

ENGINEERING REPORT
PARTIAL PROOF OF PERFORMANCE
on
WUFL(AM) – Sterling Heights, MI

In Response to the Recent Construction and
Antenna Installation of FM Translator

W284BQ
Facility ID 143173
BPFT-20161205AAX

July, 2017

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Coldwater, MI 49036

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CERTIFICATION OF ENGINEERS

The firm of Munn-Reese, Broadcast Engineering Consultants, with offices at 385 Airport Drive, Coldwater, Michigan has been retained for the purpose of preparing the technical data forming this report.

The data utilized in this report is based on field measurements made by the undersigned, or others under the supervision of the undersigned, on the dates and times indicated in the report.

The report has been prepared by properly trained electronics specialists under the direction of the undersigned whose qualifications are a matter of record before the Federal Communications Commission.

I declare under penalty of perjury that the contents of this report are true and accurate to the best of my knowledge and belief.

July 26, 2017



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DISCUSSION

The firm of Munn-Reese was retained to prepare this report detailing a Daytime Directional Partial Proof of Performance on AM Radio Station WUFL(AM) - Sterling Heights, MI, (Facility ID No. 20629), License No. BL-20070726AMP. WUFL(AM) operates with 5.0 kW of daytime only directional power using a three tower inline directional array.

This Partial Proof was conducted on the daytime only WUFL(AM) directional pattern in response to special conditions / restrictions on FM Translator Construction Permit W284BQ BPFT-20161205AAX. The translator feedline crosses the base pier and insulator of tower number 1(W) of the day array via an Iso-coupler.

Partial proof measurements were made before and after the FM translator antenna was installed on the WUFL(AM) tower number 1 (W).

The results indicate the WUFL(AM) daytime only directional operation remains wholly within the daytime standard pattern as presently authorized.

Directional field strength measurements were conducted by Mr. Richard P. Grzebik, an engineer in the employ of

Munn-Reese, who is also very familiar with the WUFL(AM) daytime only directional array. The field measurement data was recorded using a Potomac Instruments Field Intensity Meter, Model #FIM-41, S/N 844 last calibrated on July 16, 2014. S/N 844 was compared against FIM-41 S/N 1149 last calibrated on May 4, 2016, before measurement were made on WUFL(AM). S/N 844 was found to be in tolerance with most recently calibrated S/N 1149.

Measurements were taken on the four daytime monitor point radials meeting the requirements of 47 C.F.R. §73.154(a) of the FCC Rules. Field strength data was taken on the dates and times indicated in the respective Tabulations of Field Strength Measurements, shown as Exhibits(s) 1.1 and 1.2 for the daytime operation.

The tabulation sheets show the distance from the transmitter site to each point in units of kilometers. The locations and point numbers were derived from the original 2007 WUFL(AM) Proof of Performance report. To maintain consistency in the June and July 2017 data to the 2007 Proof, measurement data compared to GPS hardware and computer mapping assisted in confirmation of point locations.

Exhibit 2.1 provides a summary of the field intensity measurement radial averages for the daytime array. As seen in the overall arithmetic average (1.0246 or 2.46%) and overall log ratio average (1.0244 or 2.44%) of the 4 daytime radials, both ratios are well within the allowable 10% threshold for "before and after" comparison purposes. In addition, the arithmetic and log ratio averages for each individual radial are well within the allowable 10% threshold for "before and after" comparison purposes as well

Exhibit 2.2 provides the licensed WUFL(AM) Daytime Array Operating Parameters. The array continues to operate at licensed parameters. Therefore, the filing of Form 302-AM is unnecessary in accordance with condition 3 of the translator construction permit.

In light of the measurements taken and uniform results obtained, the recent FM Translator construction for W284BQ - BPFT-20161205AAX is believed to have had a negligible effect on the WUFL(AM) daytime operation, and WUFL(AM) remains wholly within the respective authorized standard pattern. Therefore this construction remains valid under the provisions of §1.30003.

Exhibit 1.1

Tabulation of Daytime Field Strength Measurements – 19° T & 120° T

Call:	WUFL(AM)		Frequency (kHz):		1030 kHz		Power (kW):		5.0 kW	
			Bearing (°T):		19.0°T					
Point	Before			After			Distance	Direct		Log
#	mV/m	Time	Date	mV/m	Time	Date	km	Ratio	Remarks	Ratio
5	29.5	1715	6/13/17	29.6	1532	7/18/17	3.14	1.0034		0.0034
7	32	1719	6/13/17	33.0	1535	7/18/17	3.52	1.0313		0.0308
8	24.8	1721	6/13/17	25.5	1538	7/18/17	3.73	1.0282		0.0278
9	21.4	17.3	6/13/17	21.4	1540	7/18/17	3.89	1.0000		0.0000
19	18.8	1731	6/13/17	20.1	1545	7/18/17	4.69	1.0691	MP	0.0669
20	20.0	1733	6/13/17	21.1	1547	7/18/17	4.95	1.0550		0.0535
16	6.2	1807	6/13/17	6.40	1617	7/18/17	9.83	1.0323		0.0317
15	4.55	1812	6/13/17	4.65	1622	7/18/17	10.70	1.0220		0.0217
						Arithmetic Ratio:		1.0302		
						Log Ratio:		1.0299		

