

# **ENGINEERING REPORT**

Minor Modification  
Construction Permit Application  
for FM Station:

WUPJ(FM) – Escanaba, MI  
Channel 215C1 (90.9 MHz)  
BLED-20131213BGF

October 2021

***MUNN-REESE***

Broadcast Engineering Consultants  
Coldwater, MI 49036

# **TABLE OF CONTENTS**

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Discussion of Report

- Exhibit 1.0 - Present and Proposed Contour Study
- Exhibit 2.0 – Tabulation of Non-Commercial Allocation
- Exhibit 3.0 – RFR Compliance Study

## **DISCUSSION OF REPORT**

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This firm was retained to prepare the required engineering report in support of a minor modification Construction Permit Application for Non-Commercial FM station WUPJ(FM) Escanaba, MI – File No. BLED-20131213BGF. Currently WUPJ(FM) is licensed to operate with 100 kW with a center of radiation at 374 meters AMSL utilizing a non-directional antenna mounted on ASR: 1002512. This minor change application requests 30 kW at 524 meters AMSL utilizing a non-directional antenna from ASR: 1007037. The facility will continue to serve the community of Escanaba, MI as shown in ***Exhibit 1.0***.

The proposed site for the Class C1 operation meets all the contour protection requirements towards other stations in the allocation. A tabulation of the proposed protections to each of the other relevant stations is found in ***Exhibit 2.0***.

The transmitter site is located within 320 km of the common border between the United States and Canada. Full protection is afforded all international facilities as noted in ***Exhibit 2.0***. The 34 dBu interfering contour of the proposed WUPJ does not cross onto Canadian soil. The transmitter site proposed in this application is not located within the affected radius of any Channel 6 television station, therefore no further TV-6 showings are believed necessary.

The proposed service contours have been calculated in accordance with the Rules, and the data obtained has been tabulated and plotted in this report. The plotted contours are found as ***Exhibit 1.0*** of this report. This exhibit shows the overall service that is provided by the 1.0 mV/m contour of the facility. The tabulation of the distances to the respective contours shown in this discussion is based on the use of the standard eight cardinal bearings, which were also used for the computation of the HAAT.

## DISCUSSION OF REPORT (continued)

The potential for human exposure to non-ionizing radiofrequency radiation at the proposed transmitter site has been evaluated. **Exhibit 3.0** provides the details of the study that was made to demonstrate compliance. The facility is properly marked with signs, and entry is restricted by means of fencing with locked doors and/or gates. Any other means as may be required to protect employees and the general public will be employed.

***In the event work would be required in proximity to the antenna such that the person or persons working in the area would be potentially exposed to fields in excess of the guidelines set forth in OET Bulletin No. 65 (Edition 97-01), the transmitter power will be reduced or the station will cease operation during the critical period.***

**DISTANCES TO CONTOURS:** The table below shows the distances to the 1.0 mV/m contour from the proposed facility using an ERP of 30 kW at an HAAT of 269 meters. These distances have been calculated based on the FCC F(50-50) curves.

N. Lat. = 460805.0    W. Lng. = 865656.0 HAAT and Distance to Contour, FCC, FM 2-10 Mi, 51 pts Method - NGDC 30 SEC					
Azi.	AV EL	HAAT	ERP kW	dBk	60-F5
000	273.7	250.3	30.0000	14.77	56.74
045	246.1	277.9	14.8263	11.71	52.21
090	239.6	284.4	1.9051	2.80	35.35
135	223.3	300.7	0.9505	-0.22	30.89
180	223.9	300.1	4.7760	6.79	43.55
225	259.3	264.7	30.0000	14.77	57.80
270	284.1	239.9	30.0000	14.77	55.97
315	286.0	238.0	30.0000	14.77	55.83
Ave El= 254.51 M    HAAT= 269.49 M    AMSL= 524.0					

