

ENGINEERING REPORT

Spurious Emissions Measurement Study Pursuant to 47 C.F.R. §73.317(b)

Associated with the licensing of

WGLI-CP (Fac ID: 81328)

Hancock, MI

BPH-20160527ABD

&

WCUP-CP (Fac ID: 36092)

L'anse, MI

BPH-20160527ABE

November, 2016

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MUNN-REESE, INC.

Broadcast Engineering Consultants
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RF Signal Spurious Emissions Study for the Combined Master Antenna of WGLI-CP, Hancock, MI, & WCUP-CP, L' ANSE, MI.

This firm has been retained to prepare the required engineering report in support of this Spurious Emissions Measurement Study for the di-plexed operation of FM stations WGLI-CP – Hancock, MI and WCUP-CP – L'anse, MI, onto tower Antenna Structure Registration Tower Number 1298757. This study has been conducted pursuant to 47 C.F.R. §73.317(b) and is associated with, and a condition of licensing for WGLI-CP Construction Permit BPH-20160527ABD and by default, WCUP-CP Construction Permit BPH-20160527ABE.

WGLI-CP operates on 98.7 MHz with a maximum effective radiated power (ERP) of 100 kW, circular (H&V) polarization. WCUP-CP operates on 105.7 MHz with a maximum effective radiated power (ERP) of 100 kW circular (H&V) polarization. As stated before, the common antenna is mounted on tower bearing ASR #1098757. The common FM antenna is a 12 bay Dielectric DCR-MBR-12, broadband antenna mounted with a Center of Radiation 133 meters above ground level (AGL). The antenna is powered via coaxial feedline from a Dielectric 3 station combiner, Model DFC24003BR3. The third port on the combiner is unused and its input is terminated with a 50 ohm load. The combiner was set using manufacturer specifications for stations involved.

RF signal purity measurements were conducted on October 26, 2016 during the equipment test operations associated with WGLI-CP Construction Permit BPH-20160527ABD and WCUP-CP Construction Permit BPH-20160527ABE. Measurements were conducted by Mr. Edmond R. Trombley, an engineer in the regular employment of Munn-Reese. Mr. Trombley conducted his measurements utilizing an Anritsu 2721B spectrum analyzer, serial number 1002033 with the FM transmitters in full operation. A broad spectral sweep found no obvious products above the analyzer noise floor. Using a computer generated mixing product chart, high resolution, low noise floor measurements were also made out to the 1st, 2nd and

3rd order. With the exception of noted carrier frequencies, nothing was observed over the noise floor of the analyzer as reported in the *Exhibit A*.

Exhibit A is a copy of the 1st, 2nd and 3rd order potential mixing product measurements resulting from the harmonic relationships between the 98.7 MHz and 105.7 MHz in the di-plexed operation. As a result of these studies, it has been concluded the di-plexed operation of WGLI-CP and WCUP-CP, meets or exceeds the requirements of 47 C.F.R. §73.317(b) and the special condition of licensing associated with WGLI-CP Construction Permit BPH-20160527ABD and WCUP-CP Construction Permit BPH-20160527ABE.

CERTIFICATION OF ENGINEER

The data utilized in this report was taken from the FCC Secondary Database and data on file. While this information is believed accurate, errors or omissions in the database and file data are possible. This firm may not be held liable for damages as a result of such data errors or omissions.

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 the laws of perjury that the contents of this report are true and accurate to the best of my knowledge and belief.

November 18, 2016



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**Exhibit A - Tabulation of Potential Mixing Products
WGLI-CP (98.7 MHz) & WCUP-CP (105.7 MHz)
Minimum Required signal below carrier (dBc) is -80.0**

Frequency (MHz)	Measured Level (dBc)	Frequency (MHz)	Measured Level (dBc)
7.0 MHz	N/A	394.8MHz	-122.3 dBc
7.0 MHz	N/A	408.8 MHz	-116.4 dBc
91.7 MHz	-98.7 dBc	422.8 MHz	-123.0 dBc
98.7 MHz	WGLI Carrier		
105.7 MHz	WCUP Carrier		
112.7 MHz	-109.5 dBc		
197.4 MHz	-99.3 dBc		
204.4 MHz	-108.7 dBc		
211.4MHz	106.3 dBc		
296.1 MHz	-119.4 dBc		
303.1 MHz	-114.5 dBc		
310.1 MHz	-118.8 dBc		
317.1 MHz	-121.2 dBc		

**Title 47: Telecommunication
PART 73—RADIO BROADCAST SERVICES
Subpart B—FM Broadcast Stations
§ 73.317 FM transmission system requirements.**

(a) FM broadcast stations employing transmitters authorized after January 1, 1960, must maintain the bandwidth occupied by their emissions in accordance with the specification detailed below. FM broadcast stations employing transmitters installed or type accepted before January 1, 1960, must achieve the highest degree of compliance with these specifications practicable with their existing equipment. In either case, should harmful interference to other authorized stations occur, the licensee shall correct the problem promptly or cease operation.

(b) Any emission appearing on a frequency removed from the carrier by between 120 kHz and 240 kHz inclusive must be attenuated at least 25 dB below the level of the unmodulated carrier. Compliance with this requirement will be deemed to show the occupied bandwidth to be 240 kHz or less.

(c) Any emission appearing on a frequency removed from the carrier by more than 240 kHz and up to and including 600 kHz must be attenuated at least 35 dB below the level of the unmodulated carrier.

(d) Any emission appearing on a frequency removed from the carrier by more than 600 kHz must be attenuated at least $43 + 10 \log_{10}(\text{Power, in watts})$ dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation.