

TECHNICAL EXHIBIT
APPLICATION FOR MINOR LICENSE CHANGE
BOOSTER STATION WOYE-FM2
FAJARDO, PUERTO RICO
FACILITY ID 180882

March 19, 2019

CH 247 0.25 KW 313 M AMSL

TECHNICAL EXHIBIT
APPLICATION FOR LICENSE MODIFICATION
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Engineering Statement

This Technical Exhibit was prepared on behalf of AA Broadcast, Inc., licensee of FM Booster station WOYE-FM2, Facility ID 180882, Fajardo, Puerto Rico, in support of an application for a modification of its existing license. The instant application proposes a change in the antenna type, from directional, vertical polarization to non-directional circular polarization. No change in site, antenna supporting structure, antenna height, or ERP is proposed. The proposed booster facility will operate on Channel 247 (97.3 MHz) with an antenna radiation center height above mean sea level of 313 meters, using a Shively 6812, single bay, circularly polarized antenna. The proposed operating parameters are shown in Figure 1.

Proposed Transmitter Location

The proposed facility would operate from its existing site and antenna supporting structure; no change in the antenna radiation center height is proposed. The existing and proposed site location is described by the following NAD27 geographic coordinates:

18° 16' 52" North
65° 40' 09" West

The overall height above ground of the tower is 30 meters and is registered with the FCC with the Antenna Structure Registration Number 1233151. There will be no change in the overall height of the existing structure.

Notification of FCC Monitoring Station and Arecibo Observatory

FCC rules, Section 73.1030(c), requires that the proposed facility do 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, Puerto Rico, at a distance of 80.6 kilometers on a bearing of 248° True. The proposed operation will produce field strengths much lower than 10 mV/m at the FCC Santa Isabel, PR station; notification to the FCC monitoring station is deemed necessary.

Pursuant to Section 73.1030 of the FCC Rules, the Arecibo Observatory has been notified of the proposed facility. Copies of the notification letter and of the Letter of Consent of the Observatory are shown in Appendix 1.

Environmental Considerations Environmental Considerations*

The proposal will comply with the FCC Rules concerning human exposure to radio frequency (RF) energy. The calculation of RF energy at 2-m above ground was made under the procedures of OET Bulletin No. 65.[†] 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.

The proposed antenna, a single bay Shively circularly polarized antenna, will be mounted with radiation center at a height of 30 meters on the tower; a total ERP of 500 Watts (Circular) is proposed. Figure 3 is a spreadsheet with a detailed RF exposure calculation at every other degree, using the proposed Shively antenna vertical plane radiation pattern and the proposed operational parameters. As shown in Figure 3, at no point in the site, at a height of 2 mts AGL, will the RF field exceed the 200 $\mu\text{W}/\text{sq.cm}$. allowed for a non-controlled, public environment in the FM band. Since the total RF exposure will be below 5% the FCC limits for

* This statement addresses only human exposure to radiofrequency radiation and not to other non-radiofrequency radiation matters listed in the National Environmental Policy Act of 1969.

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

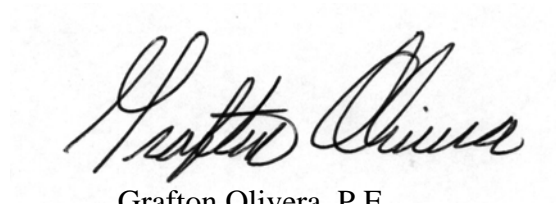
uncontrolled environments, the proposal will comply with the FCC limits for human exposure to RF radiation.

The applicant will verify that access to the tower site is restricted and the site will be appropriately marked with RFR warning signs. In addition, as this is a multi-user site, procedures will be in effect to coordinate in the event that workers or other authorized personnel need to enter the restricted area or climb the tower to ensure that appropriate measures will be taken to assure worker safety with respect to radio frequency radiation exposure. Such procedures include reducing the average exposure by spreading out the work over a longer period of time, wearing RFR exposure monitors or scheduling work when the station is shut down.

