

# Comprehensive Engineering Exhibit

## Minor Modification of BNPFT-20130826AFF

### K235CD, Facility ID No. 138619

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This exhibit is in support of a modification to change the antenna manufacturer and model only to allow the co-location/shared antenna operation with a modified K272FE.

#### Antenna Location

The proposed facility antenna is to be mounted on ASR 1026520, 150 meters above ground, to serve as a fill-in translator for station KISO(FM). Below as **Figure 1** is an overlap and spacing study from which it can be determined that this proposal is within the protected contour of **second** adjacent station K235CO channel 233.

Concerning K235CO, Section 74.1204(d) states that *“The provisions of this section concerning prohibited overlap will not apply where the area of such overlap lies entirely over water. In addition, an application otherwise precluded by this section will be accepted if it can be demonstrated that no actual interference will occur due to intervening terrain, lack of population or such other factors as may be applicable.”*

We will demonstrate that a lack of population and/or other factors allow this proposal to be compliant with 74.1204. The process commonly called “Living Way”<sup>1</sup>, allows for the use of U/D Analysis, also known as “signal strength ratio methodology” to be utilized. In this instant case the facilities of to be protected are second adjacent and are to be afforded protection from signals 40 dB stronger<sup>2</sup> than they present in the location of the proposed antenna location.

**Figure 2** is a map showing predicted 60.5 dBu signal contour of the permit of K233CO at the proposed translator antenna location utilizing the FCC F50:50 curves. Thus only a signal exceeding 100.5 dBu in a habitable area is predicted to cause interference to K233CO from this instant proposal. Utilizing the line of sight equation<sup>3</sup> it has been determined that a 100.5 dBu signal developed by 110 watts, as proposed, emitted by the proposed antenna mounted 150 meters above ground, will not reach ground level as demonstrated in **Figure 3**. With examination of the images in **Figures 4** it can be determined that no habitable space extends above this height within the confines of this contour. Thus the provisions of the rules section concerning prohibited overlap will not apply as it has been demonstrated that no actual interference will occur due to a lack of population and other factors as applied in this instant proposal.

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<sup>1</sup> As recently described in FCC 08-242 in connection with BPFT-19981001TA

<sup>2</sup> See 74.1204(a)(3)

<sup>3</sup>  $\text{ReachDistMeters} = 106.92 - (20 * (\text{LOG10}[\text{DistMeters}] / 1000)) + [\text{ERP in dBk}]$

## **RF Radiation Statement**

The proposed facilities were evaluated in terms of potential radio frequency radiation exposure at ground level in accordance with OET Bulletin No. 65, "Evaluating Compliance With FCC-Specified Guidelines for Human Exposure to Radio frequency Radiation."

The proposed antenna system is a Scala FMVMP-2, 2-level (bay) antenna mounted 150 meters above ground. As this element type is not modeled in any current computer program, for purposes of this analysis the FM Model program has been set to calculate values for a "worst case" type of antenna element array of "Ring Stub", operated with an effective radiated power of 0.110 Kilowatts in vertical. At 2 meters above the surface, at 29 meters from the base of the tower, this proposal will contribute worst case, 0.2 microwatts per square centimeter, or 0.02 percent of the allowable ANSI limit for controlled exposure, and 0.10 percent of the allowable limit for uncontrolled exposure. It is therefore believed that this proposal is in compliance with OET Bulletin Number 65 as required by the Federal Communications Commission.

