

APPLICATION FOR CONSTRUCTION PERMIT

K240ES - ST. LOUIS, MISSOURI
FACILITY ID: 140413
95.9 MHz / 99 W ERP ND

COMMUNITY BROADCASTING, INC.

SEPTEMBER, 2017

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9.4.2017

APPLICATION FOR CONSTRUCTION PERMIT

The following engineering statement and attached exhibits have been prepared for **Community Broadcasting, Inc.** ("CBI"), licensee of FM translator station K240ES at St. Louis, Missouri, and are in support of their application for construction permit.¹ This application is being filed to change the antenna type, and the antenna center of radiation associated with the facility. No other changes to the facility are proposed.

K240ES is licensed to operate on FM channel 240 with an effective radiated power of 99 Watts at a center of radiation of 320 meters above mean sea level utilizing a non-directional antenna. The proposed facility would also operate on FM channel 240 with an effective radiated power of 99 Watts utilizing a non-directional antenna. The antenna center of radiation, however, would be lowered to 310.0 meters above mean sea level.

The licensed antenna is an Electronics Research, Inc. ("ERI") model LPX-4C. This antenna was originally designed for use as an auxiliary antenna for co-located NCE FM station KSIV-FM at St. Louis, Missouri.² The performance of the antenna on the translator frequency, despite the low-power operation, has been less than satisfactory. As a result, CBI considered the replacement of the antenna with one that would provide good performance for both K240ES and KSIV-FM auxiliary operations.

During this consideration, it was noted that the antenna center of radiation above ground is incorrect. This discrepancy was determined while structural evaluations for the proposed antenna

¹ The Facility ID for K240ES at St. Louis, Missouri is 140413.

² The Facility ID for KSIV-FM at St. Louis, Missouri is 4276.

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were underway. The current LPX-4C antenna is actually located at a center of radiation of 561 feet (171 meters) above ground level. The antenna proposed for use by K240ES and KSIV-FM for auxiliary operations, is an ERI model LPX-4E-HW-SP, and is to be installed with a center of radiation of 567 feet (172.8 meters above ground level). A companion application to correct the data associated with the KSIV-FM auxiliary facility will also be filed.³

The proposed antenna system is intended to be utilized by *either* K240ES or KSIV-FM, but not both simultaneously, as no combiner is being installed. Rather, CBI will be installing a motorized coaxial switch that will normally route the K240ES transmitted signal to the antenna, but as necessary, can be switched to allow KSIV-FM use of the antenna system. Consequently, CBI respectfully requests that no condition be placed on the construction permit requiring the measurement of spurious emission products, as only a single transmitter will be utilized.

Since no change in the transmitter site location or channel is proposed, the proposed 60 dBu service contour would be encompassed by the licensed 60 dBu service contour. The proposed modification to the technical parameters therefore results in a minor change to the K240ES license. For reference purposes, Exhibit E-1 provides a comparison between the proposed and licensed 60 dBu service contours.

The authorized primary station for the facility is AM broadcast station KSIV at Clayton, Missouri.⁴ Exhibit E-2 illustrates the proposed 60 dBu service contour for K240ES along with the 2 mV/m daytime groundwave contour for KSIV, and a twenty-five mile radius centered on the KSIV

³ The KSIV-FM auxiliary facility is licensed under FCC File No. BXLED-20150108AAE.

⁴ The Facility ID for KSIV at Clayton, Missouri is 6499.

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transmitter site. As this map demonstrates, the translator 60 dBu contour is wholly contained within both of the KSIV constructs.

The proposed facility complies with the provisions of Section 74.1204 of the Commission's Rules. Due to the proposed channel of operation, Section 74.1205 is not applicable. Exhibit E-3 is a tabular interference study for the proposed facility. This study demonstrates that the contour overlap provisions of Section 74.1204 would be met by the proposed facility to all relevant authorizations with the exception of KNOU at St. Louis, Missouri, and WFUN-FM at Bethalto, Illinois.⁵ These two facilities operate second adjacent to the proposed translator. The interference to these two stations will be studied under Section 74.1204(d). The tabular interference study is graphically illustrated in Exhibit E-4.

Although normally prohibited contour overlap would exist between the proposed facility and both KNOU and WFUN-FM, no interference is predicted to occur within any populated region for either facility. Exhibit E-5 illustrates the proposed K286AR transmitter site, which is co-located with KNOU, as well as the WFUN-FM 81.7 F(50,50) dBu service contour. As indicated, the WFUN contour intersects the proposed translator site.