# 1.0 - WUPJ - Present and Proposed Service Contours

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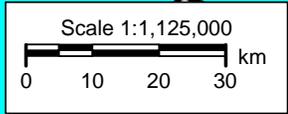
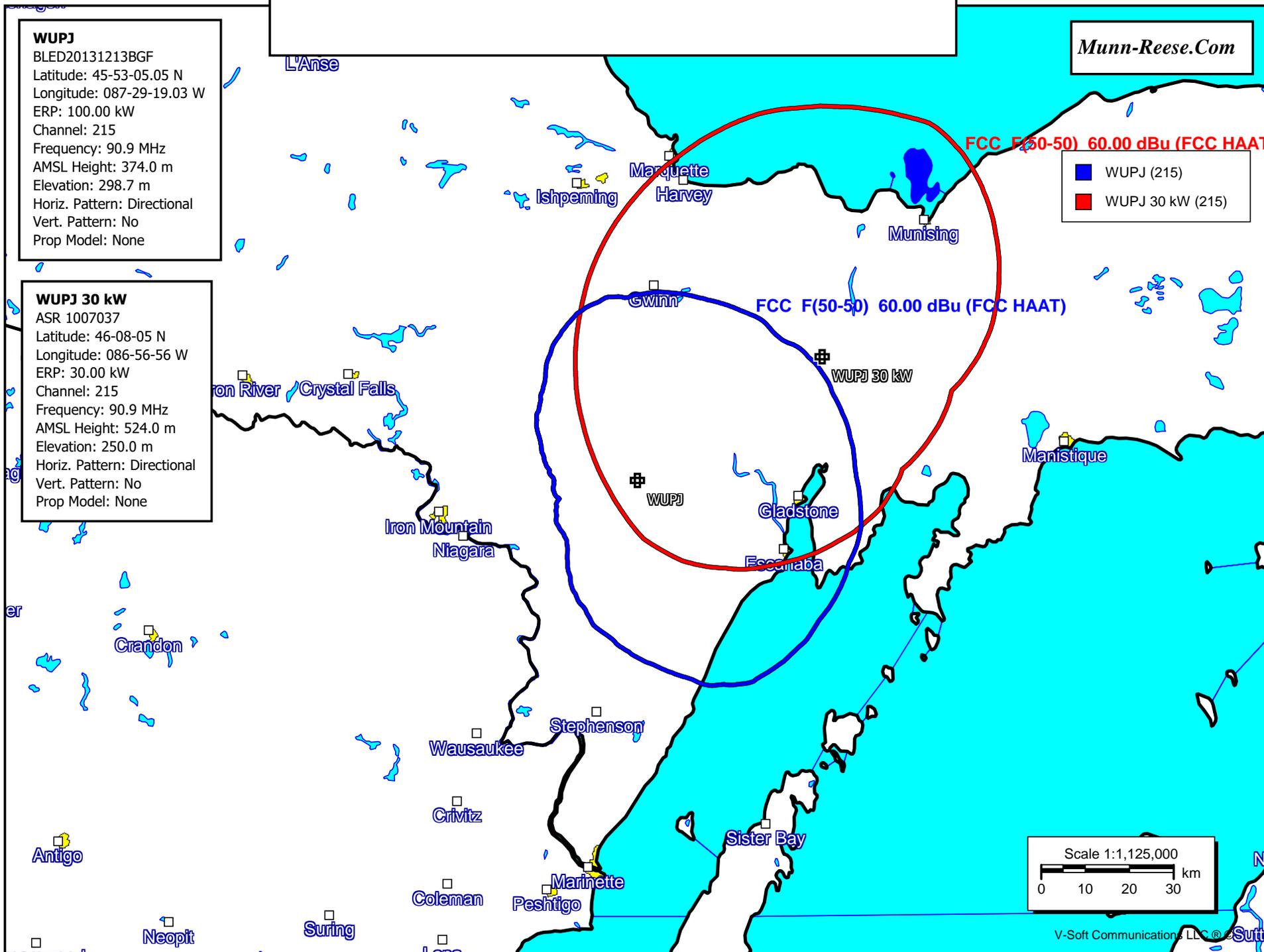
## WUPJ

BLED20131213BGF  
 Latitude: 45-53-05.05 N  
 Longitude: 087-29-19.03 W  
 ERP: 100.00 kW  
 Channel: 215  
 Frequency: 90.9 MHz  
 AMSL Height: 374.0 m  
 Elevation: 298.7 m  
 Horiz. Pattern: Directional  
 Vert. Pattern: No  
 Prop Model: None

## WUPJ 30 kW

ASR 1007037  
 Latitude: 46-08-05 N  
 Longitude: 086-56-56 W  
 ERP: 30.00 kW  
 Channel: 215  
 Frequency: 90.9 MHz  
 AMSL Height: 524.0 m  
 Elevation: 250.0 m  
 Horiz. Pattern: Directional  
 Vert. Pattern: No  
 Prop Model: None

- WUPJ (215)
- WUPJ 30 kW (215)



2.0 NCE Allocation

West Central Michigan Media Ministries

REFERENCE  
46 08 05.00 N.  
86 56 56.00 W.

