



OWL ENGINEERING & EMC TEST LABS, INC.

CONSULTING COMMUNICATIONS ENGINEERS • EMC TEST LABORATORIES

MINNESOTA OFFICE

5844 Hamline Avenue North, Shoreview, MN 55126
651-784-7445 • Fax 651-784-7541

800-797-1338

**ENGINEERING EXHIBIT FOR AN
APPLICATION FOR A CONSTRUCTION PERMIT
CHANNEL 271 WLUM-FM
MIWAUKEE RADIO ALLIANCE, LLC
MILWAUKEE, WISCONSIN**

CHANNEL 271 8.8 KW (H&V) 257 METERS HAAT

August 19, 2005



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ENGINEERING STATEMENT

This engineering exhibit, of which this Statement is a part, was prepared in accordance with the Rules and Regulations of the Federal Communications Commission and pursuant to the provisions of Section III-B of FCC Form 301 on behalf of Milwaukee Radio Alliance, LLC (hereafter “MRA”) in support of an application for authority to modify an existing FM broadcast facility (WLUM) operating on channel 271 (102.1 MHz) at Milwaukee, Wisconsin. The purpose of this application is to change the antenna location, effective radiated power to 8.8 KW, both in the horizontal and vertical plane, and the antenna center of radiation to 257 meters above the average terrain and use an omni-directional antenna. This power/height combination is an allowable Class B facility permitted under the current rules and regulations.

“MRA” proposes to operate from a site uniquely described by the geographic coordinates:

(NAD 27)

N 43° 06' 42" North Latitude

W 87° 55' 50" West Longitude

(NAD 83)

N 43° 06' 42" North Latitude

W 87° 55' 50.3" West Longitude



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Notification to the FAA office is not required since this instant application is proposing to locate on an existing tower. The FCC tower registration number is 1047092.

Engineering Figure 1 is a portion of the Milwaukee Co, Wisconsin 7.5 minute map that shows the exact location of the tower.

Figures 2 and 2A show aerial views of the proposed site and that the surrounding area is urban and the instant application is proposing to be located on an existing tower and there is not expected to be any problem with blanketing interference. The applicant is aware of the provisions of Section 73.318 of the FCC's Rules and the requirement for satisfying all complaints of blanketing interference that are received within a one-year period. The main studio for the station is located in the Milwaukee area.

ALLOCATION CONSIDERATIONS

A review of allotments and assignments on channel 271, on the three immediately upper adjacent, the three immediately lower adjacent channels and the two channels removed by 53 and 54 channels (218 & 219) shows that the site proposed would not be in full compliance with Section 73.207. Table 1 shows the results of a spacing study at the present licensed site. As can be seen in this table there are short-spaced conditions with WMUK, WTMX, WXLN and WQLF.

Table 2 shows the results of the spacing study and the proposed site location. This study shows that the predicted short-spaced conditions are reduced except to WQLF which is slightly increased.



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Table 1

WLUM ALLOCATION STUDY

REFERENCE							DISPLAY DATES	
43 05 48 N			CLASS = B				DATA	08-19-05
87 54 19 W			Current Spacings				SEARCH	08-19-05
----- Channel 271 - 102.1 MHz -----								
Call	Channel	Location	Dist	Azi	FCC	Margin		
WLUMFM	LIC-D 271B	Milwaukee	WI 0.00	0.0	241.0	-241.00*		
WMUK	LIC 271B	Kalamazoo	MI 208.42	110.5	241.0	-32.58*		
WTMX	LIC 270B	Skokie	IL 137.07	170.6	169.0	-31.93*		
WXLG	LIC 272A	Waukegan	IL 82.99	178.6	113.0	-30.01*		
WQLF	LIC-N 271A	Lena	IL 176.82	242.3	178.0	-1.18*		
WQTCFM	LIC 272A	Manitowoc	WI 116.45	10.9	113.0	3.45		
WRKU	LIC-Z 271A	Forestville	WI 183.36	12.4	178.0	5.36		
WDEZ	LIC 270C	Wausau	WI 248.15	325.5	217.0	31.15		
WAUH	LIC 272A	Wautoma	WI 144.69	316.4	113.0	31.69		
WALS	LIC 271A	Oglesby	IL 217.38	203.7	178.0	39.38		
WALS.C	CP -N 271A	Oglesby	IL 220.48	203.7	178.0	42.48		
WRHLFM	LIC 272A	Rochelle	IL 161.14	216.3	113.0	48.14		
WYBR	LIC-N 272C3	Big Rapids	MI 199.20	70.0	145.0	54.20		
WSTM	LIC 217A	Kiel	WI 70.87	350.4	15.0	55.87		
WNWCFM	LIC 273B	Madison	WI 130.64	267.6	74.0	56.64		
WMRR	LIC 269B1	Muskegon Heights	MI 129.24	80.5	71.0	58.24		
WIBAFM	LIC 268B	Madison	WI 132.80	268.6	74.0	58.80		
WVAZ	LIC 274B	Oak Park	IL 135.05	170.0	74.0	61.05		
WLDRFM	LIC 270C1	Traverse City	MI 257.04	42.8	195.0	62.04		

The protected 54 dbuv/m contours for both the present licensed location and the proposed new location were calculated and are shown in Figure 3. As can be seen in this figure the protected contour has not been increased with the instant proposal over land. The area on the eastern portion of the predicted contour has been slightly increased but this area is over the water area of Lake Michigan.



