

***APPLICATION FOR MODIFICATION  
OF CONSTRUCTION PERMIT***

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**FM TRANSLATOR STATION K223CG  
SAND SPRINGS, OKLAHOMA  
92.5 MHz / 0.062 kW ERP**

**COMMUNITY BROADCASTING, INC.**

**MAY, 2014**

## **APPLICATION FOR MODIFICATION OF CONSTRUCTION PERMIT**

The following engineering statement and attached exhibits have been prepared for **Community Broadcasting, Inc.** ("CBI"), permittee of FM translator station K223CG at Sand Springs, Oklahoma, and are in support of their application for modification of construction permit.<sup>1</sup> This application seeks to make minor changes to the current construction permit under FCC File No. BNPFT-20130327AHK.

This application seeks no change in the transmitter site location, channel of operation, or effective radiated power. Changes sought under this application include a reduction in the center of radiation relative to ground level, and a removal of the antenna structure registration number associated with the facility. Although a nominal change in the center of radiation is being proposed, this application will fully address the interference situation for the proposed facility.

The proposed facility would continue to be authorized on channel 223 with an effective radiated power of 62 Watts. The current construction permit specifies a center of radiation of 393 meters AMSL, which is rounded down from the actual original value of 393.4 meters. The value proposed under this application is 392.5 meters AMSL, which would round up to 393 meters. It should be noted that the integral values utilized on the form pages would result in an incorrect value of 392 meters AMSL.

The center of radiation above ground level is therefore 202.4 meters AGL, which is a reduction of one meter from the authorized value when rounded accordingly. This reduction in the

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<sup>1</sup> The Facility ID for K223CG at Sand Springs, Oklahoma is 140436.

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center of radiation relative to ground level is a result of the antenna placement at the site. In the application for the current construction permit, an antenna structure registration number of 1013337 was utilized, as the antenna was intended to utilize that mast. Instead, the antenna will be mounted to a pole to be installed at the building.

The site utilized is the tallest building in the Citiplex Towers complex in Tulsa, Oklahoma. This building has a roof height of 648 feet or 197.5 meters above ground level. Above the roof is a parapet 6 feet in height. The antenna would be mounted to the top of a pole that extends an additional 10 feet above this parapet. The overall height of this structure is therefore 664 feet above, 202.4 meters, above ground level, but is only 16 feet above the top of the supporting structure, the building itself. As a result, this pole, which is a distinct and separate structure from the registered antenna structure at the same building, does not require registration per evaluation by *Towair*.

The proposed facility would not operate as a fill-in translator for KQCV-FM at Shawnee, Oklahoma, the primary station.<sup>2</sup> As a result, the effective radiated power of the facility continues to be limited to 62 Watts. This power level is based on the center of radiation above average terrain along the 150 degree true radial, which is 202.5 meters.<sup>3</sup> Exhibit E-1 illustrates the 60 dBu service contour of the primary facility along with the proposed 60 dBu service contour of K223CG.

The proposed facility would comply with the provisions of Section 74.1204 of the Commission's Rules. Exhibit E-2 is a tabular based interference study for the proposed facility. As

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<sup>2</sup> The Facility ID for KQCV-FM at Shawnee, Oklahoma is 6488.

<sup>3</sup> Average terrain is based on a sample of the FCC 30-second linearly interpolated terrain database.

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this study demonstrates, the proposed facility would comply with all of the contour overlap requirements of that section to all proposed and existing facilities with the exception of KBEZ(FM) at Tulsa, Oklahoma, and KTBT(FM) at Broken Arrow, Oklahoma.<sup>4</sup> This tabular study is graphically depicted in the contour map in Exhibit E-3.

Although there would be normally prohibited contour overlap between the proposed facility and both KBEZ and KTBT, the predicted interference region would not affect any population. Exhibit E-4 illustrates that the predicted 90 dBu service contour of KBEZ(FM) and the 91 dBu service contour of KTBT(FM) intersect the translator site. It will therefore be assumed that the field strength of both full power facilities at the site is 90 dBu.

Since both full power facilities operate second adjacent to the translator facility, interference to either would be predicted to occur when the field strength of the translator is at least 40 dB above the field strength of either full power station. Specifically, interference may occur in regions where the translator field strength is at least 130 dBu.

The power density for the proposed facility at a field strength of 130 dBu is given by the following equation:

$$S = \frac{E^2}{Z_0}$$

In this equation, S represents the calculated power density in Watts per square meter, E is the electric field intensity,  $Z_0$  is the characteristic impedance of free space.

