SECTION II - APPLICANT INFORMATION			
1. NAME OF APPLICANT	Cox Radio, LLC		
MAILING ADDRESS	1601 West Peachtree Street, NE		
CITY	Atlanta	STATE GA	ZIP CODE 30309

2. This application is for:

[X] Commercial [ ] Noncommercial

[X] 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
KRMG(AM)	Tulsa, OK	N/A	N/A	N/A

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. N/A

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. N/A

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. N/A

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

[X] 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 [X] 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	
Eric Greenberg	/s/ Eric Greenberg	
Title: Vice President & Secretary	Date: 11/6/2022	Telephone Number: 404-897-7000

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

Cox Radio, LLC

PURPOSE OF AUTHORIZATION APPLIED FOR: (check one)

☐ Station License ☒ Direct Measurement of Power

1. Facilities authorized in construction permit

Call Sign	File No. of Construction Permit (if applicable)	Frequency (kHz)	Hours of Operation	Power in kilowatts	
				Night	Day
KRMG(AM)		740	Unlimited	25.0	50.0

2. Station location

State	City or Town
OK	Tulsa

3. Transmitter location

State	County	City or Town	Street address (or other identification)
OK	Tulsa	Sand Springs, OK	5801 S. 265th W. Avenue

4. Main studio location

State	County	City or Town	Street address (or other identification)
OK	Tulsa	Tulsa	2625 S. Memorial Drive

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

State	County	City or Town	Street address (or other identification)
OK	Tulsa	Tulsa	2625 S. Memorial Drive

6. Has type-approved stereo generating equipment been installed? ☐ Yes ☒ No

7. Does the sampling system meet the requirements of 47 C.F.R. Section 73.68? ☒ Yes ☐ No ☐ Not Applicable

Attach as an Exhibit a detailed description of the sampling system as installed. Exhibit No.

8. Operating constants:

RF common point or antenna current (in amperes) without modulation for night system	RF common point or antenna current (in amperes) without modulation for day system
22.9	32.4
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 j0 Day j0

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	-16.6	-5.9	0.638	0.524		
2	0.0	0.0	1.000	1.000		
3	13.4	-10.8	0.511	0.530		
4	-46.8		0.484			
5	-60.9		0.998			
6	-74.5		0.646			

Manufacturer and type of antenna monitor: Potomac Instruments AM-1901

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.
Uniform cross-section guyed towers	82.9	Per ASR	Per ASR	Exhibit No.

Excitation [X] 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	36 °	4 '	50 "	West Longitude	96°	17 '	9 "

If not fully described above, attach as an Exhibit further details and dimensions including any other antenna mounted on tower and associated isolation circuits. Exhibit No.

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

As described in BMML-20141128AIE

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.

Replacement of tower obstruction lighting

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)
Thomas S. Gorton	
Address (include ZIP Code) Hatfield & Dawson Consulting Engineers 9500 Greenwood Ave N Seattle, WA 98103-3012	Date October 28, 2022
	Telephone No. (Include Area Code) (206) 783-9151

[ ] Technical Director

[X] Registered Professional Engineer

[ ] Chief Operator

[ ] Technical Consultant

[ ] Other (specify)

STEPHEN S. LOCKWOOD, PE, PMP
———
THOMAS M. ECKELS, PE
THOMAS S. GORTON, PE
———
JAMES B. HATFIELD, PE
BENJAMIN F. DAWSON III, PE
ERIK C. SWANSON, PE, PMP
DAVID J. PINION, PE
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TELEPHONE (206) 783-9151
FACSIMILE (206) 789-9834
E-MAIL hatdaw@hatdaw.com
———
MAURY L. HATFIELD, PE
(1942-2009)
PAUL W. LEONARD, PE
(1925-2011)

Application for Modified License
and
Method of Moments "Partial" Proof of Performance
per
47CFR 1.30003(b)(2)

KRMG(AM)

Tulsa, OK

Facility ID 48729

740 kHz

50 kW Day, 25 kW Night DA-2

Cox Radio, LLC

October 2022

APPLICATION FOR MODIFIED LICENSE
RADIO STATION KRMG(AM) Tulsa, OK
740 kHz 50 kW Day, 25 kW Night DA-2

Purpose of Application

Item 1	Analysis of Tower Impedance Measurements to Verify Method of Moments Model
Item 2	Method of Moments Model Details for Towers Driven Individually
Item 3	Method of Moments Model Details for Directional Antenna Patterns
Item 4	Derivation of Operating Parameters for Directional Antenna

Purpose of Application

This engineering exhibit supports an application by Cox Radio, LLC. for a modified station license for radio station KRMG(AM) Tulsa, OK (Facility ID 48729). KRMG operates on 740 kHz with a power of 50 kW daytime and 25 kW nighttime using a 3 tower directional antenna for daytime operation and a 6 tower directional antenna for nighttime operation. KRMG was previously licensed via a method of moments proof of performance. A new method of moments proof is now being submitted following the replacement of the tower obstruction lighting on the towers of the KRMG array.

Information is provided herein demonstrating that the directional antenna parameters for the pattern authorized by the KRMG license (BMML-20141128AIE) have been determined in accordance with the requirements of section §73.151 of the FCC Rules. The system has been adjusted to produce antenna monitor parameters within +/- 5 percent in ratio and +/- 3 degrees in phase of the modeled values, as required by the Rules.

All measurements contained in this report were made by Stephen S. Lockwood P.E.

Item 1

Analysis of Tower Impedance Measurements to Verify Method of Moments Model

Tower base impedance measurements were made at the locations of the sample system current transformers using an Advantest R3754A network analyzer and a HP 8751A network analyzer in a calibrated measurement system. The other towers were open circuited at the same point where impedance measurements were made (the "reference points") for each of the measurements.

The reference point measurements are listed in the table below.

KRMG Measured "Reference Point" Impedances

Tower	Resistance	Reactance
1	26.6	-j14.4
2	26.1	-j27.2
3	25.4	-j28.0
4	27.9	-j12.8
5	28.0	-j17.6
6	26.5	-j25.6

Circuit calculations were performed to relate the method of moments modeled impedances at the tower base feed points to those at the measurement locations as shown in the diagram titled *Analysis of Tower Impedance Measurements to Verify Method of Moments Model*. The series/parallel equivalent impedance of X_{LT}, X_{SDC}, X_S and X_C was used in the moment method model as a load at ground level (lumped load) for the open circuited towers.

These measurements were then compared with those in the BMML-20141128AIE Moment Method Proof of Performance, which was the basis of the operating parameters in the present KRMG license.

	2022 Measurements		BMML-20141128AIE Measurements		Allowable Change (+/-2 ohms +/-4%)		Change Value		Meets Requirements	
Tower #	Resistance (R)	Reactance (X)	Resistance (R)	Reactance (X)	Resistance (R)	Reactance (X)				
1	26.6	-14.4	25.16	-16.78	3.01	2.67	1.44	2.38	Y	Y
2	26.1	-27.2	25.60	-28.63	3.02	3.15	0.50	1.43	Y	Y
3	25.4	-28.0	24.22	-24.86	2.97	2.99	1.18	3.14	Y	NO
4	27.9	-12.8	26.94	-14.13	3.08	2.57	0.96	1.33	Y	Y
5	28.0	-17.6	27.17	-23.24	3.09	2.97	0.83	5.76	Y	NO
6	26.5	-25.6	25.40	-28.67	3.02	3.15	1.10	3.07	Y	Y

As noted, two of the new measurements are more than +/- 2 ohms +/- 4% from those in the BMML-20141128AIE proof of performance. Therefore, pursuant to the requirement of 47CFR1.30003(b)(2) a new moment method analysis of the operation of the antenna system's two operating patterns has been performed.

