

TECHNICAL EXHIBIT
CONSTRUCTION PERMIT APPLICATION
FOR AUXILIARY ANTENNA
ARSO RADIO CORPORATION
RADIO STATION WIVA-FM
AGUADILLA, PUERTO RICO
FACILITY ID 2876

CH 262B 11.5 KW 633 M

Technical Narrative

The technical exhibit of which this narrative is part has been prepared on behalf of ARSO Radio Corporation, licensee of FM broadcast station WIVA-FM in Aguadilla, Puerto Rico. This application is being filed to request a construction permit for an auxiliary antenna for WIVA-FM. It is proposed to use the same site specified in the existing CP of WIVA-FM main facility, FCC File Number BMPH-20161031AAB. Specifications for the proposed operation are included herein as Figure 1.

It is proposed to mount the antenna on an existing, registered supporting structure with 89.6 meters of overall height AGL. Thus, the proposed WIVA-FM auxiliary facility will not have a significant environmental impact, as defined by 47 CFR 1.1307. It is believed that the proposal conforms to the applicable rules and regulations of the Federal Communications Commission.

Transmitter Location

The proposed transmitting facility will use a 4-bay circularly polarized, half-wavelength, ERI Model SHPX-4AC-HW antenna, to be side-mounted at a height of 67 m AGL on the existing authorized self-supporting tower, ASRN 1011580. It is proposed to use an ERP of 11.5 kW, which will contain the 60 dBu contour of the WIVA-FM Auxiliary antenna within the predicted 60 dBu contour of the Main facility. The following NAD27 geographic coordinates describe the existing (CP authorized) and proposed WIVA-FM Auxiliary site location:

18° 09' 03" North Latitude
66° 59' 21" West Longitude

Environmental Considerations

The Auxiliary Antenna of WIVA-FM will be side-mounted on an existing tower. The antenna will be located 67 meters above ground level with a height above mean sea level of 927 meters. A maximum radiated power (ERP) of 11.5 kW circularly polarized transmitting antenna is proposed.

With respect to the potential for human exposure to radio frequency (RF) energy, calculations prepared in accordance with FCC Bulletin OET-65.* Indicate that the proposal will not result in human exposure to RF energy at ground level in excess of FCC standards. The calculation at 2-m above ground was made using the following formula from the OET-65 document:

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

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 a “worst-case” vertical relative field value of 0.2 for any depression angle greater than 10 degrees below the horizon (see Appendix 2, vertical plane radiation pattern), a total ERP of 50 kW (H+V) and an antenna center of radiation height above ground level of 67 meters, the calculated power density at two meters above ground level at the base of the tower is 7.3 microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$), or 3.6% of the Commission’s recommended limit applicable to uncontrolled exposure areas ($200 \mu\text{W}/\text{cm}^2$ for the FM band). Therefore, the proposal complies with the FCC limits for human exposure to RF energy.

The applicant, in coordination with other users of the transmission facility, shall reduce power or cease operation as necessary to prevent RF exposure above the FCC recommended limits.

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 the proposed modification. Copy of the notification letter to the Arecibo Observatory is included in Appendix 1. As the proposed facility will radiate significant less

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

power towards the Arecibo Observatory than the authorized main facility CP (FCC File Number BMPH-20161031AAB), using the same site and antenna height, and will only operate when the main facility is off-air, the proposed auxiliary antenna facility should not pose any adverse effects to the Observatory. Copy of the consent letter for the higher power main facility CP (BMPH-20161031AAB) is also included in Appendix 1.

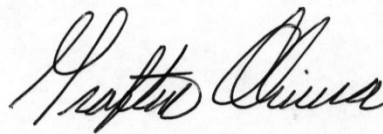
FCC Monitoring Stations

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 located at Santa Isabel, PR, at a distance of 66.8 kilometers on a bearing of 104° True. The proposed operation will produce field strengths significantly lower than 10 mV/m at the FCC Santa Isabel station.