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<sup>4</sup> The Facility ID for KBEZ(FM) at Tulsa, Oklahoma is 55707. The Facility ID for KTBT(FM) at Broken Arrow, Oklahoma is 33727.

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The power density is also given by:

$$S = \frac{P}{4\pi R^2}$$

Where S is the same units, P is the power in Watts and R is the distance from the antenna.

Rearranging the terms in the equation, it can be solved for the distance to the desired power density as follows:

$$R^2 = \frac{P}{4\pi S}$$

The results of these calculations for depression angles of 0 degrees to 90 degrees are tabulated in Exhibit E-5. The data in this exhibit is based on the use of a non-directional antenna. In addition to the tabular data in Exhibit E-12, several graphs are included in that exhibit, which graphically illustrate the interference situation. As indicated on the form pages, a Shively Labs 6812B-1 antenna is proposed for use by the facility. The relative field values listed at the various depression angles are based on the published data for this antenna, and were obtained from the Shively Labs website.

The resulting radii values indicate the volume in which interference potentially may occur relative to the center of radiation of the antenna. As the values and tables indicate, this interference area is confined to a volume located greater than 193.5 meters above ground level. The proposed site location is known as the CitiPlex Towers, which is a multi-use high-rise commercial real estate property. A photograph of the structure is below.<sup>5</sup>

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<sup>5</sup> Photograph of structure obtained from Wikipedia. The photograph of the structure was obtained on September 21, 2009 by Raecoli, and the image utilized has been released into the public domain by the artist/author. See [http://en.wikipedia.org/wiki/File:CitiPlex\\_Towers.jpg](http://en.wikipedia.org/wiki/File:CitiPlex_Towers.jpg).

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As these exhibits demonstrate, the predicted interference region would not reach ground level due to the height of the building. The potential interference region also does not affect any of the populated areas of the building. The rooftop of the structure is listed at 197.5 meters, or 648 feet above ground level. The potential interference region would generally overshoot the rooftop of the building. A portion of the region however will be confined to the rooftop due to the steel and concrete construction of the roof.

The facility specified in this application would not constitute a significant environmental impact, and is exempt from environmental processing. The translator antenna would be mounted to a pole to the rooftop of the building. The addition of this pole would not increase the environmental impact already present from the building.

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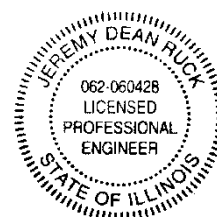
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In addition, the proposed facility would not constitute a radiofrequency radiation hazard to persons at the site. As indicated on the form pages, the proposed facility would operate with a Shively Labs 6812B-1 model antenna. The Commission's *FM Model* software package predicts a maximum power density at ground level of  $0.022 \mu\text{W}/\text{cm}^2$  at a distance of 208 meters from the base of the building. This value is considerably less than the maximum value permissible under the applicable safety standards, and categorically excludes CBI at ground level.

CBI certifies that it will, however, coordinate with all present and future users of the site to ensure that workers having access to the site are not exposed to levels of radiofrequency radiation in excess of the applicable safety standards. Such coordination will include, but is not necessarily limited to, a reduction in transmitter power or cessation of operation. CBI will comply with any RF safety program instituted by building ownership, and if necessary perform appropriate non-ionizing radiation measurements on the rooftop, and identify any potential areas where the power density exceeds applicable safety standards.

The preceding statement and attached exhibits have been prepared by me, or under my direction, and are true and accurate to the best of my belief and knowledge.



Above signature is digitized copy of actual signature  
License Expires November 30, 2015

Jeremy D. Ruck, PE  
May 5, 2014

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**K223CG.X**  
BNPFT20130327AHK  
Latitude: 36-02-35 N  
Longitude: 095-57-11 W  
ERP: 0.062 kW  
Channel: 223  
Frequency: 92.5 MHz  
AMSL Height: 392.5 m  
Horiz. Pattern: Omni  
Vert. Pattern: No  
Prop Model: None