CH# 215C1 - 90.9 MHz, Pwr= 30 kW DA, HAAT= 271.6 M, COR= 524 M  
Average Protected F(50-50)= 58.31 km  
Standard Directional

DISPLAY DATES  
DATA 09-30-21  
SEARCH 10-04-21

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*
215C1 Escanaba	WUPJ	LIC DCN MI	236.5 56.1	50.10 BLED20131213BGF	45 53 04.90 87 29 19.50	100.000 80	374	---Reference---		West Central Michigan Medi
218A Marquette	WUPX	LIC _CN MI	315.9 135.5	58.98 BLED20120418ACM	46 30 51.80 87 29 07.50	1.700 133	2.4 470	25.0	0.9	24.8 Board Of Trustees Of North
214C3 Goodman	WMVM	LIC _CN WI	250.9 69.9	119.93 BLED20160810AAW	45 46 22.80 88 24 38.40	9.300 83	53.0 519	34.7	10.2	1.4 wrvm, Inc.
216C1 Houghton	WGGL-FM	LIC _CN MI	307.5 126.3	166.89 BMLED20150330ADF	47 02 10.70 88 41 43.50	100.000 262	105.7 564	72.7	5.5	11.9 Minnesota Public Radio
215B Sault Ste Marie	AL4199	VAC ____ ON	77.1 259.0	205.80	46 31 00.08 84 20 00.15	50.000 150	143.6 389	65.0	18.4	12.2
215C2 Charlevoix	WTCK	LIC DCN MI	114.7 296.0	164.49 BLED20120511ABC	45 30 05.20 85 01 48.90	5.500 304	114.8 540	46.9	19.2	32.9 Relevant Radio, Inc.
215C0 Wausau	WHRM	LIC _CN WI	238.7 56.7	252.65 BLED20031023AAF	44 55 13.90 89 41 28.40	82.000 329	168.6 715	71.4	26.6	41.7 State Of Wisconsin - Educa
218A Iron Mountain	WVCM	LIC DVN MI	247.9 67.1	91.27 BLED20020327ABE	45 49 14.80 88 02 25.50	0.500 183	0.3 525	9.5	34.0	74.8 vcy America, Inc.
215A Schreiber	AL4693<	VAC ____ ON	355.7 175.5	297.11	48 47 59.55 87 15 00.28	6.000 100	86.7 100	38.0	243.0R	54.1M
268C1 Iron Mountain	WJNR-FM<	LIC _CN MI	248.0 67.2	91.72 BMLH20160713ABO	45 49 14.80 88 02 36.50	52.000 187	63.7 532	17.3	33.5R	58.2M Results Broadcasting Of Ir
213C1 Sturgeon Bay	WPF	LIC _CN WI	193.6 13.3	140.72 BMLED19980211KA	44 54 14.00 87 22 13.40	100.000 195	8.2 390	62.2	81.2	73.3 Educational Media Foundati
213C1 Sturgeon Bay	WPF	LIC _CN WI	193.6 13.3	140.89 0000160281	44 54 08.60 87 22 14.70	100.000 195	8.2 390	62.1	81.4	73.4 Educational Media Foundati
215A1 Schreiber	R18047<	ADD ____ ON	355.5 175.3	297.85	48 48 20.54 87 15 58.29	0.250 100	44.2 100	18.0	223.0R	74.9M
217C3 Peshtigo	WRMW	LIC _CN WI	193.7 13.4	140.46 BLED20100526ADD	44 54 23.00 87 22 15.40	5.400 170	3.3 366	34.3	85.7	99.9 Radio Maria, Inc.
214AA Wawa	CBON27<	LIC DHN ON	37.7 219.3	267.95	48 01 12.90 84 45 00.20	0.890 115	28.6 115	26.8	168.0R	100.0M

Terrain database is NED 03 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= - Zone 2, 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.  
< = Station meets FCC minimum distance spacing for its class.  
Reference station has protected zone issue: Canada

