



A & E ELECTRONICS

CONSULTING ENGINEERS

**ENGINEERING EXHIBIT
IN SUPPORT OF
APPLICATION FOR FM CONSTRUCTION PERMIT
INTERNATIONAL BROADCASTING CORP.
FM BROADCAST STATION WVOZ-FM
CAROLINA, PUERTO RICO
CH. 299B, 50 kW ERP (H+V), 283 m HAAT**

May 1, 2009

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ENGINEERING STATEMENT

This Engineering Exhibit has been prepared in accordance with the Rules of the Federal Communications Commission on behalf of **INTERNATIONAL BROADCASTING CORP.**, licensee of FM Broadcast Station **WVOZ-FM**, Carolina, Puerto Rico, in support of its Application for Construction Permit to make minor changes to its presently authorized operation. These changes specifically propose to change **WVOZ-FM**'s present transmitter location at El Yunque peak to a new site located approximately 32 kilometers West from the present site. At this new site in Aguas Buenas, Puerto Rico, the station will continue to operate on channel 299B as currently assigned, and to provide 70 dBu service over the entire Community of License, Carolina. The effective height of the Antenna Radiation Center is reduced to be 283 m AAT and the power is increased to be 50 kW ERP (H+V). The location proposed is at the existing site and transmitter building facilities currently used by stations **WSJU-DT, Ch.31**, and **WTCV-DT, Ch.18**. At this site minimum separation requirements specified in §73.207(b)(1) Table A are satisfied to the main facility of third adjacent channel **WCMN-FM** (Ch. 297B), as well as to 54th channel **WNRT(FM)** (245B). However, the Auxiliary Antenna facility of **WCMN-FM (FS)** lies 4.89 kilometers short of the required clearance of 74 kilometers specified in §73.207(b)(1) from the transmitter site proposed herein. This deficiency falls 1.1 kilometers within the buffer distance of 6 kilometers to the 68 kilometers clearance specified in order to apply pursuant to the

provisions contained in §73.215(e) for short-space antenna location between 3rd adjacent Class B facilities as in the instant case. Although the short-spacing is to a Auxiliary Antenna facility, 50 kW ERP were assumed for this facility at its presently authorized site which, in conjunction with the parameters proposed in the **INTERNATIONAL BROADCASTING CORP.** application, were object of an interference analysis, included herein, to show compliance with the interference requirement prohibiting any overlap between the interfering and protected contours as delimited in §73.215(a)(4) for stations in Puerto Rico.

Proposed location

As proposed, **WVOZ-FM** shall be relocated to the existing facilities of stations **WSJU-DT, Ch.31**, and **WTCV-DT, Ch.18**, 32 kilometers West from the currently licensed site. The geographical NAD27 coordinates are:

18° 16' 30" North Latitude

66° 5' 36" West Longitude

This location is on a bearing of 70 km \angle 276°T to the Arecibo Observatory Quiet Zone, and 24.4 km \angle 325°T to the FCC's Sábana Seca monitoring station. A letter signed by Mr. Reinaldo Velez, Spectrum Manager at the Observatory, is included in the Appendix to the instant Engineering Exhibit, stating that their analysis of the proposed relocation and operation for **WVOZ-FM**, indicates that harmful interference is unlikely to occur on their facility.

In regard to the FCC Sábana Seca monitoring station, the predicted field strength at its location is 17.8 mV/m, thus exceeding the limit of 10 mV/m required in §73.1030(c)(1) of the Rules. Therefore, pursuant to the provisions of §73.1030(c)(2), advise was sought from the Chief of the Compliance and

Information Bureau of the FCC yielding no response, and as result the Mass Media Enforcement Office referred the inquiry to its Spectrum Enforcement Division. There, Mr. Gabriel Collazo advised that upon review of the instant proposal by the FCC Engineering Staff, they would seek advise from the Spectrum Enforcement Division where final determination of conditions for grant (if any) shall be made. Mr. Collazo also mentioned that the absolute maximum field strength permitted from FM Broadcast Stations at the FCC monitoring station is 27mv/m.