Item 2

Method of Moments Model Details for Towers Driven Individually - KRMG

The array of towers was modeled using Expert MININEC Broadcast Professional Version 14.0. One wire was used to represent each tower. The top and bottom wire end points were specified using electrical degrees in the geographic coordinate system, using the theoretical directional antenna specifications for tower spacing and orientation. Each tower was modeled using 20 wire segments. As the tallest tower in the KRMG model is 79.0 electrical degrees in height, the maximum segment length is 3.95 electrical degrees.

Each tower's modeled height relative to its physical height falls within the required range of 75 to 125 percent of the actual tower height. Five of the towers have four sides with a face width of 18", the #5 tower is triangular with a face width of 24", thus all six towers have a circumference of 72".

KRMG Tower Dimensions - Physical and Modeled

Tower	Physical Height (Degrees)	Modeled Height (degrees)	Modeled Height (percent)	Modeled Radius (meters)	Modeled Radius (percent)
1	73.7	78.0	105.8	.29	100
2	73.7	78.0	105.8	.29	100
3	73.7	77.5	105.2	.29	100
4	73.7	79.0	107.2	.29	100
5	73.7	79.0	107.2	.29	100
6	73.7	78.0	105.8	.29	100

KRMG MININEC Model Node and Wire Numbering

Tower	Wire Number	Base Node Number
1	1	1
2	2	21
3	3	41
4	4	61
5	5	81
6	6	101

The following pages show the details of the method of moments model.

Unless otherwise noted, this report uses the tower numbering scheme used in the CDBS record for the night pattern. The day pattern uses tower # 1-3, but numbers the towers differently.

To avoid confusion caused by this inconsistent numbering, Cox requests that the theoretical parameters for the daytime pattern listed on the station license and contained in the CDBS be modified as shown in the table below:

Tower	Ratio	Phase	Spacing	Orientation	Tower Ref	Height	ASR
1	0.519	-5.9	0	0	0	73.7	1018469
2	1.0	0	195.0	350.0	0	73.7	1018468
3	0.519	-10.9	390.0	350.0	0	73.7	1018467

The modification above will allow the removal of Special Operating Condition #4 from the license.

KRMG Tower 1 Driven, Other Towers Open Circuit at Current Transformer Location

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.29	20
		0	0	78.		
2	none	195.	350.	0	.29	20
		195.	350.	78.		
3	none	390.	350.	0	.29	20
		390.	350.	77.5		
4	none	601.7	7.7	0	.29	20
		601.7	7.7	79.		
5	none	420.2	15.8	0	.29	20
		420.2	15.8	79.		
6	none	259.	35.	0	.29	20
		259.	35.	78.		

Number of wires = 6
current nodes = 120

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	3	3.875	4	3.95
radius	1	.29	1	.29

ELECTRICAL DESCRIPTION
Frequencies (KHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	740.	0	1	.0107639	.0109722

Sources

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

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	21	0	-7,400.	0	0	0
2	41	0	-7,400.	0	0	0
3	61	0	-7,400.	0	0	0
4	81	0	-7,400.	0	0	0
5	101	0	-7,400.	0	0	0

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IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
740.	**26.524**	**-44.092**	51.455	301.	3.604	-4.9499	-1.6743

KRMG Tower 2 Driven, Other Towers Open Circuit at Current Transformer Location

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

wire  caps Distance     Angle        Z            radius       segs
 1    none 0            0           0            .29           20
           0            0           78.
 2    none 195.         350.        0            .29           20
           195.         350.        78.
 3    none 390.         350.        0            .29           20
           390.         350.        77.5
 4    none 601.7        7.7         0            .29           20
           601.7        7.7         79.
 5    none 420.2        15.8        0            .29           20
           420.2        15.8        79.
 6    none 259.         35.         0            .29           20
           259.         35.         78.

Number of wires          =  6
          current nodes  =  120

                         minimum                  maximum
Individual wires      wire    value             wire  value
segment length         3      3.875              4    3.95
radius                 1      .29                1    .29


ELECTRICAL DESCRIPTION
Frequencies (KHz)
     frequency                 no. of  segment length (wavelengths)
 no. lowest       step         steps   minimum        maximum
 1   740.         0             1      .0107639       .0109722

Sources
source node    sector  magnitude      phase          type
 1      21      1       1.             0              voltage

Lumped loads
             resistance    reactance     inductance  capacitance passive
load  node   (ohms)        (ohms)        (mH)        (uF)        circuit
 1     1     0             -7,400.       0           0            0
 2     41    0             -7,400.       0           0            0
 3     61    0             -7,400.       0           0            0
 4     81    0             -7,400.       0           0            0
 5     101   0             -7,400.       0           0            0

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IMPEDANCE
   normalization = 50.
freq     resist   react    imped    phase    VSWR    S11      S12
(KHz)    (ohms)   (ohms)   (ohms)   (deg)             dB       dB
source =  1; node 21, sector 1
740.     26.864   -43.896  51.464   301.5    3.5514  -5.0273  -1.6383
```

KRMG Tower 3 Driven, Other Towers Open Circuit at Current Transformer Location

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

wire  caps Distance     Angle        Z            radius       segs
 1    none 0            0           0            .29           20
           0            0           78.
 2    none 195.         350.        0            .29           20
           195.         350.        78.
 3    none 390.         350.        0            .29           20
           390.         350.        77.5
 4    none 601.7        7.7         0            .29           20
           601.7        7.7         79.
 5    none 420.2        15.8        0            .29           20
           420.2        15.8        79.
 6    none 259.         35.         0            .29           20
           259.         35.         78.

Number of wires          =  6
          current nodes  =  120

                         minimum                  maximum
Individual wires      wire    value             wire  value
segment length         3      3.875              4    3.95
radius                 1      .29                1    .29


ELECTRICAL DESCRIPTION
Frequencies (KHz)
     frequency                 no. of  segment length (wavelengths)
 no. lowest       step         steps   minimum        maximum
 1   740.         0             1      .0107639       .0109722

Sources
source node    sector  magnitude      phase          type
 1      41      1       1.             0              voltage

Lumped loads
             resistance    reactance     inductance  capacitance passive
load  node   (ohms)        (ohms)        (mH)        (uF)        circuit
 1     1     0             -7,400.       0           0            0
 2     21    0             -7,400.       0           0            0
 3     61    0             -7,400.       0           0            0
 4     81    0             -7,400.       0           0            0
 5     101   0             -7,400.       0           0            0

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IMPEDANCE
   normalization = 50.
freq     resist   react    imped    phase    VSWR    S11      S12
(KHz)    (ohms)   (ohms)   (ohms)   (deg)             dB       dB
source =  1; node 41, sector 1
740.     26.083   -46.602  53.405   299.2    3.8437  -4.6258  -1.8355
```

KRMG Tower 4 Driven, Other Towers Open Circuit at Current Transformer Location

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

wire  caps Distance     Angle        Z            radius       segs
 1    none 0            0           0            .29           20
           0            0           78.
 2    none 195.         350.        0            .29           20
           195.         350.        78.
 3    none 390.         350.        0            .29           20
           390.         350.        77.5
 4    none 601.7        7.7         0            .29           20
           601.7        7.7         79.
 5    none 420.2        15.8        0            .29           20
           420.2        15.8        79.
 6    none 259.         35.         0            .29           20
           259.         35.         78.

