

[Exhibit 12]

## **Non-Interference Compliance**

Regarding Facility id 148558

Channel 217

### **Description of Exhibit 12 Contents**

This exhibit demonstrates that the proposed facility complies with contour overlap and interference protection provisions in all of the applicable rule sections and that this application for a construction permit is in full compliance with 47 C.F.R. § 74.1204.

**Let it be noted that should any actual real world interference occur, the applicant acknowledges that it will promptly suspend operation of this translator in accordance with 47 C.F.R. § 74.1203.**

Page 2 of this exhibit is an explanation of the method used to demonstrate compliance with contour overlap and interference provisions based on 47 C.F.R. § 74.1204(d), which states:

*[A]n 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.*

Page 3 contains a tabulation of the vertical radiation pattern of the proposed antenna and the minimum ground clearance of the interfering contour based on this pattern.

Pages 4 through 6 include a tabulation of the vertical radiation pattern for the proposed antenna provided by the antenna manufacturer.

Page 7 of this exhibit contains the tabulated data from the interference analysis, which shows all stations whose protected contours come within 50 km of the 34 dBμ F(50,10) contour of the proposed translator. These tabulated values were calculated using data from the FCC's CDBS files and 30 arc second terrain data. The column labeled "Adj" shows the number of channels difference between the entry and the proposed translator. The column labeled "Dist" shows the distance in km. The column labeled "Overlap" shows the area of contour overlap in square kilometers.

Pages 8 and 9 of this exhibit are portions of USGS 1:24,000 scale 7.5 minute quadrangles at full scale with the calculated area of interference overlaid. The sheets include the quadrangle name and measurement scale at the bottom-left corner (note: "Mt" refers to meters). The area of interference was calculated using the free space equation and 120 radials.

Page 10 of this exhibit is a high resolution aerial photo of the vicinity surrounding the proposed translator's tower site provided by the U.S. Geological Survey's National Aerial Photography Program. It has been included to provide clarification of the nature of the buildings in the vicinity.

## Compliance with 47 C.F.R. § 74.1204(d)

All authorized second and third adjacent stations with which the proposed translator has contour overlap are tabulated below. Column four show the station's signal level at the proposed translator's tower site, and column five gives the minimum value within the entire standard interfering contour of the proposed translator (100 dB $\mu$  for most classes, 94 for class B, 97 for class B1). The minimum second or third adjacent F(50,50) contour within the proposed translator's standard interfering contour was used to calculate the proposed translator's actual "worst-case" interfering contour.