The proposed site elevation is 450 meters AMSL and is particularly adequate in order to achieve line-of-sight over a wide range of the Northern and Northeastern coast where the Principal Community of Carolina lies. Figure 1 shows the present and proposed 70 dBu contours encompassing the entire Community of License.

Allocation study

Table I contains current pertinent data downloaded from the FCC database for analysis pursuant to the provisions of §§73.207(b)(1), 73.215(a)(4) & 73.215(e). The proposed site is clear to the licensed location of **WRNT(FM)**, the 54th channel down from **WVOZ-FM** assigned channel 299B; no assignment exists on the 53rd channel. No co-channel, first or second adjacent channels exist and the proposed location is clear, as per minimum separation requirements contained in §73.207(b)(1), to third adjacent channel **WCMN-FM** at its currently authorized main facility location. However, the proposed changes bring **WVOZ-FM** 4.89 kilometers short of compliance with that section to **WCMN-FM**'s auxiliary antenna authorized location. The allocation coordinates are also short to the proposed site, but this location is already precluded from use by **WCMN-FM**'s own current licensed main facility. The changes proposed were analyzed in accordance with the rules pertaining to short-spaced locations since

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these changes do comply with the minimum short-spacing buffer specification as stated in §73.215(e). Therefore, pursuant to the provisions contained in §73.215(a)(4) of the Rules for Puerto Rico and the US Virgin Islands, and assuming 50 kilowatts ERP (16.9 dBk higher than currently authorized) from the licensed **WCMN-FM** auxiliary antenna, calculations were done to determine the distances to each station's 64 dBu F(50,50) protected and the 104 dBu F(50,10) interfering contours as defined in the table in §73.215(a)(4), and sufficient radials studied as required in §73.215(a)(3), at one degree intervals in all critical bearings. Thus, it was determined that no prohibited overlap would be created on land as a result of a grant of the changes proposed herein (See Table I). Figure 2 is a map where each station's protected and interfering contours have been plotted as a graphical representation of the results of the calculations described above showing that no prohibited overlap would occur over land.

Proposed operation

The operation of the proposed transmission system will consist of a non-directional circularly polarized 10 bay FM antenna to be side mounted, with Antenna Center of Radiation to be 45 meters AGL, on the top section of the existing tower shared by the DTV stations mentioned earlier. The transmitter, transmission line and antenna parameters shall be adjusted so as not to exceed the limit of 50 kW ERP in any direction. The Antenna Center of Radiation will be 495 meters Above Mean Sea Level (AMSL) yielding a HAAT of 283 meters. At this height the antenna structure does not increase the overall height of the supporting structure as depicted in Figure 3.

Coverage contours

The distances to the 60 dBu F(50,50) coverage contour were calculated by means of computer software which implements the procedures specified in the FCC Rules. The data determining the

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average elevation over the span of 3 to 16 kilometers were used, and the distance to the service contour in each radial direction was determined by employing the antenna height above average terrain in the particular direction, in conjunction with the effective radiated power and the F(50,50) curves of the FCC Rules. Figure 1 is a map, included as part of this Engineering Exhibit, which presents the extension of the 60 dBu contour, thus determined, plotted to scale on the chart. Similarly the F(50,50) present 60 dBu contour and the 70 dBu contour have been plotted on the same map for reference and comparison.

Potential interference

No AM Standard Broadcast Stations are located within 3.2 kilometers of the site. Multiple DTV Broadcast Stations are installed on the same antennae supporting structure of the FM antenna system proposed for **WVOZ-FM**, Carolina. **WSJU-DT**, channel 31 and **WTCV-DT**, channel 18 are installed at the 32 meter AGL and the 25 meter AGL respectively. No adverse effects or inter-modulation products are expected to occur as a result of the implementation or the construction proposed. If, however, such undesired interference effects should occur that would impair the current operations and reception of signals currently received uneventfully, then, the applicant assumes full responsibility for the elimination of all such interference at its own cost. A specific statement to this commitment is included in the Appendix to the instant Engineering Exhibit.

Environmental considerations

The area in the selected site is of rural nature and there are several radio services operations established in the area, including the tower, equipment building, transmitter and antenna system of the DTV Broadcast Stations as mentioned above. No construction activities which could result in significant environmental impact are deemed necessary.

