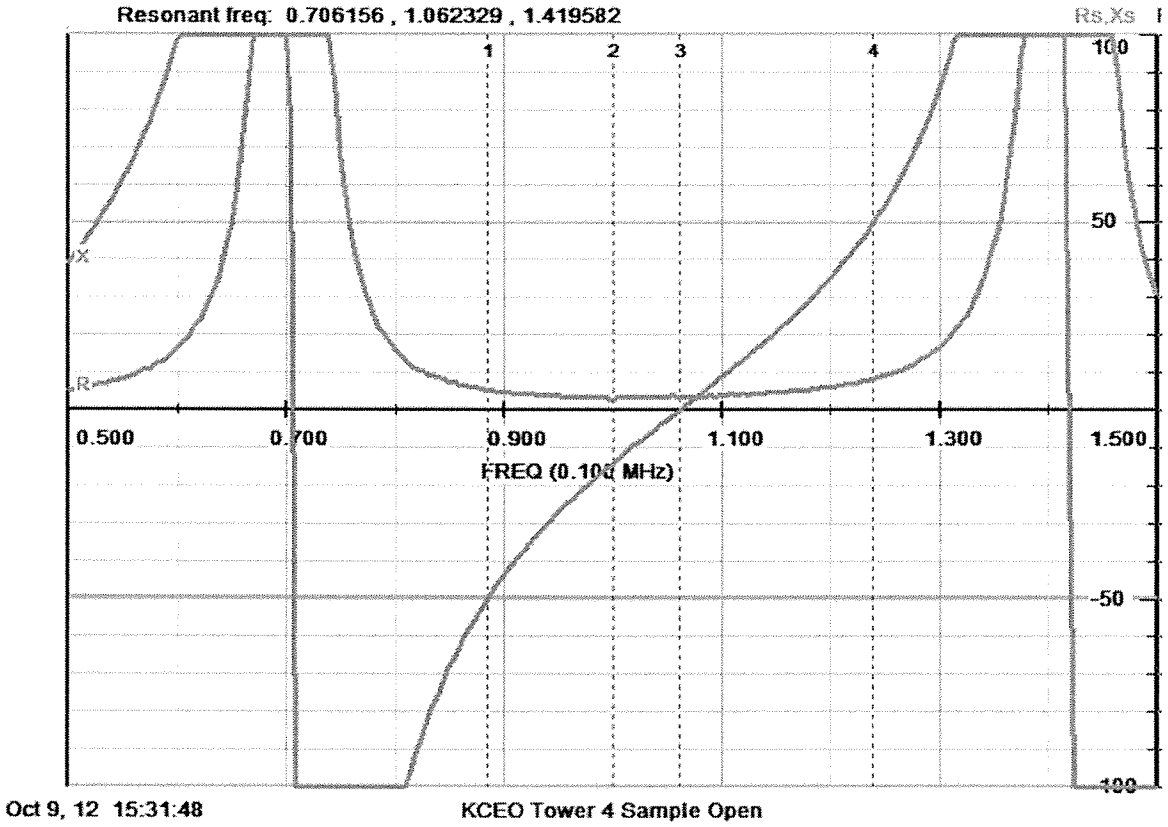
Marker	Freq	Rs	Xs	Zmag
[1]	0.884929	5.000	-50.592	50.839
[2]	1.000000	3.206	-14.234	
[3]	1.061915	3.095	0.000	
[4]	1.238901	8.275	49.834	50.516

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: 50.6772 ohms

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

Tower 4 (West) Sample Line (open circuit)



Marker	Freq	Rs	Xs	Zmag
[1]	0.885274	5.308	-49.933	50.214
[2]	1.000000	2.344	-14.359	
[3]	1.062329	3.466	0.000	
[4]	1.239384	8.311	49.555	50.247

