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Gregg P. Skall  
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May 26, 2009

US BANK/FCC MAY 27 2009

Ms. Marlene H. Dortch  
Secretary  
Federal Communications Commission  
P.O. Box 979089  
St. Louis, MO 63197-9000

**Re: FCC 302-AM Application for Broadcast License  
KYES(AM), Rockville, MN (Facility ID No. 136921)  
Fee Filing Codes MOR - \$705 and MMR - \$615  
Credit Card Payment Enclosed  
FRN: 0015-9792-63**

Dear Ms. Dortch:

Submitted herewith on behalf of Throw Fire Project is its FCC Form 302-AM application requesting a license to cover the construction permit authorized by BMP-20080715ADM.

Also submitted herewith is a Remittance Advice (FCC Form 159) containing credit card information in the amount of \$1,320 in payment of the Commission's filing fees for a license for an AM broadcast station (\$705, Fee Code MOR), together with the additional fee for licensing a directional antenna (\$615, Fee Code MMR).

Should you have any questions in connection with this application or desire additional information, kindly contact the undersigned.

Sincerely,

  
Gregg P. Skall

Enclosures

cc: Andrea W. Hilger (LPF)  
Irene Bleiweiss, Media Bureau, FCC

FOR  
FCC  
USE  
ONLY

**FCC 302-AM**  
**APPLICATION FOR AM**  
**BROADCAST STATION LICENSE**

(Please read instructions before filling out form.)

FOR COMMISSION USE ONLY

FILE NO.

**SECTION I - APPLICANT FEE INFORMATION**

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

THROW FIRE PROJECT

MAILING ADDRESS (Line 1) (Maximum 35 characters)

1310 SECOND STREET

MAILING ADDRESS (Line 2) (Maximum 35 characters)

CITY

Sauk Rapids

STATE OR COUNTRY (if foreign address)

MN

ZIP CODE

56379-2532

TELEPHONE NUMBER (include area code)

3202511780

CALL LETTERS

KYES

OTHER FCC IDENTIFIER (If applicable)

2. A. Is a fee submitted with this application?

Yes  No

B. If No, indicate reason for fee exemption (see 47 C.F.R. Section

Governmental Entity

Noncommercial educational licensee

Other (Please explain):

C. If Yes, provide the following information:

Enter in Column (A) the correct Fee Type Code for the service you are applying for. Fee Type Codes may be found in the "Mass Media Services Fee Filing Guide." Column (B) lists the Fee Multiple applicable for this application. Enter fee amount due in Column (C).

(A)		
FEE TYPE CODE		
M	O	R

(B)			
FEE MULTIPLE			
0	0	0	1

(C)
FEE DUE FOR FEE TYPE CODE IN COLUMN (A)
\$ 705.00

FOR FCC USE ONLY

To be used only when you are requesting concurrent actions which result in a requirement to list more than one Fee Type Code.

(A)		
FEE TYPE CODE		
M	M	R

(B)			
FEE MULTIPLE			
0	0	0	1

(C)
FEE DUE FOR FEE TYPE CODE IN COLUMN (A)
\$ 615.00

FOR FCC USE ONLY

ADD ALL AMOUNTS SHOWN IN COLUMN C, AND ENTER THE TOTAL HERE. THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE.

TOTAL AMOUNT REMITTED WITH THIS APPLICATION
\$ 1,320.00

FOR FCC USE ONLY

<b>SECTION II - APPLICANT INFORMATION</b>		
1. NAME OF APPLICANT Throw Fire Project		
MAILING ADDRESS 1310 Second Street		
CITY Sauk Rapids	STATE MN	ZIP CODE 56379-2532

2. This application is for:

- Commercial       Noncommercial  
 AM Directional       AM Non-Directional

Call letters KYES	Community of License Rockville, MN	Construction Permit File No. BMP-20080220ABE	Modification of Construction Permit File No(s). BMP-20080715ADM	Expiration Date of Last Construction Permit 1-25-09
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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.  
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.

5. Apart from the changes already reported, has any cause or circumstance arisen since the grant of the underlying construction permit which would result in any statement or representation contained in the construction permit application to be now incorrect?

Yes  No

If Yes, explain in an Exhibit.

Exhibit No.

6. Has the permittee filed its Ownership Report (FCC Form 323) or ownership certification in accordance with 47 C.F.R. Section 73.3615(b)?

Yes  No

If No, explain in an Exhibit.

Does not apply

Exhibit No.  
B

7. Has an adverse finding been made or an adverse final action been taken by any court or administrative body with respect to the applicant or parties to the application in a civil or criminal proceeding, brought under the provisions of any law relating to the following: any felony; mass media related antitrust or unfair competition; fraudulent statements to another governmental unit; or discrimination?

Yes  No

If the answer is Yes, attach as an Exhibit a full disclosure of the persons and matters involved, including an identification of the court or administrative body and the proceeding (by dates and file numbers), and the disposition of the litigation. Where the requisite information has been earlier disclosed in connection with another application or as required by 47 U.S.C. Section 1.65(c), the applicant need only provide: (i) an identification of that previous submission by reference to the file number in the case of an application, the call letters of the station regarding which the application or Section 1.65 information was filed, and the date of filing; and (ii) the disposition of the previously reported matter.

Exhibit No.

8. Does the applicant, or any party to the application, have a petition on file to migrate to the expanded band (1605-1705 kHz) or a permit or license either in the existing band or expanded band that is held in combination (pursuant to the 5 year holding period allowed) with the AM facility proposed to be modified herein?

Yes  No

If Yes, provide particulars as an Exhibit.

Exhibit No.

The APPLICANT hereby waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because use of the same, whether by license or otherwise, and requests and authorization in accordance with this application. (See Section 304 of the Communications Act of 1934, as amended).

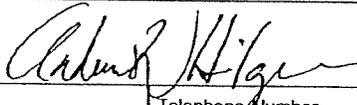
The APPLICANT acknowledges that all the statements made in this application and attached exhibits are considered material representations and that all the exhibits are a material part hereof and are incorporated herein as set out in full in

### CERTIFICATION

1. By checking Yes, the applicant certifies, that, in the case of an individual applicant, he or she is not subject to a denial of federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. Section 862, or, in the case of a non-individual applicant (e.g., corporation, partnership or other unincorporated association), no party to the application is subject to a denial of federal benefits that includes FCC benefits pursuant to that section. For the definition of a "party" for these purposes, see 47 C.F.R. Section 1.2002(b).

Yes  No

2. I certify that the statements in this application are true, complete, and correct to the best of my knowledge and belief, and are made in good faith.

Name Andrew W. Hilger	Signature 	
Title President	Date 5/26/2009	Telephone Number 320-251-1780

**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 - Page 2**

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

<b>Type Radiator</b> <b>Uniform cross-section steel towers</b>	Overall height in meters of radiator above base insulator, or above base, if grounded. 59.7	Overall height in meters above ground (without obstruction lighting) 60.7	Overall height in meters above ground (include obstruction lighting) 60.7	If antenna is either top loaded or sectionalized, describe fully in an Exhibit.  <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: auto;">                     Exhibit No.                      N/A                 </div>
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Excitation                       Series                       Shunt

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

North Latitude    45 °                      21'                      43"	West Longitude    94 °                      17'                      57"
--	--

If not fully described above, attach as an Exhibit further details and dimensions including any other antenna mounted on tower and associated isolation circuits.

Exhibit No.

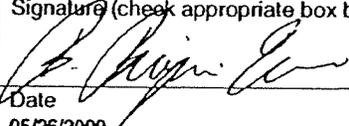
Also, if necessary for a complete description, attach as an Exhibit a sketch of the details and dimensions of ground system.

Exhibit No.

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

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

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) B. Benjamin Evans, P. E.	Signature (check appropriate box below) 
Address (include ZIP Code) 216 N. Green Bay Road, Suite 205, Thiensville, WI 53092	Date 05/26/2009  Telephone No. (Include Area Code) (262) 242-6000

- Technical Director                       Registered Professional Engineer  
 Chief Operator                               Technical Consultant  
 Other (specify)

**Throw Fire Project**

FCC 302-AM

BMP - 20080715ADM

Exhibit – A

Pursuant to Section 73.1620 (a)(4), automatic program test authority is not available to an AM station with a directional antenna system.

**Engineering Exhibit**

**Application for License to Cover Construction Permit  
KYES(AM), 1180 KHz, Rockville, Minnesota  
50.0 KW-D, 5.0 KW-N, 8.0 KW-CH, DA-3  
BMP-20080715ADM**

**Throw Fire Project**

**May 26, 2009**

## **Summary of KYES Operation and FCC Licensing Requirements**

This Engineering Exhibit supports an application for license to cover a construction permit of new AM radio broadcast station KYES, 1180 KHz, Rockville, MN (BMP-20080715ADM) for a directional antenna system to operate at 50 KW daytime, 5.0 KW nighttime and 8.0 KW critical hours, using separate antenna configurations for day and night, and using the day array at reduced power during critical hours (DA-3).

The facility was constructed in accordance with good engineering practice and in accordance with the underlying construction permit.

### **Ground System**

The tower ground system consists of 120 #10 solid copper wires around each tower within the 30' x 30' fenced area, and, from the fence line out to at least 208 feet from each tower, 240 #10 copper wires. Ground wires between adjacent towers are joined by 4-inch copper straps.

### **Sampling System**

The sampling system consists of equal lengths of Andrew LDF4 ½" foam phase-stabilized coax. The excess sample cables are buried underground under the transmitter building so that they are subjected to the same environmental conditions as the runs of cable going to the towers. The antenna monitor is a Potomac Instruments 1901.

While preparing for tune-up of the KYES antenna system, it was discovered that the phasor manufacturer had mistakenly installed at the antenna tuning units of Towers 1 and 7, the daytime towers, Delta current sampling transformers with half the sensitivity of the transformers at the other towers. Apparently, the manufacturer chose to use transformers with less sensitivity for the 50 KW daytime mode than for the nighttime towers so as not to overdrive the antenna monitor inputs, not realizing that Tower 1 is also used for the nighttime 5 KW antenna system. This results in a display on the antenna monitor of the current ratio of Tower 1 in the nighttime mode of exactly half the true value. In the interest of conducting the proof and filing the license application expeditiously, the permittee is submitting the license application, specifying the actual displayed Tower 1 nighttime current ratio, although the actual current ratio is twice that, and therefore the results conform with the construction permit. The sensitivity mistake in the installed transformers will be rectified in less than two weeks following the filing of this Form 302 application.

### **Erection of Fences to Protect Public From RF Exposure and High Voltages**

To protect the public from excess RF exposure and high RF voltages, six-foot high metal wire-mesh fences of dimensions 30 feet by 30 feet (9.1 meters by 9.1 meters) have been installed around all seven towers. These towers have been electrically grounded to prevent stray RF voltages from forming on the fences. Since each tower is in the center of the fenced-in area, and half the fence line dimension is 4.55 meters, these fences meet the prescribed distance of 4 meters for 50 KW on 1180 KHz using quarter-wave (0.25 λ)

towers, as given in Table 2 of Supplement A to OET Bulletin 65, Edition 97-01. Signs warning of high RF voltages will be posted on the tower fences.

In addition to the tower fences, the entire transmitter property is enclosed by a six-foot high fence with a locked gate across the access driveway entrance, thus providing double-protection against unauthorized access to the towers.

### **Verification of Antenna Patterns Using Method of Moments Modeling**

The permittee has chosen to conduct the KYES proof using the Method of Moments model, as provided for in Section 73.151(c) of the FCC rules. Both the day and the night antenna systems were adjusted to produce the antenna monitor parameters within  $\pm 5$  percent in current ratio and  $\pm 3$  degrees in phase of the values calculated by the Method of Moments model.