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Table 2

WLUM NEW SITE ALLOCATION STUDY

REFERENCE						DISPLAY DATES		
43 06 42 N		CLASS = B				DATA	08-19-05	
87 55 50 W		Current Spacings				SEARCH	08-19-05	
----- Channel 271 - 102.1 MHz -----								
Call	Channel	Location	Dist	Azi	FCC	Margin		
WLUMFM	LIC-D 271B	Milwaukee	WI 2.64	129.1	241.0	-238.36		
WMUK	LIC 271B	Kalamazoo	MI 210.93	110.7	241.0	-30.07		
WTMX	LIC 270B	Skokie	IL 139.06	169.9	169.0	-29.94		
WXLC	LIC 272A	Waukegan	IL 84.73	177.3	113.0	-28.27		
WQLF	LIC-N 271A	Lena	IL 175.78	241.4	178.0	-2.22*		
WQTCFM	LIC 272A	Manitowoc	WI 115.23	12.1	113.0	2.23		
WRKU	LIC-Z 271A	Forestville	WI 182.19	13.1	178.0	4.19		
WDEZ	LIC 270C	Wausau	WI 245.61	325.6	217.0	28.61		
WAUH	LIC 272A	Wautoma	WI 142.06	316.5	113.0	29.06		
WALS	LIC 271A	Oglesby	IL 218.08	203.0	178.0	40.08		
WALS.C	CP -N 271A	Oglesby	IL 221.19	203.0	178.0	43.19		
WRHLFM	LIC 272A	Rochelle	IL 161.28	215.4	113.0	48.28		
WSTM	LIC 217A	Kiel	WI 68.90	351.9	15.0	53.90		
WNWCFM	LIC 273B	Madison	WI 128.66	266.8	74.0	54.66		
WYBR	LIC-N 272C3	Big Rapids	MI 200.58	70.7	145.0	55.58		
WIBAFM	LIC 268B	Madison	WI 130.80	267.8	74.0	56.80		
WMRR	LIC 269B1	Muskegon Heights	MI 131.01	81.4	71.0	60.01		
WLDRFM	LIC 270C1	Traverse City	MI 257.23	43.4	195.0	62.23		
WVAZ	LIC 274B	Oak Park	IL 137.06	169.3	74.0	63.06		

COVERAGE CONTOURS

The three-to-sixteen-kilometer average terrain elevations were derived from the Defense Mapping Agency 3-second topography database.

The effective antenna radiation center height for each of the eight standard 45-degree spaced radials was used in conjunction with the F(50,50) metric curves of Figure 1 of Section 73.333 of the Rules to determine the distances to the 70 dBu and 60 dBu coverage contours. The contours drawn from the data are depicted on the map included as Engineering Figure 3A. As is readily evident, all of Milwaukee, Wisconsin is included within the proposed 70 dBu coverage contour as required by the rules.



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DISTANCE TO CONTOURS

DISTANCES TO CONTOURS (Kilometers):

Antenna COR elevation (AMSL): 461 meters Average HAAT: 257 meters

Frequency: 102.1000 MHz

Coordinates: N 43 6 42.00 W 87 55 50.00

F(50,50) Curves Number of Contours: 2

AZ (deg)	HAAT (m)	ERPd (kW)	CONTOUR LEVELS (dBu):	
			70.0	60.0
0.0	255	8.8000	28.3	45.9
45.0	284	8.8000	29.7	47.9
90.0	284	8.8000	29.7	47.9
135.0	277	8.8000	29.3	47.4
180.0	257	8.8000	28.4	46.0
225.0	235	8.8000	27.2	44.4
270.0	231	8.8000	27.0	44.2
315.0	235	8.8000	27.2	44.4

POPULATION AND AREA DATA

Based on the 2000 U.S. Census of Population, the numbers of persons enclosed by the proposed 60 dBu coverage contour are 1,540,299 persons. The population count was made through the employment of a computer program containing a database including the geographic coordinates of the centroids of population groupings. The area within the proposed 60 dBu coverage contour is 6,857 square kilometers. A computerized integration program determined this area.



Interference Analysis

WTMX

The interference contours with station WTMX are shown in Figure 5. As can be seen in this figure the proposed interference contours are predicted to be reduced from the presently licensed facility.

WXLC

The interference contours with station WXLC are shown in Figure 6 that shows present contours and Figure 6A shows the proposed contours. As can be seen in this figure the proposed interference contours are predicted to be reduced from the presently licensed facility.

WOLF

The interference contours with station WOLF are shown in Figure 7 that shows present contours. As can be seen in this figure the proposed interference contours are predicted to be reduced from the presently licensed facility.