Number of wires          =  6
          current nodes  =  120

                         minimum                  maximum
Individual wires      wire    value             wire  value
segment length         3      3.875              4    3.95
radius                 1      .29                1    .29


ELECTRICAL DESCRIPTION
Frequencies (KHz)
     frequency                 no. of  segment length (wavelengths)
 no. lowest       step         steps   minimum        maximum
 1   740.         0             1      .0107639       .0109722

Sources
source node    sector  magnitude      phase          type
 1      61      1       1.             0              voltage

Lumped loads
             resistance    reactance     inductance  capacitance passive
load  node   (ohms)        (ohms)        (mH)        (uF)        circuit
 1     1     0             -7,400.       0           0            0
 2     21    0             -7,400.       0           0            0
 3     41    0             -7,400.       0           0            0
 4     81    0             -7,400.       0           0            0
 5     101   0             -7,400.       0           0            0

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IMPEDANCE
   normalization = 50.
freq     resist   react    imped    phase    VSWR    S11      S12
(KHz)    (ohms)   (ohms)   (ohms)   (deg)             dB       dB
source =  1; node 61, sector 1
740.     27.585   -38.763  47.576   305.4    3.1347  -5.7422  -1.3463
```

KRMG Tower 5 Driven, Other Towers Open Circuit at Current Transformer Location

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.29	20
		0	0	78.		
2	none	195.	350.	0	.29	20
		195.	350.	78.		
3	none	390.	350.	0	.29	20
		390.	350.	77.5		
4	none	601.7	7.7	0	.29	20
		601.7	7.7	79.		
5	none	420.2	15.8	0	.29	20
		420.2	15.8	79.		
6	none	259.	35.	0	.29	20
		259.	35.	78.		

Number of wires = 6
current nodes = 120

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	3	3.875	4	3.95
radius	1	.29	1	.29

ELECTRICAL DESCRIPTION
Frequencies (KHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	740.	0	1	.0107639	.0109722

Sources

source	node	sector	magnitude	phase	type
1	81	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-7,400.	0	0	0
2	21	0	-7,400.	0	0	0
3	41	0	-7,400.	0	0	0
4	61	0	-7,400.	0	0	0
5	101	0	-7,400.	0	0	0

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IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 81, sector 1							
740.	**27.939**	**-38.565**	47.621	305.9	3.0894	-5.8328	-1.3138

KRMG Tower 6 Driven, Other Towers Open Circuit at Current Transformer Location

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

wire  caps Distance     Angle        Z            radius       segs
 1    none 0            0           0            .29           20
           0            0           78.
 2    none 195.         350.        0            .29           20
           195.         350.        78.
 3    none 390.         350.        0            .29           20
           390.         350.        77.5
 4    none 601.7        7.7         0            .29           20
           601.7        7.7         79.
 5    none 420.2        15.8        0            .29           20
           420.2        15.8        79.
 6    none 259.         35.         0            .29           20
           259.         35.         78.

Number of wires          =  6
          current nodes  =  120

                         minimum                  maximum
Individual wires      wire    value             wire  value
segment length         3      3.875              4    3.95
radius                 1      .29                1    .29


ELECTRICAL DESCRIPTION
Frequencies (KHz)
     frequency                 no. of  segment length (wavelengths)
 no. lowest       step         steps   minimum        maximum
 1   740.         0             1      .0107639       .0109722

Sources
source node    sector  magnitude      phase          type
 1      101     1       1.             0              voltage

Lumped loads
             resistance    reactance     inductance  capacitance passive
load  node   (ohms)        (ohms)        (mH)        (uF)        circuit
 1     1     0             -7,400.       0           0            0
 2     21    0             -7,400.       0           0            0
 3     41    0             -7,400.       0           0            0
 4     61    0             -7,400.       0           0            0
 5     81    0             -7,400.       0           0            0

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IMPEDANCE
   normalization = 50.
freq     resist   react    imped    phase    VSWR    S11      S12
(KHz)    (ohms)   (ohms)   (ohms)   (deg)             dB       dB
source =  1; node 101, sector 1
740.     26.604   -43.942  51.368   301.2    3.5841  -4.9789  -1.6607
```

Item 3

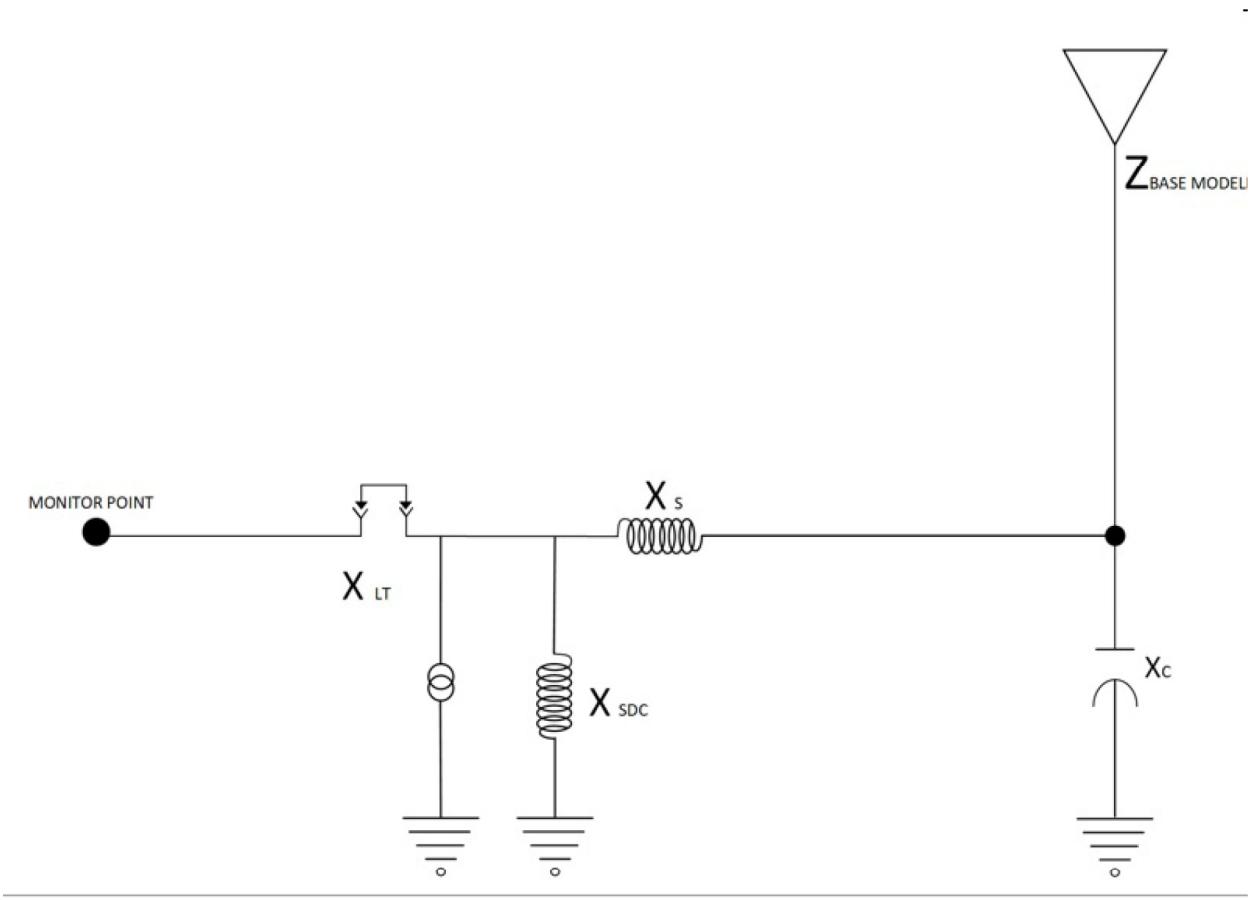
Method of Moments Model Details for Directional Antenna- KRMG

The array of towers was modeled using MININEC with the individual tower characteristics that were verified by the individual tower impedance measurements. Calculations were made to determine the complex voltage values for sources located at ground level under each tower of the array to produce current moment sums for the towers that, when normalized, equated to the theoretical field parameters of the authorized directional antenna patterns. In the schematic diagram on the following page,

X_C represents the capacitance between the tower and ground, including the base insulator
X_S represents the series inductance of the feed line connecting the ATU to the tower
X_{SDC} represents the reactance of the static drain choke
X_{LT} represents reactance of the tower lighting transformer

The values used for X_{SDC} and X_{LT} are based on values obtained from the manufacturer.
All towers also have a static drain choke.