### **Field Strength Measurements**

As required in Section 73.151(c) of FCC rules, field strength measurements were taken on the day and night patterns at full authorized powers, and are included herein as an attachment. The readings were taken on all of the maxima and minima points of the two patterns, totaling four radials on the day pattern and ten radials on the night pattern. At least four measurements were made on every radial.

Since it is desired to apply for the operating license as expeditiously as possible, information concerning these measurements, such as GPS coordinates and descriptions of the measurement points, were not available as of this date. As is explained at the end of this narrative, the permittee will submit an amendment to this Form 302 application with all of the supplemental information as soon as it becomes available.

### **Direct Measurement of Power**

Common point current and impedance measurements are made using a Delta CPB-1A impedance bridge installed in the common point bus in the main phasor cabinet. The common point impedance has been adjusted for  $50 + j0$  ohms for both day and night antenna patterns. The proper common point current, adjusted for 8% overfeed at 5 KW and 5.3% overfeed for greater than 5 KW, will be 10.4 amperes for nighttime operation, 13.0 amperes for critical hours operation, and 32.4 amperes for daytime operation.

### **Required Exhibits Attached**

The following exhibits to establish compliance with Section 73.151(c) of the FCC rules have been attached hereto:

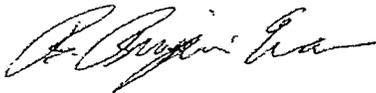
1. Moment of Methods Modeling Procedures and Calculations
2. Derivation of Monitored Antenna Parameters
3. Sample Line Measurements and Calculations
4. Reference Field Strength Measurements

**Required Exhibits yet to be Submitted**

In the interest of expeditiously filing for the operating license, this application is filed with the understanding that it will be supplemented with information regarding equipment supplier's changes and as may be appropriate due to delays by other service contractors. Therefore, in approximately two to three weeks from this date, the permittee will file a follow-up amendment to this Form 302 application, to contain the following additional information:

1. Verification of Calibration of Sample Current Transformers
2. Post-Construction Certification of Tower Locations by Surveyor
3. GPS Coordinates and Physical Descriptions of Field Measurement Points
4. Certification that the Current Sampling of Tower 1 in Night Mode has been rectified to display the true Current Ratio

The above information and the information attached are true and accurate to the best of my knowledge and belief.



B. Benjamin Evans, P.E.  
Consulting Engineer for Throw Fire Project

May 26, 2009

### **Method of Moments Modeling to Match Measurements of Self-Impedances of Towers**

Tower base impedance measurements were made at the final J-plug in the Antenna Tuning Units (ATUs) using a General Radio 916-AL "cold" bridge and a Delta receiver/generator. The other towers were floated by removing the same J-plug where the impedance measures were made. The only component between the impedance bridge and the tower base was the tower feed tube.

Expert MININEC Broadcast Professional, Version 14.5 was used to model the KYES array. Ten segments were modeled for each tower.

A lumped load of  $-j10,000$  ohms was modeled at the base of each floating tower to simulate an open circuit at the base of the tower.

The tower heights were adjusted in the model in order to achieve calibration of the model with the measured base impedances. All modeled tower heights were well within 75 and 125 percent of the physical tower heights as required by the FCC rules.

The modeled radius for each tower was the physical radius of the tower as determined by the formula  $3T/2\pi$ , where T is the tower face width in meters. The KYES towers are uniform cross section triangular towers with a face width of 0.61 meters (24 inches). Thus, according to the formula, each tower's radius was modeled at 0.29 meter.

Each tower is fed with a length of copper tubing that has two coiled turns between the exit point of the ATU and the tower for lightning protection. The series inductance due to the coiled tower feed was measured at the ATU output J-plug with the tower shorted to ground.

The modeled and measured base impedances of the towers at the ATU output J-plug, with the other towers open-circuited at their ATU output J-plug, agree within  $\pm 2$  ohms and  $\pm 4$  percent for resistance as required by FCC rules.

**Table 1 – Model Calibration to Measured Base Impedance Matrix**

<b>Twr</b>	<b>Meas. Z<sub>ATU</sub> (Ω)</b>	<b>Modeled Z<sub>base</sub> ( Ω)</b>	<b>Meas. Series X</b>	<b>Assumed Series X</b>	<b>Phys. Ht. (deg)</b>	<b>Model Ht. (deg)</b>	<b>Model % Phys. Ht.</b>
1	39.1 + j60.2	39.1 +j13.8	+j40.3	+j46.4	84.6	88.8	105.2
2	39.8 +j61.0	39.8 +j11.6	+j44.5	+j49.4	84.6	88.5	104.9
3	38.7 +j50.0	38.6+j9.8	+j33.9	+j40.2	84.6	88.2	104.5
4	37.6 +j45.8	37.6 +j8.3	+j34.8	+j37.5	84.6	88.0	104.3
5	39.7 +j60.2	39.6 +j12.0	+j46.6	+j48.2	84.6	88.6	105.0
6	38.7 +j43.2	38.7 +j10.0	+j38.1	+j33.2	84.6	88.2	104.5
7	39.0 +j58.5	39.0 +j20.9	+j38.6	+j37.6	84.6	90.2	106.9

C:\Documents and Settings\George Werl\Desktop\KYES MOM Updated 05\_19\_09\KYES Tower 1 05-19-2009 23:24:53

KYES Tower 1

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	10
		0	0	88.8		
2	none	181.2	120.2	0	.29	10
		181.2	120.2	88.5		
3	none	366.4	116.6	0	.29	10
		366.4	116.6	88.2		
4	none	123.8	213.6	0	.29	10
		123.8	213.6	88.		
5	none	201.7	144.9	0	.29	10
		201.7	144.9	88.6		
6	none	375.6	130.1	0	.29	10
		375.6	130.1	88.2		
7	none	90.	176.7	0	.29	10
		90.	176.7	90.2		

Number of wires = 7  
current nodes = 70

	minimum	maximum
Individual wires	wire value	wire value
segment length	4 8.8	7 9.02
radius	1 .29	1 .29

ELECTRICAL DESCRIPTION

Frequencies (KHz)

no.	frequency	step	no. of steps	segment length (wavelengths)
	lowest			minimum maximum
1	1,180.	0	1	.0244444 .0250556

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	1	0	0	0	0	0
2	11	0	-10,000.	0	0	0
3	21	0	-10,000.	0	0	0
4	31	0	-10,000.	0	0	0
5	41	0	-10,000.	0	0	0
6	51	0	-10,000.	0	0	0
7	61	0	-10,000.	0	0	0

C:\Documents and Settings\George Werl\Desktop\KYES MOM Updated 05\_19\_09\KYES Tower 1 05-19-2009 23:24:55

IMPEDANCE

normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1,180.	39.952	13.775	41.41	19.4	1.4853	-14.187	-1.6884

C:\Documents and Settings\George Werl\Desktop\KYES MOM Updated 05\_19\_09\KYES Tower 2 05-19-2009 23:22:29

KYES Tower 2

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	10
		0	0	88.8		
2	none	181.2	120.2	0	.29	10
		181.2	120.2	88.5		
3	none	366.4	116.6	0	.29	10
		366.4	116.6	88.2		
4	none	123.8	213.6	0	.29	10
		123.8	213.6	88.		
5	none	201.7	144.9	0	.29	10
		201.7	144.9	88.6		
6	none	375.6	130.1	0	.29	10
		375.6	130.1	88.2		
7	none	90.	176.7	0	.29	10
		90.	176.7	90.2		

Number of wires = 7  
current nodes = 70

	minimum	maximum
Individual wires	wire value	wire value
segment length	4 8.8	7 9.02
radius	1 .29	1 .29

ELECTRICAL DESCRIPTION

Frequencies (KHz)

no.	frequency	step	no. of steps	segment length (wavelengths)
	lowest			minimum maximum
1	1,180.	0	1	.0244444 .0250556

Sources

source	node	sector	magnitude	phase	type
1	11	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-10,000.	0	0	0
2	11	0	0	0	0	0
3	21	0	-10,000.	0	0	0
4	31	0	-10,000.	0	0	0
5	41	0	-10,000.	0	0	0
6	51	0	-10,000.	0	0	0
7	61	0	-10,000.	0	0	0

C:\Documents and Settings\George Werl\Desktop\KYES MOM Updated 05\_19\_09\KYES Tower 2 05-19-2009 23:22:32

IMPEDANCE

normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 11, sector 1							
1,180.	39.764	11.64	41.433	16.3	1.4133	-15.328	-1.12926

KYES Tower 3

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	10
		0	0	88.8		
2	none	181.2	120.2	0	.29	10
		181.2	120.2	88.5		
3	none	366.4	116.6	0	.29	10
		366.4	116.6	88.2		
4	none	123.8	213.6	0	.29	10
		123.8	213.6	88.		
5	none	201.7	144.9	0	.29	10
		201.7	144.9	88.6		
6	none	375.6	130.1	0	.29	10
		375.6	130.1	88.2		
7	none	90.	176.7	0	.29	10
		90.	176.7	90.2		

Number of wires = 7  
current nodes = 70

Individual wires segment length radius	minimum		maximum	
	wire	value	wire	value
	4	8.8	7	9.02
	1	.29	1	.29

ELECTRICAL DESCRIPTION

Frequencies (KHz)

no.	lowest	step	no. of steps	segment length (wavelengths) minimum	maximum
1	1,180.	0	1	.0244444	.0250556

Sources

source node	sector	magnitude	phase	type
1	21	1	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-10,000.	0	0	0
2	11	0	-10,000.	0	0	0
3	21	0	0	0	0	0
4	31	0	-10,000.	0	0	0
5	41	0	-10,000.	0	0	0
6	51	0	-10,000.	0	0	0
7	61	0	-10,000.	0	0	0

IMPEDANCE

normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 21, sector 1							
1,180.	38.622	9.8399	39.856	14.4	1.4059	-15.457	-1.1254

C:\Documents and Settings\George Werl\Desktop\KYES MOM Updated 05\_19\_09\KYES Tower 4 05-19-2009 23:19:15

KYES Tower 4

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	10
		0	0	88.8		
2	none	181.2	120.2	0	.29	10
		181.2	120.2	88.5		
3	none	366.4	116.6	0	.29	10
		366.4	116.6	88.2		
4	none	123.8	213.6	0	.29	10
		123.8	213.6	88.		
5	none	201.7	144.9	0	.29	10
		201.7	144.9	88.6		
6	none	375.6	130.1	0	.29	10
		375.6	130.1	88.2		
7	none	90.	176.7	0	.29	10
		90.	176.7	90.2		

Number of wires = 7  
current nodes = 70

Individual wires	minimum		maximum	
	wire	value	wire	value
segment length	4	8.8	7	9.02
radius	1	.29	1	.29

ELECTRICAL DESCRIPTION

Frequencies (KHz)

no.	frequency		no. of steps	segment length (wavelengths)	
	lowest	step		minimum	maximum
1	1,180.	0	1	.0244444	.0250556

Sources

source	node	sector	magnitude	phase	type
1	31	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (pF)	passive circuit
1	1	0	-10,000.	0	0	0
2	11	0	-10,000.	0	0	0
3	21	0	-10,000.	0	0	0
4	31	0	0	0	0	0
5	41	0	-10,000.	0	0	0
6	51	0	-10,000.	0	0	0
7	61	0	-10,000.	0	0	0