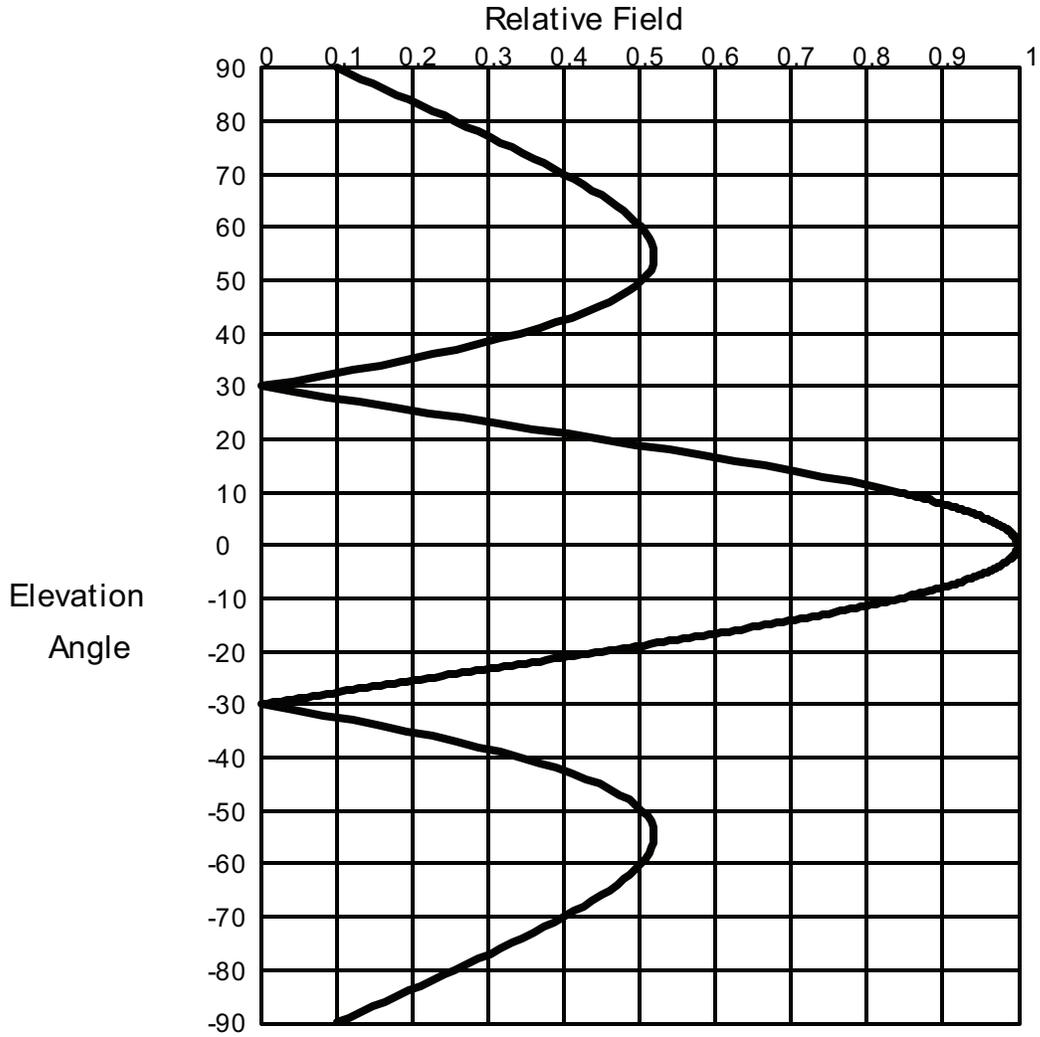
<b>Application_id</b>	<b>File Number</b>	<b>Callsign</b>	<b>Contour at Tower</b>	<b>Min. Contour</b>
73868	BMLED19841106LW	KUNI	77.8	77.8
	Minimum F(50,50) Contour of Adjacent Station within Proposed Translator's Standard Interfering Contour			<b>77.8</b>

FCC 02-244 at Section II.A.5 states that "when demonstrating that 'no actual interference will occur due to . . . other factors,' pursuant to Section 74.1204(d), an applicant may use the undesired-to-desired signal ratio method." The undesired-to-desired ratio for second and third adjacent stations required by § 74.1204(a) is 40 dB. Since the minimum protected contour strength within the proposed translator's standard interference contour is **77.8 dB $\mu$** , this makes the proposed translator's worst-case interfering contour **117.8 dB $\mu$** . By the free-space equation, this contour is calculated to extend a maximum of **106.9 m** from the transmit antenna.

The maximum horizontal plane of the interfering contour was calculated for 120 radials and plotted on the pertinent portion of the USGS quadrangles (pages 8 and 9 of this exhibit). However, the field strength of the proposed translator's antenna varies with angle of depression from horizontal. The antenna relative fields are tabulated on the following page at 5 degree increments, starting at 5 degrees below horizontal. Antenna relative field strength data was provided and certified by the manufacturer of the proposed antenna. Using a free-space calculation that neglects any loss due to reflection, the vertical ground clearance of the proposed translator's interference contour has been tabulated. As shown on the following page, the area of interference clears the tower ground level (TGL) by **58.5 m** at the lowest point. The applicant has taken into account USGS quadrangles and relevant aerial photography in stating that no structures, except possibly tower support structures, puncture the area of interference. Hence, in accordance with 47 C.F.R. § 74.1204(d) and the clarification provided by the FCC in the decision *Re: Living Way Ministries* (FCC 02-244), a lack of population has been demonstrated within the area of interference and this application is therefore in full compliance with 47 C.F.R. § 74.1204.

