

TECHNICAL EXHIBIT  
APPLICATION FOR CONSTRUCTION PERMIT  
WKAQ-FM BOOSTER STATION  
FAJARDO, PUERTO RICO

November 29, 2008

CH 284 0.5 KW(MAX-DA) 309 M AMSL

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Engineering Statement

This Technical Exhibit was prepared on behalf of Univision Radio Puerto Rico, Inc. licensee of radio station WKAQ-FM, San Juan, Puerto Rico in support of an application for construction permit for an FM booster station at Fajardo, Puerto Rico. The instant application proposes an effective radiated power (ERP) of 0.5 kW using a directional antenna. The proposed booster facility will operate on Channel 284 (104.7 MHz) with an antenna radiation center height above mean sea level of 309 m. The proposed facility will employ a Scala HDCA-5CP directional transmitting antenna array oriented at 60° True. The proposed operating parameters are shown in Figure 1.

Tower Registration

It is proposed to mount the FM booster antenna in an existing tower with overall height above ground of 24.4 m (80 ft) that has been registered with the FCC (ASRN: 1209135). The proposed tower will be fenced to prevent access from the public to the transmitting antenna.

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 Sabana Seca, Puerto Rico, at a distance of 61.4 kilometers on a bearing of 288° True. The proposed operation will produce field strengths much lower than 10 mV/m at the FCC Sabana Seca, PR station. Therefore, notification to the FCC monitoring station is not necessary.

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Pursuant to Section 73.1030 of the FCC Rules, the Arecibo Observatory located near Arecibo, Puerto Rico was notified of the proposed facility. Copy of the notification letter to the Observatory is included in Appendix 1.

### Environmental Considerations

The proposed facility is categorically excluded from environmental processing pursuant to Section 1.1306 of the FCC Rules. With respect to the potential for human exposure to radio frequency (RF) radiation, a conservative calculation of the FM energy in the downward direction indicates an RF level for the FM Booster of no greater than 2.6% of the FCC uncontrolled standard.\* Since no other significant RF emitter is currently proposed for this tower and the RF exposure is predicted not to exceed the FCC limit for uncontrolled environments, the proposal complies with the FCC limits for human exposure to RF radiation. The applicant shall reduce power or cease operation as necessary to protect persons having access to the fenced area around the tower from RF energy in excess of the FCC guidelines.

### Predicted Coverage Contour

The predicted 54 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 U.S.G.S. 3-second terrain database. The distances to the predicted 54 dBu coverage contour for the proposed booster was 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. Figure 2 is a map showing the predicted 54 dBu coverage contours of the WKAQ-FM main facility and the proposed booster. As indicated in Figure 2, the proposed predicted 54 dBu contour of the booster will be contained within the WKAQ-FM main

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\* This is based on the proposed FM booster antenna radiation center height above ground of 18 m, effective radiated power in each polarization plane of 0.5 kW, and a downward relative field factor of 0.20 for any antenna depression angle greater than 60 degrees. Calculations were made at 2-m AGL according procedures outlined in FCC OET Bulletin No. 65. Calculated combined RF energy will not exceed 5.2 uW/cm<sup>2</sup> according to these assumptions. This is 2.6% of the FCC limit of 200 uW/cm<sup>2</sup> for uncontrolled environments.

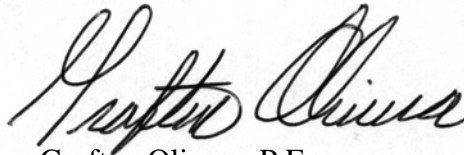
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facility predicted 54 dBu contour over land. The proposed maximum ERP for the booster is well within 20% of the licensed ERP of the primary station.

Allocation Considerations

The closest adjacent-channel FM facility in proximity to the proposed booster are W283BI, an FM translator on Channel 283 in Añasco, Puerto Rico and W285DL, an FM translator on Channel 285 in Hormigueros, Puerto Rico. The 6-dB contour protection requirement is met with respect to both W283BI and W285DL. Therefore, the proposed facility meets the adjacent-channel protection requirements outlined in the FCC Rules. The proposed booster facility meets the other allocation requirements in all respects.



