

## **WKAQ-TV Application to Modify Auxiliary Broadcast C.P.**

### **Purpose of application**

This application is being filed to modify construction permit (CP) file number 0000032015 for the auxiliary broadcast facility for WKAQ-TV, facility ID 64983, licensed to San Juan, PR. The former main antenna proposed in the original construction permit was damaged during Hurricane Maria and was found to be unusable. The previously authorized antenna is being replaced with an antenna that will support WAPA-TV's main facility as authorized in LMS file number 0000055015. This application requests modification of WKAQ-TV CP file number 0000032015 to use the WAPA-TV antenna for auxiliary purposes, modify the antenna relative field azimuth pattern, change the electrical beam tilt from 1.75 degrees to 1.25 degrees, reduce effective radiated power (ERP) from 924 kW to 500 kW, and increase the height above mean sea level from 1110.7 meters to 1119.4 meters

### **Environmental**

No new construction is proposed. The proposed antenna will replace the previously authorized side mount antenna for WKAQ-TV under construction permit file number 0000032015 at slightly greater height on the existing tower. The over-all height of the tower will not change.

The ERP will not be increased in any direction above that previously authorized. As a result, the requested facility will not create any new interference to the National Radio Astronomy Observatory at Arecibo nor will it create any new interference to other licensed or authorized facilities.

RF Power density on the ground is calculated to be below the FCC maximum permissible exposure levels for uncontrolled areas. WKAQ-TV will stop using this antenna or reduce power as necessary to protect workers on this or adjacent towers.

### **Antenna Technical Data specified in 47 C.F.R. Section 73.625(c)**

The tabulations and drawings in Exhibit 1 (attached) provide the information required under 47 C.F.R Section 73.625(c). The antenna proposed in this application is an ERI ATW26HS7-ESC1-27/28H slot antenna with 1.25 degrees of electrical beam tilt and no mechanical beam tilt. The main beam axis of symmetry of the antenna azimuth pattern is 330 degrees true.

The antenna will be elliptically polarized with a maximum horizontally polarized ERP of 500 kW and a maximum vertically polarized ERP of 395 kW. The vertically polarized ERP in the main beam of the antenna is less than the horizontally polarized ERP at all azimuths.

The question "Does the proposed antenna propose elevation radiation patterns that vary with azimuth for reasons other than the use of mechanical beam tilt?" in the "Antenna Technical Data" section was checked "Yes" solely to allow uploading of the antenna elevation pattern for more accurate interference and coverage analysis. The elevation pattern does not vary with azimuth.

