

TECHNICAL EXHIBIT  
MODIFICATION OF APPLICATION  
NEW LPFM STATION  
MOCA, PUERTO RICO  
CHANNEL 229  
FACILITY ID 193601

FEBRUARY 21, 2015

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Technical Narrative

The technical exhibit, of which this narrative is part, has been prepared on behalf of Behind The Sound Corp. (BSC), applicant of a LPFM station, Facility ID 193601, FCC File Num. BNPL-201311104ABI, in Moca, PR. BSC's application is part of a group of four applicants in Group 308 (Page 5 of Appendix A, FCC 14-211 Public Notice of December 23, 2014). Pursuant to the provisions of the above referenced Public Notice, BSC hereby submits an application for a major amendment to move to a clear channel.

Proposed Transmitter Location

The proposed transmitting facility would operate on channel 229 using an ERI, 1-bay, circularly polarized antenna, side-mounted on an existing tower. The proposed station location is described by the following NAD27 geographic coordinates:

18° 24' 23.4" North

67° 09' 07.3" West

It is proposed to side mount the antenna at a height of 47.3 meters above ground on existing tower ASR 1211402, with a base elevation of 52.7 meters AMSL. Thus the antenna will be mounted at a height of 100 meters AMSL. According to the FCC HAAT web utility, this corresponds to a HAAT of 30 meters. Thus the maximum permissible ERP of 100 Watts, allowed under these conditions, is proposed for this LPFM facility. Appendix 1 shows the HAAT calculations performed using the FCC HAAT web utility.

### Tower Registration

The FAA is not being notified of the proposed construction, as it is proposed to side-mount the FM antenna on an existing registered 79.2 m tower, ASR 1211402.

### Environmental Considerations

The proposal is excluded from environmental processing, as an existing supporting structure is to be employed and the proposal complies with the FCC Rules concerning human exposure to radio frequency (RF) energy.<sup>\*</sup> The proposal would not exceed 1.0 % of the RF exposure limit for general population/uncontrolled environments for the frequency proposed. The calculation of RF energy at 2-m above ground was made under the procedures of OET Bulletin No. 65.<sup>†</sup> The formula employed is as follows:

$$S = \frac{(33.4)F^2P}{R^2}$$

where,  $S$  = power density in  $\mu\text{W}/\text{cm}^2$ ,  $F$  = relative field factor at the angle to the calculation point,  $P$  = the total effective radiated power relative to a dipole in watts, and  $R$  = distance from the antenna radiation center to the calculation point in meters.

Based on the vertical radiation pattern of the proposed antenna, (Figure 3A), a relative field factor of 0.78 or less for any depression angle equal or greater than 30 degrees below horizon, a total effective radiated power of 100 watts (circular polarization) and an antenna radiation center height above ground of 47.3 m, the calculated power density will not exceed  $2.0 \mu\text{W}/\text{cm}^2$ . Therefore, the calculated RF exposure at 2 m above ground will not exceed 1.0 % of the limit of  $200 \mu\text{W}/\text{cm}^2$  for the general population and uncontrolled environments.

The antenna system shall be restricted from access and appropriate warning signs posted. In the event that personnel are required to climb the structure, the proposed FM translator transmissions shall be reduced or terminated as necessary to prevent RF exposure above the FCC recommended limits.

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<sup>\*</sup> Given that the proposed ERP will not exceed 100 watts, the proposal is categorically excluded from environmental processing pursuant to Section 1.1307 of the FCC Rules.

<sup>†</sup> Federal Communications Commission OET Bulletin No. 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields (Edition 97-01, August 1997).

### FCC Monitoring Stations

FCC rules pertaining to FCC monitoring stations, Section 73.1030(c), requires that the proposed facility does not produce a field strength greater than 10 mV/m at the FCC stations. The closest FCC monitoring station to the proposed operation is at Santa Isabel, PR. at a distance greater than 90 kilometers. The proposed operation will produce field strengths much lower than 10 mV/m at the FCC Santa Isabel, PR station.

### Quiet Zone Notification

As required by FCC rules pertaining to radio Quiet Zones, Section 73.1030(a), the National Astronomy and Ionosphere Center (NAIC) in Arecibo, Puerto Rico is being notified of this application. As the proposed facility is further away from the NAIC facility, no adverse effect is predicted to the Observatory. A copy of the notification letter to the Arecibo Observatory of the proposed facility is included herein as Appendix 2.

### AM Stations Within 3.2 km

There are no non-directional AM stations located within 0.80 km of the above specified coordinates, nor any directional AM stations within 3.2 km of these coordinates, except for WI3XSO, a temporary, experimental AM booster. As no new tower construction or modification of the existing tower is proposed, no adverse effect is predicted to this AM booster station. Thus, the proposal is believed to be compliant with Section 47 CFR 73.1692.

### Allocation Considerations

Figure 1 summarizes the allocation study for the proposed facility. As indicated in Figure 1, spacing with respect to co-channel and first adjacent channels is within FCC requirements. IF related facilities, though it is believed not required for LPFM stations, are met. There is short spacing predicted to second adjacent full service channel WNOD (FM).

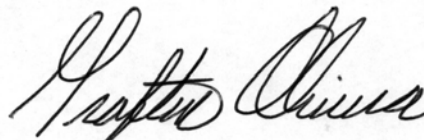
Figure 2 summarizes the list of licensed and applied for FM translators within 24 kilometers of the proposed LPFM transmitter site. An inspection of the licenses and applications of these translator facilities show that none of these translators will get their input signal on the third adjacent channel, or closer, of the proposed LPFM facility.

The proposed LPFM station will operate on Channel 229, second adjacent channel to WNOD (FM), Channel 231B. Thus, the protection requirement of the undesired signal from the proposal is 40 dB higher than the desired signal of this station. The proposed transmitter site is located 33.1 kilometers, at a bearing of 328 degrees true from station WNOD (FM), which operates on channel 231 with an ERP of 25 kW and an HAAT of 595 meters along radial 328°. The predicted WNOD (FM) F(50,50) field strength at the proposed site is 79.5 dBu. Using the U/D ratio of 40 dB, the proposed F(50,10) interfering signal is 119.5 dBu. The 119.5 dBu contour thus defines the maximum extent of predicted interference to WNOD (FM) from the proposed LPFM facility.

Since an ERP of 100 watts is proposed, the 119.5 dBu signal contour is calculated by means of a free-space calculation. Based on free-space calculations, the minimum height above ground level that the 119.5 dBu contour would reach is 69 m (226 feet) at a horizontal distance of 44.5 m (146 feet) from the transmitting antenna. This is graphically depicted in Figure 3B. Therefore, no harmful interference is predicted to WOMX-FM as a result of the proposed LPFM facility. Figure 3A is a table and Figure 3B a graphic representation showing the computed distances to the predicted 119.5 dBu contour under these assumptions.

If waiver of FCC Rules, 47 C.F.R. Section 73.807 is required, waiver of this section of The Rules is respectfully requested.

For the reasons stated above, it is believed that the proposed facility is in compliance with applicable FCC Rules and Regulations.



Grafton Olivera, P.E.

du Treil, Lundin & Rackley, Inc.  
201 Fletcher Avenue  
Sarasota, Florida 34237-6019

(941) 329-6001

February 21, 2015

# LPFM Study

du Treil, Lundin, &amp; Rackley, Inc., Sarasota, Florida



**Channel:** 229    **Coordinates:** 018-24-23.4 067-09-07.3 (NAD 27)    **Buffer:** 40 km    **Type:** LP100

**Comment:**

<i><b>Callsign</b></i>	<i><b>Status</b></i>	<i><b>Channel</b></i>	<i><b>Service</b></i>	<i><b>Freq.</b></i>	<i><b>City</b></i>			<i><b>State</b></i>	<i><b>Co.</b></i>	<i><b>Rec.</b></i>	<i><b>Latitude</b></i>	<i><b>Dist. (km)</b></i>	<i><b>Sep. (km)</b></i>	<i><b>Spac. (km)</b></i>	
<i><b>Facility ID</b></i>	<i><b>ARN</b></i>			<i><b>Class</b></i>	<i><b>DA</b></i>	<i><b>Ant. ID</b></i>	<i><b>ERP (kW)</b></i>	<i><b>HAAT (m)</b></i>			<i><b>Longitude</b></i>	<i><b>Bear. (deg)</b></i>	<i><b>Comment</b></i>		
<b>WZMT</b>	LIC	227	FM	93.3	PONCE				PR	US	C	17-59-26	72.01	53	19.01
53076	BLH	4398		B1			14.5		-69			066-37-43	129.83	<b>CLEAR</b>	
<b>WZNT</b>	LIC	229	FM	93.7	SAN JUAN				PR	US	C	18-16-44	138	138	0
74552	BLH	20020430AAH		B	N		28		560			065-51-12	95.71	<b>CLOSE</b>	
<b>WNOD</b>	LIC	231	FM	94.1	MAYAGUEZ				PR	US	C	18-09-05	33.09	92	-58.91
53554	BMLH	19990720KA		B		28662	25		597			066-59-20	148.71	<b>SHORT</b>	
<b>W283BI</b>	LIC	283	FX	104.5	MAYAGUEZ				PR	US	C	18-19-06	10.2	4	6.2
140950	BLFT	20101101AAD		D	C	102459	0.25					067-10-49	196.92	<b>CLOSE</b>	

Figure 2

# FM Inquiry

du Treil, Lundin, & Rackley, Inc., Sarasota, Florida



Listed stations are within 24 km of the point at 018-24-23.4 067-09-07.3.

<i>Callsign</i>	<i>Chan.</i>	<i>Freq.</i>	<i>Class</i>	<i>Service</i>	<i>Status</i>	<i>City</i>		<i>State</i>	<i>Latitude</i>	<i>Longitude</i>	<i>Distance (km)</i>
<i>ARN</i>			<i>DA</i>	<i>Antenna ID</i>	<i>Rotation</i>	<i>ERP (kW)</i>	<i>HAAT (m)</i>	<i>RCAMSL (m)</i>	<i>Rec. Type</i>	<i>Facility ID</i>	<i>Bearing (deg)</i>
<b>W283BI</b>	283	104.5	D	FX	LIC	MAYAGUEZ		PR	018-19-06	067-10-49	10.2
BLFT-20101101AAD			C	102459		0.25		406	C	140950	196.92
<b>W208AE</b>	208	89.5	D	FX	LIC	MAYAGUEZ		PR	018-19-06	067-10-49	10.2
BLFT-20140827ABX			N	118924		0.25		396	C	42888	196.92
<b>W208AE</b>	208	89.5		FX	APP	MAYAGUEZ		PR	018-19-06	067-10-49	10.2
BSTA-20150205ADC			N	120755		0.01		396	C	42888	196.92
<b>W295BU</b>	295	106.9	D	FX	LIC	MAYAGUEZ		PR	018-19-05.6	067-10-50	10.23
BLFT-20141016ACT			C	119649		0.25		385	C	143476	197.06