In all cases, the modeled impedance at the measurement point is within one ohm of the measured impedance at that point.



Tower	X_{LT} (Ohms)	X_{SDC} (Ohms)	X_S (Ohms)	X_C (Ohms)	Z Base Modeled	Z MP Modeled	Z MP Measured
1	-j9.35k	+j14k	30	-j10k	26.5 -j44.1	26.2 -j14.0	26.6 -j14.4
2	-j9.35k	+j14k	16	-j10k	26.9 -j43.9	26.6 -j27.8	26.1 -j27.2
3	-j9.35k	+j14k	18	-j10k	26.1 -j46.6	25.8 -j 28.4	25.4 -j28.0
4	-j9.35k	+j14k	26	-j10k	27.6 -j38.8	27.4 -j12.7	27.9 -j12.8
5	-j9.35k	+j14k	21	-j10k	27.9 -j38.6	27.7 -j17.5	28.0 -j17.6
6	-j9.35k	+j14k	18	-j10k	26.6 -j43.9	26.3 -j25.8	26.5 -j25.6

KRMG Driven Array - Day Pattern

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

wire  caps Distance     Angle        Z            radius      segs
 1    none 0            0            0            .29          20
           0            0            78.
 2    none 195.         350.         0            .29          20
           195.         350.         78.
 3    none 390.         350.         0            .29          20
           390.         350.         77.5
 4    none 601.7        7.7          0            .29          20
           601.7        7.7          79.
 5    none 420.2        15.8         0            .29          20
           420.2        15.8         79.
 6    none 259.         35.          0            .29          20
           259.         35.          78.

Number of wires          =  6
          current nodes  =  120

                        minimum                  maximum
Individual wires      wire    value             wire  value
segment length         3      3.875              4    3.95
radius                 1      .29                1    .29


ELECTRICAL DESCRIPTION
Frequencies (KHz)
     frequency                 no. of  segment length (wavelengths)
 no. lowest       step         steps   minimum        maximum
 1   740.         0             1      .0107639       .0109722

Sources
source node    sector  magnitude      phase          type
 1      1       1      1,871.92       284.5          voltage
 2      21      1      3,215.55       291.           voltage
 3      41      1      1,973.17       279.2          voltage