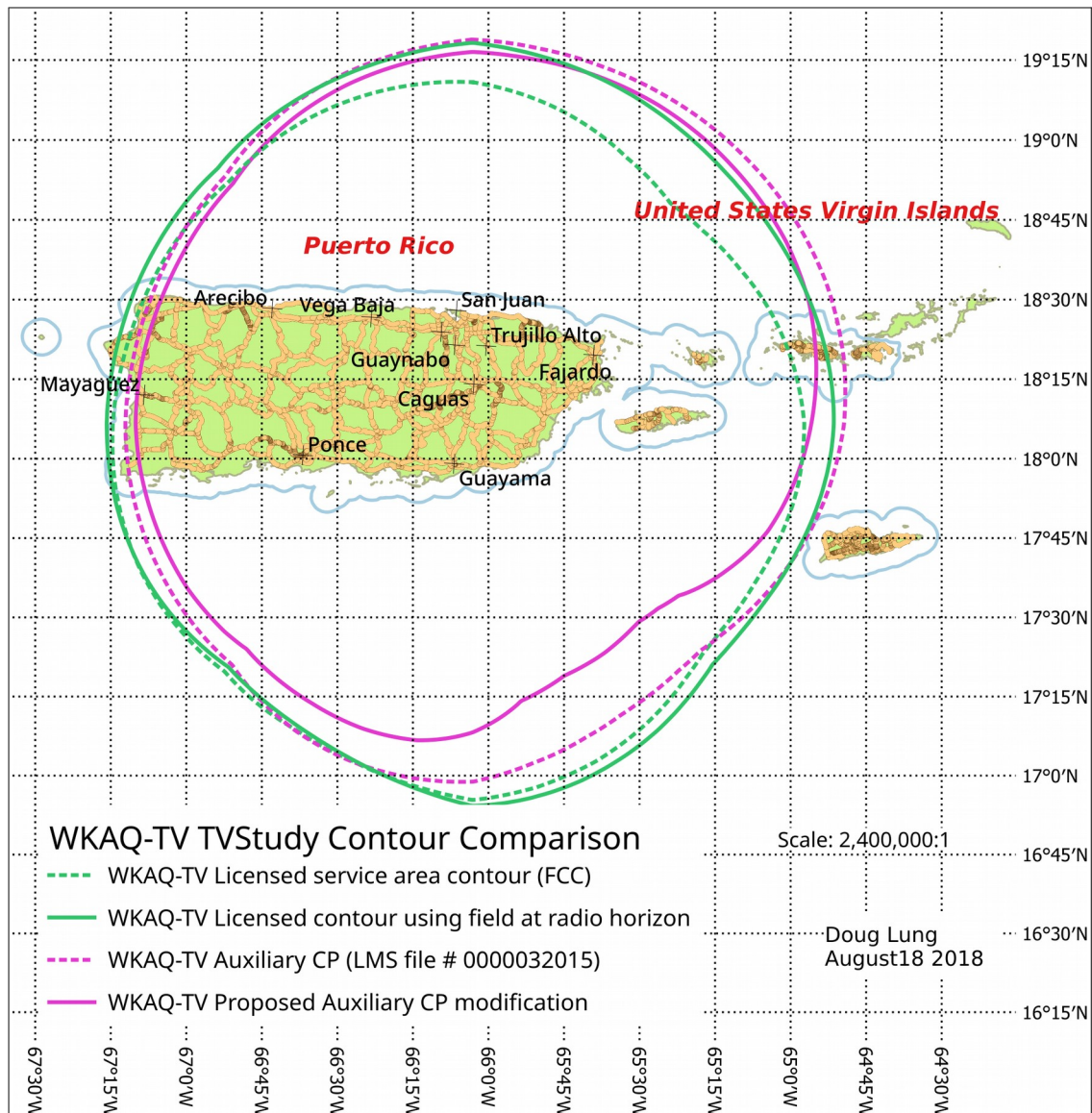
### **Broadcast Facility**

The contour of the proposed auxiliary facility, when calculated using the horizontal plane azimuth pattern, is within the FCC contour of the main WKAQ-TV facility except over water and a small area in the Virgin Islands. It is not predicted to cause new interference above 0.5% to any approved or applied for TV broadcast facility. To the extent required, WKAQ-TV agrees to accept interference to this facility from previously authorized facilities. Section 73.622(i) does not apply as the requested facility is at lower ERP and at lower HAAT than the licensed main facility. Section 73.623(e) does not apply as channel 28 is not shared with land-mobile operations. The facility will place a principal community contour over San Juan, the community of license. Technical details required by Section 73.625 are attached. The coordination required by Section 73.1030 was completed before this former main facility was licensed. The reduction in ERP (combined horizontal and vertical polarization) will not increase the field strength at the Arecibo NRAO.

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### Broadcast Facility (continued)

The attached map using contours created with TVStudy 2.2.5 shows the existing licensed WKAQ-TV service area contour calculated using the horizontal plane azimuth pattern from the mechanically tilted antenna (dashed green), the WKAQ-TV licensed contour calculated using the relative field at the radio horizon derived using TVStudy and normalized to 1.0 relative field (solid green), the service area contour for the auxiliary broadcast facility authorized in LMS file number 0000032015 (dashed magenta) and the service area after the modifications proposed in this application. The map shows the proposed contour (solid magenta) does not exceed the contour for the previously authorized auxiliary broadcast facility (dashed magenta) in any direction.



**WKAQ-TV Application to Modify Auxiliary Broadcast C.P.****EXHIBIT 1**  
**August 10, 2018**TABULATION OF AZIMUTH PATTERN: ERI ATW26HS7-ESC1-27/28H