C:\Documents and Settings\George Werl\Desktop\KYES MOM Updated 05\_19\_09\KYES Tower 4 05-19-2009 23:19:21

IMPEDANCE

normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 31, sector 1							
1,180.	37.581	8.3435	38.496	12.5	1.4098	-15.388	-1.2745

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KYES Tower 5

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	10
		0	0	88.8		
2	none	181.2	120.2	0	.29	10
		181.2	120.2	88.5		
3	none	366.4	116.6	0	.29	10
		366.4	116.6	88.2		
4	none	123.8	213.6	0	.29	10
		123.8	213.6	88.		
5	none	201.7	144.9	0	.29	10
		201.7	144.9	88.6		
6	none	375.6	130.1	0	.29	10
		375.6	130.1	88.2		
7	none	90.	176.7	0	.29	10
		90.	176.7	90.2		

Number of wires = 7  
current nodes = 70

	minimum	maximum
Individual wires	wire value	wire value
segment length	4 8.8	7 9.02
radius	1 .29	1 .29

ELECTRICAL DESCRIPTION

Frequencies (KHz)

no.	lowest	step	no. of steps	segment length (wavelengths)
				minimum maximum
1	1,180.	0	1	.0244444 .0250556

Sources

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

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-10,000.	0	0	0
2	11	0	-10,000.	0	0	0
3	21	0	-10,000.	0	0	0
4	31	0	-10,000.	0	0	0
5	41	0	0	0	0	0
6	51	0	-10,000.	0	0	0
7	61	0	-10,000.	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 41, sector 1							
1,180.	39.631	12.004	41.409	16.9	1.4254	-15.119	-.13572

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KYES Tower 6

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	10
		0	0	88.8		
2	none	181.2	120.2	0	.29	10
		181.2	120.2	88.5		
3	none	366.4	116.6	0	.29	10
		366.4	116.6	88.2		
4	none	123.8	213.6	0	.29	10
		123.8	213.6	88.		
5	none	201.7	144.9	0	.29	10
		201.7	144.9	88.6		
6	none	375.6	130.1	0	.29	10
		375.6	130.1	88.2		
7	none	90.	176.7	0	.29	10
		90.	176.7	90.2		

Number of wires = 7  
current nodes = 70

Individual wires	minimum		maximum	
	wire	value	wire	value
segment length	4	8.8	7	9.02
radius	1	.29	1	.29

ELECTRICAL DESCRIPTION

Frequencies (KHz)

no.	frequency		no. of steps	segment length (wavelengths)	
	lowest	step		minimum	maximum
1	1,180.	0	1	.0244444	.0250556

Sources

source	node	sector	magnitude	phase	type
1	51	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (pF)	passive circuit
1	1	0	-10,000.	0	0	0
2	11	0	-10,000.	0	0	0
3	21	0	-10,000.	0	0	0
4	31	0	-10,000.	0	0	0
5	41	0	-10,000.	0	0	0
6	51	0	0	0	0	0
7	61	0	-10,000.	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 51, sector 1							
1,180.	58.711	9.9957	39.981	14.5	1.4065	-15.447	-.1257

C:\Documents and Settings\George Werl\Desktop\KYES MOM Updated 05\_19\_09\KYES Tower 7 05-19-2009 23:09:42

KYES Tower 7

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	10
		0	0	88.8		
2	none	181.2	120.2	0	.29	10
		181.2	120.2	88.5		
3	none	366.4	116.6	0	.29	10
		366.4	116.6	88.2		
4	none	123.8	213.6	0	.29	10
		123.8	213.6	88.		
5	none	201.7	144.9	0	.29	10
		201.7	144.9	88.6		
6	none	375.6	130.1	0	.29	10
		375.6	130.1	88.2		
7	none	90.	176.7	0	.29	10
		90.	176.7	90.2		

Number of wires = 7  
current nodes = 70

	minimum	maximum
Individual wires	wire	value
segment length	4	8.8
radius	1	.29

ELECTRICAL DESCRIPTION

Frequencies (KHz)

no.	frequency	step	no. of steps	segment length (wavelengths)
1	lowest			minimum maximum
1	1,180.	0	1	.0244444 .0250556

Sources

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

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-10,000.	0	0	0
2	11	0	-10,000.	0	0	0
3	21	0	-10,000.	0	0	0
4	31	0	-10,000.	0	0	0
5	41	0	-10,000.	0	0	0
6	51	0	-10,000.	0	0	0
7	61	0	0	0	0	0

C:\Documents and Settings\George Werl\Desktop\KYES MOM Updated 05\_19\_09\KYES Tower 7 05-19-2009 23:09:45

IMPEDANCE

normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 61, sector 1							
1,180.	88.953	20.861	44.187	28.2	1.6967	-11.756	-1.30001

### Derivation of Operating Parameters for Daytime Directional Antenna

After the calibration of the Method of Moments modeling with the measured self-impedance of each tower with all other towers floating, the model was used to calculate the daytime operating parameters. Calculations were made to determine the complex voltage source values to be applied at ground level for each tower of the array to produce the current moment sums for the towers which, when normalized to the reference tower, provide equality to the theoretical parameters of the day directional pattern. These voltage sources were then applied in the model and the tower currents were calculated.

The KYES towers are base sampled, which is appropriate for towers of 90 degrees or less. Thus, the ground segment of each tower was used to determine the model operating parameters of the array.

The values of the lumped loads for the towers not used for the daytime pattern, towers 2 through 6, necessary to detune those towers were determined by calculating the complex voltage source values required to produce the theoretical parameters with a zero field from each of towers 2 through 6. The predicted operating base impedances produced by the model were then examined, and the conjugate value of the zero-field driving point reactance for each of towers 2 through 6 was used for the lumped load.

The calculations of the antenna parameters are as follows:

Twr	Theo. Field	Theo. Phase	Calc. R ( $\Omega$ )	Calc. X ( $\Omega$ )	Current Mag (A)	Current Phase ( $^\circ$ )	Ant. Mon. Ratio	Ant. Mon. Phase
1	1	0	50.32	35.98	28.00	5.2	1	0
7	0.894	109.2	15.27	4.68	26.29	111.1	0.939	+105.9

KYES Daytime 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	10
		0	0	88.8		
2	none	181.2	120.2	0	.29	10
		181.2	120.2	88.5		
3	none	366.4	116.6	0	.29	10
		366.4	116.6	88.2		
4	none	123.8	213.6	0	.29	10
		123.8	213.6	88.		
5	none	201.7	144.9	0	.29	10
		201.7	144.9	88.6		
6	none	375.6	130.1	0	.29	10
		375.6	130.1	88.2		
7	none	90.	176.7	0	.29	10
		90.	176.7	90.2		

Number of wires = 7  
current nodes = 70

	minimum		maximum	
	wire	value	wire	value
Individual wires				
segment length	4	8.8	7	9.02
radius	1	.29	1	.29

ELECTRICAL DESCRIPTION

Frequencies (KHz)

no.	frequency		no. of steps	segment length (wavelengths)	
	lowest	step		minimum	maximum
1	1,180.	0	1	.0244444	.0250556

Sources

source	node	sector	magnitude	phase	type
1	1	1	2,449.32	40.8	voltage
2	61	1	593.688	128.1	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	11	0	512.67	0	0	0
2	21	0	501.62	0	0	0
3	31	0	551.64	0	0	0
4	41	0	546.12	0	0	0
5	51	0	502.69	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							
1,180.	50.323	35.981	61.868	35.6	2.0193	-9.4318	-1.5255

source = 2; node 61, sector 1

1,180.	15.269	4.6807	15.97	17.	3.3062	-5.4239	-1.468
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C:\Documents and Settings\George Werl\Desktop\KYES MOM Updated 05\_19\_09\KYES Day  
 Pattern 05-20-2009 01:20:07

CURRENT rms

Frequency = 1180 KHz  
 Input power = 50,000. watts  
 Efficiency = 100. %  
 coordinates in degrees

no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	27.9982	5.2	27.8813	2.55484
2	0	0	8.88	28.5818	2.8	28.5479	1.39232
3	0	0	17.76	28.1844	1.3	28.1766	.659125
4	0	0	26.64	27.0082	.2	27.008	.0991409
5	0	0	35.52	25.0993	359.3	25.0973	-.315342
6	0	0	44.4	22.5023	358.5	22.4944	-.593883
7	0	0	53.28	19.2662	357.8	19.2519	-.740992
8	0	0	62.16	15.4418	357.2	15.4231	-.759873
9	0	0	71.04	11.0683	356.6	11.049	-.652668
10	0	0	79.92	6.1333	356.1	6.11908	-.417472
END	0	0	88.8	0	0	0	0
GND	-91.1472	-156.607	0	.731701	45.3	.514521	.520244
12	-91.1472	-156.607	8.85	.399803	45.4	.280662	.28473
13	-91.1472	-156.607	17.7	.190514	46.1	.132126	.137254
14	-91.1472	-156.607	26.55	.031041	55.5	.0176036	.0255667
15	-91.1472	-156.607	35.4	.0883825	219.5	-.0681689	-.0562537
16	-91.1472	-156.607	44.25	.168139	221.1	-.126702	-.110533
17	-91.1472	-156.607	53.1	.210502	221.2	-.158394	-.138645
18	-91.1472	-156.607	61.95	.216266	221.	-.163312	-.141775
19	-91.1472	-156.607	70.8	.185975	220.6	-.141239	-.120988
20	-91.1472	-156.607	79.65	.119049	220.1	-.0910497	-.0766987
END	-91.1472	-156.607	88.5	0	0	0	0
GND	-164.059	-327.618	0	.338549	231.1	-.212474	-.263572
22	-164.059	-327.618	8.82	.188135	231.2	-.117858	-.146643
23	-164.059	-327.618	17.64	.0922234	231.8	-.0570382	-.0724692
24	-164.059	-327.618	26.46	.0179667	238.5	-9.4E-03	-.0153133
25	-164.059	-327.618	35.28	.0385665	45.5	.0270236	.0275155
26	-164.059	-327.618	44.1	.0774468	47.2	.0525997	.0568443
27	-164.059	-327.618	52.92	.0991909	47.4	.0671965	.0729621
28	-164.059	-327.618	61.74	.103656	47.2	.0704806	.0760064
29	-164.059	-327.618	70.56	.0905161	46.8	.0619378	.0660066
30	-164.059	-327.618	79.38	.0588252	46.4	.0405767	.0425903
END	-164.059	-327.618	88.2	0	0	0	0
GND	-103.116	68.5099	0	.678345	117.	-.307563	.604613
32	-103.116	68.5099	8.8	.351498	116.8	-.158546	.31371
33	-103.116	68.5099	17.6	.152403	115.6	-.0658909	.137423
34	-103.116	68.5099	26.4	.0102929	69.3	3.64E-03	9.63E-03
35	-103.116	68.5099	35.2	.0951366	304.5	.0538369	-.0784383
36	-103.116	68.5099	44.	.157277	303.2	.0862255	-.131534
37	-103.116	68.5099	52.8	.184234	303.5	.101705	-.153617
38	-103.116	68.5099	61.6	.179751	304.2	.101035	-.148669
39	-103.116	68.5099	70.4	.14751	305.1	.08486	-.120656
40	-103.116	68.5099	79.2	.0902773	306.2	.0533161	-.0728518
END	-103.116	68.5099	88.	0	0	0	0
GND	-165.021	-115.979	0	.228686	88.1	7.62E-03	.228559
42	-165.021	-115.979	8.86	.119055	88.1	3.87E-03	.118992
43	-165.021	-115.979	17.72	.0520444	88.5	1.35E-03	.0520269
44	-165.021	-115.979	26.58	3.04E-03	103.9	-7.32E-04	2.95E-03
45	-165.021	-115.979	35.44	.0314996	265.6	-2.43E-03	-.0313969
46	-165.021	-115.979	44.3	.0527616	266.	-3.71E-03	-.052631
47	-165.021	-115.979	53.16	.062155	265.8	-4.51E-03	-.061991
48	-165.021	-115.979	62.02	.0608639	265.5	-4.73E-03	-.0600797
49	-165.021	-115.979	70.88	.0500529	265.1	-4.24E-03	-.0498731
50	-165.021	-115.979	79.74	.0306341	264.7	-2.86E-03	-.0305006

