

Technical Engineering Report

SPURIOUS EMISSIONS MEASUREMENTS STUDY

Pursuant to 47 C.F.R. §73.317(b) associated with the licensing of:

*WRSI(FM).C - Turners Falls, MA
LMS-0000116551
(FAC ID: 8775)*

&

*WHAI(FM).C - Greenfield, MA
LMS-0000116550
(FAC ID: 25833)*

November 2021

EXPLANATION OF STUDY: The applicant has prepared the required Spurious Emissions Measurement Study for the diplexed operation of FM Station(s) WRSI(FM).C - Turners Falls, MA (FAC ID: 8775) and WHAI(FM).C - Greenfield, MA (FAC ID: 25833). This study has been conducted pursuant to 47 C.F.R. §73.317(b) and is associated with, and a condition of licensing for, WRSI(FM).C Construction Permit File Number LMS-0000116551 and WHAI(FM).C Construction Permit File Number LMS-0000116550.

SUMMARY OF STATIONS: WRSI(FM).C operates on 93.9 MHz with a maximum effective radiated power (ERP) of 4.9 kW circular (H&V) polarization. WHAI(FM).C operates on 98.3 MHz with a maximum effective radiated power (ERP) of 2.4 kW circular (H&V) polarization. The common antenna is mounted on a 59 meter AGL tower which does not require Antenna Structure Registration. The common FM antenna is a three (3) bay, ERI Model LPX-3E-SP antenna mounted with a Center of Radiation 31.0 meters above ground level (AGL). The antenna is matched with an ERI model 935 & 938 Series Tee Combiner. The combiner was set using manufacturer specifications as well as information from the FCC database concerning the above-mentioned operating parameters.

MEASUREMENT RESULTS: RF Spurious Emissions Measurements were conducted on October 29, 2021 during the equipment test operations associated with the aforementioned Construction Permits. Measurements were conducted by Joshua C Smith, chief engineer for Saga Communications of New England, LLC (Greenfield). Measurements were conducted utilizing an LPT-X3000 Spectrum Analyzer, Serial Number X3LPT0100, with the FM transmitters in full operation employing the combiner for the multiple FM Translator operations. 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 through 3rd orders. With the exception of noted carrier frequencies, nothing was observed over the noise floor of the analyzer as reported at the end of this report.

The following is a copy of the 1st through 3rd order potential mixing product measurement results for the spurious relationships associated with the 93.9 MHz and 98.3 MHz common operations. As a result of these studies, it has been concluded the combined operation(s) meets or exceeds the requirements of 47 C.F.R. §73.317(b) and the special condition of licensing associated for WRSI(FM).C Construction Permit File Number LMS-0000116551 and WHAI(FM).C Construction Permit File Number LMS-0000116550.

For a WRSI(FM).C operational power of 4.9 kW, the minimum attenuation level is -80 dBc.

For a WHAI(FM).C operational power of 2.4 kW, the minimum attenuation level is -77 dBc.

Frequency (in MHz)	Measurement (in dBc)						
4.40 MHz	-92 dBc						
8.80 MHz	-97 dBc						
89.50 MHz	-94 dBc						
93.90 MHz	WRSI(FM).C Carrier*						
98.30 MHz	WHA1(FM).C Carrier*						
102.70 MHz	-95 dBc						
187.80 MHz	-92 dBc						
192.20 MHz	-90 dBc						
196.60 MHz	-96 dBc						
281.70 MHz	-96 dBc						
286.10 MHz	-97 dBc						
290.50 MHz	-98 dBc						
294.90 MHz	-97 dBc						
375.60 MHz	-98 dBc						
384.40 MHz	-97 dBc						
393.20 MHz	-99 dBc						

*No intermodulation mixing was noted on any carrier frequency

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 Log₁₀(Power, in watts) dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation.
- (e) Preemphasis shall not be greater than the impedance-frequency characteristics of a series inductance resistance network having a time constant of 75 microseconds. (See upper curve of Figure 2 of §73.333.) [51 FR 17028, May 8, 1986]

Title 47: Telecommunication: PART 74—EXPERIMENTAL RADIO, AUXILIARY, SPECIAL BROADCAST AND OTHER SERVICES

Subpart L—FM Broadcast Translator Stations and FM Broadcast Booster Stations: § 74.1236 Emission and bandwidth.

(a) The license of a station authorized under this subpart allows the transmission of either F3 or other types of frequency modulation (see §2.201 of this chapter) upon a showing of need, as long as the emission complies with the following:

- (1) For transmitter output powers no greater than 10 watts, paragraphs (b), (c), and (d) of this section apply.
 - (2) For transmitter output powers greater than 10 watts, §73.317 (a), (b), (c), and (d) apply.
 - (b) Standard width FM channels will be assigned and the transmitting apparatus shall be operated so as to limit spurious emissions to the lowest practicable value. Any emissions including intermodulation products and radiofrequency harmonics which are not essential for the transmission of the desired aural information shall be considered to be spurious emissions.
 - (c) The power of emissions appearing outside the assigned channel shall be attenuated below the total power of the emission as follows:
 - (d) Greater attenuation than that specified in paragraph (c) of this section may be required if interference results outside the assigned channel.
- [35 FR 15388, Oct. 2, 1970, as amended at 52 FR 31406, Aug. 20, 1987; 55 FR 50698, Dec. 10, 1990]

§ 74.1236 (c) Attenuations:	
Distance of emission from center Frequency	Minimum attenuation below unmodulated carrier
120 to 240 kHz	25 dB
Over 240 and up to 600 kHz	35 dB
Over 600 kHz	60 dB

CERTIFICATION OF TECHNICAL CONSULTANT: *I declare, under penalty of perjury, that the contents of this report are true and accurate to the best of my knowledge and belief. I further certify I have over twenty-two years of experience as a broadcast technical consultant before the Federal Communications Commission ("the FCC"); and am familiar with the Code of Federal Regulations Title 47 ("the Rules") as pertaining to this report and its contents herein. The underlying data utilized in this report was taken directly from FCC databases or indirectly through third party software vendors securing data directly from FCC databases. The information contained herein is believed accurate to the date reported below.*



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November 1, 2021