Allocation Considerations

Figure 2 shows the service contours of the WIVA-FM Main licensed and the proposed Auxiliary facilities. As shown in Figure 2, the 60 dBu contour of the herein proposed WIVA-FM Auxiliary antenna will not extend beyond the predicted 60 dBu contour of the Main licensed facility. The predicted contours were calculated in accordance with Section 73.313 of the FCC Rules, using the V-Soft FMCommander@2016 software in conjunction with the 30-second Global terrain database; contour calculation were made using an evenly spaced set of 72 radials. The antenna height elevation above average terrain of the current main facility CP was used in conjunction with the propagation prediction curves of Section 73.333 to determine the distances to contours. Figure 3 and Figure 4 show the distance to 60 dBu contour tables for the proposed and licensed facilities.

The applicant recognizes its responsibility to remedy any complaints of blanketing interference as required by 47 CFR 73.318 and to protect existing facilities in accordance with applicable rules.



Grafton Olivera, P.E.
Consulting Engineer
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Bradenton, Florida 34203

(941) 323-0321

May 4, 2017

Figure 1

TECHNICAL EXHIBIT
CONSTRUCTION PERMIT APPLICATION
FOR AUXILIARY ANTENNA
ARSO RADIO CORPORATION
RADIO STATION WIVA-FM
AGUADILLA, PUERTO RICO
FACILITY ID 2876

CH 262B 11.5 KW 633 M

Engineering Specifications

Channel / Frequency	262B / 100.3 MHz
Site Coordinates (NAD27)	18° 09' 03" North Latitude 66° 59' 21" West Longitude
Site elevation	860 m AMSL
Overall height of antenna structure	89.6 m AGL / 949.6 m AMSL
Height of antenna radiation center	67 m AGL / 927 m AMSL
Antenna radiation center HAAT	633 m
Transmitter	Type Approved
Transmitter power output	9.9 kW
Transmission line, 2-1/4" Heliax Air-Dielectric	Andrew, HJ12-50
Transmission line length	89.9 m
Transmission line efficiency	89.15 %
Antenna	ERI SHPX-4AC-HW
Polarization	Circular
Power gain	1.307
Antenna input power	8.8 kW
Effective radiated power (Circular Polarization)	11.5 kW