END	-165.021	-115.979	88.6	0	0	0	0
GND	-241.933	-287.305	0	.166418	239.3	-.085007	-.143069
52	-241.933	-287.305	8.82	.0924275	239.4	-.0470577	-.0795514
53	-241.933	-287.305	17.64	.0452848	240.2	-.0225292	-.0392829
54	-241.933	-287.305	26.46	8.86E-03	249.	-3.18E-03	-8.27E-03
55	-241.933	-287.305	35.28	.0190052	51.9	.0117352	.0149494
56	-241.933	-287.305	44.1	.0380775	54.1	.0223272	.0308446
57	-241.933	-287.305	52.92	.0487558	54.3	.0284744	.0395769
58	-241.933	-287.305	61.74	.0509609	54.	.0299583	.0412251
59	-241.933	-287.305	70.56	.0445228	53.5	.0264643	.0358039
60	-241.933	-287.305	79.38	.028956	52.9	.0174511	.0231064
END	-241.933	-287.305	88.2	0	0	0	0
GND	-89.8508	-5.18078	0	26.2882	111.1	-9.44532	24.5328
62	-89.8508	-5.18078	9.02	26.1014	110.3	-9.04755	24.4831
63	-89.8508	-5.18078	18.04	25.2826	109.8	-8.55742	23.7904
64	-89.8508	-5.18078	27.06	23.8729	109.4	-7.91723	22.5218
65	-89.8508	-5.18078	36.08	21.903	109.	-7.1313	20.7096
66	-89.8508	-5.18078	45.1	19.4121	108.7	-6.21237	18.3912
67	-89.8508	-5.18078	54.12	16.4455	108.3	-5.17694	15.6095
68	-89.8508	-5.18078	63.14	13.0507	108.	-4.04283	12.4087
69	-89.8508	-5.18078	72.16	9.26541	107.8	-2.82502	8.82423
70	-89.8508	-5.18078	81.18	5.08528	107.5	-1.52588	4.85096
END	-89.8508	-5.18078	90.2	0	0	0	0

### Derivation of Operating Parameters for Nighttime Directional Antenna

The Method of Moments model was used to calculate the nighttime operating parameters. Calculations were made to determine the complex voltage source values to be applied at ground level for each tower of the array to produce the current moment sums for the towers which, when normalized to the reference tower, provide equality to the theoretical parameters of the night directional pattern. These voltage sources were then applied in the model and the tower currents were calculated.

The value of the lumped load necessary to detune tower 7, the unused tower of the night array, was determined by calculating the complex voltage source values required to produce the theoretical parameters with a zero field from tower 7. The predicted operating base impedances produced by the model were then examined, and the conjugate value of the zero-field driving point reactance for tower 7 was used for the lumped load.

The calculations of the antenna parameters are as follows:

Twr	Theo. Field	Theo. Phase	Calc. R ( $\Omega$ )	Calc. X ( $\Omega$ )	Current Mag (A)	Current Phase ( $^\circ$ )	Ant. Mon. Ratio	Ant. Mon. Phase ( $^\circ$ )
1	0.438	-6.9	59.42	-30.01	3.697	0.1	0.471	-5.4
2	1	0	51.82	10.78	7.853	5.5	1	0
3	0.523	16.7	44.01	1.48	4.187	21.5	0.533	+16.0
4	0.418	64.9	0.884	-11.15	3.443	65.1	0.439	+59.6
5	0.990	99.5	4.07	-5.67	8.031	100	1.023	+94.5
6	0.549	122.0	-2.65	-1.38	4.433	121.8	0.564	+116.3

KYES 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	10
		0	0	88.8		
2	none	181.2	120.2	0	.29	10
		181.2	120.2	88.2		
3	none	366.4	116.6	0	.29	10
		366.4	116.6	88.2		
4	none	123.8	213.6	0	.29	10
		123.8	213.6	88.		
5	none	201.7	144.9	0	.29	10
		201.7	144.9	88.6		
6	none	375.6	130.1	0	.29	10
		375.6	130.1	88.2		
7	none	90.	176.7	0	.29	10
		90.	176.7	90.2		

Number of wires = 7  
current nodes = 70

	minimum	maximum
Individual wires	wire value	wire value
segment length	4 8.8	7 9.02
radius	1 .29	1 .29

ELECTRICAL DESCRIPTION

Frequencies (KHz)

frequency		no. of steps	segment length (wavelengths)	
no. lowest	step		minimum	maximum
1	1,180.	0	1 .0244444	.0250556

Sources

source	node	sector	magnitude	phase	type
1	1	1	348.101	333.3	voltage
2	11	1	587.781	17.3	voltage
3	21	1	260.727	23.4	voltage
4	31	1	54.4539	339.6	voltage
5	41	1	79.2997	45.7	voltage
6	51	1	18.6993	329.3	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	61	0	517.11	0	0	0

C:\Documents and Settings\George Werl\Desktop\KYES MOM Updated 05\_19\_09\KYES  
Night Array 05-20-2009 00:38:26

IMPEDANCE

normalization = 50.

freq (KHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1,180.	59.424	-30.012	66.573	333.2	1.7672	-11.143	-.34732
source = 2; node 11, sector 1							
1,180.	51.818	10.779	52.927	11.8	1.239	-19.432	-5.E-02
source = 3; node 21, sector 1							
1,180.	44.009	1.4782	44.034	1.9	1.1405	-23.658	-1.9E-02
source = 4; node 31, sector 1							
1,180.	.8838	-11.147	11.182	274.5	59.387	-2.29255	-11.861
source = 5; node 41, sector 1							
1,180.	4.0698	-5.6732	6.982	305.7	12.445	-1.3989	-5.6006
source = 6; node 51, sector 1							
1,180.	-2.6455	-1.3779	2.9828	207.5	****	****	****

C:\Documents and Settings\George Werl\Desktop\KYES MOM Updated 05\_19\_09\KYES  
Night Array 05-20-2009 00:38:26

CURRENT rms

Frequency = 1180 KHz

Input power = 5,000. watts

Efficiency = 100. %

coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	3.69731	.1	3.6973	6.17E-03
2	0	0	8.88	3.56489	357.	3.56014	-.183943
3	0	0	17.76	3.39436	355.1	3.38174	-.292458
4	0	0	26.64	3.16365	353.4	3.1428	-.362649
5	0	0	35.52	2.87263	352.	2.84469	-.399677
6	0	0	44.4	2.52435	350.7	2.49152	-.405829
7	0	0	53.28	2.12345	349.6	2.08868	-.382664
8	0	0	62.16	1.67505	348.6	1.6419	-.331568
9	0	0	71.04	1.1832	347.6	1.1557	-.253631
10	0	0	79.92	.646683	346.7	.629364	-.148661
END	0	0	88.8	0	0	0	0
GND	-91.1472	-156.607	0	7.85258	5.5	7.81578	.759361
12	-91.1472	-156.607	8.82	7.84543	3.	7.83473	.409626
13	-91.1472	-156.607	17.64	7.63721	1.4	7.63483	.190494
14	-91.1472	-156.607	26.46	7.24541	.2	7.24537	.024355
15	-91.1472	-156.607	35.28	6.67794	359.2	6.67723	-.0974614
16	-91.1472	-156.607	44.1	5.94518	358.3	5.9425	-.178228
17	-91.1472	-156.607	52.92	5.05936	357.5	5.05459	-.21975
18	-91.1472	-156.607	61.74	4.03338	356.8	4.02718	-.223482
19	-91.1472	-156.607	70.56	2.87717	356.2	2.87085	-.190598
20	-91.1472	-156.607	79.38	1.58746	355.6	1.58283	-.121117
END	-91.1472	-156.607	88.2	0	0	0	0
GND	-164.059	-327.618	0	4.18673	21.5	3.89604	1.53283
22	-164.059	-327.618	8.82	4.14827	19.3	3.91543	1.37023
23	-164.059	-327.618	17.64	4.01643	17.9	3.82132	1.23663
24	-164.059	-327.618	26.46	3.7935	16.9	3.6306	1.0997
25	-164.059	-327.618	35.28	3.48311	15.9	3.34907	.956944
26	-164.059	-327.618	44.1	3.09052	15.2	2.98286	.808596

27	-164.059	-327.618	52.92	2.62214	14.5	2.53882	.655781
28	-164.059	-327.618	61.74	2.0847	13.9	2.0239	.499824
29	-164.059	-327.618	70.56	1.48336	13.3	1.44347	.341706
30	-164.059	-327.618	79.38	.816502	12.8	.7962	.180946
END	-164.059	-327.618	88.2	0	0	0	0
GND	-103.116	68.5099	0	3.44338	65.1	1.4516	3.12246
32	-103.116	68.5099	8.8	3.37223	65.	1.42401	3.05681
33	-103.116	68.5099	17.6	3.23963	65.	1.36959	2.93589
34	-103.116	68.5099	26.4	3.04011	65.	1.28652	2.75447
35	-103.116	68.5099	35.2	2.77609	64.9	1.17589	2.51475
36	-103.116	68.5099	44.	2.4516	64.9	1.03937	2.22037
37	-103.116	68.5099	52.8	2.07158	64.9	.879029	1.87584
38	-103.116	68.5099	61.6	1.64117	64.9	.696997	1.48581
39	-103.116	68.5099	70.4	1.1642	64.8	.494852	1.05379
40	-103.116	68.5099	79.2	.639129	64.8	.271898	.578409
END	-103.116	68.5099	88.	0	0	0	0
GND	-165.021	-115.979	0	8.03095	100.	-1.40081	7.90784
42	-165.021	-115.979	8.86	7.90193	99.8	-1.34976	7.7858
43	-165.021	-115.979	17.72	7.6119	99.7	-1.28117	7.50331
44	-165.021	-115.979	26.58	7.15719	99.6	-1.18835	7.05784
45	-165.021	-115.979	35.44	6.54488	99.4	-1.07233	6.45643
46	-165.021	-115.979	44.3	5.78551	99.3	-.935271	5.70941
47	-165.021	-115.979	53.16	4.89167	99.2	-.779937	4.82909
48	-165.021	-115.979	62.02	3.87637	99.	-.60928	3.82818
49	-165.021	-115.979	70.88	2.74965	98.9	-.425788	2.71648
50	-165.021	-115.979	79.74	1.50889	98.8	-.230017	1.49125
END	-165.021	-115.979	88.6	0	0	0	0
GND	-241.933	-287.305	0	4.43277	121.8	-2.33506	3.76788
52	-241.933	-287.305	8.82	4.37803	121.9	-2.31444	3.71625
53	-241.933	-287.305	17.64	4.22754	122.	-2.23904	3.58591
54	-241.933	-287.305	26.46	3.98287	122.	-2.11178	3.37693
55	-241.933	-287.305	35.28	3.64843	122.	-1.93548	3.09273
56	-241.933	-287.305	44.1	3.23016	122.	-1.71365	2.73812
57	-241.933	-287.305	52.92	2.73506	122.	-1.45043	2.31879
58	-241.933	-287.305	61.74	2.17037	122.	-1.15009	1.84059
59	-241.933	-287.305	70.56	1.5416	122.	-.816013	1.30792
60	-241.933	-287.305	79.38	.847158	121.9	-.447797	.719134
END	-241.933	-287.305	88.2	0	0	0	0
GND	-89.8508	-5.18078	0	.49157	72.8	.145075	.469674
62	-89.8508	-5.18078	9.02	.264539	72.8	.078302	.252685
63	-89.8508	-5.18078	18.04	.122518	72.4	.0370396	.116785
64	-89.8508	-5.18078	27.06	.0156124	65.7	6.42E-03	.0142297
65	-89.8508	-5.18078	36.08	.0623735	255.7	-.0154138	-.060439
66	-89.8508	-5.18078	45.1	.113287	255.	-.0293819	-.109411
67	-89.8508	-5.18078	54.12	.138827	254.9	-.036158	-.134035
68	-89.8508	-5.18078	63.14	.140294	255.	-.0363748	-.135497
69	-89.8508	-5.18078	72.16	.118855	255.1	-.030597	-.11485
70	-89.8508	-5.18078	81.18	.0749771	255.2	-.0191604	-.0724876
END	-89.8508	-5.18078	90.2	0	0	0	0