Call:	WUFL(AM)			Frequency (kHz):		1030 kHz		Power (kW):		5.0 kW	
			Bearing (°T):		120.0°T						
Point	Before			After			Distance	Direct		Log	
#	mV/m	Time	Date	mV/m	Time	Date	km	Ratio	Remarks	Ratio	
22	8.4	1351	6/13/17	8.4	1244	7/18/17	6.80	1.0000		0.0000	
20	7.0	1342	6/13/17	6.9	1256	7/18/17	7.71	0.9857		-0.0144	
19	9.0	1355	6/13/17	9.0	1302	7/18/17	6.14	1.0000		0.0000	
18	14.0	1401	6/13/17	14.6	1305	7/18/17	5.68	1.0429	MP	0.0420	
17	12.3	1407	6/13/17	12.7	1310	7/18/17	5.26	1.0325		0.0320	
13	22.5	1430	6/13/17	22.8	1328	7/18/17	3.44	1.0133		0.0132	
12	29.1	1435	6/13/17	29.0	1334	7/18/17	2.91	0.9966		-0.0034	
11	37.0	1441	6/13/17	37.5	1340	7/18/17	2.69	1.0135		0.0134	
						Arithmetic Ratio:		1.0106			
						Log Ratio:		1.0104			

Exhibit 1.2

Tabulation of Daytime Field Strength Measurements – 164.5° T & 334.5° T

Call:	WUFL(AM)		Frequency (kHz):		1030 kHz				Power (kW):		5.0 kW			
			Bearing (°T):		164.5°T									
Point	Before			After			Distance	Direct			Log			
#	mV/m	Time	Date	mV/m	Time	Date	km	Ratio	Remarks	Ratio				
10	31.7	1200	6/13/17	31.2	1139	7/18/17	2.80	0.9842		-0.0159				
11	24	1206	6/13/17	24.5	1142	7/18/17	3.00	1.0208		0.0206				
13	16.7	1216	6/13/17	15.7	1147	7/18/17	4.01	0.9401	MP	-0.0617				
15	20.2	1232	6/13/17	20.0	1157	7/18/17	5.12	0.9901		-0.0100				
16	15	1248	6/13/17	15.2	1205	7/18/17	6.01	1.0133		0.0132				
17	10.5	1252	6/13/17	10.6	1207	7/18/17	6.48	1.0095		0.0095				
18	6.3	1303	6/13/17	6.3	1215	7/18/17	7.50	1.0000		0.0000				
21	6.6	1323	6/13/17	6.5	1223	7/18/17	9.22	0.9848		-0.0153				
						Arithmetic Ratio:		0.9929						
						Log Ratio:		0.9926						

Call:	WUFL(AM)		Frequency (kHz):		1030 kHz		Power (kW):		5.0 kW		
			Bearing (°T):		334.5°T						
Point	Before			After			Distance	Direct		Log	
#	mV/m	Time	Date	mV/m	Time	Date	km	Ratio	Remarks	Ratio	
13	23.5	1831	6/13/17	24.2	1636	7/18/17	4.74	1.0298	MP	0.0294	
14	20.3	1845	6/13/17	21.7	1640	7/18/17	5.30	1.0690		0.0667	
15	17.3	1850	6/13/17	18.5	1645	7/18/17	6.31	1.0694		0.0671	
16	10.6	1859	6/13/17	11.3	1649	7/18/17	7.19	1.0660		0.0639	
18	7.6	1916	6/13/17	8.2	1713	7/18/17	9.39	1.0789		0.0760	
19	7.3	1921	6/13/17	7.8	1716	7/18/17	10.20	1.0685		0.0662	
20	7.8	1926	6/13/17	8.2	1721	7/18/17	11.30	1.0513		0.0500	
22	4.7	1935	6/13/17	5.1	1831	7/18/17	13.60	1.0851		0.0817	
						Arithmetic Ratio:		1.0647			
						Log Ratio:		1.0646			

Exhibit 2.1

Tabulation of Daytime Radial Ratio Averages

Radial	2017 Arithmetic Ratio	2017 Log Ratio	2007 Licensed Standard Pattern	2007 Full Proof IDF	2017 IDF
19.0°T	1.0302	1.0299	156.4	135.41	139.46
120.0°T	1.0106	1.0104	156.4	123.75	125.04
164.5°T	0.9929	0.9926	156.4	122.54	121.63
334.5°T	1.0647	1.0646	156.4	121.37	129.21
Average:	1.0246	1.0244			

Exhibit 2.2

Daytime Array Operating Parameters

WUFL(AM) Day Antenna Monitor		
Tower	Field Ratio	Phase
1 (W)	0.492	-160.2
2 (C)	1.000	0.0
3 (E)	0.780	155.1

Daytime Monitor Point Measurement & Licensed Limit Data

WUFL(AM) Monitor Points			
	Before	After	Licensed
Azimuth	06/13/17	07/18/17	Limit
° True	(mV/m)	(mV/m)	(mV/m)
19°	18.8	20.1	25.4
120°	14.0	14.6	22.5
164.5°	16.7	15.7	24.6
334.5°	23.5	24.2	30.9

2007 Licensed Daytime Power

DA Power Calculator		
		100%
<u>Power</u>	Nominal	5000
<u>Antenna Input Power</u>		5720
<u>Resistance</u>	Ohms	50 j<0
<u>Current</u>	Amps	10.70