Main beam axis of symmetry: 330° true

Electrical Beam Tilt: 1.25°

Main Beam Calculated Max. H-pol Azimuth Pattern Gain (peak): 1.52 1.82 dBd

Maximum Main Beam H-Pol. Effective Radiated Power (ERP): 500.0 kW 26.99 dBk

Maximum Main Beam V-Pol. Effective Radiated Power (ERP): 395.0 kW 25.96 dBk

**Tabulation of Azimuth Pattern (Horizontal polarization)**

Angle	RF	dBk	ERP kW
0	0.938	26.4	439.9
10	0.935	26.4	437.1
20	0.963	26.7	463.7
30	0.989	26.9	489.1
40	0.994	26.9	494.0
50	0.987	26.9	487.1
60	0.974	26.8	474.3
70	0.921	26.3	424.1
80	0.811	25.2	328.9
90	0.695	23.8	241.5
100	0.604	22.6	182.4
110	0.504	21.0	127.0
120	0.363	18.2	65.9
130	0.235	14.4	27.6
140	0.190	12.6	18.1
150	0.195	12.8	19.0
160	0.193	12.7	18.6
170	0.228	14.1	26.0
180	0.348	17.8	60.6
190	0.495	20.9	122.5
200	0.602	22.6	181.2
210	0.691	23.8	238.7
220	0.803	25.1	322.4
230	0.917	26.2	420.4
240	0.979	26.8	479.2
250	0.993	26.9	493.0
260	0.999	27.0	499.0
270	0.996	27.0	496.0
280	0.972	26.7	472.4
290	0.941	26.5	442.7
300	0.937	26.4	439.0
310	0.963	26.7	463.7
320	0.985	26.9	485.1
330	0.992	26.9	492.0
340	0.987	26.9	487.1
350	0.966	26.7	466.6

**Maximum**

Angle	RF	dBk	ERP kW
264	1.000	27.0	500.0
38	0.994	26.9	494.0
330	0.992	26.9	492.0
152	0.195	12.8	19.0

**Minimum**

Angle	RF	dBk	ERP kW
142	0.190	12.6	18.1
158	0.193	12.7	18.6
6	0.932	26.4	434.3
296	0.934	26.4	436.2