FIGURE 2 – 60 DBU COVERAGE – WIVA-FM LICENSED AND PROPOSED AUXILIARY ANTENNA

LEGEND: GREEN LINE: LICENSED; YELLOW LINE: PROPOSED AUX. ANTENNA; BLACK LINE: 25 MILES REFERENCE DISTANCE

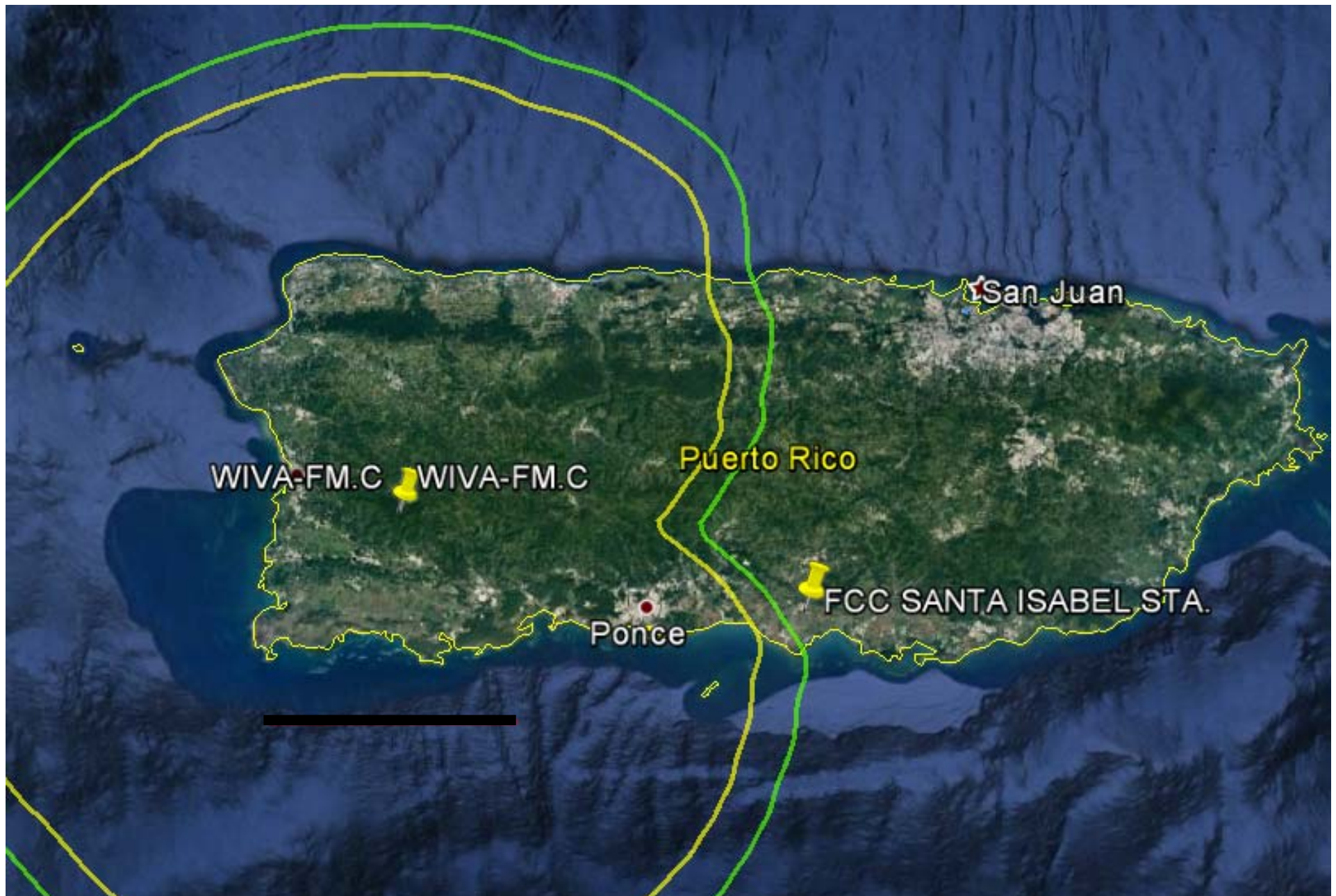


FIGURE 3 – DISTANCE TO CONTOURS PROPOSED AUXILIARY ANTENNA – WIVA-FM

N. Lat. = 180903.0 W. Lng. = 65921.0

HAAT and Distance to Contour, FCC, FM 2-10 Mi, 51 pts Method - GLOBE 30 SEC

ERP= 11.5 KW Ave El= 277.85 M HAAT= 633 M AMSL= 927 M

Azi.	AV EL	HAAT	dBk	60-F5	Azi.	AV EL	HAAT	dBk	60-F5	Azi.	AV EL	HAAT	dBk	60-F5
000	303.0	624.0	10.61	70.11	130	330.7	596.3	10.61	69.03	260	95.4	831.6	10.61	77.18
005	303.9	623.1	10.61	70.07	135	289.6	637.4	10.61	70.62	265	110.7	816.3	10.61	76.74
010	314.7	612.3	10.61	69.66	140	248.2	678.8	10.61	72.16	270	139.5	787.5	10.61	75.87
015	336.8	590.2	10.61	68.77	145	218.7	708.3	10.61	73.23	275	159.6	767.4	10.61	75.23
020	341.6	585.4	10.61	68.57	150	192.0	735.0	10.61	74.16	280	193.3	733.7	10.61	74.11
025	324.1	602.9	10.61	69.29	155	156.6	770.4	10.61	75.33	285	223.7	703.3	10.61	73.05
030	319.5	607.5	10.61	69.47	160	132.0	795.0	10.61	76.10	290	191.6	735.4	10.61	74.17
035	316.1	610.9	10.61	69.60	165	115.3	811.7	10.61	76.61	295	190.3	736.7	10.61	74.21
040	315.1	611.9	10.61	69.64	170	115.6	811.4	10.61	76.60	300	206.0	721.0	10.61	73.67
045	351.4	575.6	10.61	68.13	175	116.5	810.5	10.61	76.57	305	230.6	696.4	10.61	72.80
050	407.9	519.1	10.61	64.92	180	108.0	819.0	10.61	76.82	310	247.4	679.6	10.61	72.19
055	467.2	459.8	10.61	61.04	185	109.2	817.8	10.61	76.78	315	258.1	668.9	10.61	71.80
060	486.4	440.6	10.61	59.91	190	115.2	811.8	10.61	76.61	320	261.8	665.2	10.61	71.66
065	502.7	424.3	10.61	58.97	195	118.6	808.4	10.61	76.51	325	276.3	650.7	10.61	71.12
070	554.4	372.6	10.61	56.04	200	112.6	814.4	10.61	76.68	330	281.2	645.8	10.61	70.93
075	587.4	339.6	10.61	53.98	205	103.4	823.6	10.61	76.95	335	291.9	635.1	10.61	70.53
080	638.6	288.4	10.61	50.59	210	98.1	828.9	10.61	77.10	340	301.1	625.9	10.61	70.18
085	696.6	230.4	10.61	46.51	215	93.2	833.8	10.61	77.24	345	302.3	624.7	10.61	70.14
090	734.8	192.2	10.61	43.62	220	103.5	823.5	10.61	76.95	350	297.6	629.4	10.61	70.31
095	737.4	189.6	10.61	43.42	225	125.5	801.5	10.61	76.30	355	301.2	625.8	10.61	70.18
100	642.8	284.2	10.61	50.31	230	126.1	800.9	10.61	76.28					
105	546.7	380.3	10.61	56.48	235	99.8	827.2	10.61	77.05					
110	451.1	475.9	10.61	62.05	240	75.2	851.8	10.61	77.73					
115	435.6	491.4	10.61	63.06	245	74.4	852.6	10.61	77.75					
120	400.1	526.9	10.61	65.44	250	84.0	843.0	10.61	77.49					
125	376.3	550.7	10.61	66.89	255	91.6	835.4	10.61	77.28					