WMUK

The interference analysis was performed using the requirements of section 73.213 (a) of the Rules. The interference contours for the proposed station and WMUK were computed and are shown in Figure 4. Since the contours are close in the eastern area an expanded view is shown in figure 4A As can be seen in this figure no overlap is predicted over the land area of the WMUK protected contour. **Processing under Section 73.215 is requested.**



ANSI Power Density Calculations

The power density at the base of the tower was calculated using the following formula from OST Bulletin Number 65, August, 1997:

$$S = \frac{((0.64)(1.64)(ERP)(1000)(\text{milliwatts/watt}))}{(\pi(R)^2)}$$

where: S = power density in milliwatts per square centimeter

ERP = effective radiated power in watts

R = distance to radiation source in centimeters

$\pi = 3.14$

Using this formula and the values shown below, a power density of .008 $\mu\text{W}/\text{cm}^2$ is found to exist at the base of the tower. This predicted value is 0.008 % of the controlled exposure maximum limit of 1 mW/cm^2 . There are several other RF facilities located on the tower (WDJT-TV, WTYU-LP and WMLW) and their total contribution was computed and does not exceed the Controlled radiation limit.

ERP = 17.6 kilowatts

R = 27,130 cm.

Access to RF circuitry is restricted by a metal fence that surrounds the property that limits access to the public. Signs are posted warning of the potential danger. When persons require access to the site, tower or antenna for maintenance purposes, the transmitter power will be reduced or completely eliminated to comply with ANSI guidelines. Hence, the conditions of Section 1.1306(b)(3) would not be involved. Since this is a multi-transmitter site measurements will be made after construction to ensure compliance with the radiation requirements. Since this is a multi-transmitter site measurements will be taken after construction to ensure compliance with the exposure standard.



CONCLUSIONS

Based on the engineering studies provided, the following conclusions can be obtained:

- (1) Implementation of the instant proposal will continue to provide Milwaukee with a full time aural broadcast service.
- (2) 1,540,299 persons in 6,857 square kilometers would have an available signal strength of 60 dBu or greater from the proposed construction location.
- (3) All of Milwaukee would be served with a signal of 70 dBu or greater from the proposed construction site.
- (4) The proposal is in complete conformance with all technical rules of the Federal Communications Commission.

Garrett G. Lysiak, P.E.

August 19, 2005

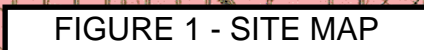
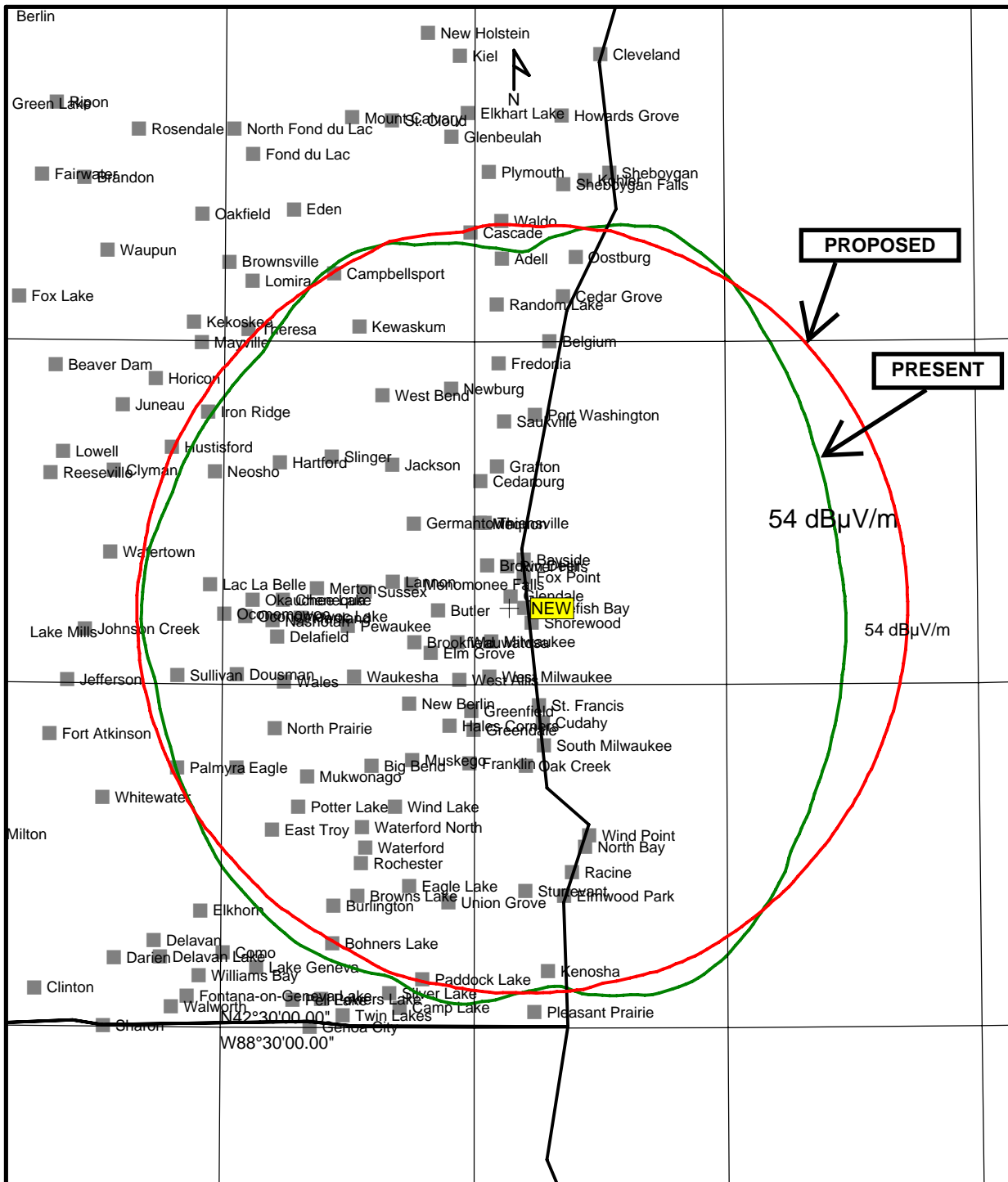