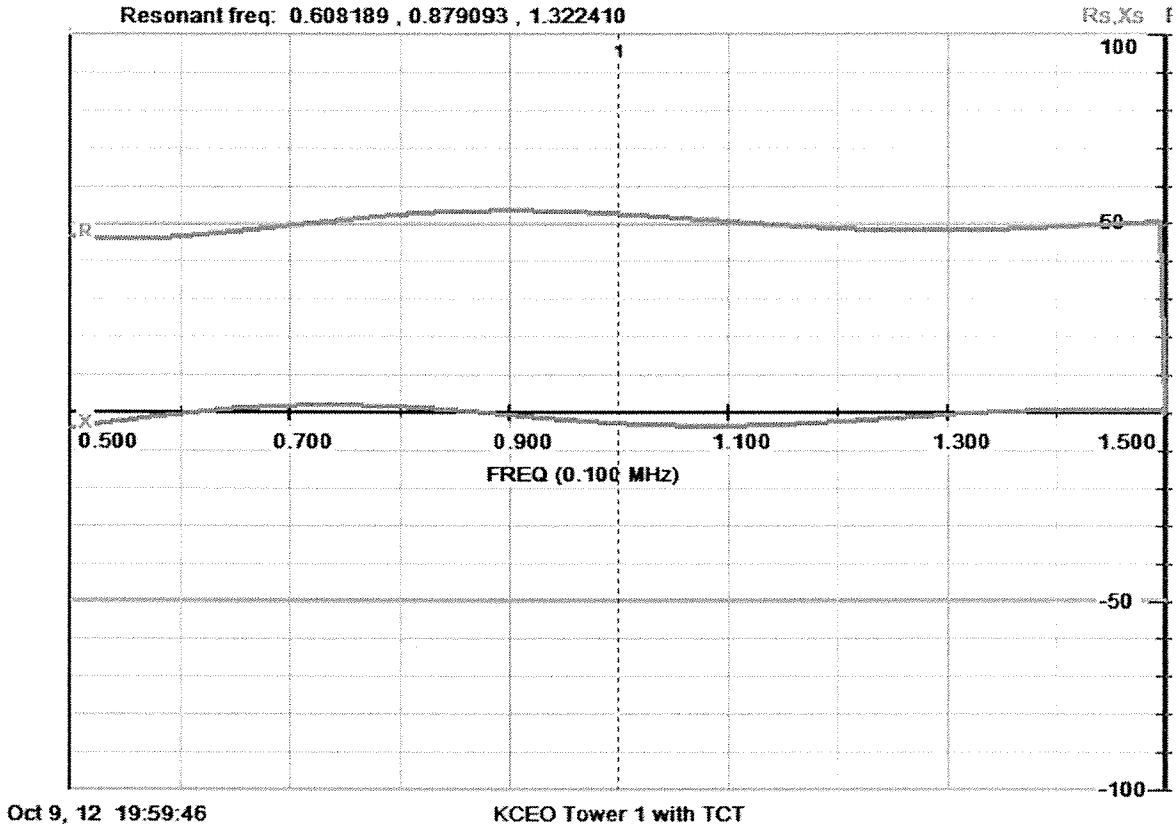
Markers: [1] = closest odd quarter wave minus 1/8 wavelength
[2] = operating frequency
[3] = closest odd quarter wave
[4] = closest odd quarter wave plus 1/8 wavelength

Mean Tower 4 Sample Line Zmag: 50.2305 ohms

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

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

Tower 1 (South)