## Exhibit 3.0 Compliance with Radiofrequency Radiation Guidelines

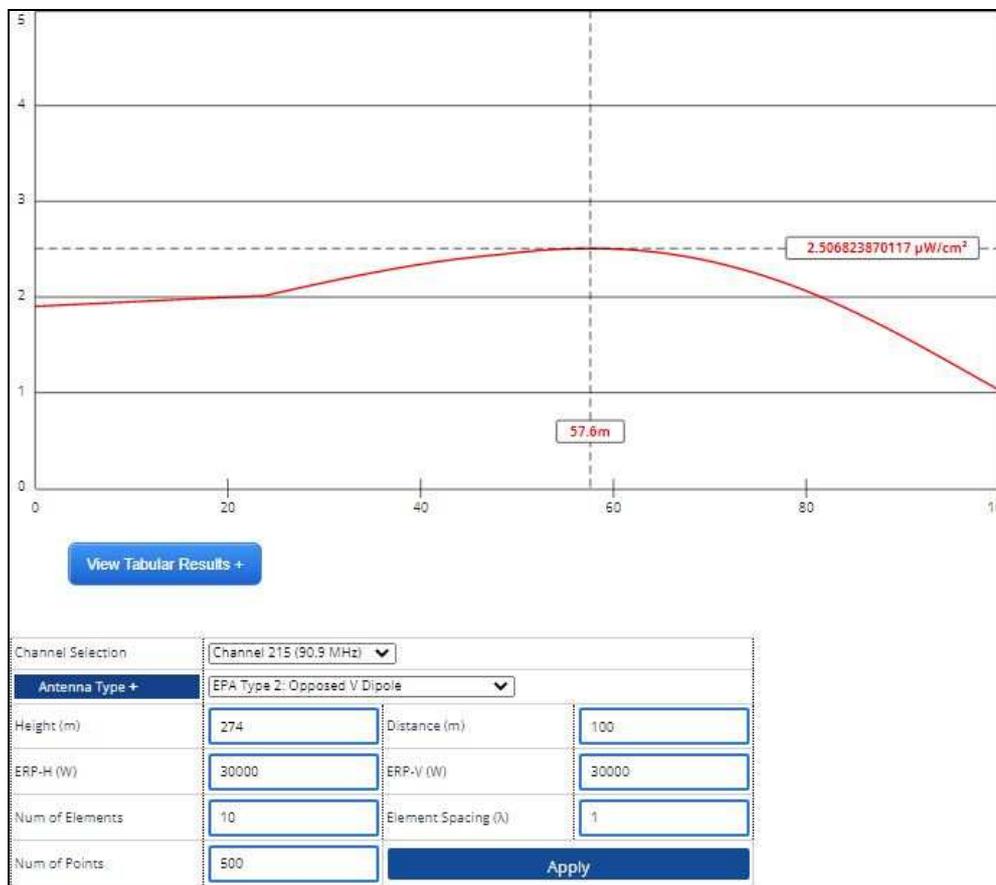
The RF Compliance Study has been evaluated for human exposure to non-ionizing radiofrequency radiation at the transmitter site. The site is intended to house multiple transmitters. The potential for human exposure to non-ionizing radiofrequency radiation at the proposed transmitter site has therefore been evaluated with regards to the §1.1307(b)(3), five percent (5%) contribution rule, for multiple transmitter sites.

The proposed operation will broadcast from an antenna COR mounted 274 meters above ground level (AGL). The facility will operate with a ten bay antenna employing EPA Type 2 elements as defined by *FM Model - Appendix B* issued March 31, 2016<sup>1</sup>. This facility will not operate with HD/IBOC facilities at this time.

To evaluate the total exposure to non-ionizing radio-frequency radiation with regards to the five percent contribution exclusion rule, it is necessary to establish 5.0% of the maximum permissible limit. 5.0% of the 200  $\mu\text{W}/\text{cm}^2$  results in 10  $\mu\text{W}/\text{cm}^2$ . Therefore if the resulting contribution is less than or equal to 10  $\mu\text{W}/\text{cm}^2$  or 5.0%, the exposure is concluded to be within the guidelines of OET Bulletin No. 65 (Edition 97-01) and §1.1307(b)(3). Protection of the more restrictive uncontrolled limit implies protection of the controlled limit.

Inspection of the graph below indicates the maximum contribution for the uncontrolled environment is less than the 10  $\mu\text{W}/\text{cm}^2$  (5.0%) limit as set forth by §1.1307(b)(3), therefore the facility is in compliance with FCC guidelines. §1.1307(b)(3) states that facilities contributing less than five percent of the exposure limit at locations with multiple transmitters are categorically excluded from responsibility for taking any corrective action in the areas where its contribution is less than five percent. Since this instant application meets the five percent exclusion test at all ground level areas, the impact of the proposed facility may be considered independently from other facilities operating at or nearby this site. It is believed the impact of the proposed operation should not be considered to be a factor at ground level as defined under §1.1307(b)(3).

In addition to the protection afforded by the proposed antenna height above ground, the facility is or will be properly marked with signs, and entry to the facility will be restricted by means of fencing with locked doors and/or gates if required. Any other means that may be required to protect employees and the general public will also be employed. In the event work is required in proximity to the antenna(s) such that the person or persons working in the area will be potentially exposed to fields in excess of the current guidelines, an agreement signed by all broadcast parties at the site will be in effect for the offending transmitter(s) to reduce power, or cease operation during the critical period.



<sup>1</sup> The current *FM Model* web-based software application employs the standards as detailed in OET Bulletin No. 65 (Edition 97-01). FM radiofrequency radiation levels have been predicted using both the array pattern, the calculations of which are based on the number of bays in the antenna and wavelength spacing between the bays, and the element pattern. The element pattern has been determined by using measured element data prepared by the EPA and published in "An Engineering Assessment of the Potential Impact of Federal Radiation Protection Guidance on the AM, FM and TV Services," by Paul C. Gailey and Richard Tell - April 1985, U.S. Environmental Protection Agency. The results of the evaluation for the FM station have been shown at the end of this RF compliance discussion. To ensure complete protection, the maximum FM contribution has been assumed without regard to any restricted access fencing distance.