Grafton Olivera, P.E.  
Consulting Engineer

du Treil, Lundin & Rackley, Inc.  
201 Fletcher Ave.  
Sarasota, FL 34237-6019

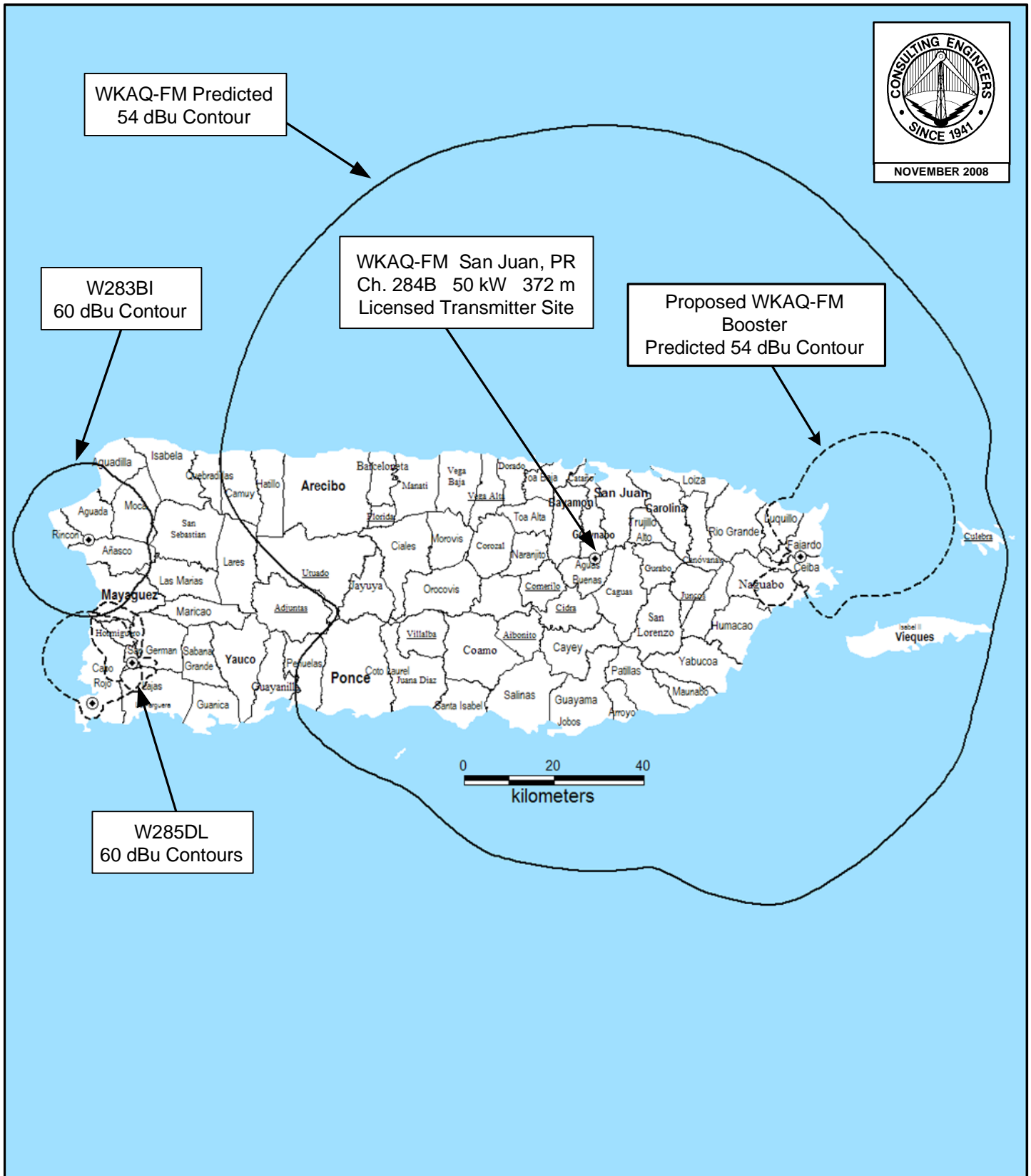
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Engineering Specifications

Channel / Frequency	284 / 104.7 MHz
Site Coordinates	18° 17' 01" North Latitude 65° 40' 29" West Longitude
Site elevation	291.4 m AMSL
Overall height of proposed structure	24.4 m AGL / 315.8 m AMSL
Height of antenna radiation center	18 m AGL / 309 m AMSL
Transmitter	Bext, XT150
Transmitter power output	0.109 kW
Transmission line	Andrew, LDF5-50A
Transmission line length	30 m
Transmission line efficiency	91.9%
Antenna	Scala, HDCA-5CP Array
Polarization	Circular
Power gain	5.0
Antenna input power	0.10 kW
Effective radiated power (H & V)	0.5 kW

Figure 2



**PREDICTED COVERAGE CONTOURS**  
**FM BOOSTER STATION FOR WKAQ-FM**  
**FAJARDO, PUERTO RICO**  
**CH 284 0.5 KW(MAX-DA) 309 M AMSL**  
 du Treil, Lundin & Rackley, Inc. Sarasota, Florida