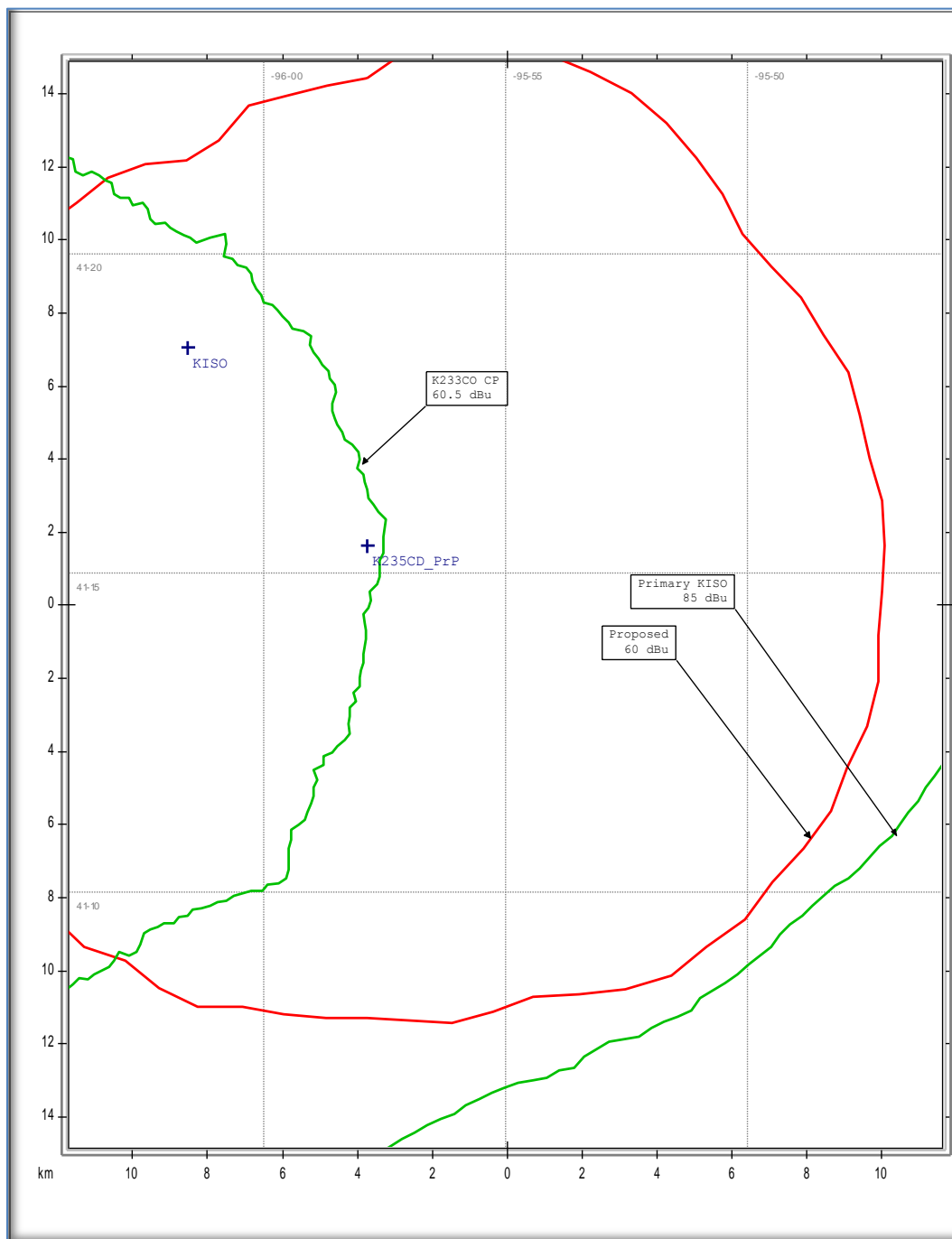
Further, the applicant will see that signs are posted in the vicinity of the tower, warning of potential radio frequency hazards at the site. The site itself is restricted from public access. The applicant will cooperate with other users of the tower to reduce power of the facility, or discontinue operation, as necessary to limit human exposure to levels less than specified by the Federal Communications Commission should anyone be required to climb the tower for maintenance or inspection.

**Figure 1. Overlap and Spacing Study**

K235CD into K272FE CP Ant 8-21-2014										
REFERENCE 41 15 26.0 N. 95 57 50.9 W.		CH# 235D - 94.9 MHz, Pwr= 0.11 kw, HAAT= 179.4 M, COR= 510 M Average Protected F(50-50)= 14.15 km Omni-directional							DISPLAY DATES DATA 08-21-14 SEARCH 08-21-14	
CH CITY	CALL	TYPE STATE	ANT STATE	AZI <--	DIST FILE #	LAT LNG	PWR(kw) HAAT(M)	INT(km) COR(M)	PRO(km) LICENSEE	*IN* (Overlap in km)
235D	K235CD Omaha	CP	_C_	270.0 90.0	0.00 BNPFT20130826AFF	41 15 26.0 95 57 51.0	0.050 183	40.0 512	12.1 calvary Chapel of Omaha	-53.6*< -57.0*<
236C2	KRKR waverly	LIC	NCX	243.6 63.1	68.75 BLED20100427ABY	40 58 48.0 96 41 46.0	50.000 84	69.1 466	44.1 My Bridge Radio	-14.2*< 3.7
233D	K233CO Omaha	CP	_C_	268.1 88.0	12.97 BMPFT20140709AAD	41 15 12.0 96 07 08.0	0.250 183	1.1 448	13.3 Salem Media Of Illinois, L	-1.7*< -1.1*<
236D	K236BY Plattsmouth	LIC	DC_	169.1 349.1	38.61 BLFT20140613AAO	40 54 57.0 95 52 37.0	0.250 183	14.2 390	10.2 Flood Broadcasting, Inc.	10.2 7.0
234L1	NEW Blair	CP	_C_	337.1 157.0	34.38 BNPL20131114AEO	41 32 31.8 96 07 30.0	0.100 17	359	14.1 Blair Healing Rooms Inc	10.5
237C2	KCSI villisca	LIC	NCX	111.6 292.1	69.04 BLH20110819AAZ	41 01 35.2 95 12 02.0	50.000 101	5.1 454	46.2 Hawkeye Communications, In	48.7 22.2
235C0	KGGG Des Moines	LIC	_C_	77.9 259.6	213.63 BMLH19870212KB	41 37 54.0 93 27 24.0	100.000 325	176.2 597	75.0 Radio License Holding Cbc,	22.9 91.2
234D	K234BB Harlan	LIC	_C_	57.5 237.8	54.84 BLFT20070907AFE	41 31 15.0 95 24 35.0	0.001 -3	2.5 387	1.8 Radio Assist Ministry, Inc	38.2 31.7
288A	KFMT-FM Fremont	LIC	_CN	290.1 109.7	50.46 BLH19800416AB	41 24 40.0 96 31 53.0	1.200 137	0.0 516	0.0 walnut Radio, Llc	10.0R 40.5M
234C1	KNEN Norfolk	LIC	_CX	299.1 118.0	155.67 BLH20060420ABO	41 55 28.0 97 36 22.0	100.000 164	91.3 683	61.3 Red Beacon Communications,	50.8 74.0
288D	K288GS Nebraska City	LIC	_C_	172.6 352.7	62.30 BLFT20140321ADQ	40 42 03.0 95 52 09.0	0.250 183	0.0 414	0.0 Flood Broadcasting, Inc.	10.0R 52.3M
233D	K233AN Lincoln	LIC	_C_	231.6 51.1	79.41 BLFT20120515ABL	40 48 41.0 96 42 09.0	0.250 53	1.1 430	11.6 Nrg License Sub	64.2 67.1
238C1	KGLI Sioux City	LIC	_CN	348.7 168.5	142.48 BMLH19891211KC	42 30 53.0 96 18 13.0	100.000 274	9.8 646	71.0 Amfm Radio Licenses, L.l.c	119.5 70.8