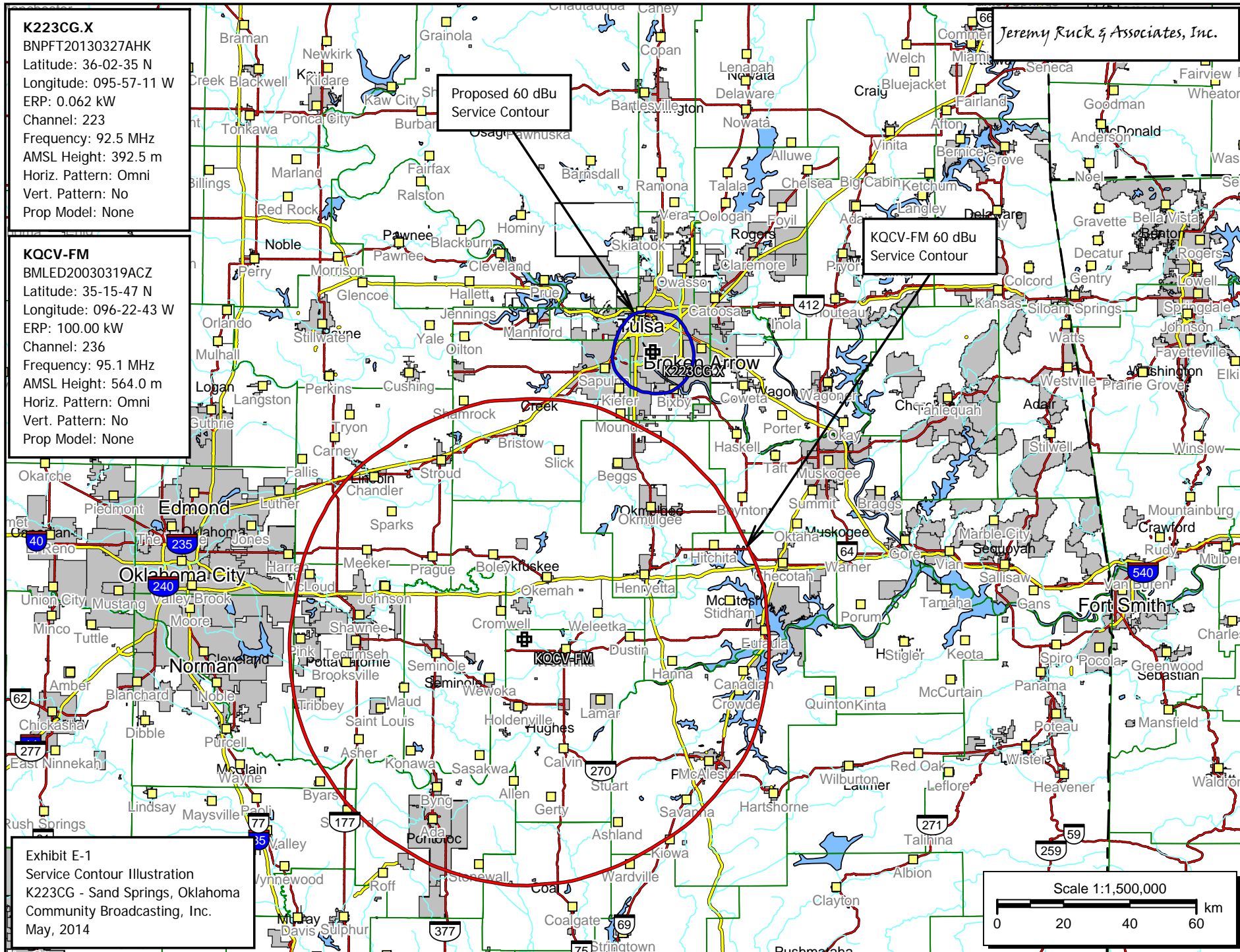
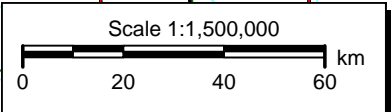
**KQCV-FM**  
BMLED20030319ACZ  
Latitude: 35-15-47 N  
Longitude: 096-22-43 W  
ERP: 100.00 kW  
Channel: 236  
Frequency: 95.1 MHz  
AMSL Height: 564.0 m  
Horiz. Pattern: Omni  
Vert. Pattern: No  
Prop Model: None

Proposed 60 dBu  
Service Contour

KQCV-FM 60 dBu  
Service Contour

Jeremy Ruck & Associates, Inc.

Exhibit E-1  
Service Contour Illustration  
K223CG - Sand Springs, Oklahoma  
Community Broadcasting, Inc.  
May, 2014





Jeremy Ruck & Associates, Inc.  
Consulting Engineers - Canton, Illinois

Exhibit E-2 - Tabular Interference Study  
K223CG - Sand Springs, Oklahoma  
CH# 223D - 92.5 MHz, Pwr= 0.062 kW, HAAT= 182.1 M, COR= 392.5 M  
Average Protected F(50-50)= 12.39 km  
Omni-directional

DISPLAY DATES  
DATA 05-05-14  
SEARCH 05-05-14

REFERENCE  
36 02 35.0 N.  
95 57 11.0 W.