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Notification Letter  
National Astronomy and Ionosphere Center

*{1 sheet follows}*





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

**Grafton Olivera**  
Direct Dial 941-329-6001  
e-mail: [grifton@dlr.com](mailto:grifton@dlr.com)

November 29, 2008

Via email ([prcz@naic.edu](mailto:prcz@naic.edu))

Dr. Tim Hankins, Director  
Mr. Reinaldo Velez, Spectrum Manager  
National Astronomy and Ionosphere Center  
Arecibo Observatory  
HC3 Box 53995  
Arecibo, PR 00612

Gentlemen:

On behalf of our client, Univision Radio Puerto Rico Inc. licensee of radio station WKAQ-FM, San Juan, Puerto Rico and applicant for an FM booster station in Fajardo, Puerto Rico, in accordance with Section 73.1030 of the FCC Rules, we are hereby notifying of the facility. The particulars of the proposal are as follows:

Proposed Facilities

Geographical coordinates of antenna location (NAD83): 18-16-54.1 / 65-40-27.1  
Antenna radiation center height: 18 m AGL; 309 m AMSL  
Antenna directivity: see attached antenna pattern  
Operating channel: 284 (104.7 MHz)  
Type of emission: F3E  
Effective isotropic radiated power: 0.82 kW (Circular Polarization)

Please review this proposal and if you find any cause of concern, let us know immediately, so appropriate action can be taken.

Please feel free to communicate via email (<mailto:Grafton@dlr.com>), telefax (941-329-6030) or regular mail.

Very truly yours,

Grafton Olivera, P.E.

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Antenna Manufacturer's Pattern Data