Both facilities operate second adjacent to the proposed translator frequency. No interference to KNOU would result from K286AR due their co-location. The ERP of KNOU is 92 kW, while the translator is 99 Watts. Due to the co-location, no condition would exist where the translator field strength would exceed that of KNOU, let alone be 40 dB above KNOU. In the case of WFUN-FM, interference to that facility would potentially occur in regions where the K286AR field

⁵ The Facility ID for KNOU at St. Louis, Missouri is 27022. The Facility ID for WFUN-FM at Bethalto, Illinois is 4948.

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strength is at least 40 dB above that of WFUN. Specifically this would be in regions where the field strength of the translator is at least 121.7 dBu.

The power density for the interfering field strength 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, and Z_0 is the characteristic impedance of free space of 377 ohms.

The power density is also given by:

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

Where S is the same units, P is the total 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-6. The values listed for the relative field at the various depression angles were obtained from published manufacturer data for the proposed antenna. The listed radii values on this tabulation indicate the boundary of the potential interference region, and as is indicated, the potential interference region is confined to a radius of 57.4 meters from the antenna.

The following satellite image illustrates the tower proposed for use by K286AR. From this image, it can be reasonably inferred that no population would be in any interference region. No

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structures other than the transmitter building would be located within the 57.4 meter radius, and as is indicated in Exhibit E-6, the lowest elevation of the interference region is no closer to the base elevation of the tower than 164 meters above ground level.



The proposed facility would not constitute a significant environmental impact, and is exempt from environmental processing. The translator antenna would utilize an existing structure that is registered with the Commission. The addition of the translator antenna to this tower would not increase the existing environmental impact already present from the structure.

In addition, the proposed facility would not constitute a radiofrequency radiation hazard to persons at the site. The Commission's on-line *FM Model* utility calculates a maximum power density of $0.005 \mu\text{W}/\text{cm}^2$ at a distance of 665 meters from the tower. This value complies with the

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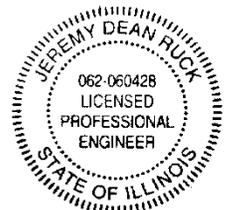
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uncontrolled environment condition of the Commission's safety standard, and is sufficiently low to categorically exclude the facility. The LPX antenna is considered a "type-3" antenna, and was analyzed as such.

CBI certifies that it will coordinate with all other users of the site to ensure that workers and other personnel are not exposed to levels of radiofrequency radiation in excess of the applicable safety standards. Coordination activities will include, but are not necessarily limited to, a reduction in transmitter power or cessation of operation.

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, 2017

Jeremy D. Ruck, PE
September 4, 2017

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K240ES
BLFT20170609AAR
Latitude: 38-34-28 N
Longitude: 090-19-31 W
ERP: 0.099 kW
Channel: 240
Frequency: 95.9 MHz
AMSL Height: 320.0 m
Horiz. Pattern: Omni

K240ES.X
BLFT20170609AAR
Latitude: 38-34-27.70 N
Longitude: 090-19-31.48 W
ERP: 0.099 kW
Channel: 240
Frequency: 95.9 MHz
AMSL Height: 310.0 m
Horiz. Pattern: Omni