FIGURE 2 - AERIAL SITE PHOTO



FIGURE 2A - AERIAL PHOTO SITES



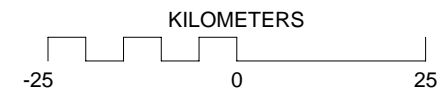
Prop. model: FCC-EDX
 Time: 50.0% Loc.: 50.0%
 Prediction Confidence Margin: 0.0dB
 Climate: Continental Temperate
 Land use (clutter): none
 Atmospheric Abs.: none
 K Factor: 1.333
 RX Antenna - Type: OMNI
 Height: 9.2 m AGL Gain: 0.00 dBd

Field strength at remote

■ = 54.0 dBµV/m

Display threshold level: -120.0 dBmW

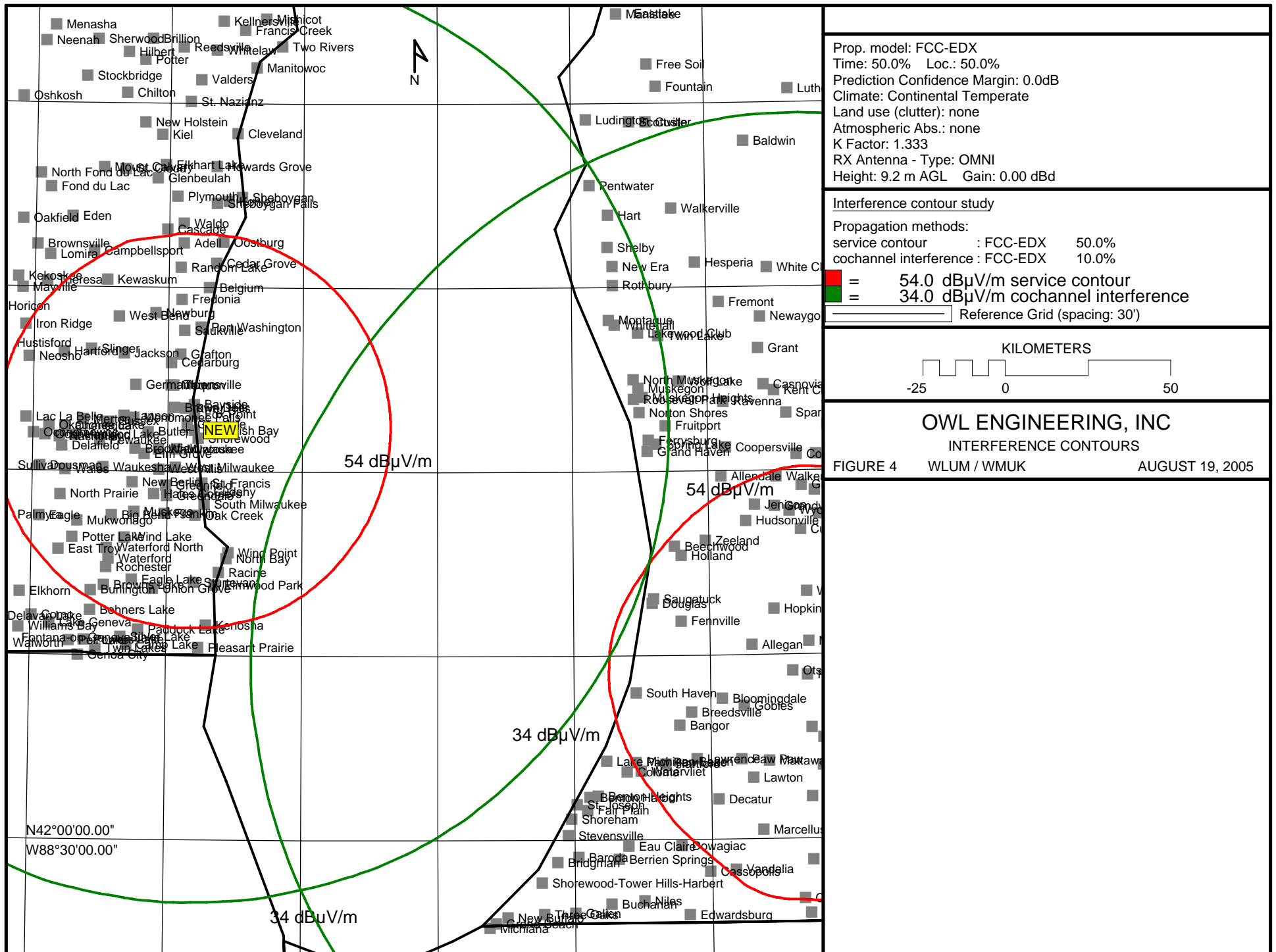
Reference Grid (spacing: 30')