FIGURE 4 – DISTANCE TO CONTOURS LICENSED FACILITY – WIVA-FM

N. Lat. = 180907.0 W. Lng. = 665915.0, HAAT and Distance to Contour, FCC, FM 2-10 Mi, 51 pts Method - GLOBE 30 SEC
 ERP= 22 KW Ave El= 291.69 M HAAT= 614 M AMSL= 913 M

Azi.	AV EL	HAAT	dBk	60-F5	Azi.	AV EL	HAAT	dBk	60-F5	Azi.	AV EL	HAAT	dBk	60-F5
000	300.7	612.3	13.42	76.69	145	257.2	655.8	13.42	78.35	290	199.8	713.2	13.42	80.43
005	306.3	606.7	13.42	76.47	150	236.4	676.6	13.42	79.13	295	212.2	700.8	13.42	80.00
010	311.9	601.1	13.42	76.24	155	215.5	697.5	13.42	79.88	300	224.5	688.5	13.42	79.56
015	317.5	595.5	13.42	76.01	160	194.7	718.3	13.42	80.61	305	236.9	676.1	13.42	79.11
020	323.2	589.8	13.42	75.76	165	173.8	739.2	13.42	81.32	310	249.2	663.8	13.42	78.65
025	328.8	584.2	13.42	75.51	170	153.0	760.0	13.42	82.00	315	261.6	651.4	13.42	78.19
030	334.4	578.6	13.42	75.26	175	132.1	780.9	13.42	82.66	320	265.9	647.1	13.42	78.03
035	340.0	573.0	13.42	74.99	180	111.3	801.7	13.42	83.29	325	270.3	642.7	13.42	77.86
040	345.6	567.4	13.42	74.72	185	113.1	799.9	13.42	83.24	330	274.6	638.4	13.42	77.70
045	351.3	561.7	13.42	74.44	190	114.9	798.1	13.42	83.18	335	279.0	634.0	13.42	77.53
050	393.5	519.5	13.42	71.97	195	116.7	796.3	13.42	83.13	340	283.3	629.7	13.42	77.36
055	435.8	477.2	13.42	69.04	200	118.5	794.5	13.42	83.07	345	287.7	625.3	13.42	77.20
060	478.1	434.9	13.42	66.15	205	120.3	792.7	13.42	83.02	350	292.0	621.0	13.42	77.03
065	520.4	392.6	13.42	63.53	210	122.1	790.9	13.42	82.96	355	296.3	616.7	13.42	76.86
070	562.7	350.3	13.42	60.84	215	123.9	789.1	13.42	82.91					
075	604.9	308.1	13.42	57.95	220	125.7	787.3	13.42	82.85					
080	647.2	265.8	13.42	54.99	225	127.5	785.5	13.42	82.80					
085	689.5	223.5	13.42	51.86	230	130.1	782.9	13.42	82.72					
090	731.8	181.2	13.42	48.40	235	132.6	780.4	13.42	82.64					
095	683.7	229.3	13.42	52.32	240	135.2	777.8	13.42	82.56					
100	635.6	277.4	13.42	55.83	245	137.7	775.3	13.42	82.48					
105	587.5	325.5	13.42	59.14	250	140.3	772.7	13.42	82.40					
110	539.4	373.6	13.42	62.35	255	142.8	770.2	13.42	82.32					
115	491.3	421.7	13.42	65.32	260	145.4	767.6	13.42	82.24					
120	443.2	469.8	13.42	68.51	265	147.9	765.1	13.42	82.16					
125	395.1	517.9	13.42	71.87	270	150.5	762.5	13.42	82.08					
130	347.0	566.0	13.42	74.65	275	162.8	750.2	13.42	81.68					
135	299.0	614.0	13.42	76.76	280	175.2	737.8	13.42	81.27					
140	278.1	634.9	13.42	77.56	285	187.5	725.5	13.42	80.86					