 Proposed K240ES 60 dBu Service Contour
 Licensed K240ES 60 dBu Service Contour

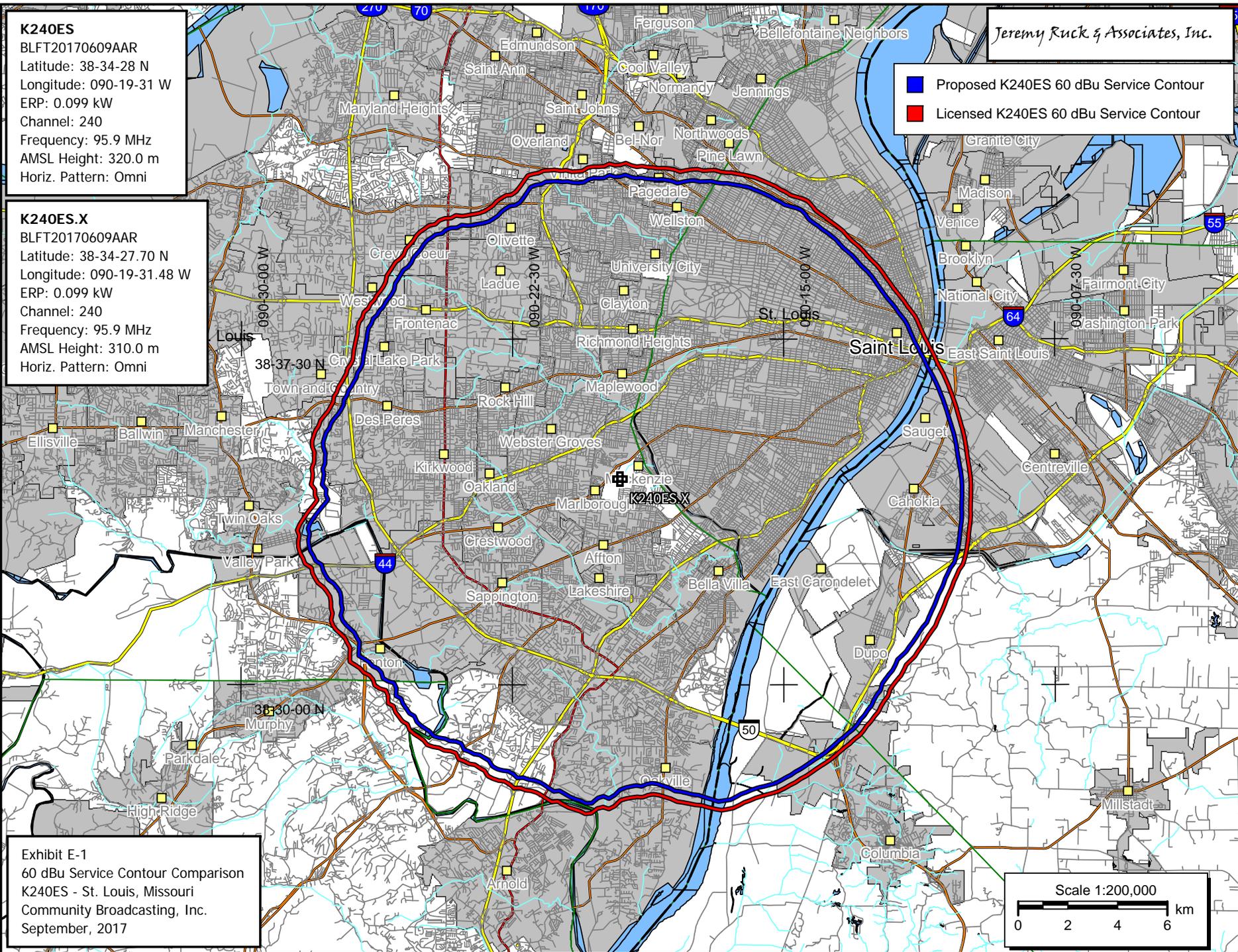
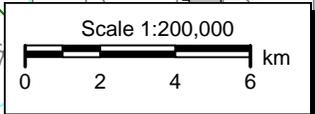


Exhibit E-1
60 dBu Service Contour Comparison
K240ES - St. Louis, Missouri
Community Broadcasting, Inc.
September, 2017



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

Exhibit E-3 - Tabular Interference Study
 K240ES - St. Louis, Missouri
 CH# 240D - 95.9 MHz, Pwr= 0.099 kW, HAAT= 152.5 M, COR= 310 M
 Average Protected F(50-50)= 12.65 km
 Omni-directional

DISPLAY DATES
 DATA 09-04-17
 SEARCH 09-04-17

REFERENCE
 38 34 28.0 N.
 90 19 31.0 W.