Predicted Coverage Contour

The predicted 60 dBu coverage contours were calculated in accordance with Section 73.313 of the FCC Rules. The average terrain elevations from 3 to 16 km from the proposed site were computed using the Globe 30-second terrain database. The distances to the predicted 60 dBu coverage contours for the proposed booster were determined using the average elevations of radials spaced every 5-degree of azimuth. The antenna radiation center height above average terrain and the ERP in each radial direction were used in conjunction with the propagation prediction curves of Section 73.333 to determine the distances to the contour. Appendix 3 shows the distance to 60 dBu contour table. The V-Soft FMCommader@2016 software was used to perform the above referred calculations.

As is the case for the licensed facility of WOEY-FM2, the 60 dBu F50,50 contour of the proposed facility extends beyond the 60 dBu contour of WOEY(FM), but only over the ocean water. Figure 2 is a map showing the predicted 60 dBu coverage contours of the proposed facility of WOEY-FM2 and the 60 dBu contour of WOEY(FM). As shown in Figure 2, the proposed 60 dBu contour of WOEY-FM2 will not extended beyond the contour of the main licensed facility at any point over land. Therefore, it is believed that the proposed facility meets all pertinent requirements of the FCC Rules.

A handwritten signature in black ink, appearing to read "Grafton Olivera", is centered on the page. The signature is fluid and cursive, with the first name "Grafton" and last name "Olivera" clearly distinguishable.