Lumped loads
             resistance    reactance     inductance  capacitance passive
load  node   (ohms)        (ohms)        (mH)        (uF)        circuit
 1     61    0             608.          0           0            0
 2     81    0             613.          0           0            0
 3     101   0             613.          0           0            0
```

IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
740.	**19.156**	**-57.285**	60.403	288.5	6.2597	-2.7991	-3.2323
source = 2; node 21, sector 1							
740.	**17.837**	**-51.366**	54.375	289.1	5.9503	-2.9474	-3.0741
source = 3; node 41, sector 1							
740.	**19.584**	**-59.911**	63.031	288.1	6.4553	-2.7129	-3.3295

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CURRENT rms
Frequency = 740 KHz
Input power = 50,000. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	**21.9172**	**356.**	21.8641	-1.52491
2	0	0	3.9	21.2961	355.5	21.2306	-1.66947
3	0	0	7.8	20.7756	355.2	20.7019	-1.74842
4	0	0	11.7	20.2067	354.9	20.1262	-1.80119
5	0	0	15.6	19.5731	354.6	19.4871	-1.83246
6	0	0	19.5	18.8688	354.4	18.7784	-1.84429
7	0	0	23.4	18.092	354.2	17.9984	-1.83779
8	0	0	27.3	17.2426	354.	17.1469	-1.81366
9	0	0	31.2	16.3221	353.8	16.2256	-1.77245
10	0	0	35.1	15.3323	353.6	15.2361	-1.71462
11	0	0	39.	14.2755	353.4	14.1809	-1.64056
12	0	0	42.9	13.1545	353.2	13.0628	-1.55067
13	0	0	46.8	11.9718	353.1	11.8842	-1.44532
14	0	0	50.7	10.7301	352.9	10.648	-1.32487
15	0	0	54.6	9.43161	352.8	9.35629	-1.18958
16	0	0	58.5	8.07764	352.6	8.01046	-1.03961
17	0	0	62.4	6.66799	352.5	6.61035	-.8749
18	0	0	66.3	5.19904	352.3	5.15239	-.694889
19	0	0	70.2	3.65948	352.2	3.62544	-.497916
20	0	0	74.1	2.01824	352.	1.9988	-.279455
END	0	0	78.	0	0	0	0
GND	192.038	33.8614	0	**41.8225**	**1.9**	41.8007	1.35048
22	192.038	33.8614	3.9	40.7481	1.4	40.7363	.981344
23	192.038	33.8614	7.8	39.8225	1.1	39.8155	.746165
24	192.038	33.8614	11.7	38.7911	.8	38.7872	.548093
25	192.038	33.8614	15.6	37.6261	.6	37.6243	.375952
26	192.038	33.8614	19.5	36.3177	.4	36.317	.224991
27	192.038	33.8614	23.4	34.8628	.2	34.8626	.0929491
28	192.038	33.8614	27.3	33.2623	360.	33.2623	-.0213898
29	192.038	33.8614	31.2	31.5187	359.8	31.5185	-.118725
30	192.038	33.8614	35.1	29.636	359.6	29.6354	-.199485
31	192.038	33.8614	39.	27.6189	359.5	27.6177	-.26395
32	192.038	33.8614	42.9	25.4725	359.3	25.4706	-.312312
33	192.038	33.8614	46.8	23.2019	359.1	23.1993	-.344717
34	192.038	33.8614	50.7	20.8123	359.	20.8092	-.361274
35	192.038	33.8614	54.6	18.308	358.9	18.3045	-.362057

36	192.038	33.8614	58.5	15.6917	358.7	15.6879	-.347081
37	192.038	33.8614	62.4	12.9628	358.6	12.9589	-.316253
38	192.038	33.8614	66.3	10.1144	358.5	10.1108	-.269251
39	192.038	33.8614	70.2	7.12423	358.3	7.12127	-.2052
40	192.038	33.8614	74.1	3.93186	358.2	3.92997	-.121814
END	192.038	33.8614	78.	0	0	0	0
GND	384.075	67.7228	0	**22.1393**	**351.1**	21.8727	-3.42601
42	384.075	67.7228	3.875	21.4883	350.6	21.1986	-3.5165
43	384.075	67.7228	7.75	20.9486	350.2	20.6456	-3.55006
44	384.075	67.7228	11.625	20.3633	350.	20.0509	-3.55329
45	384.075	67.7228	15.5	19.7151	349.7	19.3966	-3.52944
46	384.075	67.7228	19.375	18.9973	349.4	18.6758	-3.48005
47	384.075	67.7228	23.25	18.208	349.2	17.8866	-3.40608
48	384.075	67.7228	27.125	17.3472	349.	17.0288	-3.30825
49	384.075	67.7228	31.	16.416	348.8	16.1037	-3.18721
50	384.075	67.7228	34.875	15.4163	348.6	15.1128	-3.04357
51	384.075	67.7228	38.75	14.3503	348.4	14.0587	-2.87794
52	384.075	67.7228	42.625	13.2206	348.3	12.9438	-2.69094
53	384.075	67.7228	46.5	12.0297	348.1	11.7707	-2.48317
54	384.075	67.7228	50.375	10.7804	347.9	10.5419	-2.25519
55	384.075	67.7228	54.25	9.47465	347.8	9.25954	-2.00746
56	384.075	67.7228	58.125	8.1137	347.6	7.92488	-1.74023
57	384.075	67.7228	62.	6.69737	347.5	6.53776	-1.45341
58	384.075	67.7228	65.875	5.22185	347.3	5.09452	-1.14613
59	384.075	67.7228	69.75	3.67568	347.2	3.58403	-.815692
60	384.075	67.7228	73.625	2.02757	347.	1.97588	-.454867
END	384.075	67.7228	77.5	0	0	0	0
GND	596.275	-80.6195	0	.204956	202.1	-.189848	-.0772325
62	596.275	-80.6195	3.95	.148064	202.2	-.137131	-.0558392
63	596.275	-80.6195	7.9	.111689	202.2	-.103383	-.0422656
64	596.275	-80.6195	11.85	.0809978	202.4	-.0748648	-.0309177
65	596.275	-80.6195	15.8	.0542759	202.9	-.0499886	-.0211425
66	596.275	-80.6195	19.75	.0308103	204.3	-.02809	-.0126581
67	596.275	-80.6195	23.7	.0103368	211.	-8.86E-03	-5.32E-03
68	596.275	-80.6195	27.65	7.92E-03	6.8	7.86E-03	9.38E-04
69	596.275	-80.6195	31.6	.0229964	15.6	.0221495	6.18E-03
70	596.275	-80.6195	35.55	.0356198	17.1	.0340519	.0104519
71	596.275	-80.6195	39.5	.04571	17.5	.0435848	.0137755
72	596.275	-80.6195	43.45	.0532706	17.7	.0507526	.0161844
73	596.275	-80.6195	47.4	.0583045	17.7	.0555505	.0177076
74	596.275	-80.6195	51.35	.0608095	17.6	.057967	.0183745
75	596.275	-80.6195	55.3	.0607767	17.4	.0579832	.0182144
76	596.275	-80.6195	59.25	.0581871	17.3	.0555695	.0172559
77	596.275	-80.6195	63.2	.0530016	17.	.050677	.0155248
78	596.275	-80.6195	67.15	.0451416	16.8	.0432176	.0130384
79	596.275	-80.6195	71.1	.0344338	16.5	.0330123	9.79E-03
80	596.275	-80.6195	75.05	.0204645	16.2	.0196492	5.72E-03
END	596.275	-80.6195	79.	0	0	0	0
GND	404.324	-114.412	0	.726344	290.1	.249376	-.682193
82	404.324	-114.412	3.95	.523159	290.1	.179743	-.491313
83	404.324	-114.412	7.9	.393462	290.2	.135588	-.369362
84	404.324	-114.412	11.85	.284244	290.3	.0986995	-.266558
85	404.324	-114.412	15.8	.189369	290.7	.0669508	-.177139
86	404.324	-114.412	19.75	.106255	291.8	.0394212	-.0986719
87	404.324	-114.412	23.7	.0338504	297.5	.0156542	-.0300132
88	404.324	-114.412	27.65	.0297973	98.9	-4.62E-03	.0294375
89	404.324	-114.412	31.6	.0828701	105.1	-.0215687	.080014
90	404.324	-114.412	35.55	.126923	106.2	-.0353332	.121906
91	404.324	-114.412	39.5	.161905	106.5	-.046021	.155227
92	404.324	-114.412	43.45	.187887	106.6	-.0537325	.18004

93	404.324	-114.412	47.4	.20493	106.6	-.0585654	.196383
94	404.324	-114.412	51.35	.213078	106.5	-.0606164	.204274
95	404.324	-114.412	55.3	.212352	106.4	-.0599822	.203705
96	404.324	-114.412	59.25	.202744	106.3	-.0567562	.194638
97	404.324	-114.412	63.2	.184178	106.1	-.0510205	.17697
98	404.324	-114.412	67.15	.156444	105.9	-.0428285	.150467
99	404.324	-114.412	71.1	.119013	105.7	-.0321581	.114586
100	404.324	-114.412	75.05	.070535	105.4	-.0187843	.0679878
END	404.324	-114.412	79.	0	0	0	0
GND	212.16	-148.556	0	1.07198	299.5	.527918	-.93297
102	212.16	-148.556	3.9	.774336	299.5	.38151	-.67383
103	212.16	-148.556	7.8	.584715	299.6	.288633	-.50851
104	212.16	-148.556	11.7	.425025	299.7	.210815	-.369058
105	212.16	-148.556	15.6	.286269	300.1	.143595	-.24765
106	212.16	-148.556	19.5	.164648	301.1	.0850544	-.140978
107	212.16	-148.556	23.4	.0585519	305.8	.0342523	-.047488
108	212.16	-148.556	27.3	.0349031	105.5	-9.34E-03	.0336293
109	212.16	-148.556	31.2	.112667	114.1	-.0460685	.102818
110	212.16	-148.556	35.1	.177492	115.4	-.0761611	.160321
111	212.16	-148.556	39.	.22915	115.8	-.0998048	.206273
112	212.16	-148.556	42.9	.267735	116.	-.117159	.24074
113	212.16	-148.556	46.8	.293327	116.	-.128369	.263746
114	212.16	-148.556	50.7	.305977	115.9	-.133574	.275282
115	212.16	-148.556	54.6	.305707	115.8	-.132906	.275305
116	212.16	-148.556	58.5	.292486	115.6	-.126483	.263724
117	212.16	-148.556	62.4	.266186	115.5	-.114391	.240353
118	212.16	-148.556	66.3	.226479	115.3	-.0966414	.204825
119	212.16	-148.556	70.2	.172569	115.	-.0730649	.156339
120	212.16	-148.556	74.1	.102461	114.8	-.0430079	.0929979
END	212.16	-148.556	78.	0	0	0	0

Medium wave array vertical current moment (amps-degrees) rms
(Calculation assumes tower wires are grouped together.
The first wire of each group must contain the source.)

tower	magnitude	phase (deg)
1	1,637.47	354.1
2	3,157.28	0.0
3	1,637.49	349.1
4	.350648	308.6
5	.982038	40.5
6	1.36474	16.5

KRMG Driven Array - Night Pattern

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

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.29	20
		0	0	78.		
2	none	195.	350.	0	.29	20
		195.	350.	78.		
3	none	390.	350.	0	.29	20
		390.	350.	77.5		
4	none	601.7	7.7	0	.29	20
		601.7	7.7	79.		
5	none	420.2	15.8	0	.29	20
		420.2	15.8	79.		
6	none	259.	35.	0	.29	20
		259.	35.	78.		

Number of wires = 6
current nodes = 120

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	3	3.875	4	3.95
radius	1	.29	1	.29

ELECTRICAL DESCRIPTION
Frequencies (KHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	740.	0	1	.0107639	.0109722

Sources

source	node	sector	magnitude	phase	type
1	1	1	1,103.37	278.	voltage
2	21	1	1,418.1	284.9	voltage
3	41	1	573.117	277.6	voltage
4	61	1	781.86	237.8	voltage
5	81	1	1,826.57	230.2	voltage
6	101	1	1,655.3	213.5	voltage

IMPEDANCE
normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
740.	**22.265**	**-51.043**	55.688	293.6	4.8241	-3.654	-2.4498
source = 2; node 21, sector 1							
740.	**10.909**	**-44.348**	45.67	283.8	8.2867	-2.1066	-4.1528
source = 3; node 41, sector 1							
740.	**-4.418**	**-35.98**	36.25	263.	****	****	****
source = 4; node 61, sector 1							
740.	**12.173**	**-50.582**	52.026	283.5	8.436	-2.069	-4.2138
source = 5; node 81, sector 1							
740.	**20.304**	**-55.424**	59.026	290.1	5.7197	-3.0687	-2.9527
source = 6; node 101, sector 1							