CH CITY	CALL	TYPE ANT STATE	AZI <--	DIST FILE #	LAT LNG	PWR(kW) HAAT(M)	INT(km) COR(M)	PRO(km) LICENSEE	*IN* (Overlap in km)	*OUT*
242C1	KNOU	LIC NCX MO	0.0 44.9	0.00 BLH20150318ABQ	38 34 27.7 90 19 31.4	92.000 309	10.1 462	72.3 Emmis Radio License, Lic	-22.2*	-73.0*
240D	K240ES	LIC _C_ MO	0.0 0.0	0.00 BLFT20170609AAR	38 34 28.0 90 19 31.0	0.099	42.1 320	12.6 Community Broadcasting, In	-54.2*	-53.5*
238C3	WFUN-FM	LIC ZCX IL	22.4 202.5	9.35 BLH20121203AQQ	38 39 08.0 90 17 03.0	10.500 155	2.9 312	31.6 Radio One Licenses, Lic	-6.3*	-22.9*
240A	WOLG	LIC _C_ IL	25.9 206.2	82.37 BLED20000709AAA	39 14 25.0 89 54 27.0	6.000 99	86.9 287	28.4 Covenant Network	-17.3*	11.3
240C3	KYLS-FM	LIC NCX MO	192.4 12.2	103.24 BLH20031121AGE	37 40 02.0 90 34 38.0	3.100 198	88.2 520	31.7 Dockins Broadcast Group, L	2.0	28.3
240A	WDON-FM	LIC _C_ IL	122.2 302.9	112.12 BMLED20150316ABE	38 01 56.0 89 14 30.0	6.000 100	86.7 233	28.1 Three Angels Broadcasting	12.1	39.7
240L1	KSLN-LP	LIC ___ MO	242.2 61.6	83.03 BLL20150102AAY	38 13 21.2 91 09 56.9	0.041 46	296	45.8 Sullivan Seventh-day Adven		33.7

Terrain database is FCC 30 meter, 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.
 All separation margins (if shown) include rounding.
 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 restricted contour.

K240ES.X
 BLFT20170609AAR
 Latitude: 38-34-27.70 N
 Longitude: 090-19-31.48 W
 ERP: 0.099 kW
 Channel: 240
 Frequency: 95.9 MHz
 AMSL Height: 310.0 m
 Horiz. Pattern: Omni

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

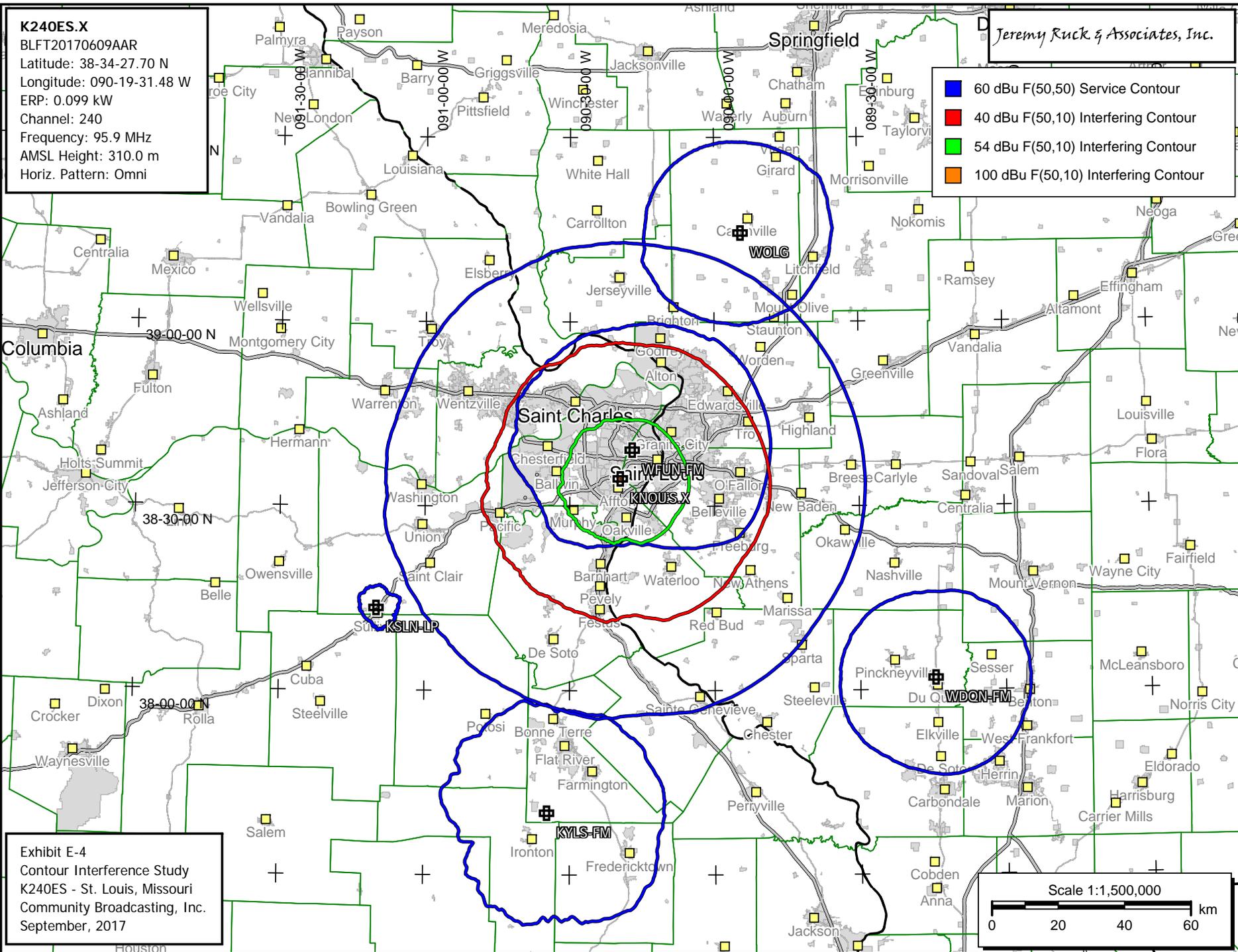
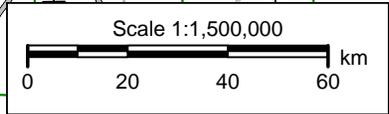