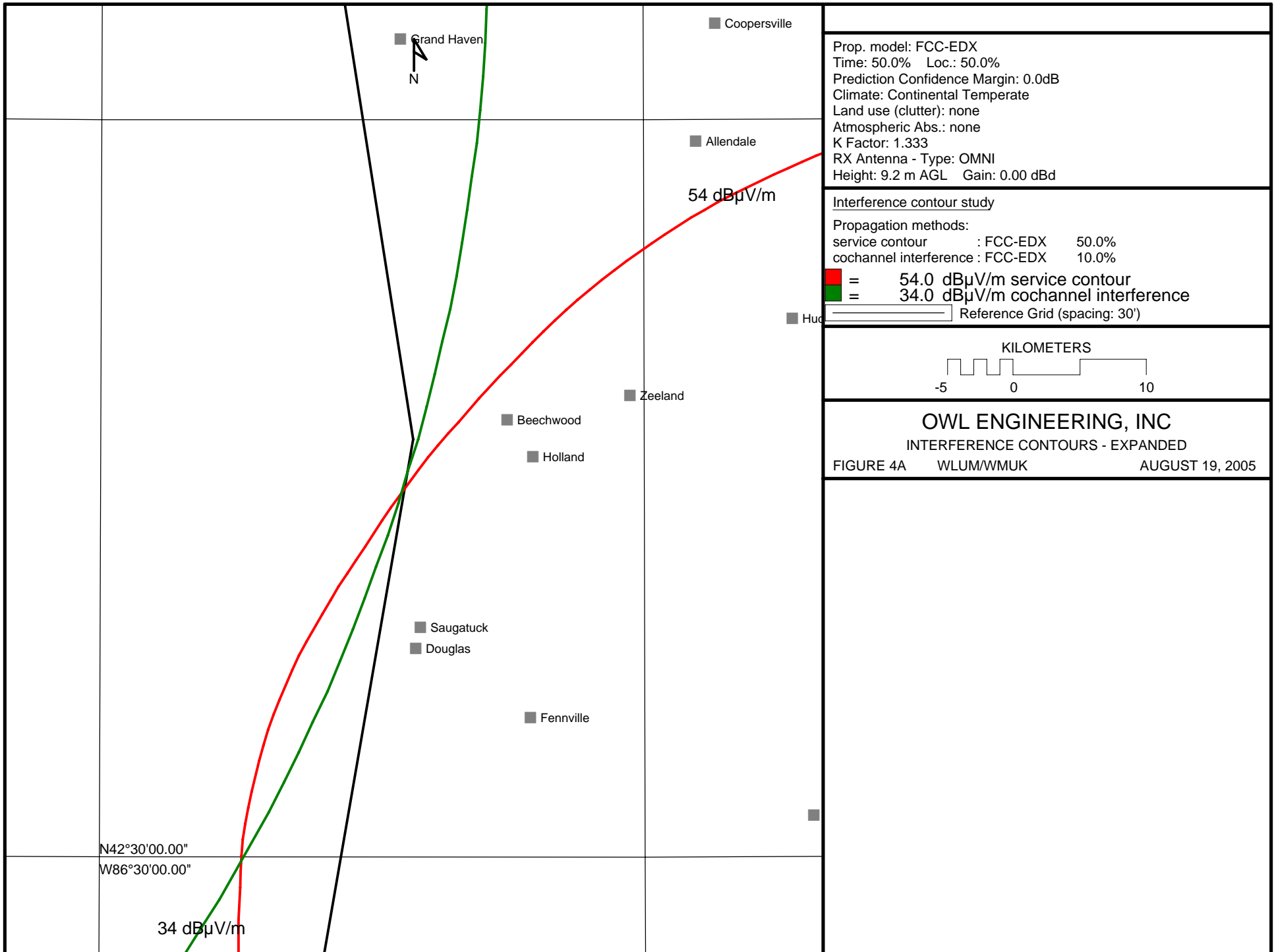


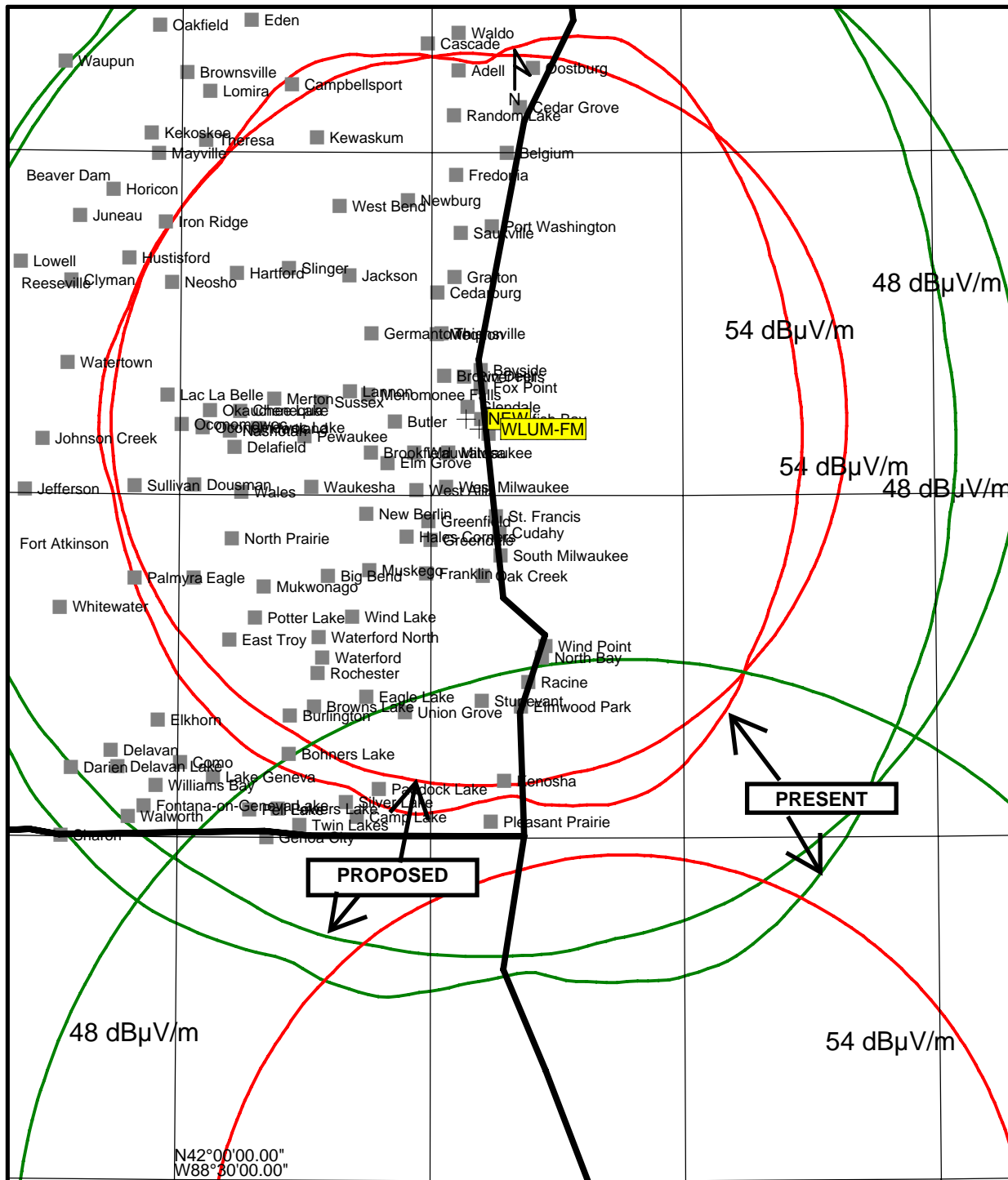
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 PROTECTED CONTOURS

FIGURE 3

AUGUST 19,, 2005







Prop. model: FCC-EDX
Time: 10.0% Loc.: 50.0%
Prediction Confidence Margin: 0.0dB
Climate: Continental Temperate
Land use (clutter): none
Atmospheric Abs.: none
K Factor: 1.333
RX Antenna - Type: OMNI
Height: 9.2 m AGL Gain: 0.00 dBd

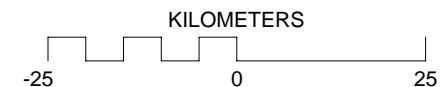
Sites

Site: MILWAUKEE
N43°06'42.00" W87°55'50.00" 187.0 m
NEW Tx.Ht.AGL: 271.3 m Total ERPd: 8.80 kW
Grp: 1 omni-horizontal/0.0° 102.1000 MHz

Site: MILWAUKEE
N43°05'48.00" W87°54'19.00" 198.0 m
WLUM-FM Tx.Ht.AGL: 243.0 m Total ERPd: 20.00kW
Grp: 1 directional-horizontal/0.0° 102.1000 MHz

Site: SKOKIE
N41°52'44.00" W87°38'08.00" 178.0 m
WTMX Tx.Ht.AGL: 479.0 m Total ERPd: 4.20kW
Grp: 1 omni-horizontal/0.0° 101.9000 MHz

Reference Grid (spacing: 30')