### Sample Line Measurements and Calculations

The sampling system for KYES consists of Delta TCT current transformers installed at the output of each antenna tuning unit, immediately adjacent to the final J-plug. Samples from the current transformers are fed to the antenna monitor via equal lengths of 1/2-inch phase-stabilized foam-dielectric coaxial transmission lines. The antenna monitor is a Potomac Instruments 1901.

Impedance measurements of the sample lines were made using a General Radio 916-AL impedance bridge. The measurements were made looking into the antenna monitor ends of the sample lines with the tower ends of the lines open-circuited.

The table below shows the frequencies above and below the carrier frequency where resonance, defined as zero reactance corresponding with low resistance, was found. As the length of distortionless transmission line is 180 electrical degrees at the difference frequency between adjacent frequencies of resonance, and frequencies of resonance occur at odd multiples of 90 degrees electrical length, the sample line length at the resonant frequency below the carrier frequency of 1180 KHz, which is the closest to 1180 KHz, is 270 electrical degrees. The electrical length at 1180 KHz of each sample line was calculated by ratioing 1180 to the lower resonant frequency and multiplying that ratio by 270 electrical degrees, as shown in the table below:

<b>Twr</b>	<b>Sample Line OC Resonance Below 1180 KHz (KHz)</b>	<b>Sample Line OC Resonance Above 1180 KHz (KHz)</b>	<b>Sample Line Calc. Electrical Length at 1180 KHz (deg.)</b>
1	961.0	1609.3	331.5
2	961.2	1609.6	331.5
3	961.2	1609.5	331.5
4	961.1	1609.6	331.5
5	961.1	1609.5	331.5
6	961.3	1609.9	331.4
7	961.1	1609.6	331.5

Thus, the sample lines are of equal length to within one electrical degree as required by FCC rules.

To determine the characteristic impedances of the sample lines, open-circuit measurements were made with frequency offsets of 45 electrical degrees above and below the resonant frequency nearest to the carrier frequency.

The characteristic impedance was calculated using the following formula, where  $R_1 + jX_1$  and  $R_2 + jX_2$  are the measured impedances at the +45 and -45 degree offset frequencies, respectively:

$$Z_0 = ((R_1^2 + X_1^2)^{1/2} \times (R_2^2 + X_2^2)^{1/2})^{1/2}$$

Twr	+45° Offset Freq. (Khz)	-45° Offset Freq. (Khz)	+45° Meas. Z (ohms)	-45° Meas. Z (ohms)	Calc. Z <sub>0</sub> (ohms)
1	1121.2	800.8	5.6 + j48.1	4.4 - j50.6	49.6
2	1121.4	801.0	5.6 + j48.1	4.3 - j50.6	49.6
3	1121.4	801.0	5.7 + j48.1	4.3 - j50.6	49.6
4	1121.3	800.9	5.6 + j48.1	4.3 - j50.6	49.6
5	1121.3	800.9	5.7 + j48.1	4.3 - j50.6	49.6
6	1121.5	801.1	5.6 + j48.1	4.3 - j50.6	49.6
7	1121.3	800.9	5.7 + j48.1	4.4 - j50.6	49.6

As seen in the above table, the characteristic impedances of the sample lines are in agreement to well within 2 ohms as required by FCC rules.

**Field Strength Measurements  
KYES, 1180 KHz, Rockville, MN  
138.5 degree Daytime Radial**

<b>Dist. (km)</b>	<b>Field (mV/m)</b>	<b>Time</b>	<b>Date</b>
3.04	39.5	0843	5/21/09
5.18	18.4	0851	5/21/09
6.76	10	0858	5/21/09
8.58	7.8	0909	5/21/09
10.30	5.2	0915	5/21/09
11.79	6.8	0920	5/21/09

**Field Strength Measurements  
KYES, 1180 KHz, Rockville, MN  
176.7 degree Daytime Radial**

<b>Dist. (km)</b>	<b>Field (mV/m)</b>	<b>Time</b>	<b>Date</b>
4.71	45	0911	5/21/09
6.48	36	0902	5/21/09
8.75	20.5	0838	5/21/09
11.18	13.5	0851	5/21/09

**Field Strength Measurements  
KYES, 1180 KHz, Rockville, MN  
215 degree Daytime Radial**

<b>Dist. (km)</b>	<b>Field (mV/m)</b>	<b>Time</b>	<b>Date</b>
3.70	33	0755	5/21/09
4.75	23.5	0806	5/21/09
6.76	18.5	0816	5/21/09
8.72	16	0823	5/21/09

**Field Strength Measurements  
KYES, 1180 KHz, Rockville, MN  
356.7 degree Daytime Radial**

<b>Dist. (km)</b>	<b>Field (mV/m)</b>	<b>Time</b>	<b>Date</b>
2.94	670	0752	5/21/09
5.04	345	0802	5/21/09
5.81	282	0807	5/21/09
6.90	239	0811	5/21/09
9.32	151	0816	5/21/09

**Field Strength Measurements  
KYES, 1180 KHz, Rockville, MN  
18 degree Nighttime Radial**

<b>Dist. (km)</b>	<b>Field (mV/m)</b>	<b>Time</b>	<b>Date</b>
2.32	490	1332	5/20/09
4.41	210	1339	5/20/09
6.11	156	1346	5/20/09
8.67	83	1354	5/20/09
11.02	56	1404	5/20/09

**Field Strength Measurements  
KYES, 1180 KHz, Rockville, MN  
82 degree Nighttime Radial**

<b>Dist. (km)</b>	<b>Field (mV/m)</b>	<b>Time</b>	<b>Date</b>
4.23	6.5	1631	5/20/09
7.85	2.45	1639	5/20/09
9.44	2.25	1645	5/20/09
11.60	1.5	1654	5/20/09
12.81	0.88	1700	5/20/09

**Field Strength Measurements  
KYES, 1180 KHz, Rockville, MN  
111.5 Nighttime Radial**

<b>Dist. (km)</b>	<b>Field (mV/m)</b>	<b>Time</b>	<b>Date</b>
4.51	5.3	1747	5/20/09
6.66	1.5	1742	5/20/09
8.53	1.14	1733	5/20/09
10.91	0.58	1725	5/20/09
12.44	0.8	1716	5/20/09

**Field Strength Measurements  
KYES, 1180 KHz, Rockville, MN  
148 degree Nighttime Radial**

<b>Dist. (km)</b>	<b>Field (mV/m)</b>	<b>Time</b>	<b>Date</b>
2.69	7.6	1758	5/20/09
5.71	0.89	1813	5/20/09
8.77	0.56	1827	5/20/09
10.38	0.72	1837	5/20/09
12.24	0.49	1845	5/20/09

**Field Strength Measurements  
KYES, 1180 KHz, Rockville, MN  
171.5 degree Nighttime Radial**

<b>Dist. (km)</b>	<b>Field (mV/m)</b>	<b>Time</b>	<b>Date</b>
3.12	6.7	1713	5/20/09
4.76	3.5	1726	5/20/09
5.58	2.8	1820	5/20/09
10.52	0.95	1840	5/20/09

**Field Strength Measurements  
KYES, 1180 KHz, Rockville, MN  
186 degree Nighttime Radial**

<b>Dist. (km)</b>	<b>Field (mV/m)</b>	<b>Time</b>	<b>Date</b>
3.09	7.7	1707	5/20/09
4.73	3.0	1730	5/20/09
7.96	1.4	1903	5/20/09
8.80	2.65	1830	5/20/09

**Field Strength Measurements  
KYES, 1180 KHz, Rockville, MN  
208.5 degree Nighttime Radial**

<b>Dist. (km)</b>	<b>Field (mV/m)</b>	<b>Time</b>	<b>Date</b>
3.46	16.7	1650	5/20/09
5.37	10.4	1736	5/20/09
6.29	9.3	1747	5/20/09
10.52	6.0	1853	5/20/09

**Field Strength Measurements  
KYES, 1180 KHz, Rockville, MN  
229.5 Nighttime Radial**

<b>Dist. (km)</b>	<b>Field (mV/m)</b>	<b>Time</b>	<b>Date</b>
4.05	4.25	1643	5/20/09
6.03	1.98	1654	5/20/09
8.53	1.44	1704	5/20/09
11.09	1.17	1712	5/20/09

**Field Strength Measurements  
KYES, 1180 KHz, Rockville, MN  
252 degree Nighttime Radial**

<b>Dist. (km)</b>	<b>Field (mV/m)</b>	<b>Time</b>	<b>Date</b>
4.75	14.9	1630	5/20/09
6.87	10.2	1751	5/20/09
8.59	8.3	1741	5/20/09
10.25	9.9	1728	5/20/09

**Field Strength Measurements  
KYES, 1180 KHz, Rockville, MN  
298.5 degree Nighttime Radial**

<b>Dist. (km)</b>	<b>Field (mV/m)</b>	<b>Time</b>	<b>Date</b>
3.88	14.1	1847	5/20/09
5.26	10.7	1836	5/20/09
8.66	5.0	1829	5/20/09
11.95	2.75	1815	5/20/09

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Gregg P. Skall  
Direct Dial: (202) 857-4441  
Direct Fax: (202) 261-0041  
E-mail: gskall@wcsr.com

July 8, 2009

FILED/ACCEPTED

JUL - 8 2009

Federal Communications Commission  
Office of the Secretary

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

**Re: File No. BMML 20090527AIB  
KYES(AM), Rockville, MN (Facility ID No. 136921)  
Amendment to License Application (License to Cover BMP-20080715ADM)**

Dear Ms. Dortch:

By transmittal letter of June 29, 2009, Throw Fire Project filed its amendment to FCC Form 302-A for the above-referenced radio station. At the time of filing this amendment, the St. Louis bank had not yet logged the original 302-AM application, which had therefore not yet received the file number. That file number has now appeared.

Please associate the amendment filed on June 29, 2009 with File No. BMML 20090527AIB. For your reference and convenience, a copy of the June 29, 2009 transmittal letter and attachments are enclosed herewith.

Should you desire further information in connection with this request, kindly contact the undersigned.