Exhibit E-4
 Contour Interference Study
 K240ES - St. Louis, Missouri
 Community Broadcasting, Inc.
 September, 2017



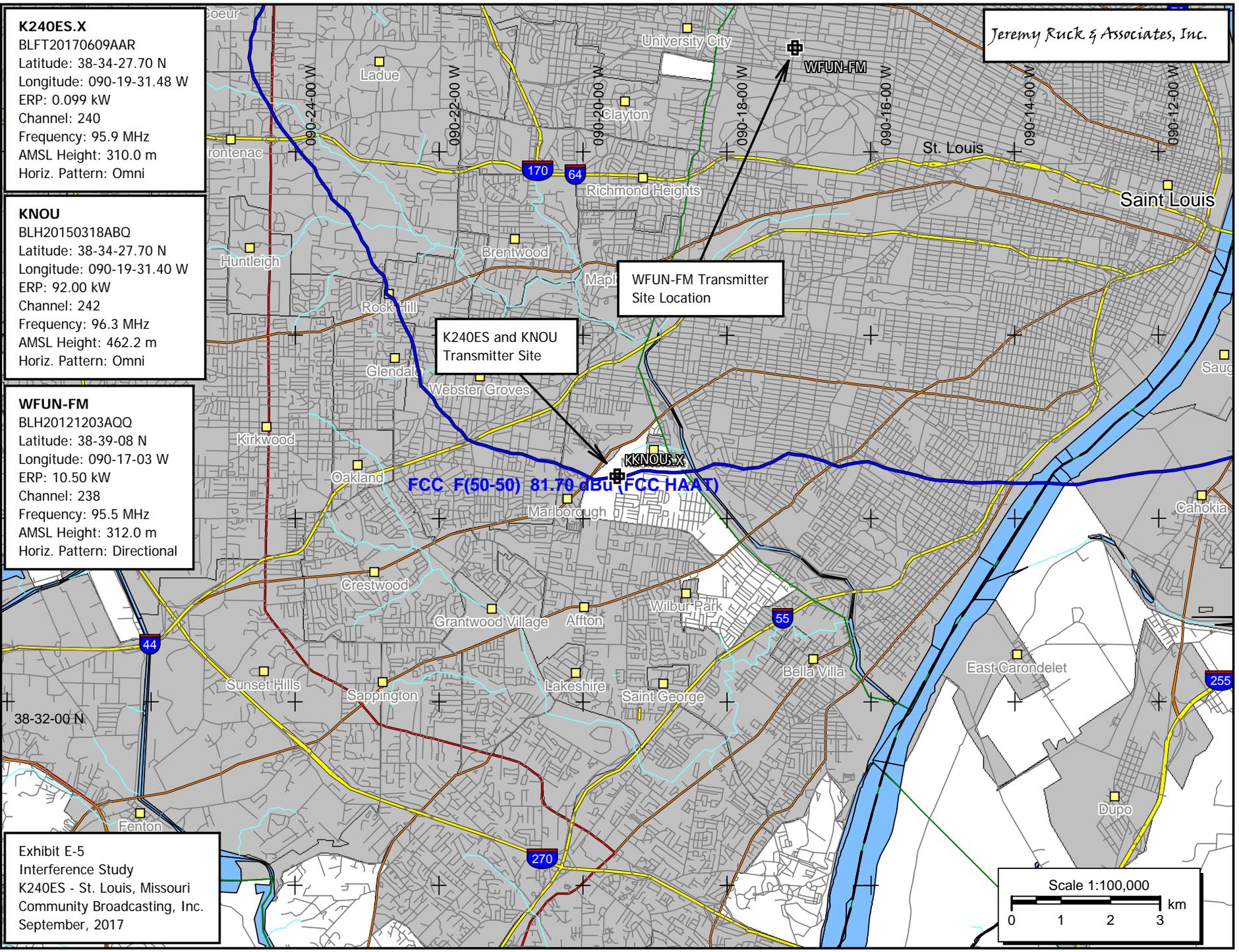
K240ES.X
BLFT20170609AAR
Latitude: 38-34-27.70 N
Longitude: 090-19-31.48 W
ERP: 0.099 kW
Channel: 240
Frequency: 95.9 MHz
AMSL Height: 310.0 m
Horiz. Pattern: Omni