# WKAQ-TV Application to Modify Auxiliary Broadcast C.P.

**EXHIBIT 1**  
**August 10, 2018**

## PLOT OF AZIMUTH PATTERN (Relative Field): ERI ATW26HS7-ESC1-27/28H

Main beam axis of symmetry: 330° true

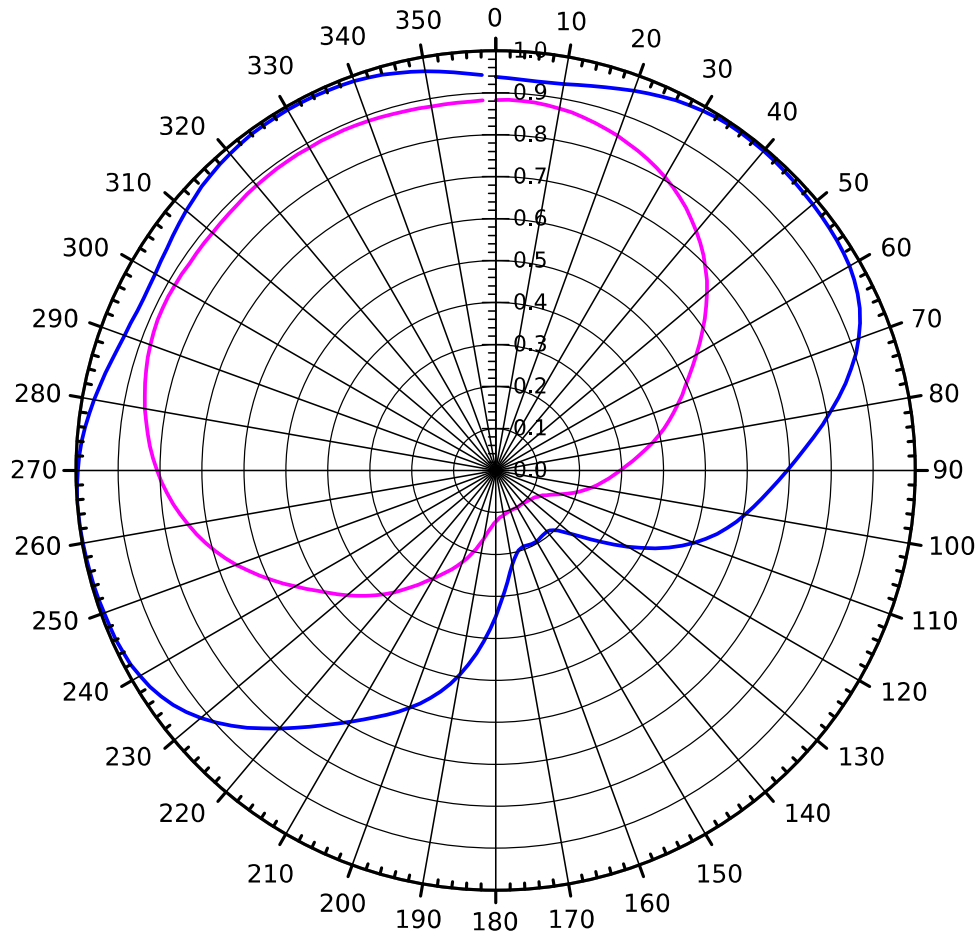
Electrical Beam Tilt: 1.25°

Main Beam Calculated Max. H-pol Azimuth Pattern Gain (peak): 1.52 1.82 dBd

Maximum Main Beam H-Pol. Effective Radiated Power (ERP): 500.0 kW 26.99 dBk

Maximum Main Beam V-Pol. Effective Radiated Power (ERP): 395.0 kW 25.96 dBk

Relative Field



Blue plot shows azimuth pattern relative field for horizontal polarization

Magenta plot shows azimuth pattern relative field for vertical polarization

# WKAQ-TV Application to Modify Auxiliary Broadcast C.P.

**EXHIBIT 1**  
**August 10, 2018**

## PLOT OF AZIMUTH PATTERN (dBk): ERI ATW26HS7-ESC1-27/28H

Main beam axis of symmetry: 330° true

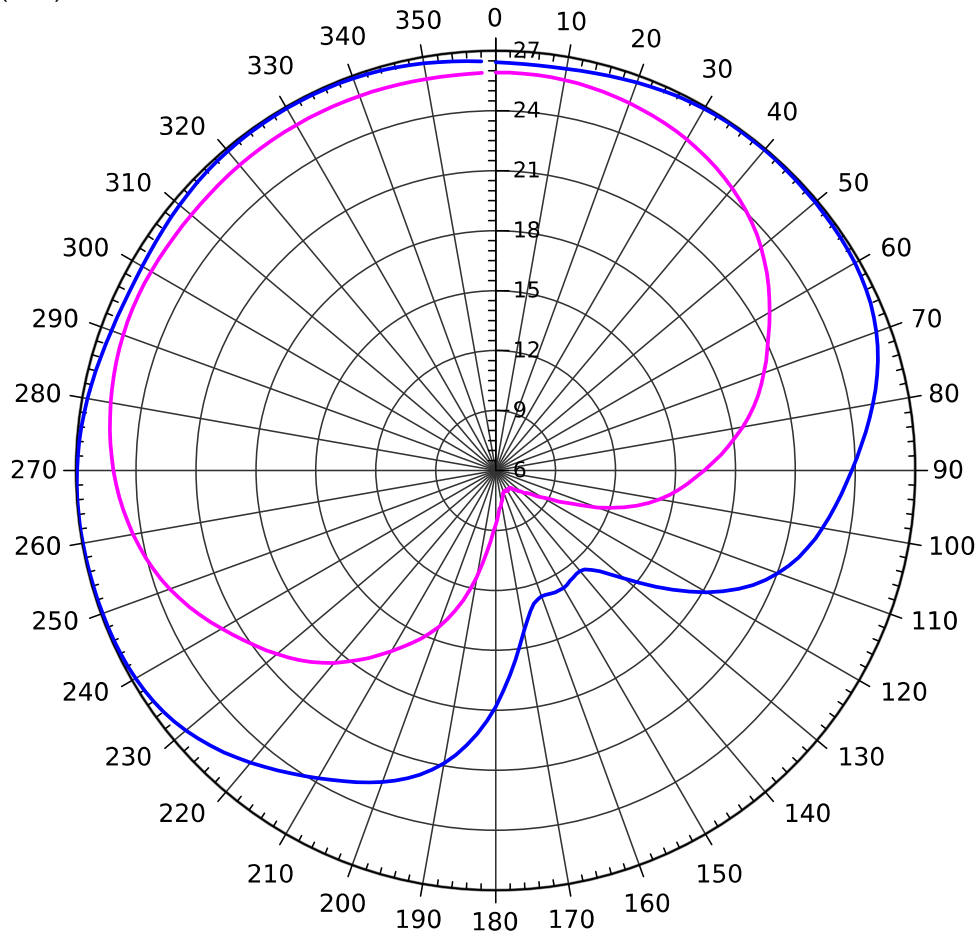
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Maximum Main Beam H-Pol. Effective Radiated Power (ERP): 500.0 kW 26.99 dBk

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Power (dBk)