CH CITY	CALL	TYPE STATE	ANT	AZI <--	DIST FILE #	LAT LNG	PWR(kW) HAAT(M)	INT(km) COR(M)	PRO(km) LICENSEE	*IN* (Overlap in km)	*OUT*
225C0 Tul sa	KBEZ	LIC_CN OK		321.7 141.7	20.89 BLH19880513KB	36 11 26.0 96 05 50.0	100.000 402	11.9 636	81.6 Journal Broadcast Corporat	-3.6 -61.2*	
223C Okl ahoma Ci ty	KOMA	LIC_C_ OK		249.2 68.3	148.23 BLH20070907ABP	35 33 36.0 97 29 07.0	100.000 472	189.1 822	85.4 Tyler Media, L.I.c.	-53.5*	21.3
223D Sand Springs	K223CG	CP_C_ OK		0.0 0.0	0.00 BNPFT20130327AHK	36 02 35.0 95 57 11.0	0.062 183	40.4 393	12.2 Community Broadcasting, In	-52.6*	-52.6*
221C2 Broken Arrow	KTBT	LIC_CN OK		316.5 136.4	10.35 BLH19901114KC	36 06 38.0 96 01 57.0	27.000 200	6.1 425	53.7 Clear Channel Broadcasting	-8.0*	-43.9*
223C0 Jopl in	KSYN	LIC NCX MO		46.0 226.8	169.99 BLH20060106ABP	37 05 49.0 94 34 25.0	100.000 300	173.1 584	73.1 Zimmer Radio, Inc.	-15.4*	56.3

Terrain database is FCC NGDC 30 Sec , R= 73.215 qualifying spacings or FCC minimum Spacings in KM, M= Margin in KM  
In & Out distances between contours are shown at closest points. Reference zone= West Zone, Co to 3rd adjacent.  
Ant Column: (D= DA Standard, Z= DA 73.215, N= Not DA 73.215, \_= Omni), Polarization (C,H,V,E), Beamtilt(Y,N,X)  
"\*"affixed to 'IN' or 'OUT' values = site inside protected contour.