740.	**24.254**	**-79.298**	82.924	287.	7.6004	-2.299	-3.8614

CURRENT rms
Frequency = 740 KHz
Input power = 25,000. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	**14.0088**	**344.4**	13.4949	-3.75934
2	0	0	3.9	13.6512	343.8	13.1122	-3.79796
3	0	0	7.8	13.3428	343.5	12.7909	-3.79765
4	0	0	11.7	12.9989	343.1	12.4398	-3.77143
5	0	0	15.6	12.6101	342.8	12.0486	-3.72097
6	0	0	19.5	12.173	342.6	11.6138	-3.6472
7	0	0	23.4	11.6868	342.3	11.1344	-3.55074
8	0	0	27.3	11.1517	342.1	10.6104	-3.43215
9	0	0	31.2	10.5684	341.9	10.0426	-3.29201
10	0	0	35.1	9.93844	341.6	9.4324	-3.13088
11	0	0	39.	9.2631	341.4	8.78102	-2.94935
12	0	0	42.9	8.54429	341.2	8.09032	-2.74802
13	0	0	46.8	7.78359	341.1	7.3618	-2.52749
14	0	0	50.7	6.98285	340.9	6.59725	-2.28833
15	0	0	54.6	6.14339	340.7	5.79796	-2.03098
16	0	0	58.5	5.26612	340.5	4.96483	-1.75572
17	0	0	62.4	4.35086	340.4	4.09771	-1.46244
18	0	0	66.3	3.39524	340.2	3.19445	-1.15029
19	0	0	70.2	2.39182	340.	2.2481	-.816604
20	0	0	74.1	1.32022	339.9	1.23963	-.454203
END	0	0	78.	0	0	0	0
GND	192.038	33.8614	0	**21.9539**	**1.1**	21.95	.414031
22	192.038	33.8614	3.9	21.4586	.8	21.4565	.297251
23	192.038	33.8614	7.8	21.0145	.6	21.0133	.222839
24	192.038	33.8614	11.7	20.5066	.4	20.506	.16016
25	192.038	33.8614	15.6	19.9222	.3	19.922	.105685
26	192.038	33.8614	19.5	19.2574	.2	19.2573	.0579175

27	192.038	33.8614	23.4	18.5108	0.0	18.5108	.0161531
28	192.038	33.8614	27.3	17.6833	359.9	17.6833	-.0199806
29	192.038	33.8614	31.2	16.7764	359.8	16.7763	-.0506912
30	192.038	33.8614	35.1	15.7922	359.7	15.7921	-.0760982
31	192.038	33.8614	39.	14.7334	359.6	14.7331	-.0962726
32	192.038	33.8614	42.9	13.6026	359.5	13.6021	-.111255
33	192.038	33.8614	46.8	12.4026	359.4	12.402	-.12107
34	192.038	33.8614	50.7	11.1361	359.4	11.1354	-.12573
35	192.038	33.8614	54.6	9.80545	359.3	9.80465	-.12523
36	192.038	33.8614	58.5	8.41202	359.2	8.41117	-.119548
37	192.038	33.8614	62.4	6.95548	359.1	6.95463	-.10862
38	192.038	33.8614	66.3	5.43198	359.	5.4312	-.092304
39	192.038	33.8614	70.2	3.82955	358.9	3.8289	-.0702675
40	192.038	33.8614	74.1	2.11542	358.9	2.11501	-.0416905
END	192.038	33.8614	78.	0	0	0	0
GND	384.075	67.7228	0	**11.1782**	**14.6**	10.8172	2.81774
42	384.075	67.7228	3.875	10.9686	14.7	10.6088	2.7862
43	384.075	67.7228	7.75	10.769	14.8	10.4123	2.74879
44	384.075	67.7228	11.625	10.5319	14.8	10.1802	2.6992
45	384.075	67.7228	15.5	10.2523	14.9	9.90739	2.63687
46	384.075	67.7228	19.375	9.92849	15.	9.59233	2.56165
47	384.075	67.7228	23.25	9.56029	15.	9.23472	2.47367
48	384.075	67.7228	27.125	9.14806	15.	8.83489	2.37312
49	384.075	67.7228	31.	8.69285	15.1	8.39385	2.26029
50	384.075	67.7228	34.875	8.19555	15.1	7.91243	2.13553
51	384.075	67.7228	38.75	7.65757	15.1	7.39199	1.99922
52	384.075	67.7228	42.625	7.08025	15.2	6.8338	1.85178
53	384.075	67.7228	46.5	6.46504	15.2	6.23926	1.6936
54	384.075	67.7228	50.375	5.81323	15.2	5.60962	1.52508
55	384.075	67.7228	54.25	5.12595	15.2	4.94592	1.34657
56	384.075	67.7228	58.125	4.40381	15.2	4.24876	1.15825
57	384.075	67.7228	62.	3.64654	15.3	3.51787	.96011
58	384.075	67.7228	65.875	2.85199	15.3	2.75116	.751628
59	384.075	67.7228	69.75	2.01371	15.3	1.94239	.531154
60	384.075	67.7228	73.625	1.11425	15.3	1.07473	.294123
END	384.075	67.7228	77.5	0	0	0	0
GND	596.275	-80.6195	0	**10.6255**	**314.3**	7.41681	-7.60862
62	596.275	-80.6195	3.95	10.3542	313.9	7.18547	-7.45506
63	596.275	-80.6195	7.9	10.1192	313.7	6.99552	-7.31167
64	596.275	-80.6195	11.85	9.85696	313.6	6.79157	-7.14382
65	596.275	-80.6195	15.8	9.56042	313.4	6.56748	-6.94765
66	596.275	-80.6195	19.75	9.22715	313.2	6.32098	-6.72202
67	596.275	-80.6195	23.7	8.85651	313.1	6.05137	-6.46674
68	596.275	-80.6195	27.65	8.44873	313.	5.75866	-6.18214
69	596.275	-80.6195	31.6	8.00453	312.8	5.44328	-5.86884
70	596.275	-80.6195	35.55	7.52495	312.7	5.10587	-5.52765
71	596.275	-80.6195	39.5	7.01123	312.6	4.74727	-5.15954
72	596.275	-80.6195	43.45	6.46474	312.5	4.36838	-4.76552
73	596.275	-80.6195	47.4	5.88688	312.4	3.97015	-4.34664
74	596.275	-80.6195	51.35	5.279	312.3	3.55346	-3.90393
75	596.275	-80.6195	55.3	4.64224	312.2	3.11914	-3.43823
76	596.275	-80.6195	59.25	3.97736	312.1	2.66766	-2.95009
77	596.275	-80.6195	63.2	3.28431	312.	2.199	-2.43948
78	596.275	-80.6195	67.15	2.5614	311.9	1.71208	-1.90515
79	596.275	-80.6195	71.1	1.80314	311.9	1.20324	-1.34296
80	596.275	-80.6195	75.05	.994297	311.8	.662387	-.741532
END	596.275	-80.6195	79.	0	0	0	0
GND	404.324	-114.412	0	**21.8793**	**300.1**	10.9662	-18.9327
82	404.324	-114.412	3.95	21.2733	299.5	10.4883	-18.508

83	404.324	-114.412	7.9	20.7609	299.2	10.124	-18.125
84	404.324	-114.412	11.85	20.1981	298.9	9.75545	-17.686
85	404.324	-114.412	15.8	19.569	298.6	9.36941	-17.1802
86	404.324	-114.412	19.75	18.8679	298.4	8.96081	-16.6043
87	404.324	-114.412	23.7	18.0931	298.1	8.52762	-15.9574
88	404.324	-114.412	27.65	17.2449	297.9	8.06946	-15.2404
89	404.324	-114.412	31.6	16.3246	297.7	7.58656	-14.4546
90	404.324	-114.412	35.55	15.3344	297.5	7.07976	-13.6022
91	404.324	-114.412	39.5	14.2765	297.3	6.54995	-12.6853
92	404.324	-114.412	43.45	13.154	297.1	5.99841	-11.7067
93	404.324	-114.412	47.4	11.9696	297.	5.42638	-10.6689
94	404.324	-114.412	51.35	10.7261	296.8	4.83508	-9.57452
95	404.324	-114.412	55.3	9.42581	296.6	4.22556	-8.42559
96	404.324	-114.412	59.25	8.07034	296.5	3.59852	-7.22364
97	404.324	-114.412	63.2	6.65963	296.3	2.95395	-5.96865
98	404.324	-114.412	67.15	5.19032	296.2	2.29042	-4.65762
99	404.324	-114.412	71.1	3.65136	296.	1.60316	-3.2806
100	404.324	-114.412	75.05	2.01208	295.9	.878957	-1.80995
END	404.324	-114.412	79.	0	0	0	0
GND	212.16	-148.556	0	**14.1135**	**286.5**	4.00691	-13.5328
102	212.16	-148.556	3.9	13.5745	285.8	3.70653	-13.0586
103	212.16	-148.556	7.8	13.1541	285.4	3.49676	-12.6809
104	212.16	-148.556	11.7	12.7196	285.	3.30091	-12.2839
105	212.16	-148.556	15.6	12.2561	284.7	3.11027	-11.8548
106	212.16	-148.556	19.5	11.7576	284.4	2.92125	-11.3889
107	212.16	-148.556	23.4	11.2222	284.1	2.73228	-10.8845
108	212.16	-148.556	27.3	10.6494	283.8	2.54267	-10.3414
109	212.16	-148.556	31.2	10.0396	283.5	2.35221	-9.76018
110	212.16	-148.556	35.1	9.39387	283.3	2.16088	-9.14196
111	212.16	-148.556	39.	8.71351	283.1	1.96885	-8.48817
112	212.16	-148.556	42.9	8.00014	282.8	1.77635	-7.80044
113	212.16	-148.556	46.8	7.25535	282.6	1.58365	-7.0804
114	212.16	-148.556	50.7	6.48061	282.4	1.39102	-6.32956
115	212.16	-148.556	54.6	5.67739	282.2	1.1987	-5.5494
116	212.16	-148.556	58.5	4.84652	282.	1.0068	-4.74079
117	212.16	-148.556	62.4	3.98793	281.8	.815275	-3.90371
118	212.16	-148.556	66.3	3.09959	281.6	.623705	-3.03619
119	212.16	-148.556	70.2	2.17488	281.4	.430796	-2.13179
120	212.16	-148.556	74.1	1.19568	281.2	.2331	-1.17274
END	212.16	-148.556	78.	0	0	0	0

Medium wave array vertical current moment (amps-degrees) rms
(Calculation assumes tower wires are grouped together.
The first wire of each group must contain the source.)

tower	magnitude	phase (deg)
1	1,058.48	342.2
2	1,677.8	360.
3	862.214	15.
4	811.978	313.
5	1,657.73	298.
6	1,013.04	284.

Comparison of Current Moments with Theoretical Antenna Field Parameters - Day

Tower	Current Moment Magnitude	Current Moment Magnitude	Normalized Magnitude	Normalized Phase (Degrees)	Theoretical Phase (Degrees)	Theoretical Phase (Degrees)
1	1,637.47	354.1	0.519	-5.9	0.519	-5.9
2	3,157.28	0.0	1.0	0	1.0	0
3	1,637.49	349.1	0.519	-10.9	0.519	-10.9
4	.350648	--	0.0001	--	--	--
5	.982038	--	0.0003	--	--	--
6	1.36474	--	0.0004	--	--	--

Comparison of Current Moments with Theoretical Antenna Field Parameters - Night

Tower	Current Moment Magnitude	Current Moment Magnitude	Normalized Magnitude	Normalized Phase (Degrees)	Theoretical Phase (Degrees)	Theoretical Phase (Degrees)
1	1,058.48	342.2	0.631	-17.8	0.631	-17.8
2	1,677.8	360	1.0	0	1.0	0
3	862.214	15	0.514	15.0	0.514	15.0
4	811.978	313	0.484	-47.0	0.484	-47.0
5	1,657.73	298	0.988	-62.0	0.988	-62.0
6	1,013.04	284	0.604	-76.0	0.604	-76.0

As shown in the tables above, the base voltages used in the Method of Moments computer model produce current moments in each of the towers that are identical to the field ratios and phases (+/- 0.1°) of the theoretical antenna parameters specified in the KRMG station license.

Item 4

Derivation of Operating Parameters for Directional Antennas - KRMG

The currents at the tower reference points have been calculated by using the computer circuit simulation program pspice. A pspice model has been made for each tower using the antenna base currents and base impedances calculated by MININEC and shown in the driven array model above, and the reactances listed previously in the table *Analysis of Tower Impedance Measurements to Verify Method of Moments Model*. The magnitude and phase of the current source in the pspice model was adjusted so that the current calculated in the output branch of the pspice model (the current through resistor R_L) was the same as the base current for the tower calculated by MININEC. The current at the reference point is the current source in the pspice model. These calculated currents are then normalized to the reference tower to obtain the antenna monitor phase and ratio readings, as shown in the tables labeled Antenna Monitor Parameters, which follow the pspice data below.