**Antenna Manufacturer:** SWR  
**Antenna Model:** 2FM1-1  
**CORAGL:** 105 m  
**Maximum ERP:** 0.14 kW  
**Interfering Contour:** 117.8 dB $\mu$   
**Max Int. Contour Distance:** 106.9 m  
**Min Ground Clearance:** 58.5 m

Depression Angle Below Horizontal	Antenna Relative Field	ERP (watts)	Distance to Interfering Contour from Antenna (m)	Horizontal Distance of Interfering Contour from Tower (m)	Vertical Clearance of Interfering Contour above TGL (m)
5	.959	128.8	102.5	102.1	96.1
10	.843	99.5	90.1	88.8	89.3
15	.666	62.1	71.2	68.8	86.6
20	.450	28.4	48.1	45.2	88.5
25	.220	6.8	23.5	21.3	95.1
30	.000	0.0	0.0	0.0	105.0
35	.192	5.2	20.5	16.8	93.2
40	.342	16.4	36.6	28.0	81.5
45	.446	27.8	47.7	33.7	71.3
50	.503	35.4	53.8	34.6	63.8
55	.519	37.7	55.5	31.8	59.5
60	.502	35.3	53.7	26.8	58.5
65	.460	29.6	49.2	20.8	60.4
70	.401	22.5	42.9	14.7	64.7
75	.331	15.3	35.4	9.2	70.8
80	.256	9.2	27.4	4.8	78.0
85	.178	4.4	19.0	1.7	86.0
90	.100	1.4	10.7	0.0	94.3
Minimum Clearance above TGL:					<b>58.5 m</b>



## Elevation Pattern

Scale: Linear

Systems With Reliability Inc.