**K223CG.X**

BNPFT20130327AHK

Latitude: 36-02-35 N

Longitude: 095-57-11 W

ERP: 0.062 kW

Channel: 223

Frequency: 92.5 MHz

AMSL Height: 392.5 m

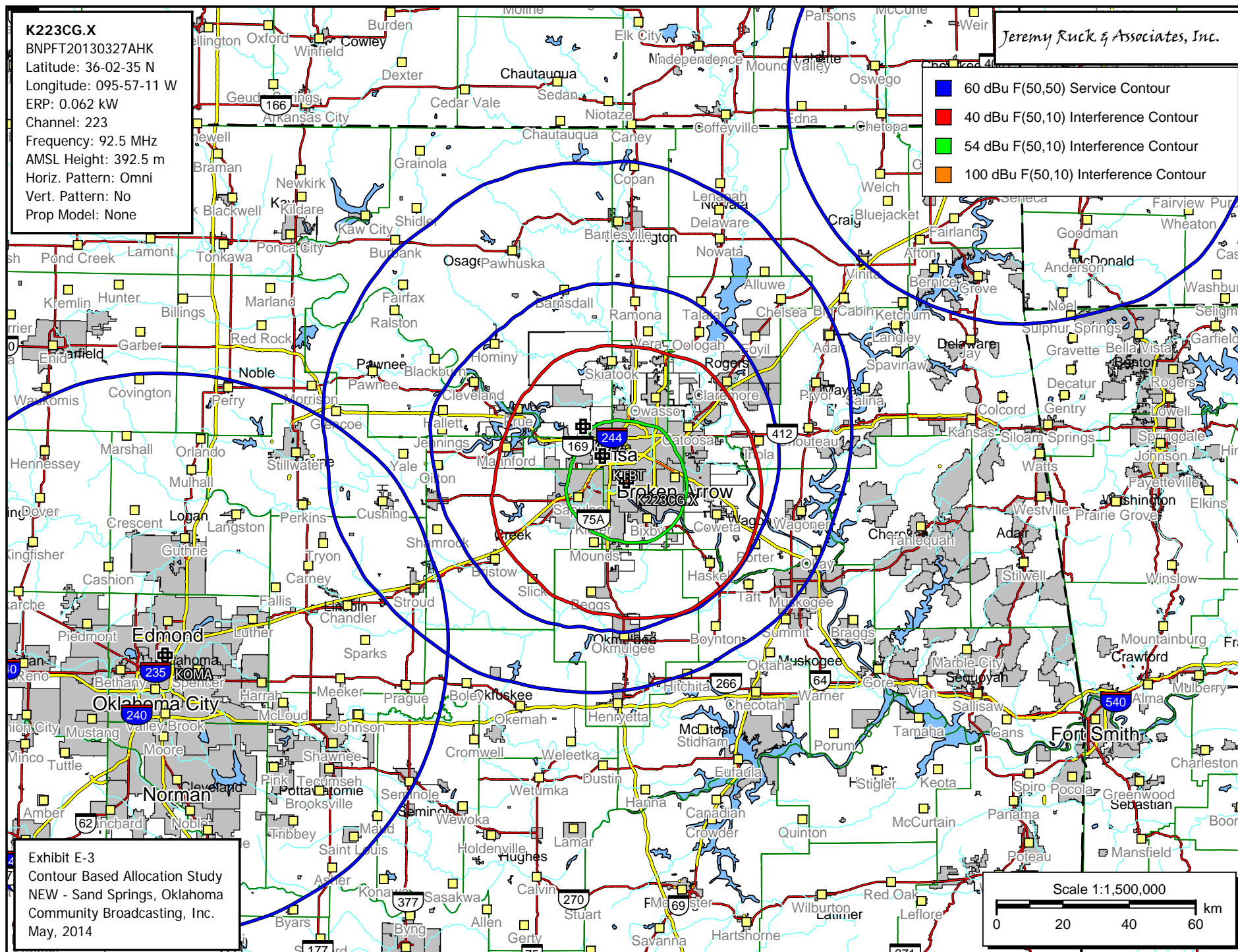
Horiz. Pattern: Omni

Vert. Pattern: No

Prop Model: None

*Jeremy Ruck & Associates, Inc.*

- 60 dBu F(50,50) Service Contour
- 40 dBu F(50,10) Interference Contour
- 54 dBu F(50,10) Interference Contour
- 100 dBu F(50,10) Interference Contour



**K223CG.X**

BNPFT20130327AHK  
Latitude: 36-02-35 N  
Longitude: 095-57-11 W  
ERP: 0.062 kW  
Channel: 223  
Frequency: 92.5 MHz  
AMSL Height: 392.5 m  
Horiz. Pattern: Omni  
Vert. Pattern: No  
Prop Model: None

**KBEZ**

BLH19880513KB  
Latitude: 36-11-26 N  
Longitude: 096-05-50 W  
ERP: 100.00 kW  
Channel: 225  
Frequency: 92.9 MHz  
AMSL Height: 636.0 m  
Horiz. Pattern: Omni  
Vert. Pattern: No  
Prop Model: None

**KBEZ**

BLH19880513KB  
Latitude: 36-11-26 N  
Longitude: 096-05-50 W  
ERP: 100.00 kW  
Channel: 225  
Frequency: 92.9 MHz  
AMSL Height: 636.0 m  
Horiz. Pattern: Omni  
Vert. Pattern: No  
Prop Model: None

**Exhibit E-4**

Interference Study  
NEW - Sand Springs, Oklahoma  
Community Broadcasting, Inc.  
May, 2014