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Consulting Engineer

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March 19, 2019

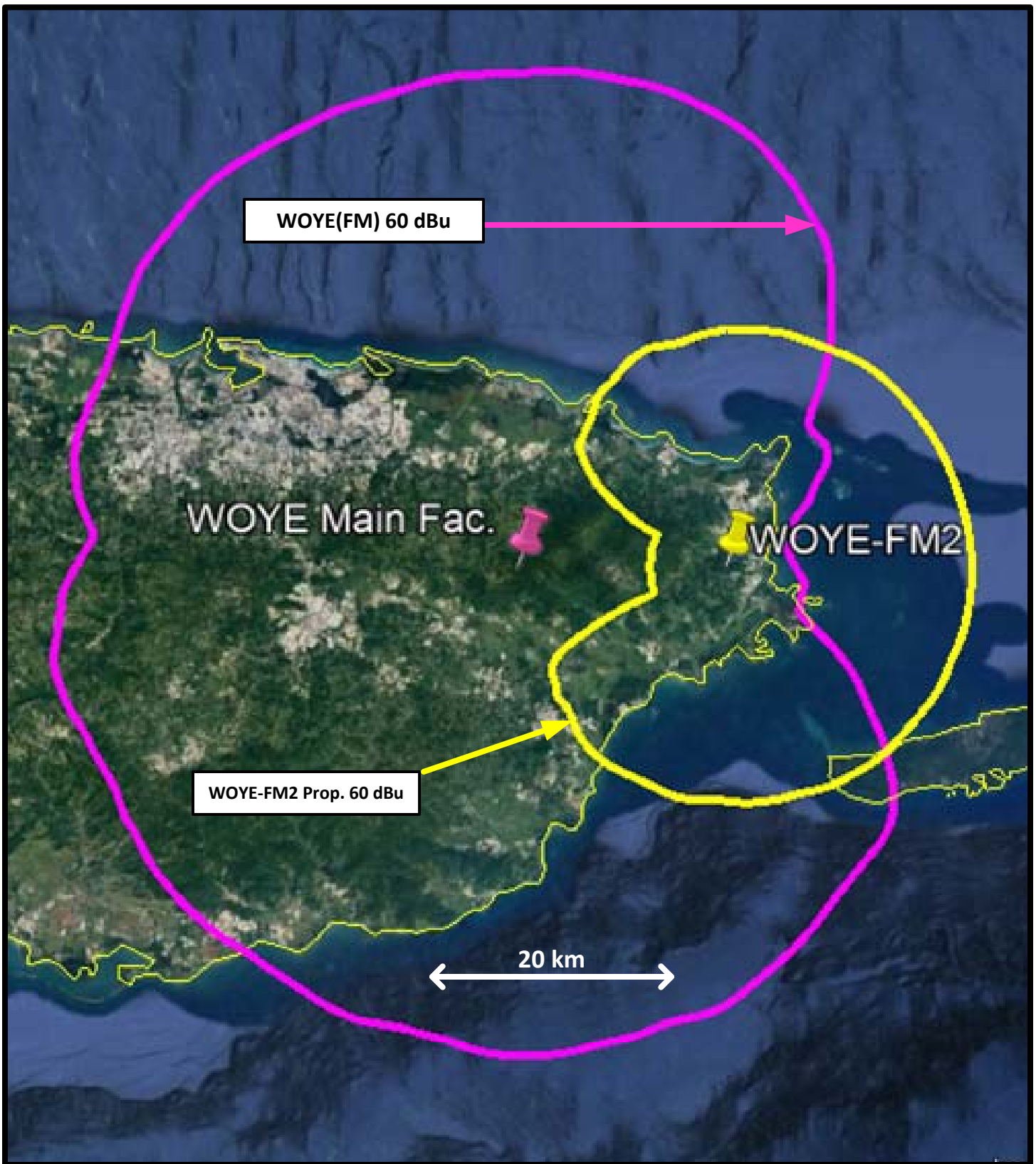
Figure 1

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Engineering Specifications

Channel / Frequency	247 / 97.3 MHz
Site Coordinates	18° 16' 52" North Latitude 65° 40' 09" West Longitude
Site elevation	283 m AMSL
Overall height of existing structure	30 m AGL / 313 m AMSL
Height of antenna radiation center	30 m AGL / 313 m AMSL
Transmitter	Nautel VS1
Transmitter power output	0.680 kW
Transmission line	Andrew, LDF4-50A
Transmission line length	45 m
Transmission line efficiency	79.9%
Antenna	Shively 6812 – 1 bay
Polarization	Circular
Power gain	0.46 X
Antenna input power	0.543 kW
Effective radiated power (H & V)	0.25 kW

Figure 2



PREDICTED COVERAGE CONTOURS

STATION WOYE-FM2

FAJARDO, PUERTO RICO

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Grafton Olivera, P.E. Consulting Engineer

Figure 3

Power Density Calc.		Station:	WOYE-FM2	RC Hght (feet):	30	SITE:		Los Machos	Ant. G (X)	0.46
RCAGL (m)	30.0	ERP (kW):		Tot. Avg Pwr (kW):		0.500	Max. RF-uW		ERP (W)	Ant. In (W)
		0.25		TV Channel:		6	5.48	2.7%	250	543
			Ant. Polariz.	Freq. (MHz)		97.3	ANTENA:		Line Eff (%)	79.9%
			(Sng=1, Cir=2) :	MPE (uW/cm^2)		200.00	Shively 6812-1 Circ		TPO (W):	680
			O.K.	Max. RFE % =		2.7%				
Depression Angle	Vertical Relative Field	Ant. =>	Shively 6812-1 Circ	Max. RF Exp. =	5.48	uW/sq.cm	R-dist (m)	X-dist. (m)	% of Max.	X-dist. (feet)
1	1.000				0.01	1,604.4	1,604.1	0.0	5,263	