Appendix 1

Grafton Olivera, P.E.

Consulting Engineer

May 4, 2017

Via email (prcz@naic.edu)

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

Gentlemen:

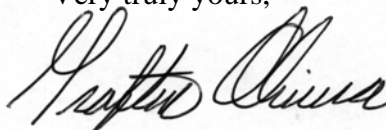
On behalf of our client, ARSO RADIO CORPORATION, licensee of WIVA-FM, in Aguadilla, Puerto Rico, in accordance with Section 73.1030 of FCC Rules, we hereby notify of a proposed Construction Permit (CP) for an auxiliary antenna for the main facility of WIVA-FM. As the proposed facility will radiate significant less power than the already authorized main facility CP, FCC File Number BMPH-20161031AAB, using the same site and antenna height, and will only operate when the main facility is off, the proposed auxiliary facility should not cause any adverse effects to the Observatory. The particulars of the proposal are as follows:

Proposed Facility:

Geographical coordinates of antenna location (NAD27): 18-09-03 / 66-59-21
Antenna height: 67 m AGL; 927 m AMSL
Antenna Gain (horizontal plane): 0 dBd (non-directional)
Operating channel: 262, 100.3 MHz
Type of emission: F3E
Effective isotropic radiated power: 18.9 kW – Circular Polarization

Please review this proposal and let me know your findings; feel free to communicate via email (<mailto:Grafton.Olivera@me.com>), telephone (941-323-0381) or regular mail.

Very truly yours,



Grafton Olivera, P.E.
5119 60th Drive E
Bradenton, FL 34203

Tel. 941-323-0381
Email: Grafton.Olivera@me.com

ARECIBO OBSERVATORY

The William E. Gordon Telescope
Angel Ramos Foundation Science and Visitor Center



October 25, 2016

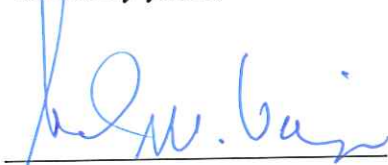
Mr. Grafton Olivera, P.E.
Consulting Engineer
5119 60th Drive E
Bradenton, FL 34203

Re: WIVA-FM, Canal 262B
ARSO Radio Corporation

Dear Grafton Olivera:

Thank you very much for the copy of your FCC application sent to us in accordance with the Puerto Rico Coordination zone agreements. We have considered the technical aspects of your application and find that your installation/path originating in Aguadilla is unlikely to cause harmful interference to the passive use of the Radio Astronomy bands at the Observatory. We therefore have no objection to your proposed installation.