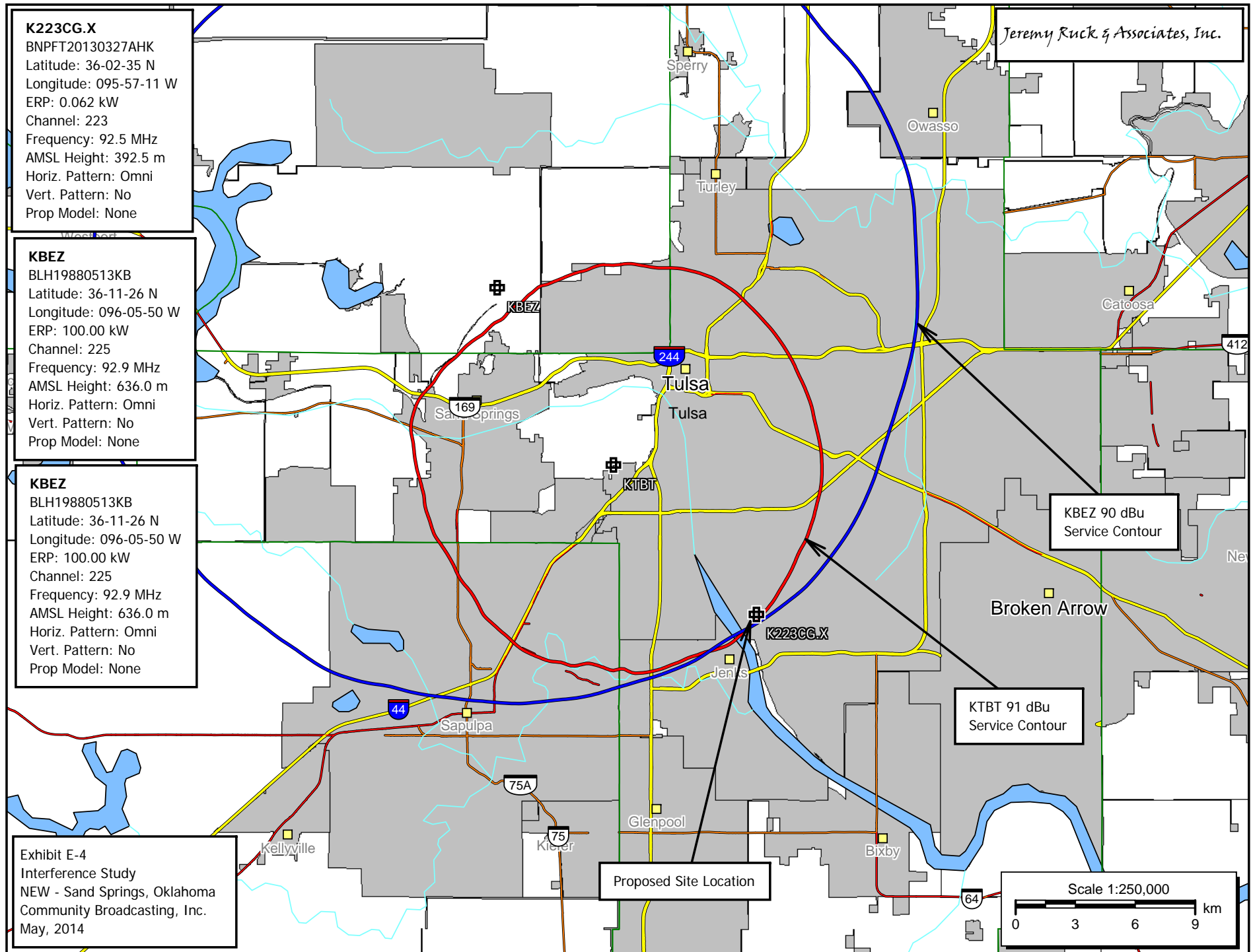
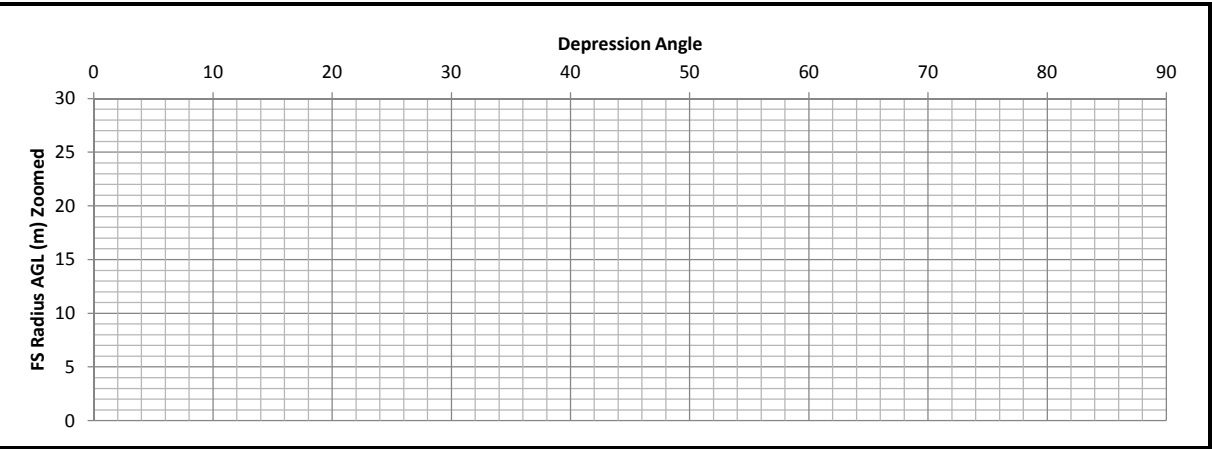
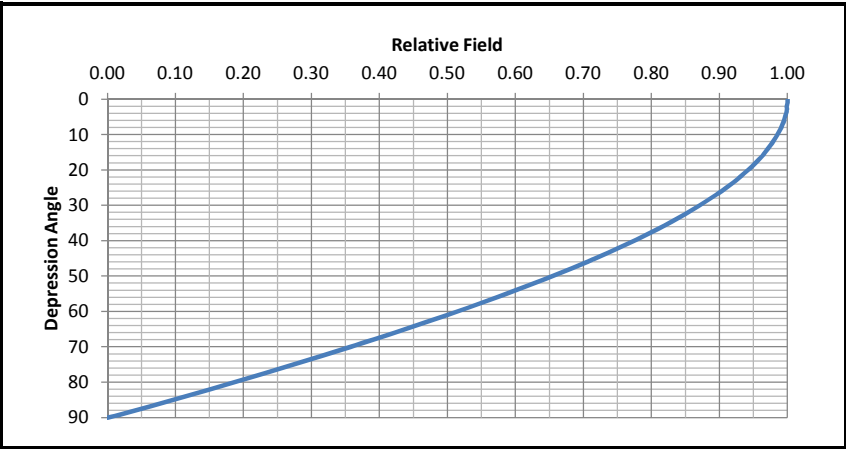