Units: Field, Relative

CLIENT: *General*

Date: 11/10/03

ANTENNA TYPE: FM1/2

FREQUENCY: 98.1

PATTERN POL.: Circular

DIRECTIVITY(Peak): 1.918/2.828 dBd

Beam Tilt (Deg.) : 0

DIRECTIVITY(Horiz): 1.918/2.828 dBd

Null Fill(s)(%) : 0, 0, 0

# Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
3.2	.983 (-0.146)	-4.4	.969 (-0.278)	-12.0	.779 (-2.174 )
3.0	.985 (-0.129)	-4.6	.966 (-0.304)	-12.2	.772 (-2.252 )
2.8	.987 (-0.112)	-4.8	.963 (-0.331)	-12.4	.765 (-2.332 )
2.6	.989 (-0.097)	-5.0	.959 (-0.36)	-12.6	.757 (-2.413 )
2.4	.991 (-0.082)	-5.2	.956 (-0.389)	-12.8	.75 (-2.496 )
2.2	.992 (-0.069)	-5.4	.953 (-0.42)	-13.0	.743 (-2.581 )
2.0	.993 (-0.057)	-5.6	.949 (-0.452)	-13.2	.736 (-2.667 )
1.8	.995 (-0.046)	-5.8	.946 (-0.485)	-13.4	.728 (-2.755 )
1.6	.996 (-0.037)	-6.0	.942 (-0.52)	-13.6	.721 (-2.845 )
1.4	.997 (-0.028)	-6.2	.938 (-0.556)	-13.8	.713 (-2.937 )
1.2	.998 (-0.021)	-6.4	.934 (-0.593)	-14.0	.705 (-3.031 )
1.0	.998 (-0.014)	-6.6	.93 (-0.631)	-14.2	.698 (-3.126 )
.8	.999 (-0.009)	-6.8	.926 (-0.67)	-14.4	.69 (-3.224 )
.6	.999 (-0.005)	-7.0	.921 (-0.711)	-14.6	.682 (-3.323 )
.4	1.00 (-0.002)	-7.2	.917 (-0.753)	-14.8	.674 (-3.425 )
.2	1.00 (-0.001)	-7.4	.912 (-0.797)	-15.0	.666 (-3.528 )
.0	1.00 (0)	-7.6	.908 (-0.841)	-15.2	.658 (-3.634 )
-.2	1.00 (-0.001)	-7.8	.903 (-0.887)	-15.4	.65 (-3.742 )
-.4	1.00 (-0.002)	-8.0	.898 (-0.935)	-15.6	.642 (-3.851 )
-.6	.999 (-0.005)	-8.2	.893 (-0.983)	-15.8	.634 (-3.963 )
-.8	.999 (-0.009)	-8.4	.888 (-1.033)	-16.0	.625 (-4.078 )
-1.0	.998 (-0.014)	-8.6	.883 (-1.084)	-16.2	.617 (-4.194 )
-1.2	.998 (-0.021)	-8.8	.877 (-1.137)	-16.4	.609 (-4.313 )
-1.4	.997 (-0.028)	-9.0	.872 (-1.191)	-16.6	.60 (-4.435 )
-1.6	.996 (-0.037)	-9.2	.866 (-1.246)	-16.8	.592 (-4.558 )
-1.8	.995 (-0.046)	-9.4	.861 (-1.303)	-17.0	.583 (-4.685 )
-2.0	.993 (-0.057)	-9.6	.855 (-1.361)	-17.2	.575 (-4.814 )
-2.2	.992 (-0.069)	-9.8	.849 (-1.421)	-17.4	.566 (-4.945 )
-2.4	.991 (-0.082)	-10.0	.843 (-1.482)	-17.6	.557 (-5.079 )
-2.6	.989 (-0.097)	-10.2	.837 (-1.544)	-17.8	.549 (-5.216 )
-2.8	.987 (-0.112)	-10.4	.831 (-1.608)	-18.0	.54 (-5.356 )
-3.0	.985 (-0.129)	-10.6	.825 (-1.674)	-18.2	.531 (-5.499 )
-3.2	.983 (-0.146)	-10.8	.818 (-1.74)	-18.4	.522 (-5.644 )
-3.4	.981 (-0.165)	-11.0	.812 (-1.809)	-18.6	.513 (-5.793 )
-3.6	.979 (-0.186)	-11.2	.805 (-1.879)	-18.8	.504 (-5.945 )
-3.8	.976 (-0.207)	-11.4	.799 (-1.95)	-19.0	.495 (-6.1 )
-4.0	.974 (-0.229)	-11.6	.792 (-2.023)	-19.2	.486 (-6.259 )
-4.2	.971 (-0.253)	-11.8	.785 (-2.098)	-19.4	.477 (-6.421 )