Calculations were performed to determine the combined environmental impact of the proposed **WVOZ-FM** operation with other broadcast operations already on the site. An approximation of the power density to be expected below the proposed antenna system, was determined by substituting, into equation (10), page 23 of the Office of Engineering and Technology's (**OET**) Bulletin No. 65, Edition 97-01, August, 1997, the corresponding average total ERP, including the sum of its horizontal and vertical components, and a 0.05 field factor, representing the highest predictable electric field relative to the main lobe value, to be radiated from the proposed JAMPRO model JHPC ten bay antenna in the neighborhood below the antenna, 2 meters above ground level, yields the following result:

$$S_{\text{WVOZ-FM}} = \frac{33.4(0.05)^2 \times (50,000_{\text{Hor}} + 50,000_{\text{Vert}})W}{(43\text{m})^2} = 4.52 \mu\text{W}/\text{cm}^2$$

DTV Broadcast Station **WSJU-DT** holds a CP for which a modification to increase its power to be 66 kW in the main lobe with a electrical beam tilt of 0.5 degrees has been filed. The proposed DTV antenna is a JAMPRO model JA/MS-8-SHP horizontally polarized slot antenna for operation on channel 31 (572-578 MHz). The corresponding average total ERP of 66 kW to be horizontally radiated in the main lobe, and a 0.15 field factor, representing the highest predictable electric field relative to the main lobe value to be radiated from the proposed eight slot antenna in the neighborhood below the antenna, 2 meters above ground level as per the procedures described above yields:

$$S_{\text{WSJU-DT}} = \frac{33.4(0.15)^2 \times (66,000)W}{(30\text{m})^2} = 55.11 \mu\text{W}/\text{cm}^2$$

DTV Broadcast Station **WTCV-DT** currently operates pursuant to a STA with a average ERP of 1.06 kW non-directional with horizontal polarization on channel 18. Its licensee holds a CP to move to El Yunque peak approximately 32 kilometers East from this site and changed channel to be 32. The corresponding average ERP of 1.06 kW horizontally radiated omni-directionally, and a unity field

factor, representing the highest predictable electric field value to be radiated from the unknown antenna, in the neighborhood below the antenna, 2 meters above ground level as per the procedures stated above yields:

$$S_{\text{WTCV-DT}} = \frac{33.4(1.0)^2 \times (1,060)W}{(23\text{m})^2} = 66.93 \mu\text{W}/\text{cm}^2$$

The composite value of $126.56 \mu\text{W}/\text{cm}^2$ of the resulting power densities represents 63.3% of the $200 \mu\text{W}/\text{cm}^2$ limit established in the guidelines for general public/uncontrolled exposure, and therefore complying with established environmental requirements.

The proximity of high energy RF fields in the immediate neighborhood of the antennae and the proposed DTV facility, demands that measures be taken to ensure that the exposure of workers to RF radiation is maintained within safe limits whenever they are required to perform inspections, maintenance, or installation of equipment at either ground level or in the antennae supporting structures at levels above ground. As a safety measure, **INTERNATIONAL BROADCASTING CORP.** proposes to post on existing structures, equipment buildings and fences, appropriate warning signs, and to coordinate the installation, and sub-sequently, maintenance and operation of the proposed tower and associated equipment, with the management of the tower facilities, as well as with that of the other DTV broadcast stations installed, to ensure minimum exposure to workers, by scheduling installation tasks during off-air times of these stations whenever possible and practical, as well as by reduction of power to safe limits whenever jobs are required to be done during on-air time of any of the stations as well as the proposed station.

Alberto Pereira, PE Date
Consulting Electronics Engineer

APPENDIX

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POTENTIAL INTERFERENCE STATEMENT

The proposed site is in itself a multiple radio communications center, and actual operations have shown no interference to other services or intermodulation products or any other spurious emissions have developed and no such adverse effects are expected to occur as a result of the proposed **WVOZ-FM** operation. If, however, objectionable effects should occur as a result of the implementation of the proposed construction, then **INTERNATIONAL BROADCASTING CORP.** agrees to accept full responsibility for the elimination of any objectionable effect, including that caused by receiver-induced or other types of modulation, to existing or authorized facilities, and radio receivers in use prior to a grant of this application.