Exhibit E-5

Proximity Interference Analysis

K223CG - Sand Springs, Oklahoma

Antenna No:	90	<div><div></div><div></div><div></div></div>	Center of Radiation:	202.4 m AGL
Manufacturer:	Shively	<div><div></div><div></div><div></div></div>	Effective Radiated Power:	62 Watts
Model:	6812-1		FS Contour:	130 dBu
Number of Bays:	1		E Field Strength:	3.16228 V/m
Bay Spacing:	Lambda		Z0 (Ohms):	377 Ohms
			Power Density:	0.026525199 W/m^2



Depression Angle	Relative Field	Relative Power	ERP Watts	Radii in meters			
				Field Strength	Horizontal	Vertical	AGL
0	1.0000	1.0000	62.00	17.47	17.47	0.00	202.40
1	1.0000	1.0000	62.00	17.47	17.46	0.30	202.10
2	0.9990	0.9980	61.88	17.45	17.44	0.61	201.79
3	0.9990	0.9980	61.88	17.45	17.42	0.91	201.49
4	0.9980	0.9960	61.75	17.43	17.39	1.22	201.18
5	0.9960	0.9920	61.50	17.40	17.33	1.52	200.88
6	0.9950	0.9900	61.38	17.38	17.28	1.82	200.58
7	0.9930	0.9860	61.14	17.34	17.21	2.11	200.29
8	0.9910	0.9821	60.89	17.31	17.14	2.41	199.99
9	0.9880	0.9761	60.52	17.26	17.04	2.70	199.70
10	0.9850	0.9702	60.15	17.20	16.94	2.99	199.41
11	0.9820	0.9643	59.79	17.15	16.84	3.27	199.13
12	0.9790	0.9584	59.42	17.10	16.73	3.56	198.84
13	0.9750	0.9506	58.94	17.03	16.59	3.83	198.57
14	0.9710	0.9428	58.46	16.96	16.46	4.10	198.30
15	0.9670	0.9351	57.98	16.89	16.31	4.37	198.03
16	0.9630	0.9274	57.50	16.82	16.17	4.64	197.76
17	0.9580	0.9178	56.90	16.73	16.00	4.89	197.51
18	0.9530	0.9082	56.31	16.64	15.83	5.14	197.26
19	0.9480	0.8987	55.72	16.56	15.66	5.39	197.01
20	0.9420	0.8874	55.02	16.45	15.46	5.63	196.77
21	0.9360	0.8761	54.32	16.35	15.26	5.86	196.54
22	0.9300	0.8649	53.62	16.24	15.06	6.08	196.32
23	0.9240	0.8538	52.93	16.14	14.86	6.31	196.09
24	0.9170	0.8409	52.14	16.02	14.63	6.51	195.89
25	0.9100	0.8281	51.34	15.89	14.40	6.72	195.68
26	0.9030	0.8154	50.56	15.77	14.18	6.91	195.49
27	0.8950	0.8010	49.66	15.63	13.93	7.10	195.30
28	0.8870	0.7868	48.78	15.49	13.68	7.27	195.13
29	0.8790	0.7726	47.90	15.35	13.43	7.44	194.96
30	0.8710	0.7586	47.04	15.21	13.17	7.61	194.79
31	0.8620	0.7430	46.07	15.06	12.90	7.75	194.65
32	0.8540	0.7293	45.22	14.92	12.65	7.90	194.50
33	0.8450	0.7140	44.27	14.76	12.38	8.04	194.36
34	0.8350	0.6972	43.23	14.58	12.09	8.16	194.24
35	0.8260	0.6823	42.30	14.43	11.82	8.27	194.13
36	0.8160	0.6659	41.28	14.25	11.53	8.38	194.02
37	0.8060	0.6496	40.28	14.08	11.24	8.47	193.93
38	0.7960	0.6336	39.28	13.90	10.96	8.56	193.84
39	0.7850	0.6162	38.21	13.71	10.66	8.63	193.77
40	0.7740	0.5991	37.14	13.52	10.36	8.69	193.71
41	0.7630	0.5822	36.09	13.33	10.06	8.74	193.66
42	0.7520	0.5655	35.06	13.13	9.76	8.79	193.61
43	0.7410	0.5491	34.04	12.94	9.47	8.83	193.57
44	0.7290	0.5314	32.95	12.73	9.16	8.84	193.56
45	0.7170	0.5141	31.87	12.52	8.85	8.85	193.55