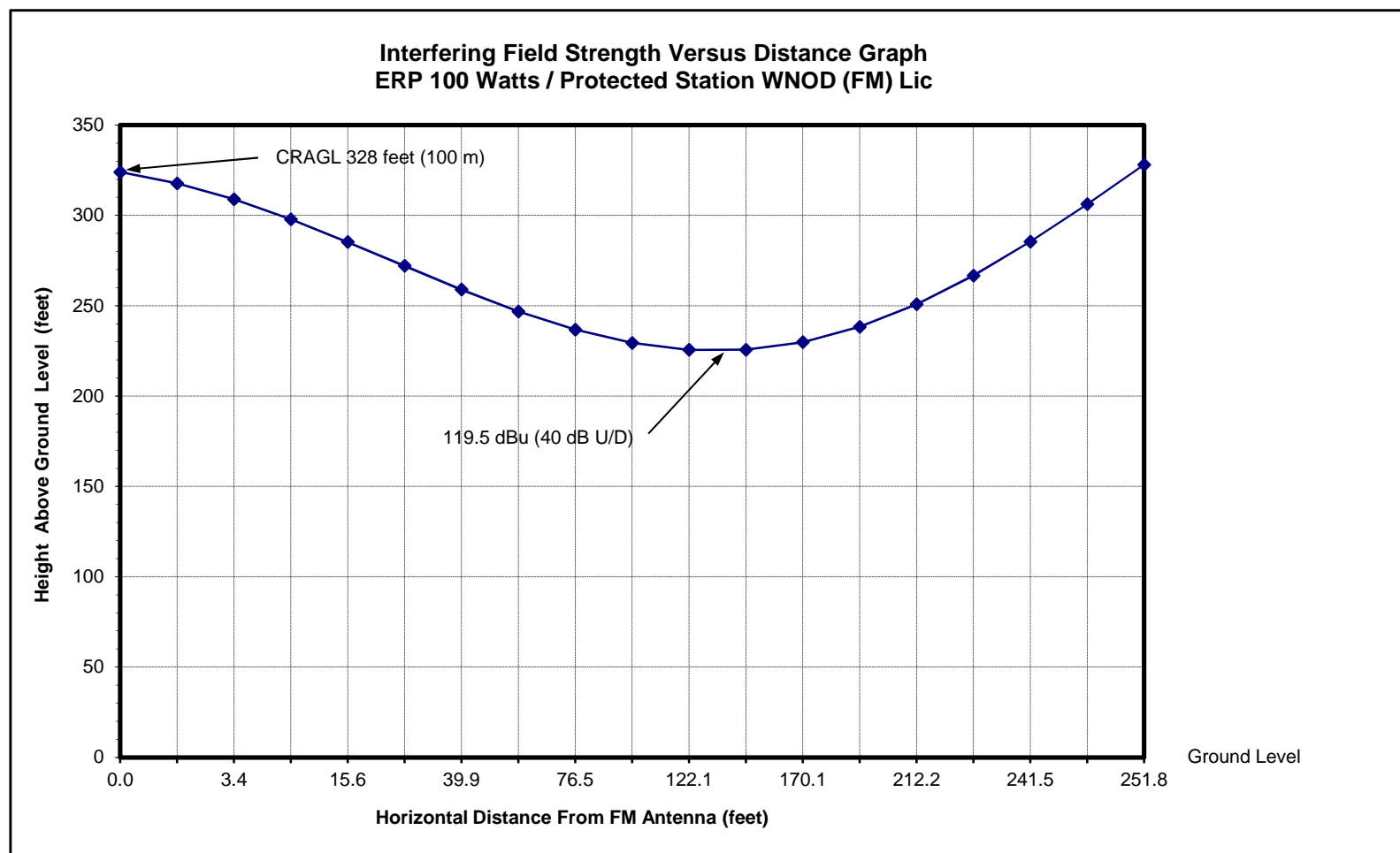


### Interfering Field Strength Vs. Distance Graph

ERP      **0.1** kW  
             -10 dBk

**\*\*Free Space Field Equation=**     Dist. (km)=LOG-1((107.2+P(DBK)-FS)/20)

FIGURE 3B



## APPENDIX 1

## Antenna Height Above Average Terrain Calculations -- Results

## Input Data

Latitude **18° 24' 16.2"** NorthLongitude **67° 9' 6"** West (NAD 83)Height of antenna radiation center above mean sea level: **100** meters AMSLNumber of Evenly Spaced Radials = **12** 0° is referenced to True North

## Results

Calculated HAAT = **30 meters**Antenna Height Above Average Terrain calculated  
using 1 km [GLOBE terrain data](#)

## Individual "Radial HAAT" Values, in meters

0°	67.6 m	120°	43.1 m	240°	81.3 m
30°	22.6 m	150°	-26.6 m	270°	100.0 m
60°	-52.0 m	180°	34.4 m	300°	100.0 m
90°	-130.8 m	210°	26.1 m	330°	100.0 m



201 Fletcher Ave.  
Sarasota, FL 34237-6019  
941-329-6000  
941-329-6031 FAX

**Grafton Olivera**  
Direct Dial 941-329-6001  
e-mail: grafton@dlr.com

February 21, 2015

Via email (prcz@naic.edu)

Angel M. Vázquez, Spectrum Manager  
National Astronomy and Ionosphere Center  
Arecibo Observatory  
HC3 Box 53995  
Arecibo, PR 00612

Gentlemen:

On behalf of our client, Behind The Sound Corp., applicant for a New LPFM station, in accordance with Section 73.1030 of the FCC Rules, we are hereby notifying you of a proposed amendment for this new facility application. The particulars of the amended proposal are as follows:

Proposed Facility:

Geographical coordinates of antenna location (NAD83): 18-24-16.2 / 67-09-06.0  
Antenna height: 47.3 m AGL; 100 m AMSL  
Antenna Gain: 0 dB  
Antenna Orientation: ND  
Operating channel: 229 (93.7 MHz)  
Type of emission: F3E  
Effective isotropic radiated power: 0.328 kW – Circular Polarization

Please review this proposal and let us know your findings. Please feel free to communicate via email (<mailto:Grafton@dlr.com>), telefax (941-329-6030) or regular mail.

Very truly yours,

A handwritten signature in black ink, appearing to read "Grafton Olivera".

Grafton Olivera, P.E.