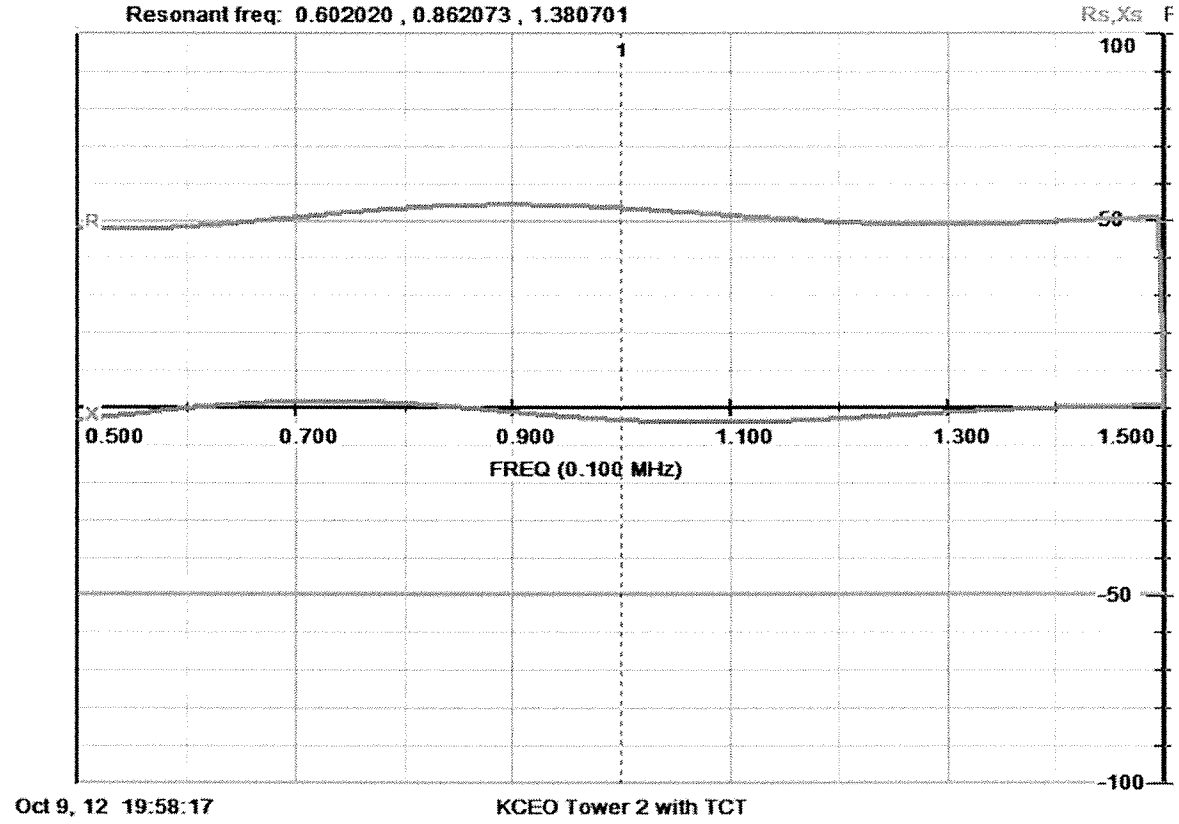


Impedance of Tower 1 line at 1000 KHz, monitor end with transformer connected at other end:

52.656 -j2.701ohms

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

Tower 2 (Center)

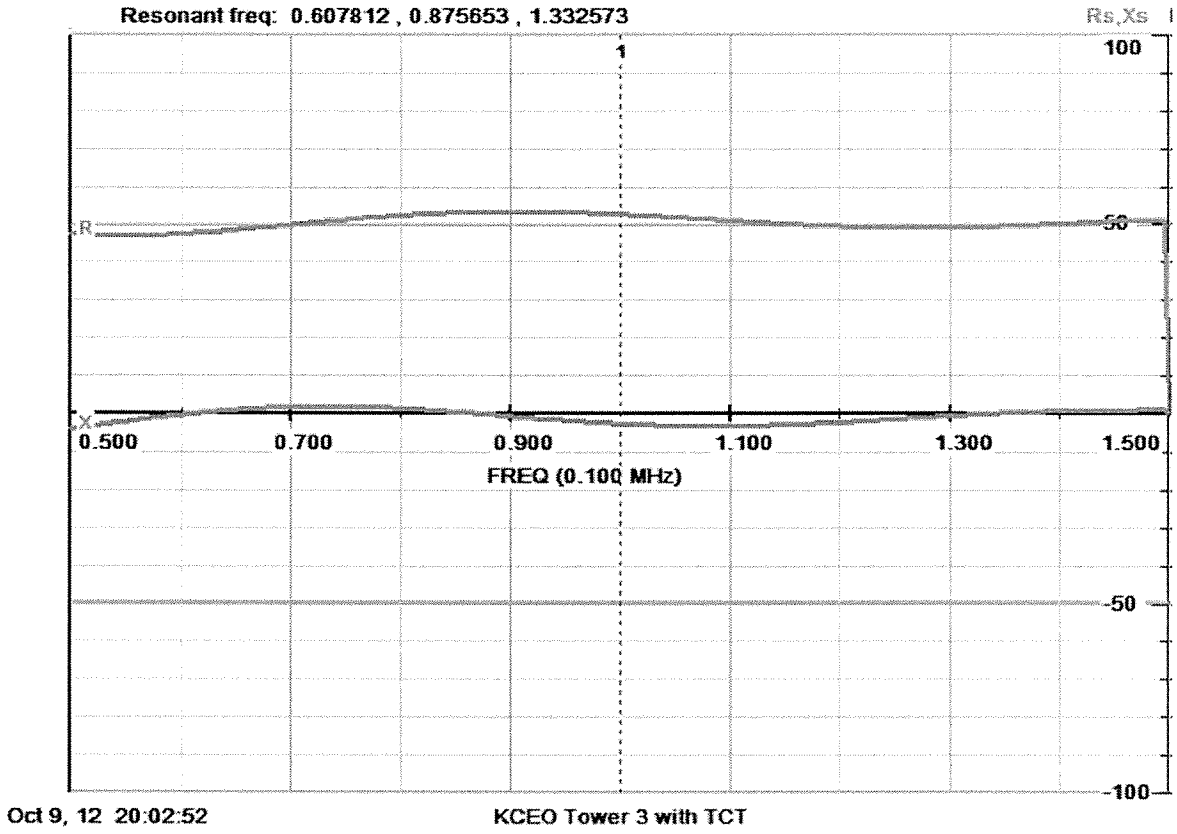


Impedance of Tower 2 line at 1000 KHz, monitor end with transformer connected at other end:

53.527 -j3.056 ohms

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

Tower 3 (North)

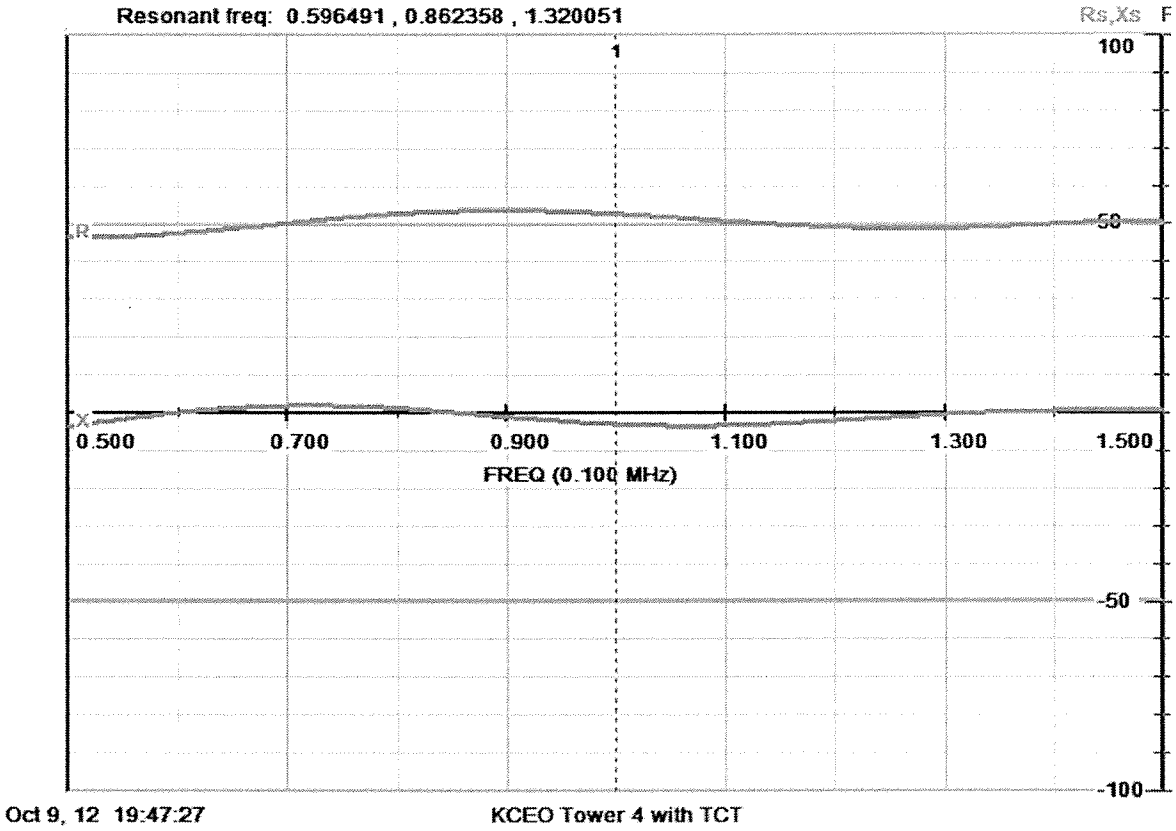


Impedance of Tower 3 line at 1000 KHz, monitor end with transformer connected at other end:

52.749 -j2.479 ohms

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

Tower 4 (West)



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

52.736 -j2.879 ohms

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

KCEO Daytime Reference Field Strength Measurements

[47 CFR 73.151(c)(3)]