```
 ## KRMG TOWER 1 DAY BASE MODEL

 ****     CIRCUIT DESCRIPTION

********************************************************************************


.OPT LIST NOPAGE NODE NOMOD
.AC LIN 1 740kHz 740kHz

IIN             0                       1       AC 22.0677 -3.85
LXsdc           1                       2               3011uH
CXlt            1                       2               23pF
Rlc             2                       0               .001ohms
LXs             1                       3               6.452uH
CXc             3                       0               21.5pF
CL              3                       4               3754.4pF
RL              4                       0               19.156ohms

.PRINT AC IM(RL) IP(RL)

##.PROBE
.END




 ****     AC ANALYSIS                     TEMPERATURE =   27.000 DEG C


  FREQ         IM(RL)       IP(RL)

   7.400E+05   2.192E+01  -3.998E+00
```

```
## KRMG TOWER 2 DAY BASE MODEL

 ****     CIRCUIT DESCRIPTION

******************************************************************************


.OPT LIST NOPAGE NODE NOMOD
.AC LIN 1 740kHz 740kHz

IIN             0                       1       AC 42.087 2.04
LXsdc           1                       2               3011uH
CXlt            1                       2               23pF
Rlc             2                       0               .001ohms
LXs             1                       3               3.441uH
CXc             3                       0               21.5pF
CL              3                       4               4187.1pF
RL              4                       0               17.837ohms