**Systems With Reliability Inc.**

Page 1 of 2

CLIENT: *General*

Date: 11/10/03

ANTENNA TYPE: FM1/2

FREQUENCY: 98.1

PATTERN POL.: Circular

DIRECTIVITY(Peak): 1.918/ 2.828 dBd

Beam Tilt (Deg.) : 0

DIRECTIVITY(Horiz): 1.918/ 2.828 dBd

Null Fill(s)(%) : 0, 0, 0

# Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
-19.6	.468 (-6.587)	-27.2	.121 (-18.344)	-54.0	.519 (-5.694 )
-19.8	.459 (-6.756)	-27.4	.112 (-19.006)	-55.0	.519 (-5.69 )
-20.0	.45 (-6.929)	-27.6	.103 (-19.721)	-56.0	.518 (-5.708 )
-20.2	.441 (-7.106)	-27.8	.094 (-20.496)	-57.0	.516 (-5.747 )
-20.4	.432 (-7.288)	-28.0	.086 (-21.343)	-58.0	.512 (-5.807 )
-20.6	.423 (-7.473)	-28.2	.077 (-22.278)	-59.0	.508 (-5.887 )
-20.8	.414 (-7.663)	-28.4	.068 (-23.322)	-60.0	.502 (-5.986 )
-21.0	.405 (-7.858)	-28.6	.06 (-24.503)	-61.0	.495 (-6.103 )
-21.2	.396 (-8.057)	-28.8	.051 (-25.863)	-62.0	.488 (-6.239 )
-21.4	.386 (-8.261)	-29.0	.042 (-27.469)	-63.0	.479 (-6.392 )
-21.6	.377 (-8.471)	-29.2	.034 (-29.429)	-64.0	.47 (-6.563 )
-21.8	.368 (-8.686)	-29.4	.025 (-31.951)	-65.0	.46 (-6.751 )
-22.0	.359 (-8.906)	-29.6	.017 (-35.496)	-66.0	.449 (-6.956 )
-22.2	.349 (-9.132)	-29.8	.008 (-41.54)	-67.0	.438 (-7.178 )
-22.4	.34 (-9.365)	-30.0	.00 (-50)	-68.0	.426 (-7.417 )
-22.6	.331 (-9.604)	-31.0	.041 (-27.712)	-69.0	.413 (-7.673 )
-22.8	.322 (-9.85)	-32.0	.081 (-21.828)	-70.0	.401 (-7.948 )
-23.0	.312 (-10.103)	-33.0	.119 (-18.454)	-71.0	.387 (-8.24 )
-23.2	.303 (-10.364)	-34.0	.156 (-16.113)	-72.0	.374 (-8.551 )
-23.4	.294 (-10.632)	-35.0	.192 (-14.343)	-73.0	.36 (-8.881 )
-23.6	.285 (-10.909)	-36.0	.225 (-12.937)	-74.0	.345 (-9.231 )
-23.8	.276 (-11.195)	-37.0	.257 (-11.786)	-75.0	.331 (-9.603 )
-24.0	.266 (-11.491)	-38.0	.288 (-10.824)	-76.0	.316 (-9.997 )
-24.2	.257 (-11.797)	-39.0	.316 (-10.008)	-77.0	.301 (-10.415 )
-24.4	.248 (-12.113)	-40.0	.342 (-9.31)	-78.0	.286 (-10.859 )
-24.6	.239 (-12.441)	-41.0	.367 (-8.709)	-79.0	.271 (-11.332 )
-24.8	.23 (-12.781)	-42.0	.39 (-8.189)	-80.0	.256 (-11.836 )
-25.0	.22 (-13.135)	-43.0	.41 (-7.738)	-81.0	.241 (-12.374 )
-25.2	.211 (-13.503)	-44.0	.429 (-7.349)	-82.0	.225 (-12.951 )
-25.4	.202 (-13.887)	-45.0	.446 (-7.013)	-83.0	.21 (-13.571 )
-25.6	.193 (-14.287)	-46.0	.461 (-6.724)	-84.0	.194 (-14.242 )
-25.8	.184 (-14.706)	-47.0	.474 (-6.479)	-85.0	.178 (-14.971 )
-26.0	.175 (-15.145)	-48.0	.486 (-6.272)	-86.0	.163 (-15.768 )
-26.2	.166 (-15.606)	-49.0	.495 (-6.101)	-87.0	.147 (-16.648 )
-26.4	.157 (-16.092)	-50.0	.503 (-5.963)	-88.0	.131 (-17.627 )
-26.6	.148 (-16.605)	-51.0	.51 (-5.855)	-89.0	.116 (-18.733 )
-26.8	.139 (-17.149)	-52.0	.514 (-5.775)	-90.0	.10 (-20 )
-27.0	.13 (-17.727)	-53.0	.517 (-5.722)	90.0	.00 (-50 )