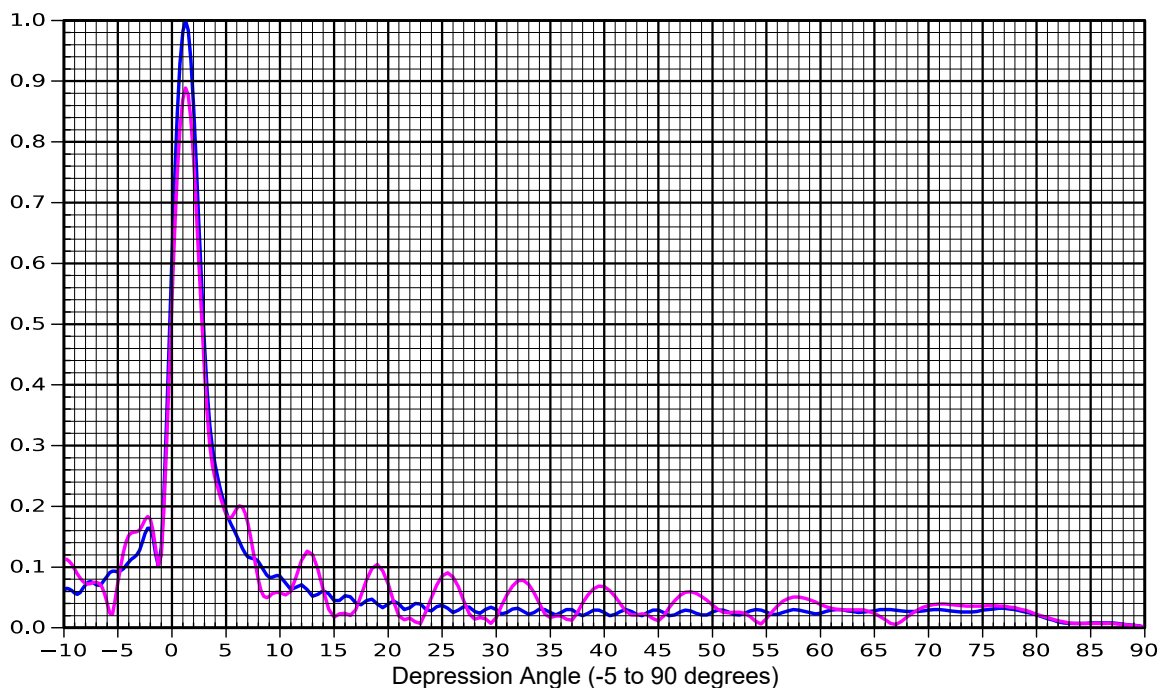
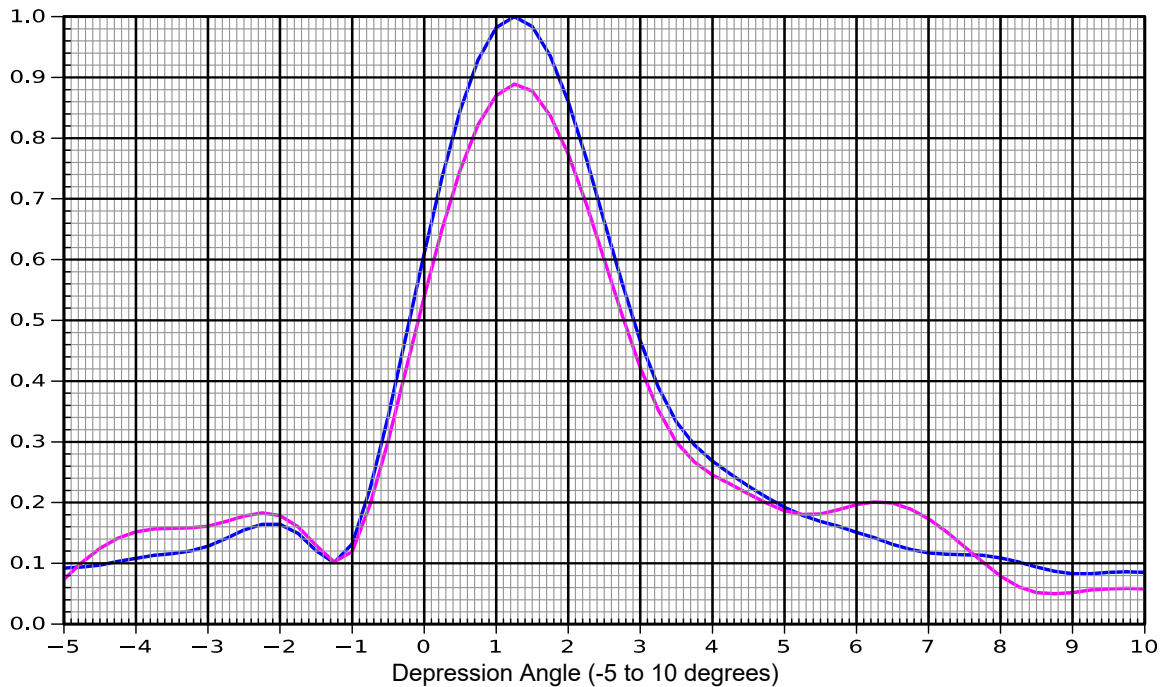
Blue plot shows azimuth pattern power (dBk) for horizontal polarization  
Magenta plot shows azimuth pattern power (dBk) for vertical polarization