.PRINT AC IM(RL) IP(RL)

##.PROBE
.END




 ****     AC ANALYSIS                        TEMPERATURE =   27.000 DEG C


  FREQ         IM(RL)       IP(RL)

   7.400E+05    4.182E+01    1.902E+00
```

```
 ## KRMG TOWER 3 DAY BASE MODEL

 ****     CIRCUIT DESCRIPTION

******************************************************************************


.OPT LIST NOPAGE NODE NOMOD
.AC LIN 1 740kHz 740kHz

IIN             0                       1       AC 22.31 -8.75
LXsdc           1                       2               3011uH
CXlt            1                       2               23pF
Rlc             2                       0               .001ohms
LXs             1                       3               3.871uH
CXc             3                       0               21.5pF
CL              3                       4               3589.9pF
RL              4                       0               19.584ohms

.PRINT AC IM(RL) IP(RL)

##.PROBE
.END




 ****     AC ANALYSIS                     TEMPERATURE =   27.000 DEG C


  FREQ         IM(RL)       IP(RL)

   7.400E+05   2.214E+01  -8.901E+00
```

```
 ## KRMG TOWER 1 NIGHT BASE MODEL

 ****     CIRCUIT DESCRIPTION

********************************************************************************


.OPT LIST NOPAGE NODE NOMOD
.AC LIN 1 740kHz 740kHz

IIN             0                       1       AC 14.0885 -15.43
LXsdc           1                       2               3011uH
CXlt            1                       2               23pF
Rlc             2                       0               .001ohms
LXs             1                       3               6.452uH
CXc             3                       0               21.5pF
CL              3                       4               4213.6pF
RL              4                       0               22.265ohms

.PRINT AC IM(RL) IP(RL)

##.PROBE
.END




 ****     AC ANALYSIS                     TEMPERATURE =   27.000 DEG C


  FREQ         IM(RL)       IP(RL)

   7.400E+05   1.401E+01   -1.560E+01
```

```
 ## KRMG TOWER 2 NIGHT BASE MODEL

 ****     CIRCUIT DESCRIPTION

********************************************************************************


.OPT LIST NOPAGE NODE NOMOD
.AC LIN 1 740kHz 740kHz

IIN             0                       1       AC 22.0743 1.184
LXsdc           1                       2               3011uH
CXlt            1                       2               23pF
Rlc             2                       0               .001ohms
LXs             1                       3               3.441uH
CXc             3                       0               21.5pF
CL              3                       4               4849.7pF
RL              4                       0               10.909ohms

.PRINT AC IM(RL) IP(RL)

##.PROBE
.END




 ****     AC ANALYSIS                     TEMPERATURE =   27.000 DEG C


  FREQ         IM(RL)       IP(RL)

   7.400E+05   2.195E+01   1.100E+00
```

```
## KRMG TOWER 3 NIGHT BASE MODEL

 ****     CIRCUIT DESCRIPTION

******************************************************************************


.OPT LIST NOPAGE NODE NOMOD
.AC LIN 1 740kHz 740kHz

IIN             0                       1       AC 11.2283 14.57
LXsdc           1                       2               3011uH
CXlt            1                       2               23pF
Rlc             2                       0               .001ohms
LXs             1                       3               3.871uH
CXc             3                       0               21.5pF
CL              3                       4               5977.6pF
RL              4                       0               -4.418ohms

.PRINT AC IM(RL) IP(RL)

##.PROBE
.END




 ****     AC ANALYSIS                     TEMPERATURE =   27.000 DEG C


  FREQ         IM(RL)       IP(RL)

   7.400E+05   1.118E+01    1.460E+01
```

```
## KRMG TOWER 4 NIGHT BASE MODEL

 ****     CIRCUIT DESCRIPTION

******************************************************************************


.OPT LIST NOPAGE NODE NOMOD
.AC LIN 1 740kHz 740kHz

IIN             0                       1       AC 10.69 -45.61
LXsdc           1                       2               3011uH
CXlt            1                       2               23pF
Rlc             2                       0               .001ohms
LXs             1                       3               5.592uH
CXc             3                       0               21.5pF
CL              3                       4               4252pF
RL              4                       0               12.173ohms

.PRINT AC IM(RL) IP(RL)

##.PROBE
.END




 ****     AC ANALYSIS                     TEMPERATURE =   27.000 DEG C


  FREQ         IM(RL)       IP(RL)

   7.400E+05   1.063E+01   -4.570E+01
```

```
 ## KRMG TOWER 5 NIGHT BASE MODEL

 ****     CIRCUIT DESCRIPTION

********************************************************************************


.OPT LIST NOPAGE NODE NOMOD
.AC LIN 1 740kHz 740kHz

IIN             0                       1       AC 22.03 -59.74
LXsdc           1                       2               3011uH
CXlt            1                       2               23pF
Rlc             2                       0               .001ohms
LXs             1                       3               4.5165uH
CXc             3                       0               21.5pF
CL              3                       4               3880.5pF
RL              4                       0               20.304ohms

.PRINT AC IM(RL) IP(RL)

##.PROBE
.END




 ****     AC ANALYSIS                     TEMPERATURE =   27.000 DEG C


  FREQ         IM(RL)       IP(RL)

   7.400E+05   2.188E+01   -5.990E+01
```

```
## KRMG TOWER 6 NIGHT BASE MODEL

 ****     CIRCUIT DESCRIPTION

******************************************************************************


.OPT LIST NOPAGE NODE NOMOD
.AC LIN 1 740kHz 740kHz

IIN             0                       1       AC 14.255 -73.3
LXsdc           1                       2               3011uH
CXlt            1                       2               23pF
Rlc             2                       0               .001ohms
LXs             1                       3               3.871uH
CXc             3                       0               21.5pF
CL              3                       4               2712.2pF
RL              4                       0               24.254ohms

.PRINT AC IM(RL) IP(RL)

##.PROBE
.END




 ****     AC ANALYSIS                     TEMPERATURE =   27.000 DEG C


  FREQ         IM(RL)       IP(RL)

   7.400E+05   1.411E+01   -7.349E+01
```

Antenna Monitor Parameters - Day Pattern - KRMG

Tower	Ref Point Current Magnitude	Ref Point Current Phase (Degrees)	Normalized Magnitude	Normalized Phase (Degrees)
1	22.0677	-3.85	0.524	-5.9
2	42.087	2.04	1.0	0
3	22.31	-8.75	0.530	-10.8

Antenna Monitor Parameters - Night Pattern - KRMG

Tower	Ref Point Current Magnitude	Ref Point Current Phase (Degrees)	Normalized Magnitude	Normalized Phase (Degrees)
1	14.0885	-15.43	0.638	-16.6
2	22.0743	1.184	1.0	0
3	11.2283	14.57	0.511	13.4
4	10.69	-45.61	0.484	-46.8
5	22.03	-59.74	0.998	-60.9
6	14.255	-73.3	0.646	-74.5

Summary of Post Construction Array Geometry - KRMG

The KRMG antenna array has been previously licensed by means of a measurement based proof of performance. Therefore a survey of the array geometry is not required.

Ground System

The ground system is as specified in BMML-20141128AIE.

Certification

This Engineering Report has been prepared personally by the undersigned or under my immediate supervision, and all representations are true and correct to the best of my knowledge. I am an experienced radio engineer whose qualifications are a matter of record with the Federal Communications Commission, I am an engineer in the firm of Hatfield & Dawson Consulting Engineers, LLC, and I am Registered as a Professional Engineer in the States of Washington and Oregon.

October 28, 2022

Thomas S. Gorton P.E.