**Systems With Reliability Inc.**

Page 2 of 2

CLIENT: *General*

Date: 11/10/03

ANTENNA TYPE: FM1/2

FREQUENCY: 98.1

PATTERN POL.: Circular

DIRECTIVITY(Peak): 1.918/ 2.828 dBd

Beam Tilt (Deg.) : 0

DIRECTIVITY(Horiz): 1.918/ 2.828 dBd

Null Fill(s)(%) : 0, 0, 0

**Adjacent Channel Study  
For Station K217FT, Facility\_id: 148558**

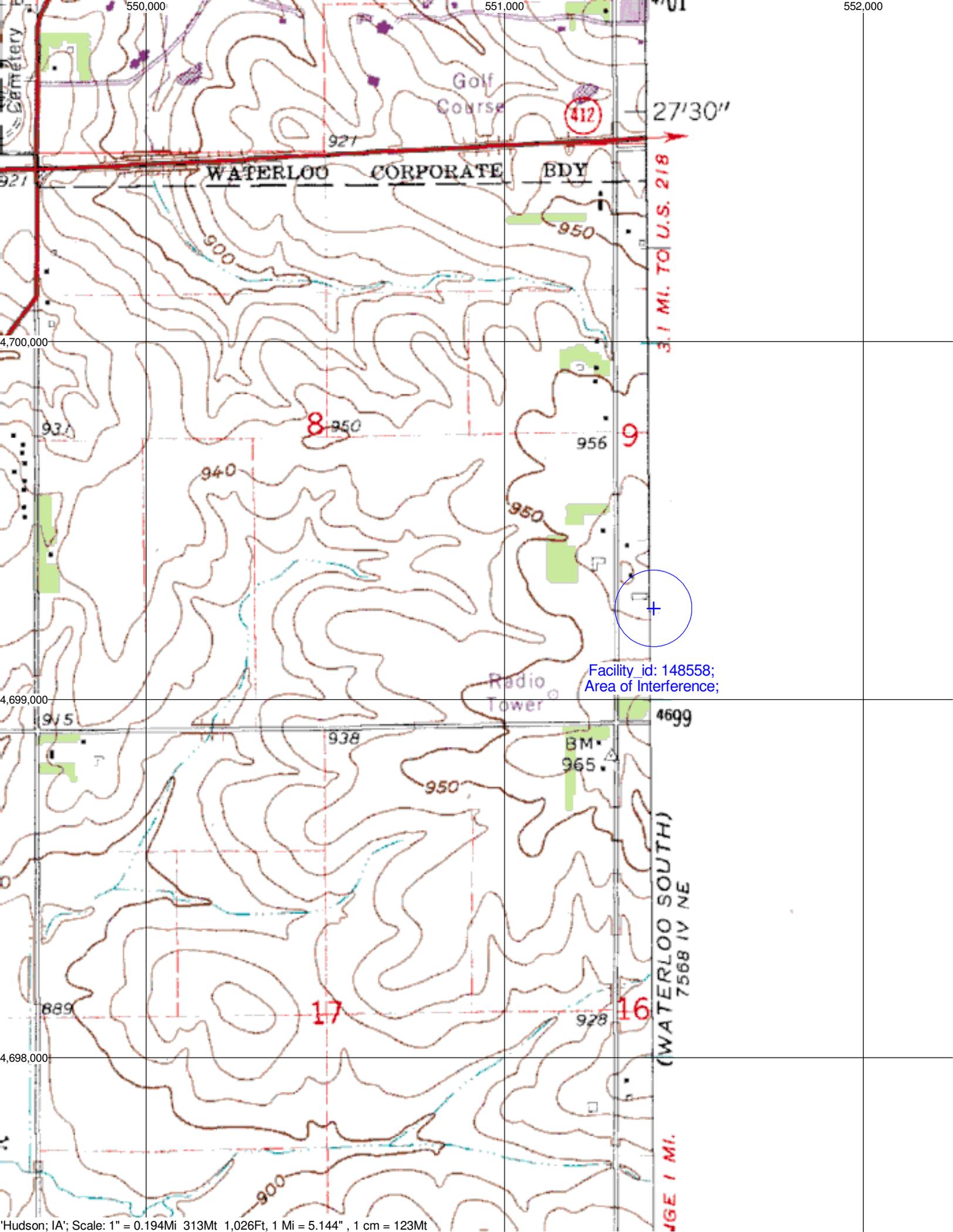
**Co-channel through third adjacent:**

Application_id	Facility_id	Prefix	ARN	Call	Licensee	Class	City	State	Status	ERP	RCAMSL	Channel	Adj	Dist	Overlap
73868	69158	BMLD	19841106LW	KUNI	UNIVERSITY OF NORTHERN IOWA	C	CEDAR FALLS	IA	LIC	94	799	215	2	44.8	0.8354
1259541	92457	BLED	20080728AAD	KTDV	MARSHALLTOWN EDUCATION PLUS, INC.	C3	STATE CENTER	IA	LIC	22	402.1	220	3	60.3	0
1154213	76660	BMLFT	20060920AEE	K218CE	CALVARY CHAPEL OF TWIN FALLS, INC.	D	MARSHALLTOWN	IA	LIC	0.08	335	218	1	69.7	0
108659	69284	BLED	19880125KA	KUNY	UNIVERSITY OF NORTHERN IOWA	C3	MASON CITY	IA	LIC	8	460	218	1	100.6	0
174694	69129	BLFT	19920619TB	K214BA	UNIVERSITY OF NORTHERN IOWA	D	MASON CITY, ETC.	IA	LIC	0.273	426	214	3	107.8	0
228779	66626	BLED	19960708KC	KSUI	THE UNIVERSITY OF IOWA	C	IOWA CITY	IA	LIC	95	626	219	2	117.3	0