# WKAQ-TV Application to Modify Auxiliary Broadcast C.P.

EXHIBIT 1  
August 10, 2018

ELEVATION PATTERN (Relative Field): ERI ATW26HS7-ESC1-27/28H

Electrical Beam Tilt:	1.25°	
Calculated Maximum Elevation Gain:	26.00	14.47 dBd
RMS Gain at Horizontal:	9.67	9.86 dBd
Maximum Main Beam H-Pol. Effective Radiated Power (ERP):	500.0 kW	26.99 dBk
Maximum Main Beam V-Pol. Effective Radiated Power (ERP):	395.0 kW	25.96 dBk



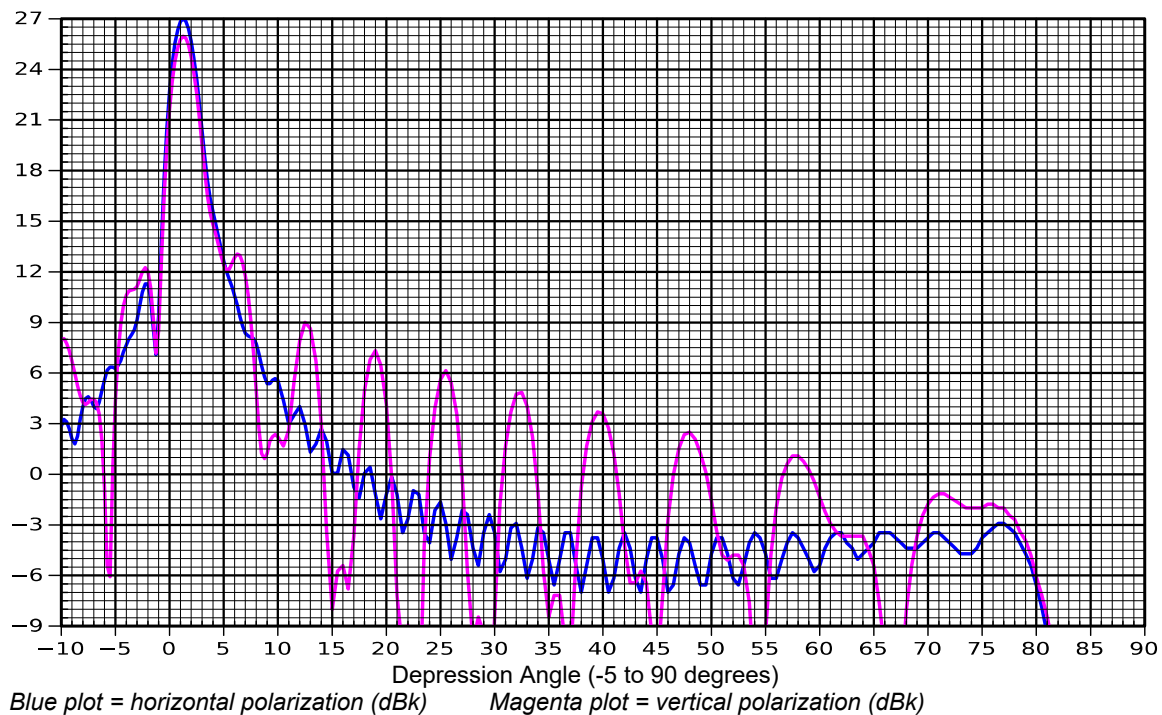
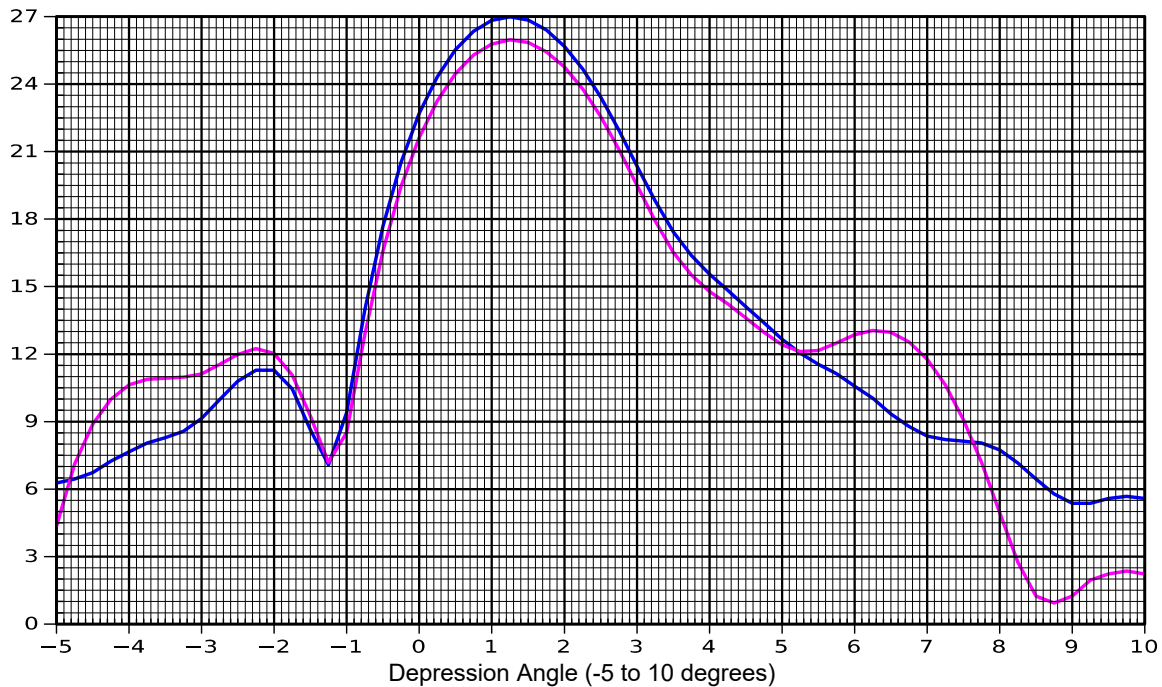
Blue plot = horizontal polarization (relative field)      Magenta plot = vertical polarization (relative field)