Sincerely,

Gregg P. Skall

Enclosures



June 29, 2009

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

FILED/ACCEPTED  
JUN 29 2009  
Federal Communications Commission  
Office of the Secretary

**Re: KYES(AM), Rockville, MN (Facility ID No. 136921)  
Amendment to License Application (License to Cover BMP-20080715ADM)**

Dear Ms. Dortch:

Transmitted herewith on behalf of Throw Fire Project is an amendment to the license application filed with the FCC on May 26, 2009. A stamped copy (Attachment A) of the license application is attached for your reference, as the license has not yet been granted an application number.

We respectfully note that this amendment consists of information which was not included in the original license application. The information contained in this amendment consists of the following:

- Verification of Calibration of Sample Current Transformers
- Post-Construction Certification of Tower Locations by Surveyor
- Field Measurement Data with GPS Coordinates and Physical Descriptions of Measuring Points
- Certification that the Current Sampling of Tower 1 in Night Mode has been rectified to display the true Current Ratio

Should any question arise concerning this material, please communicate directly with this office or, with respect to technical matters, with B. Benjamin Evans, 216 N. Green Bay Road, Suite 205, Thiensville, WI 53092; telephone: (262) 242-6000; email: [ben@evansassoc.com](mailto:ben@evansassoc.com).

Sincerely,



Gregg P. Skall

Enclosures

cc: Andrew W. Hilger (LPF)  
Son Nguyen, Media Bureau, FCC  
Irene Bleiweiss, Media Bureau, FCC

FOR  
FCC  
USE  
ONLY

**FCC 302-AM**  
**APPLICATION FOR AM**  
**BROADCAST STATION LICENSE**

(Please read instructions before filling out form.)

FOR COMMISSION USE ONLY

FILE NO.

**SECTION I - APPLICANT FEE INFORMATION**

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

**THROW FIRE PROJECT**

MAILING ADDRESS (Line 1) (Maximum 35 characters)

**1310 SECOND STREET**

MAILING ADDRESS (Line 2) (Maximum 35 characters)

CITY  
**SAUK RAPIDS**

STATE OR COUNTRY (if foreign address)  
**MN**

ZIP CODE  
**56379-2532**

TELEPHONE NUMBER (include area code)  
**320-251-1780**

CALL LETTERS  
**KYES**

OTHER FCC IDENTIFIER (If applicable)  
**136921**

2. A. Is a fee submitted with this application?

Yes  No

B. If No, indicate reason for fee exemption (see 47 C.F.R. Section 1.1112).

Governmental Entity

Noncommercial educational licensee

Other (Please explain): **Amendment**

C. If Yes, provide the following information:

Enter in Column (A) the correct Fee Type Code for the service you are applying for. Fee Type Codes may be found in the "Mass Media Services Fee Filing Guide." Column (B) lists the Fee Multiple applicable for this application. Enter fee amount due in Column (C).

(A)

FEE TYPE CODE		

(B)

FEE MULTIPLE			
0	0	0	1

(C)

FEE DUE FOR FEE TYPE CODE IN COLUMN (A)
\$

FOR FCC USE ONLY

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To be used only when you are requesting concurrent actions which result in a requirement to list more than one Fee Type Code.

(A)

--	--	--

(B)

0	0	0	1
---	---	---	---

(C)

\$
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FOR FCC USE ONLY

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ADD ALL AMOUNTS SHOWN IN COLUMN C,  
AND ENTER THE TOTAL HERE.  
THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED  
REMITTANCE.

TOTAL AMOUNT  
REMITTED WITH THIS  
APPLICATION

\$

FOR FCC USE ONLY

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<b>SECTION II - APPLICANT INFORMATION</b>		
1. NAME OF APPLICANT <b>Throw Fire Project</b>		
MAILING ADDRESS <b>P. O. Box 547, 1310 Second Street North</b>		
CITY <b>Sauk Rapids</b>	STATE <b>MN</b>	ZIP CODE <b>56379</b>

2. This application is for:

- Commercial                       Noncommercial  
 AM Directional                       AM Non-Directional

Call letters <b>KYES</b>	Community of License <b>Rockville, MN</b>	Construction Permit File No. <b>BNP-20020508AAN</b>	Modification of Construction Permit File No(s). <b>BMP-20080715ADM</b> <b>BMP-20080220ABE</b>	Expiration Date of Last Construction Permit <b>01/25/2009</b>
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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. Eng. Stmt.
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4. Have all the terms, conditions, and obligations set forth in the above described construction permit been fully met?  Yes  No

If No, state exceptions in an Exhibit.

Exhibit No.
-------------

5. Apart from the changes already reported, has any cause or circumstance arisen since the grant of the underlying construction permit which would result in any statement or representation contained in the construction permit application to be now incorrect?  Yes  No

If Yes, explain in an Exhibit.

Exhibit No.
-------------

6. Has the permittee filed its Ownership Report (FCC Form 323) or ownership certification in accordance with 47 C.F.R. Section 73.3615(b)?  Yes  No  
 Does not apply

If No, explain in an Exhibit.

Exhibit No.
-------------

7. Has an adverse finding been made or an adverse final action been taken by any court or administrative body with respect to the applicant or parties to the application in a civil or criminal proceeding, brought under the provisions of any law relating to the following: any felony; mass media related antitrust or unfair competition; fraudulent statements to another governmental unit; or discrimination?  Yes  No

If the answer is Yes, attach as an Exhibit a full disclosure of the persons and matters involved, including an identification of the court or administrative body and the proceeding (by dates and file numbers), and the disposition of the litigation. Where the requisite information has been earlier disclosed in connection with another application or as required by 47 U.S.C. Section 1.65(c), the applicant need only provide: (i) an identification of that previous submission by reference to the file number in the case of an application, the call letters of the station regarding which the application or Section 1.65 information was filed, and the date of filing; and (ii) the disposition of the previously reported matter.

Exhibit No.
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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).

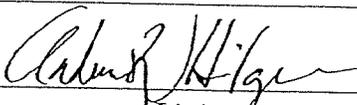
The APPLICANT acknowledges that all the statements made in this application and attached exhibits are considered material representations and that all the exhibits are a material part hereof and are incorporated herein as set out in full in

**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 Andrew W. Hilger	Signature 	
Title President	Date 5/26/2009	Telephone Number 320-251-1780

**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.





**Engineering Statement  
Amendment to Application for License  
KYES(AM), 1180 KHz, Rockville, MN**

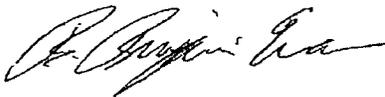
This Engineering Statement and attached exhibits supports the pending application for license to cover construction permit of KYES, 1180 KHz, Rockville, MN (BMP-20080715ADM).

At the time the permittee of KYES, Throw Fire Project, submitted its antenna proof and application for license to cover, on May 26, 2009, certain information required for licensure was not yet available. With this amendment, Throw Fire hereby submits all of the required information that was not included in the original license application.

The information contained in this amendment is as follows:

1. Verification of Calibration of Sample Current Transformers
2. Post-Construction Certification of Tower Locations by Surveyor
3. Field Measurement Data with GPS Coordinates and Physical Descriptions of Measuring Points
4. Certification that the Current Sampling of Tower 1 in Night Mode has been rectified to display the true Current Ratio

The above information and the information attached are true and accurate to the best of my knowledge and belief.



B. Benjamin Evans, P.E.  
Consulting Engineer for Throw Fire Project

June 25, 2009

## Verification of Calibration of Sample Current Transformers

Prior to calibration of the current transformers, a check was made of the calibration of the Potomac Instruments 1901 phase monitor's current sample inputs. The PI monitor was placed in the "test" mode as per instructions in the manual. An RF voltage of more than 3 volts was applied to the Tower 1 (daytime reference tower) input to the phase monitor, and the test ratio and phase indications for Towers 1 through 7 were observed. In test mode, the readings should nominally be 1.000 ratio and 180.0 degrees phase. The results are as follows:

Tower	Ratio	Phase
1	1.000	180.0
2	0.998	180.1
3	0.998	179.9
4	0.998	180.0
5	0.998	180.0
6	0.998	180.0
7	0.998	180.1

As can be seen, all ratios were within -0.2% of the Day reference and all phases were within  $\pm 0.1$  degree of the Day reference. According to the PI manual, no calibration adjustments are required and none were performed.

For purposes of current sample toroid calibration, a test jig was constructed in the phasor cabinet to energize three toroids at a time side-by-side with a common RF feed to the dummy load (see photographs). The toroids were grounded to the copper strap within the phasor cabinet. The test jig accommodated no more than three toroids at a time due to space and mounting limitations. Toroids were measured in groups of three, and measurements were repeated for different combinations of toroids using the same phase monitor inputs. The Tower #1 toroid was included in every test group as the common reference. Toroid #1 was connected to the Day reference input (Tower 1) of the antenna monitor. More than 2 volts RF were applied to all phase monitor inputs used.

Three equal length test cables (approximately 25 feet long) were constructed using RG-58 cable. These cables were from the same cable spool, and they measured within 1/4 inch of each other.

The results of these comparisons are shown below:

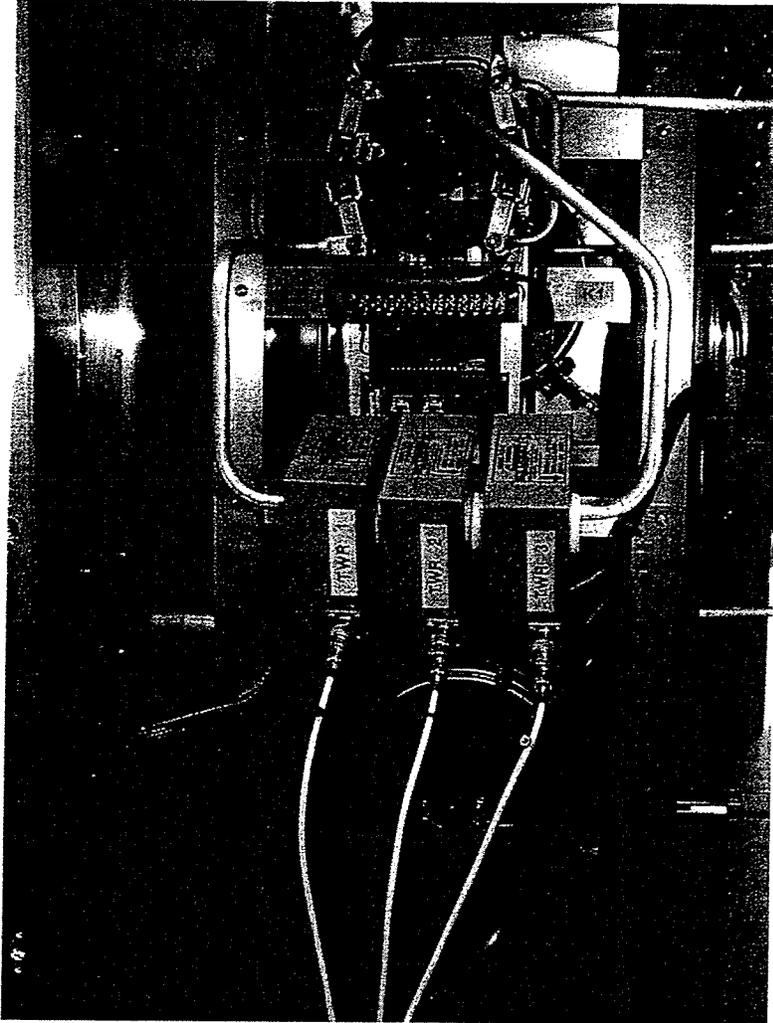
<b>Test Group 1</b>				
Toroid	S/N	Input	Ratio	Phase
1	17822	1 (A)	1.000	-0.1
2	17880	4 (D)	0.998	0.0
3	17881	5 (E)	0.997	0.2