1226826	171642	BNPED	20071018AKJ	KDVO	UNIVERSITY OF NORTHERN IOWA	C3	MASON CITY	IA	CP	14	467	214	3	121.4	0
687431	20849	BLED	20030923ABC	KDFR	FAMILY STATIONS, INC.	C2	DES MOINES	IA	LIC	32	405	217	0	132.5	0
1201157	29066	BLED	20070911ABL	KTPR	IOWA STATE UNIVERSITY OF SCIENCE AND TE	C	FORT DODGE	IA	LIC	100	676	216	1	171.7	0
266568	42965	BLED	19980504KG	KLSE-FM	MINNESOTA PUBLIC RADIO	C1	ROCHESTER	MN	LIC	94	638	219	2	177.4	0

**Intermediate Frequencies (53 and 54 channels difference):**

Application_id	Facility_id	Prefix	ARN	Call	Licensee	Class	City	State	Status	ERP	RCAMSL	Channel	Adj	Dist	Clr
1190887	49786	BMLD	20070614AAO	KNWS-FM	NORTHWESTERN COLLEGE	C	WATERLOO	IA	LIC	80	585	270	53	30.2	1.2
1134026	49786	BXML	20060616ABF	KNWS-FM	NORTHWESTERN COLLEGE	C	WATERLOO	IA	LIC	80	585	270	53	30.2	1.2
1095140	49786	BLED	20051102ABH	KNWS-FM	NORTHWESTERN COLLEGE	C	WATERLOO	IA	LIC	100	762	270	53	43.9	14.9





550.000

551.000

552.000

Cemetery

Golf Course

412

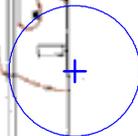
27'30"

WATERLOO CORPORATE BDY

3.1 MI. TO U.S. 218

4,700,000

8-950



Facility\_id: 148558;  
Area of Interference;

4,699,000

Radio Tower

4699

BM 965

(WATERLOO SOUTH)  
7568 IV NE

4,698,000

17

16

1 MI.