# WKAQ-TV Application to Modify Auxiliary Broadcast C.P.

EXHIBIT 1  
August 10, 2018

## ELEVATION PATTERN (dBk): ERI ATW26HS7-ESC1-27/28H

Electrical Beam Tilt:	1.25°	
Calculated Maximum Elevation Gain:	26.00	14.47 dBd
RMS Gain at Horizontal:	9.67	9.86 dBd
Maximum Main Beam H-Pol. Effective Radiated Power (ERP):	500.0 kW	26.99 dBk
Maximum Main Beam V-Pol. Effective Radiated Power (ERP):	395.0 kW	25.96 dBk





# WKAQ-TV Application to Modify Auxiliary Broadcast C.P.

**EXHIBIT 1**  
**August 10, 2018**

## TABULATED ELEVATION PATTERN (Relative Field): ERI ATW26HS7-ESC1-27/28H

Electrical Beam Tilt: 1.25°  
Calculated Maximum Elevation Gain: 26.00 14.47 dBd  
RMS Gain at Horizontal: 9.67 9.86 dBd  
Maximum Main Beam H-Pol. Effective Radiated Power (ERP): 500.0 kW 26.99 dBk  
Maximum Main Beam V-Pol. Effective Radiated Power (ERP): 395.0 kW 25.96 dBk