Test Group 2				
Toroid	S/N	Input	Ratio	Phase
1	17822	1 (A)	1.000	-0.1
4	17877	4 (D)	0.999	0.2
5	17878	5 (E)	0.997	0.4

Test Group 3				
Toroid	S/N	Input	Ratio	Phase
1	17822	1 (A)	1.000	-0.1
6	17879	4 (D)	0.998	0.3
7	17823	5 (E)	0.997	0.3

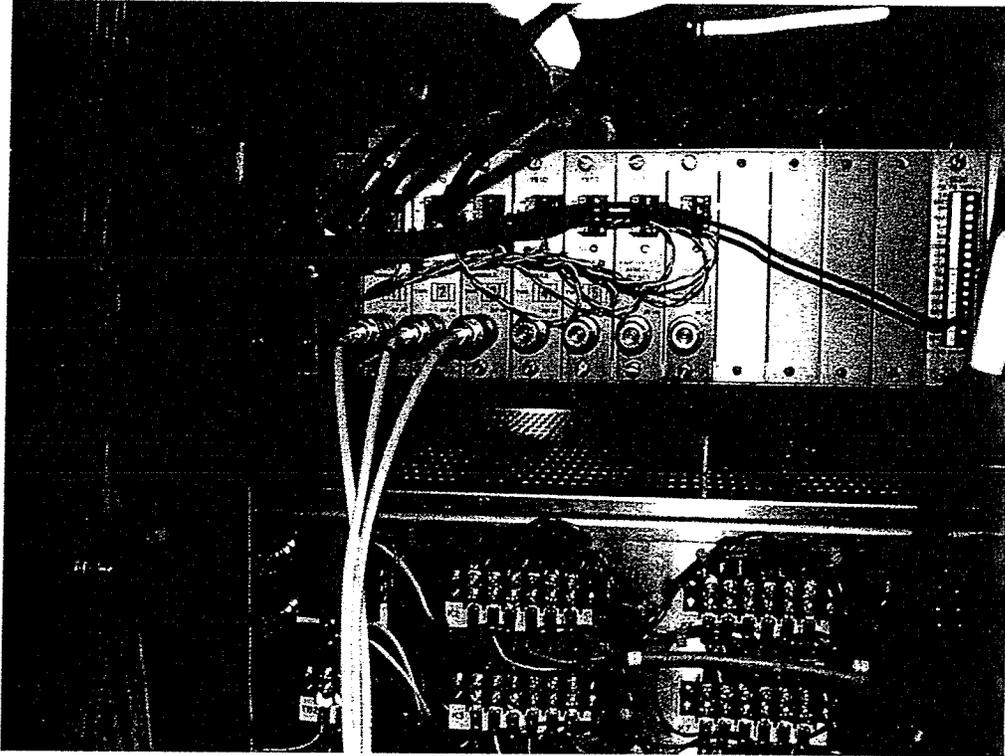
As can be seen, all three combinations of toroid test groups produced nearly identical readings on the phase monitor, and all readings are essentially unity ratio and zero phase, well within the published accuracy of the phase monitor ( $\pm 0.010$  ratio,  $\pm 1.0$  degree phase). Thus, it is concluded that the current sampling of all the toroids are in excellent agreement with each other.

**Photographs of Sample Current Toroid Test Setup**



**RF power applied to group of toroids under test**

**Photographs of Sample Current Toroid Test Setup (Continued)**



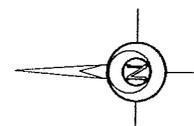
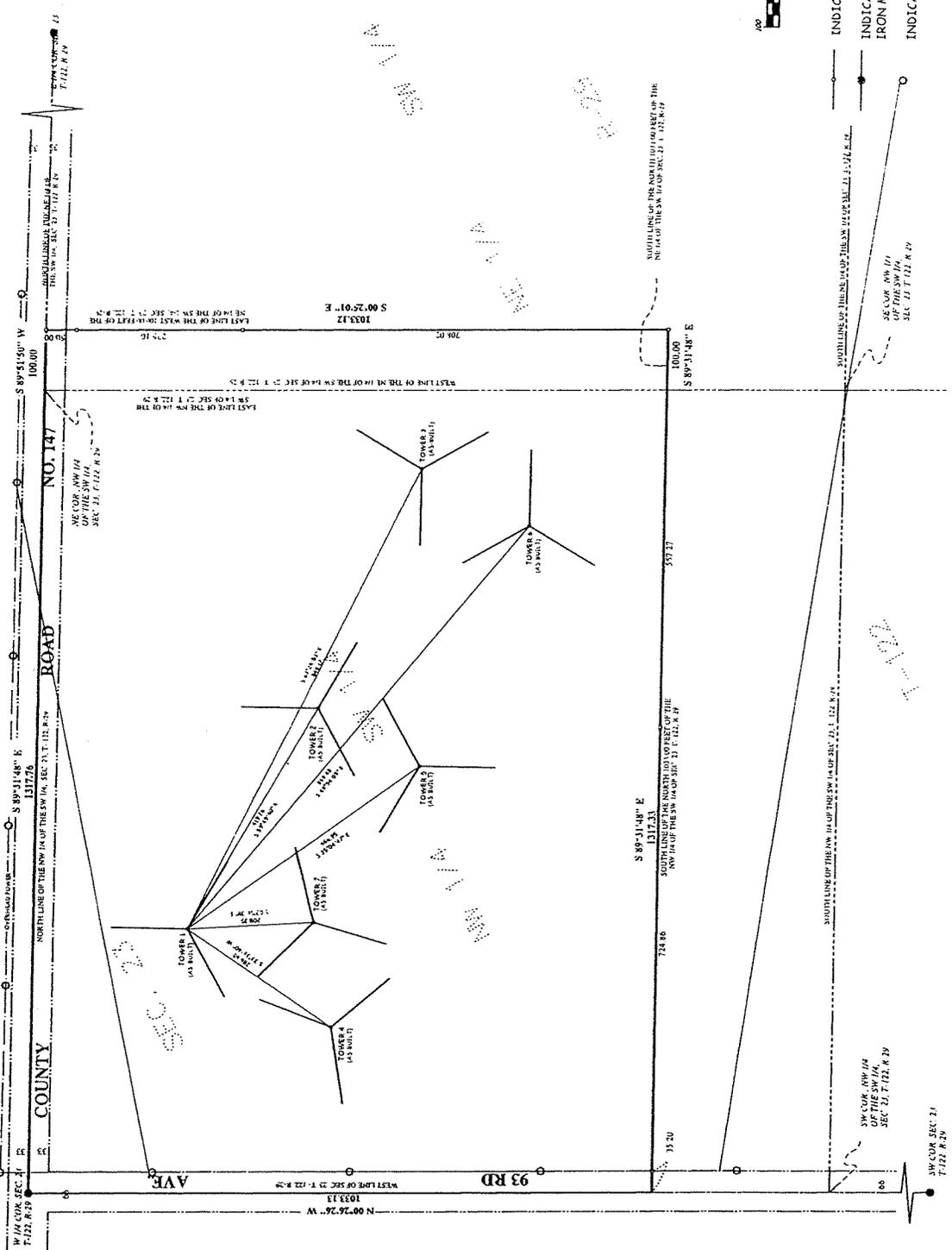
**Toroid current samples into phase monitor inputs**

## Post-Construction Certification of Tower Locations by Surveyor

As required by the FCC rules, a post-construction certification by a land surveyor was commissioned to confirm the orientations and distances to Towers 2 through 7, with Tower 1 as reference. The actual certified survey is on the next page. The results are summarized in the table below. The survey figures have been converted to electrical degrees for the spacings, and azimuths clockwise from True North for the orientations, as per FCC convention.

Tower	Figures from Survey		Survey Figures Converted		Per Construction Permit	
	Dist. (ft)	Orientation	Dist. (elec deg)	Orientation (deg T)	Spacing (deg)	Orientation (deg T)
2	419.26	S 59° 49' 40" E	181.1	120.2	181.2	120.2
3	848.17	S 63° 24' 53" E	366.3	116.6	366.4	116.6
4	286.65	S 33° 36' 40" W	123.8	213.6	123.8	213.6
5	466.95	S 35° 04' 47" E	201.7	144.9	201.7	144.9
6	869.48	S 49° 54' 05" E	375.5	130.1	375.6	130.1
7	208.39	S 03° 16' 38" E	90.0	176.7	90.0	176.7

As can be seen, the measured spacings are all within a tenth of an electrical degree from the construction permit values, and all of the measured orientations match the construction permit values, rounded to the nearest tenth of a degree.



- Legend
- INDICATES IRON MONUMENT PLACED
  - INDICATES STEARNS COUNTY EAST IRON MONUMENT
  - INDICATES POWER POLE

NOTE:

THIS SURVEY IS INTENDED ONLY FOR THE BENEFIT OF THE PARTY TO WHOM IT IS MADE AND NO OTHER PARTY SHOULD NOT BE RELIED UPON BY ANY OTHER PARTY FOR ANY PURPOSES. THE SURVEYOR AND HIS OR HER FELLOW SURVEYOR WHO DEVELOPED AND MADE THIS DOCUMENT UNAUTHORIZED REPRODUCTION OF THIS DOCUMENT IS PROHIBITED.

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FAX 320-685-3056

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WILLMAR, MN 56201  
PH 320-485-5000  
FAX 320-214-9310

I HEREBY CERTIFY THAT THIS SURVEY, PLAN OR REPORT WAS PREPARED BY ME OR UNDER MY CLOSE PERSONAL SUPERVISION AND THAT I AM A DULY REGISTERED LAND SURVEYOR UNDER THE LAWS OF THE STATE OF MINNESOTA.

BENJAMIN C. O'MALLEY DATE: 05/27/09  
MINNESOTA REGISTRATION NO. 42100

SHEET 1 OF 1

**Certification that the Current Sampling of Tower 1 in Night Mode  
Has Been Rectified to Display the True Current Ratio**

As reported in the engineering statement of the original license application, it was discovered, while preparing for tune-up of the KYES antenna system, that the phasor manufacturer had mistakenly installed at the antenna tuning units of Towers 1 and 7, the daytime towers, Delta current sampling toroids with half the sensitivity of the transformers at the other towers. Apparently, the manufacturer chose to use toroids with less sensitivity for the 50 KW daytime mode than for the nighttime towers so as not to overdrive the antenna monitor inputs, not realizing that Tower 1 is also used for the nighttime 5 KW antenna system. This resulted in a display on the antenna monitor of the current ratio of Tower 1 in the nighttime mode of exactly half the true value.

This problem has now been rectified. The toroids at Towers 2 through 6 have been replaced with toroids identical to those that are installed at Towers 1 and 7. The make and model is Delta TCT-1. Now all the Tower ATUs are equipped with identical toroids with the same sensitivity of 0.5 volts per ampere<sup>1</sup>, and now the display of the Tower 1 nighttime current ratio reads its correct value. The replacement of these toroids resulted in very little change in the other monitored antenna parameters, and are well within the permitted deviation from the modeled parameters, as seen below:

**Nighttime Antenna Parameters**

Tower	Modeled Antenna Parameters		Actual Parameters after Toroid Replacement	
	Ratio	Phase (°)	Ratio	Phase (°)
1	0.471	-5.4	0.471	-4.8
2	1	0	1	0
3	0.533	+16.0	0.528	+16.9
4	0.439	+59.6	0.435	+59.9
5	1.023	+94.5	1.029	+95.2
6	0.564	+116.3	0.562	+115.8

<sup>1</sup> The calibration of the current samples described in the first section of this report included the five replacement toroids.