KNOU
BLH20150318ABQ
Latitude: 38-34-27.70 N
Longitude: 090-19-31.40 W
ERP: 92.00 kW
Channel: 242
Frequency: 96.3 MHz
AMSL Height: 462.2 m
Horiz. Pattern: Omni

WFUN-FM
BLH20121203AQQ
Latitude: 38-39-08 N
Longitude: 090-17-03 W
ERP: 10.50 kW
Channel: 238
Frequency: 95.5 MHz
AMSL Height: 312.0 m
Horiz. Pattern: Directional

Exhibit E-5
Interference Study
K240ES - St. Louis, Missouri
Community Broadcasting, Inc.
September, 2017

Jeremy Ruck & Associates, Inc.



K240ES and KNOU
Transmitter Site

WFUN-FM Transmitter
Site Location

FCC F(50-50) 81.70 dBu (FCC HAAT)

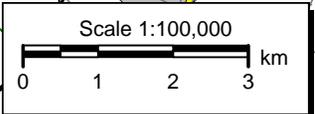
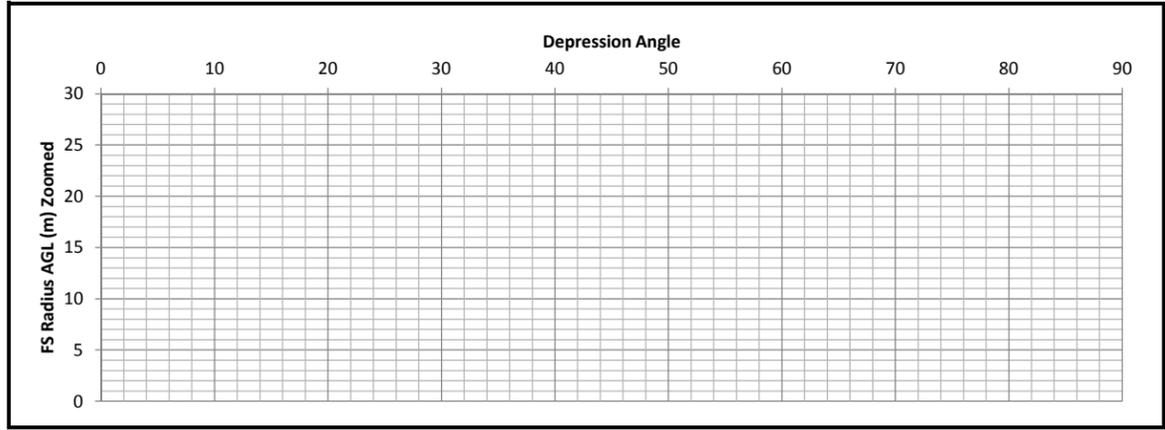
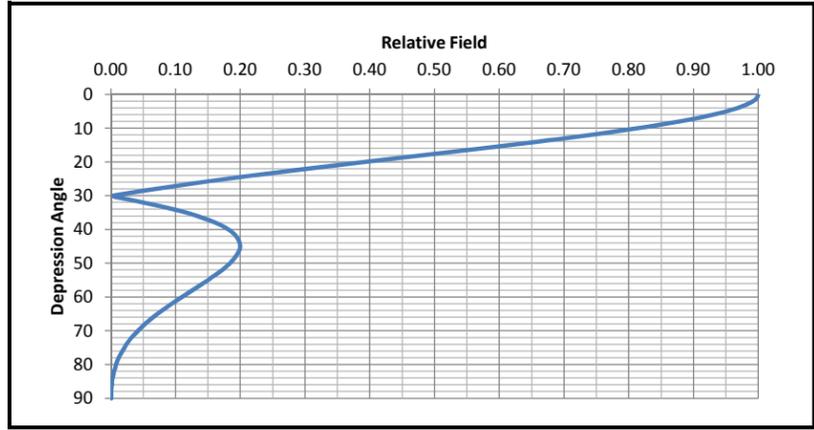