Point	Distance	mv/m	Coordinates (NAD 83)	Description
20° True (Minima, monitor point radial)				
1:	0.98 km	180	33.241126,-117.266981	1504 Glacier
2:	1.64	84	33.246703,-117.264547	1652 Seattle Slew Way
3:	1.71	82	33.247296,-117.264348	Old Ranch Rd. at transformer box
47° True (Maxima)				
1:	2.15	44	33.245963,-117.253651	1657 Mission Meadows
2:	2.23	39	33.246488,-117.253044	5719 Shetland Court
3:	2.36	42	33.247273,-117.251952	1714 Shire Ave.
65° True (Minima, monitor point radial)				
1:	2.80	37	33.243469,-117.243370	2804 Hutchinson
2:	3.51	31	33.246123,-117.236344	Harris Drive by mailbox cluster
3:	3.90	39	33.247605,-117.232558	3040 Blackwell Drive
238° True (Maxima)				
1:	1.44	745	33.225886,-117.283725	1322 Napoli Street
2:	1.65	555	33.224970,-117.285595	4913 Verona Street
3:	2.03	560	33.223149,-117.289083	Avendia Mantilla @ park monument

Daytime pattern measurements taken 12:48 PM - 1:56 PM PDT, October 12, 2012 by the writer using Potomac Instruments FIM-41 s/n 1655.

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

KCEO Nighttime Reference Field Strength Measurements

[47 CFR 73.151(c)(3)]

Point	Distance	mv/m	Coordinates (NAD 83)	Description
70° True (Maxima, minor lobe)				
1:	1.54 km	112	33.237441,-117.255007	Guajone Lake Road at Ramona Drive
2:	2.29	100	33.239825,-117.247422	Bautista Ave. at electric meter
3:	3.38	68	33.243201,-117.236447	Hidden Lake Lane at fireplug
114° True (Minima, monitor point radial)				
1:	3.53	10	33.219877,-117.235928	Calle Jules at phone box
2:	4.19	11	33.217400,-117.229432	617 Lynette Court
3:	4.46	8.4	33.216434,-117.226829	Bobier @ North Gate Market
209° True (Maxima, major lobe)				
1:	1.96	238	33.217386,-117.280798	1745 Calle Platico
2:	2.28	178	33.214835,-117.282464	1779 Avenida Segovia
3:	2.56	172	33.212645,-117.283875	1849 Corte Segundo
311.5° True (Minima, monitor point radial)				
1:	1.20	16	33.239943,-117.280301	886 Pinewood
2:	1.32	12.5	33.240697,-117.281253	5174 Prado Court
3:	1.65	14.5	33.242656,-117.283840	5224 Silver Bluff Drive
334° True (Maxima between nulls)				
1:	4.85	5.5	33.252143,-117.273021	1023 Vista Pointe Blvd.
2:	5.05	3.45	33.250247,-117.272707	Douglas Dr. at Parkview Dr.
3:	5.33	4.9	33.253422,-117.273182	1095 Parkview by mailboxes
354° True (Minima)				
1:	1.95	20	33.273567,-117.294448	5446 Elderberry Way
2:	2.16	17.5	33.272028,-117.293488	5479 Loganberry Way (end of street)
3:	2.31	16	33.275892,-117.295769	5471 Gooseberry Way (end of street)

Nighttime pattern measurements taken 2:59 PM – 4:51 PM PDT, October 12, 2012 by the writer using Potomac Instruments FIM-41 s/n 1655.

The FIM-41 used for the daytime and nighttime measurements was last calibrated by the factory in 2004 but is compared to other similar meters at each station it is used at and has never been more than 1% different. The most recent comparison was in March 2012 with a FIM-41 last calibrated in February 2012. The meters agreed within 0.5%.

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

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° at 190° T)

Tower 2 (C) to 3 (N): 218.3 feet (79.87°) at 11.00° True (theo. =80° at 10° T)

Tower 2 (C) to 4 (W): 245.4 feet (89.78°)* at 281.29° True (theo. = 86° at 280° 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 1.29°. The theoretical tower spacings and orientation were used in the model.

* The tower 4 spacing is 3.78° longer than that called for in the construction permit, outside the allowable +/-1.5° tolerance. The construction permit is being modified to reflect this spacing along with 281° True for the bearing in order to comply with the 1.5° absolute tower location limit. 89° spacing and 281° bearing was used to model the array and generate this report.

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

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

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 Broadcast Electronics AM-6A 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 October 22, 2012 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 to arise in the first year of operation.

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

Mueller Broadcast Design
613 S. La Grange Road
La Grange, Illinois 60525
(708) 352-2166

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.

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 13, 2012
Amended December 7, 2012

Mark A. Mueller