**Field Strength Measurements  
 KYES, 1180 KHz, Rockville, MN  
 138.5 degree Daytime Radial**

Dist. (km)	Field (mV/m)	Time	Date	GPS Coordinates (NAD-83)	Point Description
3.04	39.5	0843	5/21/09	45 20 29.5 94 16	26.7 150th Street, 100 feet East of power pole #01301300
5.18	18.4	0851	5/21/09	45 19 37.4 94 15	21.2 140th Street, front of house #7018
6.76	10	0858	5/21/09	45 19 1.0 94 14	31.7 CR 44 at east end of curve in road
8.58	7.8	0909	5/21/09	45 18 15.9 94 13	39.3 Intersection of Quinn Avenue and 105th Street
10.30	5.2	0915	5/21/09	45 17 34.1 94 12	48.9 Intersection of MN 55 and Lincoln Avenue, front of house #600
11.79	6.8	0920	5/21/09	45 16 58.1 94 12	2.5 90th Street at mailboxes #14981 and 14957

## Field Strength Measurements KYES, 1180 KHz, Rockville, MN 176.7 degree Daytime Radial

Dist. (km)	Field (mV/m)	Time	Date	GPS Coordinates (NAD-83)	Point Description
4.71	45	0911	5/21/09	45 19 10.2 94 17 46.3	Intersection of 135th Street and Hodge Podge Road
6.48	36	0902	5/21/09	45 17 13.7 94 17 43.3	CR 150 at mailbox #12420
8.75	20.5	0838	5/21/09	45 16 59.4 94 17 36.2	Kingston Street at West edge of pond
11.18	13.5	0851	5/21/09	45 15 40.7 94 17 29.5	732nd Avenue at power pole #12261800

## Field Strength Measurements KYES, 1180 KHz, Rockville, MN 215 degree Daytime Radial

Dist. (km)	Field (mV/m)	Time	Date	GPS Coordinates (NAD-83)	Point Description
3.70	33	0755	5/21/09	45 20 4.9 94 19 38.2	Powder Ridge Road at power pole #02340300
4.75	23.5	0806	5/21/09	45 19 36.8 94 20 6.5	140th Street at driveway to "Outback Retrievers")
6.76	18.5	0816	5/21/09	45 18 43.8 94 20 0.6	MN 55 at "No Passing" sign
8.72	16	0823	5/21/09	45 17 51.8 94 21 50.0	123rd Avenue at mailbox #12057

## Field Strength Measurements KYES, 1180 KHZ, Rockville, MN 356.7 degree Daytime Radial

Dist. (km)	Field (mV/m)	Time	Date	GPS Coordinates (NAD-83)	Point Description
2.94	670	0752	5/21/09	45 23 18.3 94 18	8.7 CR 8 and 93rd Avenue, 50 feet East of intersection
5.04	345	0802	5/21/09	45 24 25.5 94 18	11.7 CR 146, front of gray house, #9347
5.81	282	0807	5/21/09	45 24 50.9 94 18	15.4 Echo Road at farm field entry, 100 feet East of small barn
6.90	239	0811	5/21/09	45 25 25.9 94 18	18.4 CR 141 across from power pole with down guy (only one with guy nearby)
9.32	151	0816	5/21/09	45 26 43.7 94 18	24.2 Rausch Lake Road at "orange with black arrow" farm field marker

**Field Strength Measurements  
KYES, 1180 KHz, Rockville, MN  
18 degree Nighttime Radial**

Dist. (km)	Field (mV/m)	Time	Date	GPS Coordinates (NAD-83)	Point Description
2.32	490	1332	5/20/09	45 22 54.3 94 17 26.6	CR 8 at 88th Avenue, 100 feet East of "School Bus Stop" sign
4.41	210	1339	5/20/09	45 23 58.8 94 16 57.0	CR 146 and 190th Street, 100 feet West of end of curve in road
6.11	156	1346	5/20/09	45 24 51.1 94 16 34.2	200th Street, corner of field at green fence gate (electrified fence)
8.67	83	1354	5/20/09	45 26 9.7 94 15 56.7	CR 141 across road from farm building (cow barns?) next to house #7468
11.02	56	1404	5/20/09	45 27 22.9 94 15 23.5	Ahles Road at mailbox #7096

**Field Strength Measurements  
KYES, 1180 KHz, Rockville, MN  
82 degree Nighttime Radial**

Dist. (km)	Field (mV/m)	Time	Date	GPS Coordinates (NAD-83)	Point Description
4.23	6.5	1631	5/20/09	45 22 1.9 94 14 48.1	66th Avenue, 100 feet North of treeline
7.85	2.45	1639	5/20/09	45 22 17.9 94 12 3.5	CR 7 at twin pine trees, 200 feet North of house marker 17068
9.44	2.25	1645	5/20/09	45 22 26.2 94 10 50.4	33rd Avenue, 100 feet North of Telco pedestal
11.60	1.5	1654	5/20/09	45 22 36.4 94 9 12.8	Dellwood Road across from irrigator pivot
12.81	0.88	1700	5/20/09	45 22 41.4 94 8 17.4	CR 45 at mailbox 17615

**Field Strength Measurements  
KYES, 1180 KHz, Rockville, MN  
111.5 degree Nighttime Radial**

Dist. (km)	Field (mV/m)	Time	Date	GPS Coordinates (NAD-83)	Point Description
4.51	5.3	1747	5/20/09	45 20 50.7 94 14 48.4	66th Avenue, 500 feet North of treeline
6.66	1.5	1742	5/20/09	45 20 25.8 94 13 16.4	53rd Avenue at "POSTED Private Property" sign
8.53	1.14	1733	5/20/09	45 20 3.0 94 11 54.3	CR 45 at corner of fenced field South of house marker #14525
10.91	0.58	1725	5/20/09	45 19 33.3 94 10 1.7	CR 44 at entry to farm field
12.44	0.8	1716	5/20/09	45 19 16.7 94 9 3.9	Bayberry Road at house marker #1908

**Field Strength Measurements  
 KYES, 1180 KHz, Rockville, MN  
 148 degree Nighttime Radial**

Dist. (km)	Field (mV/m)	Time	Date	GPS Coordinates (NAD-83)	Point Description
2.69	7.6	1758	5/20/09	45 20 29.4 94 16 55.3	150th Street 100 feet East of "T" intersection ("Knife River" access)
5.71	0.89	1813	5/20/09	45 19 8.7 94 15 41.4	73rd Avenue at power pole #11410800
8.77	0.56	1827	5/20/09	45 17 42.4 94 14 28.8	MN 55 at Telco pedestal (South side of highway)
10.38	0.72	1837	5/20/09	45 16 58.0 94 13 46.9	90th Street at "No Hunting, No Trespassing" sign
12.24	0.49	1845	5/20/09	45 16 6.6 94 13 3.8	80th Street at bottom of hill next to small pond

**Field Strength Measurements  
 KYES, 1180 KHz, Rockville, MN  
 171.5 degree Nighttime Radial**

Dist. (km)	Field (mV/m)	Time	Date	GPS Coordinates (NAD-83)	Point Description
3.12	6.7	1713	5/20/09	45 21 43.0 94 18 0.2	Intersection of CR 15 and Powder Ridge Road
4.76	3.5	1726	5/20/09	45 19 10.2 94 17 26.8	135th Street, 0.3 mi. East of MN 55 intersection
5.58	2.8	1820	5/20/09	45 18 44.3 94 17 22.7	Hazel Avenue (CR 44), front of house #621
10.52	0.95	1840	5/20/09	45 16 5.3 94 16 51.9	100 feet East of intersection of 360th Street and 737th Avenue

**Field Strength Measurements  
 KYES, 1180 KHZ, Rockville, MN  
 186 degree Nighttime Radial**

Dist. (km)	Field (mV/m)	Time	Date	GPS Coordinates (NAD-83)	Point Description
3.09	7.7	1707	5/20/09	45 20 3.7 94 18 17.7	Powder Ridge Road at power pole #02342100
4.73	3.0	1730	5/20/09	45 19 10.1 94 18 22.6	135th Street at West access road to Kimball Cemetery
7.96	1.4	1903	5/20/09	45 17 26.2 94 18 34.1	CR 15 at Telco pedestal with "Fiber Optic" sign
8.80	2.65	1830	5/20/09	45 16 59.3 94 18 39.7	Kingston Street East of intersection with CR 15 at treeline

## Field Strength Measurements KYES, 1180 KHZ, Rockville, MN 208.5 degree Nighttime Radial

Dist. (km)	Field (mV/m)	Time	Date	GPS Coordinates (NAD-83)	Point Description
3.46	16.7	1650	5/20/09	45 20 4.6 94 19 15.5	Powder Ridge Road at Telco pedestal, "Fiber Optic" sign
5.37	10.4	1736	5/20/09	45 19 9.5 94 19 58.1	108th Avenue and 135th Street, 100 feet east of intersection
6.29	9.3	1747	5/20/09	45 18 43.9 94 20 18.0	MN 55 across from power pole #500
10.52	6.0	1853	5/20/09	45 16 41.9 94 21 50.6	697th Avenue at mailbox #36494

**Field Strength Measurements  
 KYES, 1180 KHZ, Rockville, MN  
 229.5 degree Nighttime Radial**

Dist. (km)	Field (mV/m)	Time	Date	GPS Coordinates (NAD-83)	Point Description
4.05	4.25	1643	5/20/09	45 20 17.9 94 20	23.2 Balkan Road at power pole #02681100
6.03	1.98	1654	5/20/09	45 19 36.3 94 21	30.7 140th Street at treeline West of house marker #11997
8.53	1.44	1704	5/20/09	45 18 43.2 94 22	59.2 MN55 front of white house, 100 feet East of "Meeker County" sign
11.09	1.17	1712	5/20/09	45 17 49.3 94 24	28.8 380th Street at "Curve" sign

## Field Strength Measurements KYES, 1180 KHz, Rockville, MN 252 degree Nighttime Radial

Dist. (km)	Field (mV/m)	Time	Date	GPS Coordinates (NAD-83)	Point Description
4.75	14.9	1630	5/20/09	45 20 55.1 94 21	28.2 155th Street (CR 149) at mailbox #12012
6.87	10.2	1751	5/20/09	45 20 35.8 94 23	0.1 CR 149, 100 feet North of "S" curve road sign
8.59	8.3	1741	5/20/09	45 20 15.1 94 24	14.8 143rd Avenue at power pole #03261200
10.25	9.9	1728	5/20/09	45 19 58.9 94 25	27.7 153rd Avenue, 200 feet South of power pole 2108

**Field Strength Measurements  
 KYES, 1180 KHz, Rockville, MN  
 298.5 degree Nighttime Radial**

Dist. (km)	Field (mV/m)	Time	Date	GPS Coordinates (NAD-83)	Point Description
3.88	14.1	1847	5/20/09	45 22 42.9 94 20 36.5	113th Avenue across from middle tree in wetland on East side
5.26	10.7	1836	5/20/09	45 23 2.3 94 21 32.7	121st Avenue at first tree South of intersection
8.66	5.0	1829	5/20/09	45 23 56.6 94 23 49.9	CR 165, 200 feet East of "No Passing" sign
11.95	2.75	1815	5/20/09	45 24 47.9 94 26 4.0	200th Street at mailbox #15802

# ATTACHMENT A