Depression Angle	Relative Field	Relative Power	ERP Watts	Radii in meters			
				Field Strength	Horizontal	Vertical	AGL
45	0.7170	0.5141	31.87	12.52	8.85	8.85	193.55
46	0.7050	0.4970	30.82	12.31	8.55	8.86	193.54
47	0.6930	0.4802	29.78	12.10	8.25	8.85	193.55
48	0.6800	0.4624	28.67	11.88	7.95	8.83	193.57
49	0.6670	0.4449	27.58	11.65	7.64	8.79	193.61
50	0.6540	0.4277	26.52	11.42	7.34	8.75	193.65
51	0.6410	0.4109	25.47	11.20	7.05	8.70	193.70
52	0.6280	0.3944	24.45	10.97	6.75	8.64	193.76
53	0.6140	0.3770	23.37	10.72	6.45	8.56	193.84
54	0.6000	0.3600	22.32	10.48	6.16	8.48	193.92
55	0.5860	0.3434	21.29	10.23	5.87	8.38	194.02
56	0.5720	0.3272	20.29	9.99	5.59	8.28	194.12
57	0.5580	0.3114	19.30	9.75	5.31	8.17	194.23
58	0.5440	0.2959	18.35	9.50	5.03	8.06	194.34
59	0.5290	0.2798	17.35	9.24	4.76	7.92	194.48
60	0.5140	0.2642	16.38	8.98	4.49	7.77	194.63
61	0.4990	0.2490	15.44	8.72	4.23	7.62	194.78
62	0.4840	0.2343	14.52	8.45	3.97	7.46	194.94
63	0.4690	0.2200	13.64	8.19	3.72	7.30	195.10
64	0.4530	0.2052	12.72	7.91	3.47	7.11	195.29
65	0.4370	0.1910	11.84	7.63	3.23	6.92	195.48
66	0.4220	0.1781	11.04	7.37	3.00	6.73	195.67
67	0.4060	0.1648	10.22	7.09	2.77	6.53	195.87
68	0.3900	0.1521	9.43	6.81	2.55	6.32	196.08
69	0.3730	0.1391	8.63	6.51	2.33	6.08	196.32
70	0.3570	0.1274	7.90	6.24	2.13	5.86	196.54
71	0.3410	0.1163	7.21	5.96	1.94	5.63	196.77
72	0.3240	0.1050	6.51	5.66	1.75	5.38	197.02
73	0.3070	0.0942	5.84	5.36	1.57	5.13	197.27
74	0.2900	0.0841	5.21	5.07	1.40	4.87	197.53
75	0.2730	0.0745	4.62	4.77	1.23	4.61	197.79
76	0.2560	0.0655	4.06	4.47	1.08	4.34	198.06
77	0.2390	0.0571	3.54	4.17	0.94	4.07	198.33
78	0.2210	0.0488	3.03	3.86	0.80	3.78	198.62
79	0.2040	0.0416	2.58	3.56	0.68	3.50	198.90
80	0.1860	0.0346	2.14	3.25	0.56	3.20	199.20
81	0.1680	0.0282	1.75	2.93	0.46	2.90	199.50
82	0.1510	0.0228	1.41	2.64	0.37	2.61	199.79
83	0.1330	0.0177	1.10	2.32	0.28	2.31	200.09
84	0.1140	0.0130	0.81	1.99	0.21	1.98	200.42
85	0.0960	0.0092	0.57	1.68	0.15	1.67	200.73
86	0.0780	0.0061	0.38	1.36	0.10	1.36	201.04
87	0.0590	0.0035	0.22	1.03	0.05	1.03	201.37
88	0.0400	0.0016	0.10	0.70	0.02	0.70	201.70
89	0.0210	0.0004	0.03	0.37	0.01	0.37	202.03
90	0.0000	0.0000	0.00	0.00	0.00	0.00	202.40