Sincerely yours,



Angel M. Vázquez
Spectrum Manager

AV:ws

Cc: PRCZ files [File #001600100019]

Appendix 2

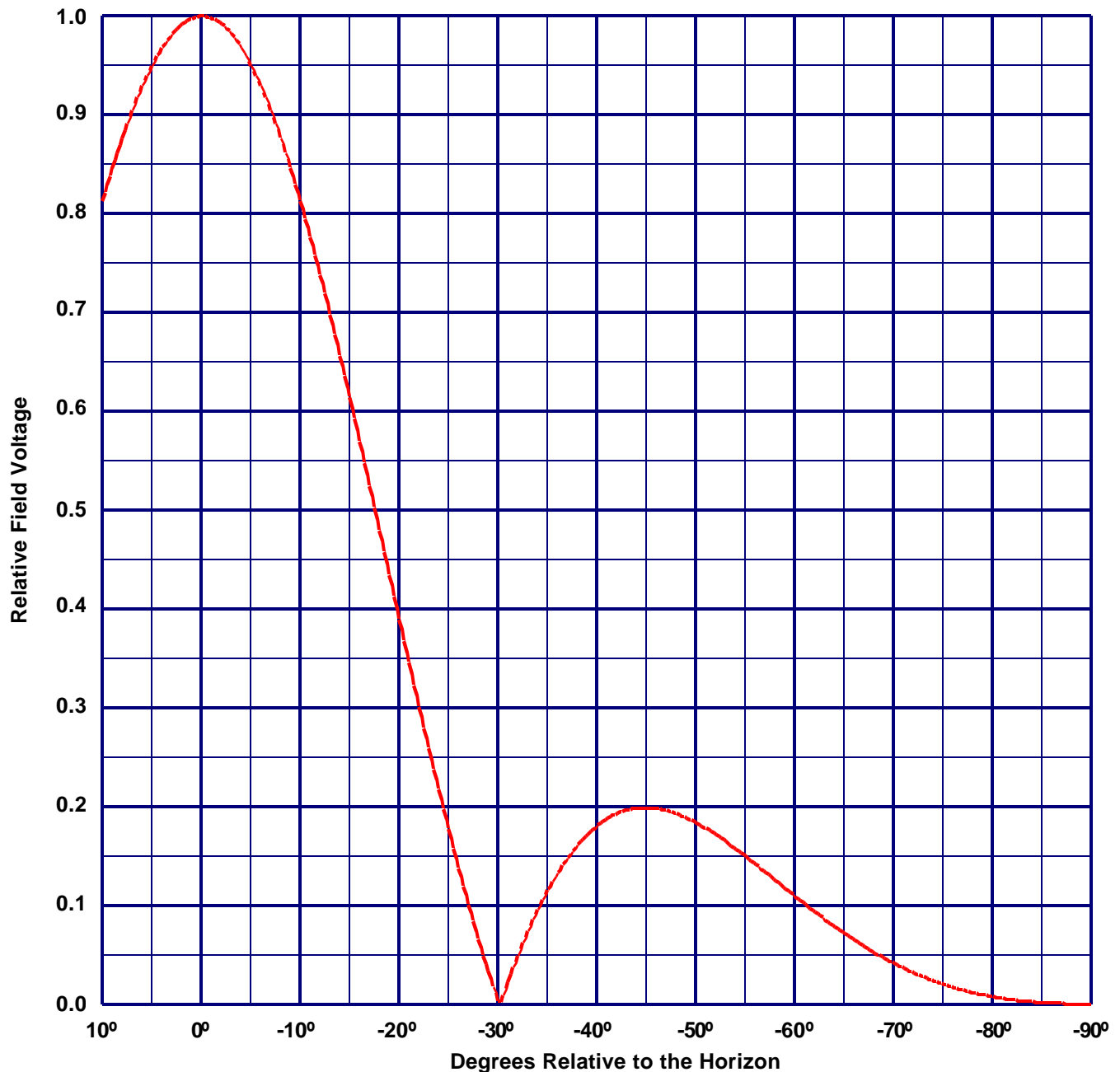


Vertical Plane Relative Field Pattern

ERI TYPE SHP, SHPX, MP, MPX, LP OR LPX ELEMENTS

A 4 level, .5 wave-length spaced non directional antenna

with 0° beam tilt, 0% null fill and a H/V maximum power ratio of 1.000



Vertical Polarization Gain:

Maximum: 1.307 (1.163 dB)

Horizontal Plane: 1.307 (1.163 dB)

Horizontal Polarization Gain:

Maximum: 1.307 (1.163 dB)

Horizontal Plane: 1.307 (1.163 dB)