3	0.999				0.06	535.0	534.3	0.0	1,753	
5	0.996				0.16	321.3	320.0	0.1	1,050	
7	0.993				0.31	229.8	228.0	0.2	748	
9	0.988				0.51	179.0	176.8	0.3	580	
11	0.982				0.75	146.7	144.0	0.4	473	
13	0.975				1.02	124.5	121.3	0.5	398	
15	0.967				1.33	108.2	104.5	0.7	343	
17	0.958				1.67	95.8	91.6	0.8	300	
19	0.948				2.03	86.0	81.3	1.0	267	
21	0.936				2.40	78.1	72.9	1.2	239	
23	0.924				2.78	71.7	66.0	1.4	216	
25	0.910				3.15	66.3	60.0	1.6	197	
27	0.895				3.52	61.7	55.0	1.8	180	
29	0.879				3.87	57.8	50.5	1.9	166	
31	0.862				4.20	54.4	46.6	2.1	153	
33	0.845				4.51	51.4	43.1	2.3	141	
35	0.826				4.78	48.8	40.0	2.4	131	
37	0.806				5.01	46.5	37.2	2.5	122	
39	0.785				5.20	44.5	34.6	2.6	113	
41	0.763				5.34	42.7	32.2	2.7	106	
43	0.741				5.44	41.1	30.0	2.7	99	
45	0.717				5.48	39.6	28.0	2.7	92	Max. RF Field at 2 mts AGL
47	0.693				5.47	38.3	26.1	2.7	86	
49	0.667				5.40	37.1	24.3	2.7	80	
51	0.641				5.29	36.0	22.7	2.6	74	
53	0.614				5.12	35.1	21.1	2.6	69	
55	0.586				4.91	34.2	19.6	2.5	64	
57	0.558				4.66	33.4	18.2	2.3	60	
59	0.529				4.38	32.7	16.8	2.2	55	
61	0.499				4.06	32.0	15.5	2.0	51	
63	0.469				3.72	31.4	14.3	1.9	47	
65	0.437				3.34	30.9	13.1	1.7	43	
67	0.406				2.98	30.4	11.9	1.5	39	
69	0.373				2.58	30.0	10.7	1.3	35	
71	0.341				2.21	29.6	9.6	1.1	32	
73	0.307				1.84	29.3	8.6	0.9	28	
75	0.273				1.48	29.0	7.5	0.7	25	
77	0.239				1.16	28.7	6.5	0.6	21	
79	0.204				0.85	28.5	5.4	0.4	18	
81	0.168				0.59	28.3	4.4	0.3	15	
83	0.133				0.37	28.2	3.4	0.2	11	
85	0.096				0.19	28.1	2.4	0.1	8	
87	0.059				0.07	28.0	1.5	0.0	5	
89	0.021				0.01	28.0	0.5	0.0	2	