Terrain database is NED 03 SEC , R= 73.215 qualifying spacings or FCC minimum spacings in KM, M= Margin in KM  
 Contour distances are on direct line to and from reference station. Reference 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.  
 < = Contour overlap

**Figure 2. Contour Map**



**Figure 3. Distance to Signal Contour**

<b>Proposed Antenna: Scala FMMP-2</b> <b>Proposed Power:</b> 0.11 kW <b>Antenna Height AGL:</b> 150 meters <b>Interference Contour:</b> 100.5 dBu f(50:10) <b>Artificial Rcv Antenna Height:</b> 2 meters <b>Distance (Free Space) Equation:</b> $= (10^{((106.92 - [\text{desired dBu}] + [\text{ERP in dBk}]) / 20)}) * 1000$ <b>Field Strength (dBu) Equation:</b> $= 106.92 - (20 * (\text{LOG10}[\text{DistMeters} / 1000])) + [\text{ERP in dBk}]$								
Depression				Distance				
Angle	Antenna			from Ant.	Distance	Field Strength	Distance	Field Strength
Below	Relative	ERP	ERP	to Interf	from Ant. to	in dBu @	from Ant.	in dBu @
Horizon	Field	in kW	in dBk	Contour	Artificial Plane	Artificial Plane	to Ground Level	Ground Level
0°	1.000	0.110	-9.59	694.54 m	infinite	---	infinite	---
-5°	0.967	0.103	-9.88	671.62 m	1698.11 m	92.44 dBu	1721.06 m	92.33 dBu
-10°	0.873	0.084	-10.77	606.33 m	852.30 m	97.54 dBu	863.82 m	97.43 dBu
-15°	0.726	0.058	-12.37	504.23 m	571.83 m	99.41 dBu	579.56 m	99.29 dBu
-20°	0.545	0.033	-14.86	378.52 m	432.72 m	99.34 dBu	438.57 m	99.22 dBu
-25°	0.350	0.013	-18.70	243.09 m	350.20 m	97.33 dBu	354.93 m	97.21 dBu
-30°	0.163	0.003	-25.34	113.21 m	296.00 m	92.15 dBu	300.00 m	92.04 dBu
-35°	0.010	0.000	-49.59	6.95 m	258.03 m	69.10 dBu	261.52 m	68.98 dBu
-40°	0.119	0.002	-28.08	82.65 m	230.25 m	91.60 dBu	233.36 m	91.48 dBu
-45°	0.198	0.004	-23.65	137.52 m	209.30 m	96.85 dBu	212.13 m	96.74 dBu
-50°	0.235	0.006	-22.16	163.22 m	193.20 m	99.04 dBu	195.81 m	98.92 dBu
-55°	0.240	0.006	-21.98	166.69 m	180.67 m	99.80 dBu	183.12 m	99.68 dBu
-60°	0.222	0.005	-22.66	154.19 m	170.90 m	99.61 dBu	173.21 m	99.49 dBu
-65°	0.189	0.004	-24.06	131.27 m	163.30 m	98.60 dBu	165.51 m	98.49 dBu
-70°	0.148	0.002	-26.18	102.79 m	157.50 m	96.79 dBu	159.63 m	96.68 dBu
-75°	0.105	0.001	-29.20	72.58 m	153.22 m	94.01 dBu	155.29 m	93.89 dBu
-80°	0.060	0.000	-34.02	41.67 m	150.28 m	89.36 dBu	152.31 m	89.24 dBu
-85°	0.018	0.000	-44.48	12.50 m	148.57 m	79.00 dBu	150.57 m	78.88 dBu
-90°	0.023	0.000	-42.35	15.97 m	148.00 m	81.16 dBu	150.00 m	81.05 dBu

**Figure 4. View of Antenna Location.**