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.00	0.062	-1.25	0.101	7.5	0.114	22.5	0.040	40.0	0.025	57.5	0.030	75.0	0.029
-9.75	0.065	-1.00	0.132	7.8	0.113	23.0	0.039	40.5	0.020	58.0	0.029	75.5	0.030
-9.50	0.064	-0.75	0.223	8.0	0.109	23.5	0.030	41.0	0.022	58.5	0.027	76.0	0.031
-9.25	0.061	-0.50	0.342	8.3	0.102	24.0	0.028	41.5	0.027	59.0	0.025	76.5	0.032
-9.00	0.057	-0.25	0.475	8.5	0.094	24.5	0.035	42.0	0.030	59.5	0.023	77.0	0.032
-8.75	0.055	0.00	0.610	8.8	0.087	25.0	0.037	42.5	0.027	60.0	0.024	77.5	0.031
-8.50	0.058	0.25	0.736	9.0	0.083	25.5	0.032	43.0	0.022	60.5	0.027	78.0	0.030
-8.25	0.065	0.50	0.846	9.3	0.083	26.0	0.025	43.5	0.020	61.0	0.029	78.5	0.028
-8.00	0.071	0.75	0.929	9.5	0.085	26.5	0.029	44.0	0.025	61.5	0.030	79.0	0.026
-7.75	0.075	1.00	0.982	9.8	0.086	27.0	0.035	44.5	0.029	62.0	0.030	79.5	0.024
-7.50	0.076	<b>1.25</b>	<b>1.000</b>	10.0	0.085	27.5	0.034	45.0	0.029	62.5	0.028	80.0	0.021
-7.25	0.074	1.50	0.984	10.5	0.074	28.0	0.027	45.5	0.025	63.0	0.027	80.5	0.018
-7.00	0.071	1.75	0.935	11.0	0.063	28.5	0.024	46.0	0.020	63.5	0.025	81.0	0.015
-6.75	0.070	2.00	0.860	11.5	0.067	29.0	0.030	46.5	0.021	64.0	0.026	81.5	0.013
-6.50	0.073	2.25	0.766	12.0	0.071	29.5	0.034	47.0	0.026	64.5	0.027	82.0	0.010
-6.25	0.079	2.50	0.663	12.5	0.063	30.0	0.030	47.5	0.029	65.0	0.028	82.5	0.008
-6.00	0.085	2.75	0.560	13.0	0.052	30.5	0.023	48.0	0.028	65.5	0.030	83.0	0.007
-5.75	0.091	3.00	0.466	13.5	0.055	31.0	0.025	48.5	0.024	66.0	0.030	83.5	0.007
-5.50	0.093	3.25	0.390	14.0	0.061	31.5	0.031	49.0	0.021	66.5	0.030	84.0	0.007
-5.25	0.093	3.50	0.333	14.5	0.056	32.0	0.032	49.5	0.021	67.0	0.029	84.5	0.007
-5.00	0.092	3.75	0.295	15.0	0.045	32.5	0.027	50.0	0.026	67.5	0.028	85.0	0.008
-4.75	0.094	4.00	0.268	15.5	0.045	33.0	0.022	50.5	0.029	68.0	0.027	85.5	0.008
-4.50	0.097	4.25	0.247	16.0	0.053	33.5	0.025	51.0	0.029	68.5	0.027	86.0	0.008
-4.25	0.103	4.50	0.227	16.5	0.051	34.0	0.031	51.5	0.026	69.0	0.027	86.5	0.008
-4.00	0.108	4.75	0.209	17.0	0.041	34.5	0.030	52.0	0.022	69.5	0.028	87.0	0.008
-3.75	0.113	5.00	0.192	17.5	0.038	35.0	0.025	52.5	0.021	70.0	0.029	87.5	0.007
-3.50	0.116	5.25	0.179	18.0	0.045	35.5	0.021	53.0	0.024	70.5	0.030	88.0	0.006
-3.25	0.120	5.50	0.169	18.5	0.047	36.0	0.025	53.5	0.028	71.0	0.030	88.5	0.005
-3.00	0.128	5.75	0.161	19.0	0.039	36.5	0.030	54.0	0.030	71.5	0.029	89.0	0.004
-2.75	0.141	6.00	0.151	19.5	0.033	37.0	0.030	54.5	0.029	72.0	0.028	89.5	0.003
-2.50	0.155	6.25	0.142	20.0	0.039	37.5	0.024	55.0	0.026	72.5	0.027	90.0	0.001
-2.25	0.164	<b>6.50</b>	0.131	<b>20.5</b>	0.044	<b>38.0</b>	0.020	<b>55.5</b>	0.022	<b>73.0</b>	0.026		
-2.00	0.164	<b>6.75</b>	0.123	<b>21.0</b>	0.039	<b>38.5</b>	0.024	<b>56.0</b>	0.022	<b>73.5</b>	0.026		
-1.75	0.149	<b>7.00</b>	0.117	<b>21.5</b>	0.030	<b>39.0</b>	0.029	<b>56.5</b>	0.025	<b>74.0</b>	0.026		
-1.50	0.121	<b>7.25</b>	0.115	<b>22.0</b>	0.033	<b>39.5</b>	0.029	<b>57.0</b>	0.028	<b>74.5</b>	0.027		