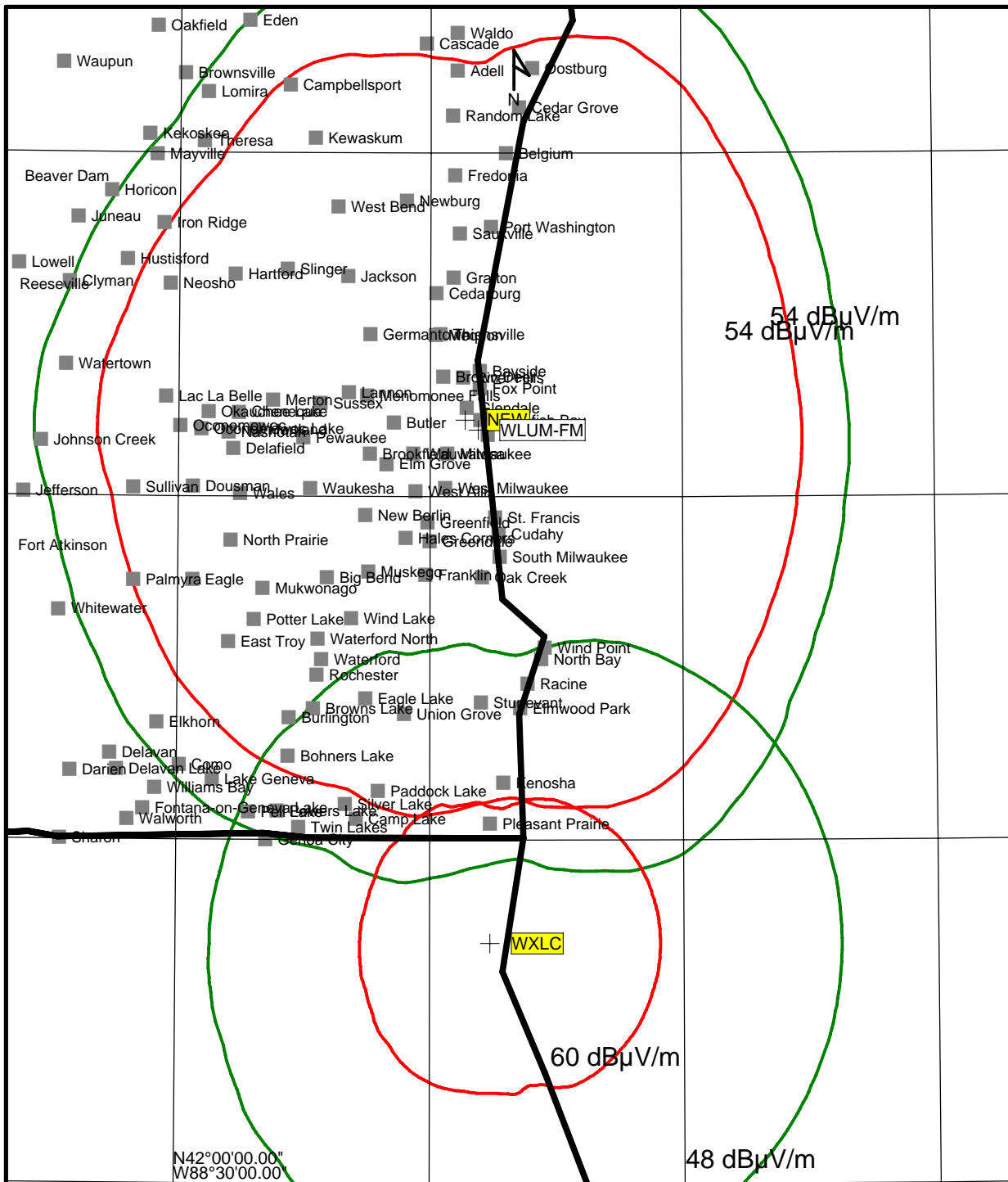


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INTERFERENCE CONTOURS

FIGURE 5 WLUM / WTMX

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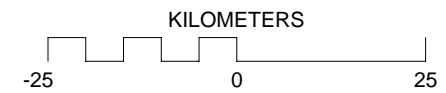
Prop. model: FCC-EDX
Time: 10.0% Loc.: 50.0%
Prediction Confidence Margin: 0.0dB
Climate: Continental Temperate
Land use (clutter): none
Atmospheric Abs.: none
K Factor: 1.333
RX Antenna - Type: OMNI
Height: 9.2 m AGL Gain: 0.00 dBd

Sites

Site: MILWAUKEE
N43°06'42.00" W87°55'50.00" 187.0 m
NEW Tx.Ht.AGL: 271.3 m Total ERPd: 8.80 kW
Grp: 1 omni-horizontal/0.0° 102.1000 MHz

Site: WAUKEGAN
N42°20'59.00" W87°52'53.00" 213.7 m
WXLC Tx.Ht.AGL: 95.3 m Total ERPd: 3.00kW
Grp: 1 omni-horizontal/0.0° 102.3000 MHz

Reference Grid (spacing: 30')