Exhibit E-6
Proximity Interference Analysis
 K240ES - St. Louis, Missouri

Antenna No:	152	Center of Radiation:	172.8 m AGL
Manufacturer:	ERI	Effective Radiated Power:	99 Watts
Model:	LPX-4E-HW-SP	FS Contour:	121.7 dBu
Number of Bays:	4	E Field Strength:	1.21619 V/m
Bay Spacing:	0.5	Z0:	377 Ohms
		Power Density:	0.003923364 W/m^2



Depression Angle	Relative Field	Relative Power	ERP Watts	Radii in meters			
				Field Strength	Horizontal	Vertical	AGL
0	1.0000	1.0000	99.00	57.39	57.39	0.00	172.80
1	0.9980	0.9960	98.60	57.27	57.26	1.00	171.80
2	0.9920	0.9841	97.42	56.93	56.89	1.99	170.81
3	0.9820	0.9643	95.47	56.35	56.28	2.95	169.85
4	0.9680	0.9370	92.77	55.55	55.41	3.87	168.93
5	0.9510	0.9044	89.54	54.57	54.37	4.76	168.04
6	0.9300	0.8649	85.63	53.37	53.08	5.58	167.22
7	0.9050	0.8190	81.08	51.93	51.55	6.33	166.47
8	0.8780	0.7709	76.32	50.38	49.89	7.01	165.79
9	0.8470	0.7174	71.02	48.61	48.01	7.60	165.20
10	0.8140	0.6626	65.60	46.71	46.00	8.11	164.69
11	0.7780	0.6053	59.92	44.65	43.83	8.52	164.28
12	0.7400	0.5476	54.21	42.47	41.54	8.83	163.97
13	0.7000	0.4900	48.51	40.17	39.14	9.04	163.76
14	0.6580	0.4330	42.86	37.76	36.64	9.13	163.67
15	0.6150	0.3782	37.44	35.29	34.09	9.13	163.67
16	0.5710	0.3260	32.28	32.77	31.50	9.03	163.77
17	0.5260	0.2767	27.39	30.18	28.87	8.83	163.97
18	0.4810	0.2314	22.90	27.60	26.25	8.53	164.27
19	0.4360	0.1901	18.82	25.02	23.66	8.15	164.65
20	0.3910	0.1529	15.14	22.44	21.08	7.67	165.13
21	0.3470	0.1204	11.92	19.91	18.59	7.14	165.66
22	0.3030	0.0918	9.09	17.39	16.12	6.51	166.29
23	0.2600	0.0676	6.69	14.92	13.73	5.83	166.97
24	0.2180	0.0475	4.70	12.51	11.43	5.09	167.71
25	0.1780	0.0317	3.14	10.21	9.26	4.32	168.48
26	0.1400	0.0196	1.94	8.03	7.22	3.52	169.28
27	0.1030	0.0106	1.05	5.91	5.27	2.68	170.12
28	0.0680	0.0046	0.46	3.90	3.45	1.83	170.97
29	0.0350	0.0012	0.12	2.01	1.76	0.97	171.83
30	0.0040	0.0000	0.00	0.23	0.20	0.11	172.69
31	0.0250	0.0006	0.06	1.43	1.23	0.74	172.06
32	0.0510	0.0026	0.26	2.93	2.48	1.55	171.25
33	0.0750	0.0056	0.56	4.30	3.61	2.34	170.46
34	0.0970	0.0094	0.93	5.57	4.61	3.11	169.69
35	0.1170	0.0137	1.36	6.71	5.50	3.85	168.95
36	0.1340	0.0180	1.78	7.69	6.22	4.52	168.28
37	0.1490	0.0222	2.20	8.55	6.83	5.15	167.65
38	0.1620	0.0262	2.60	9.30	7.33	5.72	167.08
39	0.1730	0.0299	2.96	9.93	7.72	6.25	166.55
40	0.1820	0.0331	3.28	10.44	8.00	6.71	166.09
41	0.1890	0.0357	3.54	10.85	8.19	7.12	165.68
42	0.1940	0.0376	3.73	11.13	8.27	7.45	165.35
43	0.1970	0.0388	3.84	11.31	8.27	7.71	165.09
44	0.1990	0.0396	3.92	11.42	8.21	7.93	164.87
45	0.2000	0.0400	3.96	11.48	8.12	8.12	164.68