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Antenna Manufacturer's Vertical Plane Radiation Pattern

{two sheets follow}

Antenna Mfg.: Shively Labs
Antenna Type: 6812-1

Date: 11/23/2011

Station: none

Beam Tilt 0

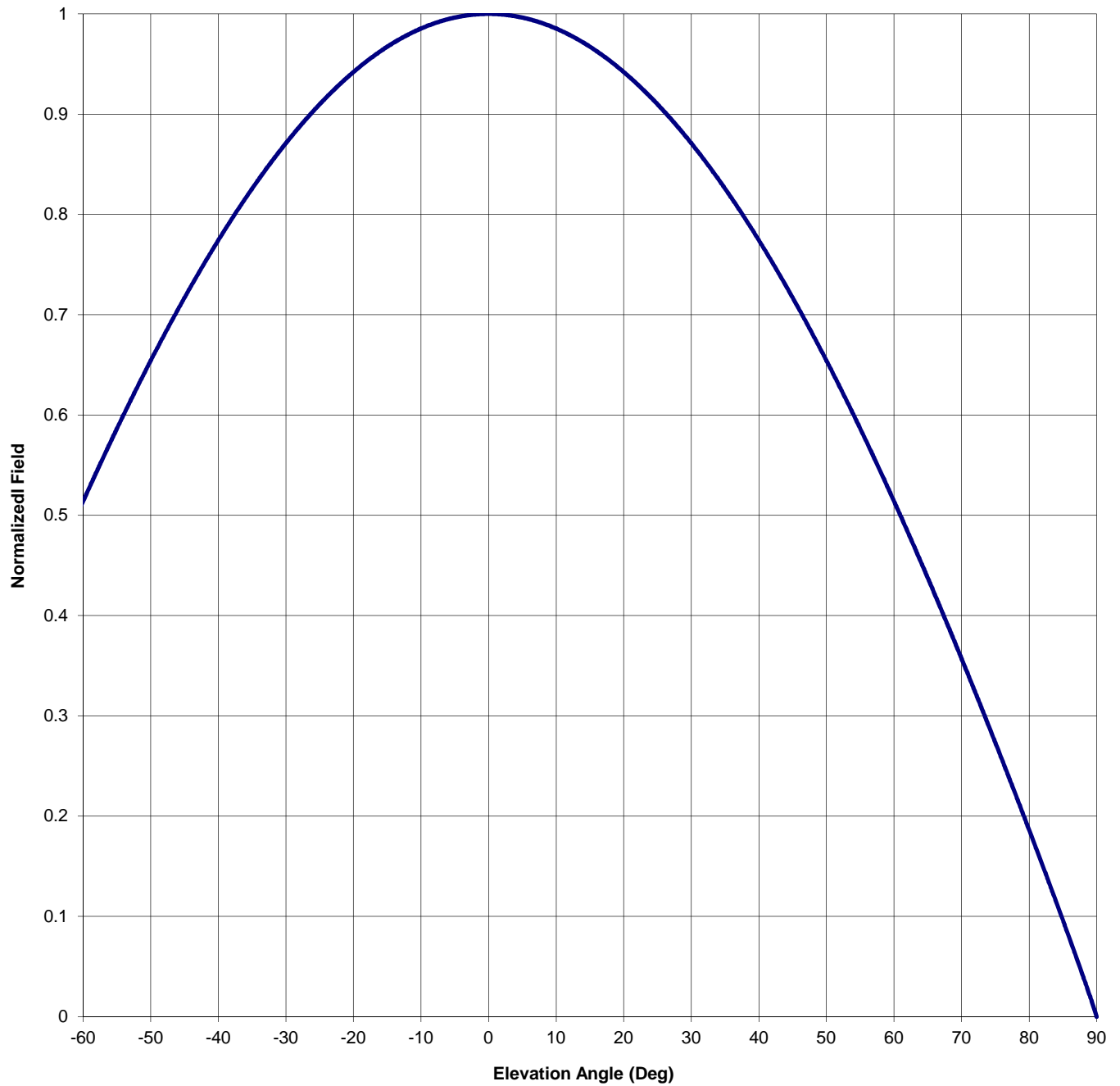
Frequency: 93.1

Gain (Max) 0.460 -3.369 dB

Channel #: 226

Gain (Horizon) 0.460 -3.369 dB

Figure: 3



Antenna Mfg.: Shively Labs

Date: 11/23/2011

Antenna Type: 6812-1

Station: none

Beam Tilt 0

Frequency: 93.1

Gain (Max) 0.460 -3.369 dB

Channel #: 226

Gain (Horizon) 0.460 -3.369 dB

Figure: 3

Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field
-90	0.000	-44	0.729	0	1.000	46	0.705
-89	0.021	-43	0.741	1	1.000	47	0.693
-88	0.040	-42	0.752	2	0.999	48	0.680
-87	0.059	-41	0.763	3	0.999	49	0.667
-86	0.078	-40	0.774	4	0.998	50	0.654
-85	0.096	-39	0.785	5	0.996	51	0.641
-84	0.114	-38	0.796	6	0.995	52	0.628
-83	0.133	-37	0.806	7	0.993	53	0.614
-82	0.151	-36	0.816	8	0.991	54	0.600
-81	0.168	-35	0.826	9	0.988	55	0.586
-80	0.186	-34	0.835	10	0.985	56	0.572
-79	0.204	-33	0.845	11	0.982	57	0.558
-78	0.221	-32	0.854	12	0.979	58	0.544
-77	0.239	-31	0.862	13	0.975	59	0.529
-76	0.256	-30	0.871	14	0.971	60	0.514
-75	0.273	-29	0.879	15	0.967	61	0.499
-74	0.290	-28	0.887	16	0.963	62	0.484
-73	0.307	-27	0.895	17	0.958	63	0.469
-72	0.324	-26	0.903	18	0.953	64	0.453
-71	0.341	-25	0.910	19	0.948	65	0.437
-70	0.357	-24	0.917	20	0.942	66	0.422
-69	0.373	-23	0.924	21	0.936	67	0.406
-68	0.390	-22	0.930	22	0.930	68	0.390
-67	0.406	-21	0.936	23	0.924	69	0.373
-66	0.422	-20	0.942	24	0.917	70	0.357
-65	0.437	-19	0.948	25	0.910	71	0.341
-64	0.453	-18	0.953	26	0.903	72	0.324
-63	0.469	-17	0.958	27	0.895	73	0.307
-62	0.484	-16	0.963	28	0.887	74	0.290
-61	0.499	-15	0.967	29	0.879	75	0.273
-60	0.514	-14	0.971	30	0.871	76	0.256
-59	0.529	-13	0.975	31	0.862	77	0.239
-58	0.544	-12	0.979	32	0.854	78	0.221
-57	0.558	-11	0.982	33	0.845	79	0.204
-56	0.572	-10	0.985	34	0.835	80	0.186
-55	0.586	-9	0.988	35	0.826	81	0.168
-54	0.600	-8	0.991	36	0.816	82	0.151
-53	0.614	-7	0.993	37	0.806	83	0.133
-52	0.628	-6	0.995	38	0.796	84	0.114
-51	0.641	-5	0.996	39	0.785	85	0.096
-50	0.654	-4	0.998	40	0.774	86	0.078
-49	0.667	-3	0.999	41	0.763	87	0.059
-48	0.680	-2	0.999	42	0.752	88	0.040
-47	0.693	-1	1.000	43	0.741	89	0.021
-46	0.705	0	1.000	44	0.729	90	0.000
-45	0.717			45	0.717		