*{2 sheets follow}*

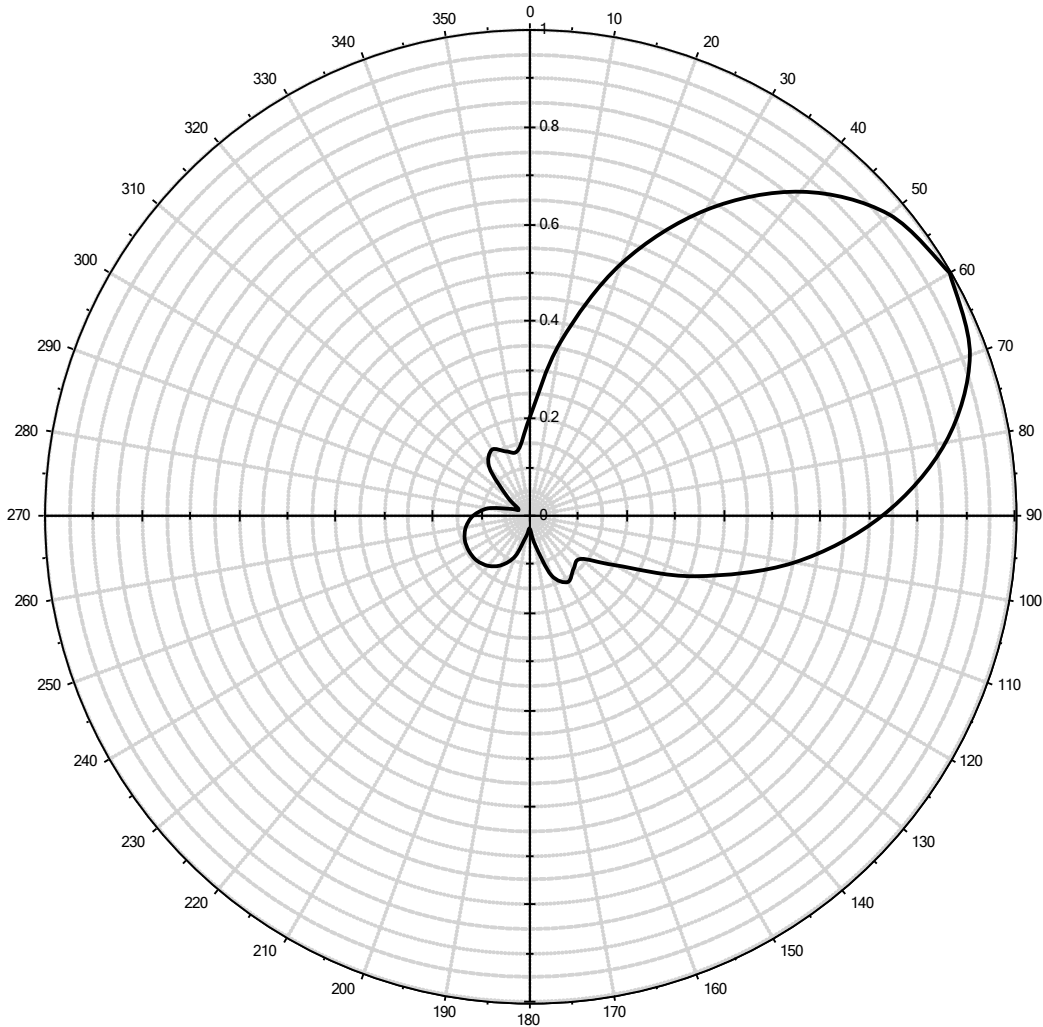
# DA Inquiry

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



**Antenna Pattern:** Antenna ID: 800137

**FM BOOSTER FOR  
WKAQ-FM, SAN JUAN, PR  
104.7 MHz  
(2) HDCA-5CP @ 60°  
Gain: 7.0 dBd**



**Antenna DLR ID: 800137 Rotation: 60.00°**

## Antenna Details:

0°	1.000	60°	0.203	120°	0.027	180°	0.145	240°	0.027	300°	0.203
10°	0.966	70°	0.138	130°	0.042	190°	0.143	250°	0.060	310°	0.363
20°	0.871	80°	0.141	140°	0.088	200°	0.134	260°	0.130	320°	0.553
30°	0.727	90°	0.157	150°	0.117	210°	0.117	270°	0.157	330°	0.727
40°	0.553	100°	0.130	160°	0.134	220°	0.088	280°	0.141	340°	0.871
50°	0.363	110°	0.060	170°	0.143	230°	0.042	290°	0.138	350°	0.966

**Antenna Make:** SCALA

**Standard Pattern:**

**Antenna Model:** HDCA-5CP Array

**Last Change Date:**

## HDCA-5CP/RM

### FM YAGI ANTENNA

4.5 dBd gain

88 to 108 MHz

Circularly polarized

The Kathrein-Scala HDCA-5CP/RM is a ruggedly built yagi antenna, designed for professional FM transmit and receive applications.

Like all Kathrein-Scala antennas, the HDCA-5CP/RM is made of the finest materials resulting in superior performance and long service life.

The HDCA-5CP/RM may be used stand-alone or in stacked arrays for higher gain, increased side-lobe suppression, or custom azimuth patterns.

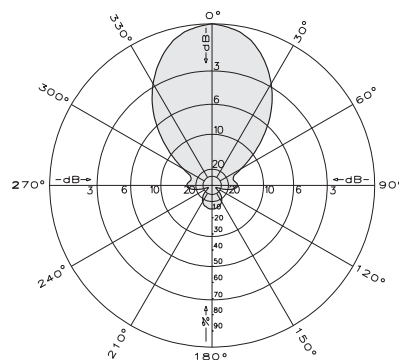
#### Specifications:

Frequency range	Any specified FM channel 88 to 108 MHz
Gain	4.5 dBd
Impedance	50 or 75 ohms
VSWR	< 1.5:1
Polarization	Circular
Front-to-back ratio	>14 dB
Maximum input power	100 watts (75Ω N) 250 watts (50Ω N)
Azimuth pattern	62 degrees (half-power)
Elevation pattern	62 degrees (half-power)
Connector	50Ω N or 75Ω N
Weight	34.5 lb (15.6 kg)
Dimensions	74.1 x 54 x 51 inches maximum (1882 x 1372 x 1295 mm)
Equivalent flat plate area	2.69 ft <sup>2</sup> (0.25 m <sup>2</sup> ) maximum
Wind survival rating*	100 mph (160 kph)
Shipping dimensions	84 x 13 x 8 inches maximum (2134 x 330 x 203 mm)
Shipping weight	37.5 lb (15.6 kg)
Mounting	For masts of 2.375 inches (60 mm) OD.

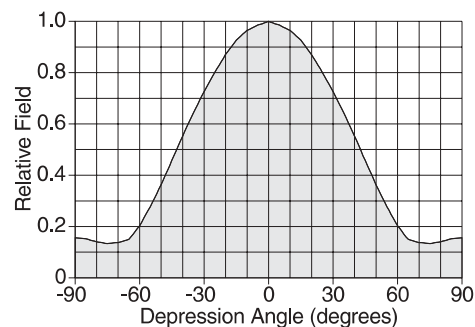
\* Mechanical design is based on environmental conditions as stipulated in EIA-222-F (June 1996) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

#### Order Information:

Contact Kathrein-Scala Customer Service for detailed order information.



**Azimuth pattern (E-plane)**



10768-A