Depression Angle	Relative Field	Relative Power	ERP Watts	Radii in meters			
				Field Strength	Horizontal	Vertical	AGL
45	0.2000	0.0400	3.96	11.48	8.12	8.12	164.68
46	0.1990	0.0396	3.92	11.42	7.93	8.21	164.59
47	0.1960	0.0384	3.80	11.25	7.67	8.23	164.57
48	0.1930	0.0372	3.69	11.08	7.41	8.23	164.57
49	0.1890	0.0357	3.54	10.85	7.12	8.19	164.61
50	0.1840	0.0339	3.35	10.56	6.79	8.09	164.71
51	0.1780	0.0317	3.14	10.21	6.43	7.94	164.86
52	0.1720	0.0296	2.93	9.87	6.08	7.78	165.02
53	0.1650	0.0272	2.70	9.47	5.70	7.56	165.24
54	0.1570	0.0246	2.44	9.01	5.30	7.29	165.51
55	0.1500	0.0225	2.23	8.61	4.94	7.05	165.75
56	0.1420	0.0202	2.00	8.15	4.56	6.76	166.04
57	0.1340	0.0180	1.78	7.69	4.19	6.45	166.35
58	0.1260	0.0159	1.57	7.23	3.83	6.13	166.67
59	0.1180	0.0139	1.38	6.77	3.49	5.80	167.00
60	0.1100	0.0121	1.20	6.31	3.16	5.47	167.33
61	0.1020	0.0104	1.03	5.85	2.84	5.12	167.68
62	0.0940	0.0088	0.87	5.39	2.53	4.76	168.04
63	0.0860	0.0074	0.73	4.94	2.24	4.40	168.40
64	0.0790	0.0062	0.62	4.53	1.99	4.07	168.73
65	0.0720	0.0052	0.51	4.13	1.75	3.74	169.06
66	0.0650	0.0042	0.42	3.73	1.52	3.41	169.39
67	0.0590	0.0035	0.34	3.39	1.32	3.12	169.68
68	0.0530	0.0028	0.28	3.04	1.14	2.82	169.98
69	0.0470	0.0022	0.22	2.70	0.97	2.52	170.28
70	0.0420	0.0018	0.17	2.41	0.82	2.26	170.54
71	0.0370	0.0014	0.14	2.12	0.69	2.01	170.79
72	0.0320	0.0010	0.10	1.84	0.57	1.75	171.05
73	0.0280	0.0008	0.08	1.61	0.47	1.54	171.26
74	0.0240	0.0006	0.06	1.38	0.38	1.32	171.48
75	0.0210	0.0004	0.04	1.21	0.31	1.16	171.64
76	0.0180	0.0003	0.03	1.03	0.25	1.00	171.80
77	0.0150	0.0002	0.02	0.86	0.19	0.84	171.96
78	0.0120	0.0001	0.01	0.69	0.14	0.67	172.13
79	0.0100	0.0001	0.01	0.57	0.11	0.56	172.24
80	0.0080	0.0001	0.01	0.46	0.08	0.45	172.35
81	0.0070	0.0000	0.00	0.40	0.06	0.40	172.40
82	0.0050	0.0000	0.00	0.29	0.04	0.28	172.52
83	0.0040	0.0000	0.00	0.23	0.03	0.23	172.57
84	0.0030	0.0000	0.00	0.17	0.02	0.17	172.63
85	0.0020	0.0000	0.00	0.11	0.01	0.11	172.69
86	0.0020	0.0000	0.00	0.11	0.01	0.11	172.69
87	0.0010	0.0000	0.00	0.06	0.00	0.06	172.74
88	0.0010	0.0000	0.00	0.06	0.00	0.06	172.74
89	0.0010	0.0000	0.00	0.06	0.00	0.06	172.74
90	0.0010	0.0000	0.00	0.06	0.00	0.06	172.74