Distance to 60 dBu Contour Table

N. Lat. = 181652.0 W. Lng. = 654009.0
 FCC, FM 2-10 Mi, 51 pts Method - GLOBE 30 SEC

Azi.	AV EL	ERP kW	60-F5
000	24.7	0.2500	22.13
005	20.6	0.2500	22.28
010	17.3	0.2500	22.40
015	14.7	0.2500	22.49
020	16.3	0.2500	22.44
025	14.0	0.2500	22.52
030	7.9	0.2500	22.74
035	3.4	0.2500	22.91
040	2.7	0.2500	22.93
045	4.0	0.2500	22.89
050	5.3	0.2500	22.84
055	5.6	0.2500	22.83
060	5.3	0.2500	22.84
065	6.4	0.2500	22.80
070	6.7	0.2500	22.79
075	6.0	0.2500	22.81
080	3.8	0.2500	22.89
085	2.4	0.2500	22.94
090	1.1	0.2500	22.99
095	1.3	0.2500	22.98
100	1.6	0.2500	22.97
105	2.5	0.2500	22.94
110	6.1	0.2500	22.81
115	5.9	0.2500	22.82
120	4.7	0.2500	22.86
125	8.0	0.2500	22.74
130	10.4	0.2500	22.65
135	9.7	0.2500	22.68
140	7.3	0.2500	22.77
145	9.7	0.2500	22.68
150	13.3	0.2500	22.54
155	15.2	0.2500	22.47
160	23.6	0.2500	22.17
165	26.2	0.2500	22.07
170	27.4	0.2500	22.03
175	28.8	0.2500	21.97
180	35.8	0.2500	21.72
185	36.4	0.2500	21.69
190	32.7	0.2500	21.83
195	36.3	0.2500	21.70
200	43.4	0.2500	21.43
205	45.2	0.2500	21.36
210	43.5	0.2500	21.43

Azi.	AV EL	ERP kW	60-F5
215	45.6	0.2500	21.35
220	54.4	0.2500	21.01
225	71.2	0.2500	20.34
230	83.3	0.2500	19.84
235	90.5	0.2500	19.52
240	104.9	0.2500	18.90
245	172.1	0.2500	15.31
250	278.3	0.2500	7.57
255	392.0	0.2500	7.09
260	502.0	0.2500	7.09
265	551.6	0.2500	7.09
270	574.3	0.2500	7.09
275	549.7	0.2500	7.09
280	543.2	0.2500	7.09
285	515.4	0.2500	7.09
290	404.9	0.2500	7.09
295	284.9	0.2500	7.09
300	223.7	0.2500	12.18
305	165.9	0.2500	15.71
310	124.4	0.2500	18.02
315	112.6	0.2500	18.55
320	94.4	0.2500	19.35
325	73.2	0.2500	20.26
330	63.1	0.2500	20.67
335	45.4	0.2500	21.36
340	36.5	0.2500	21.69
345	42.1	0.2500	21.48
350	39.8	0.2500	21.57
355	30.4	0.2500	21.92

Ave El= 96.02 M HAAT= 216.98 M AMSL= 313.0