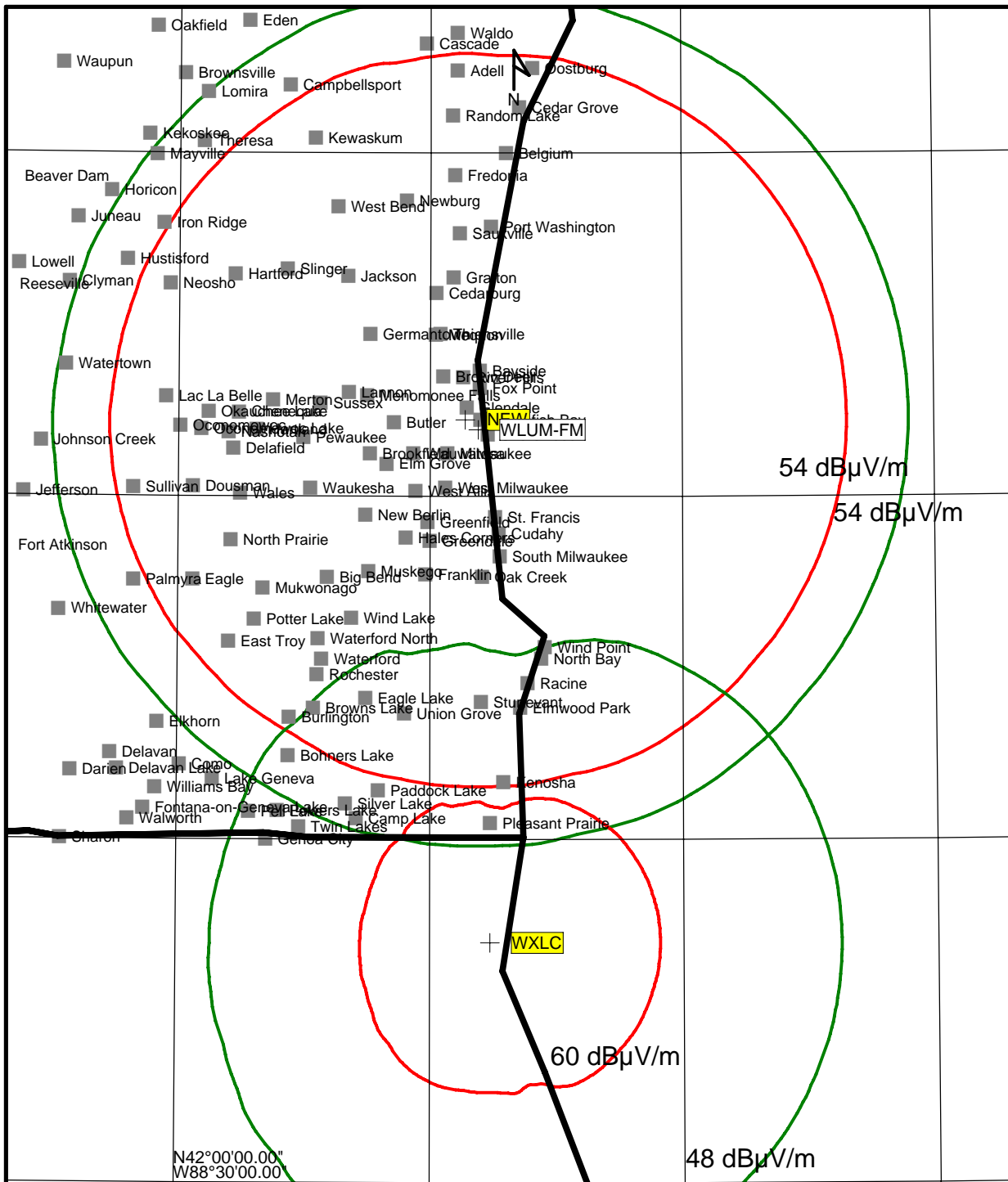


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INTERFERENCE CONTOURS - PRESENT

FIGURE 6 WLUM / WXLC

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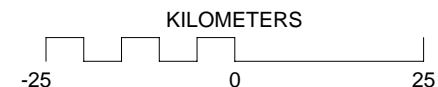
Prop. model: FCC-EDX
Time: 10.0% Loc.: 50.0%
Prediction Confidence Margin: 0.0dB
Climate: Continental Temperate
Land use (clutter): none
Atmospheric Abs.: none
K Factor: 1.333
RX Antenna - Type: OMNI
Height: 9.2 m AGL Gain: 0.00 dBd

Sites

Site: MILWAUKEE
N43°06'42.00" W87°55'50.00" 187.0 m
NEW Tx.Ht.AGL: 271.3 m Total ERPd: 8.80 kW
Grp: 1 omni-horizontal/0.0° 102.1000 MHz

Site: WAUKEGAN
N42°20'59.00" W87°52'53.00" 213.7 m
WXLC Tx.Ht.AGL: 95.3 m Total ERPd: 3.00kW
Grp: 1 omni-horizontal/0.0° 102.3000 MHz

Reference Grid (spacing: 30')



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INTERFERENCE CONTOURS - PROPOSED

FIGURE 6A WLUM / WXLC

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