

CircuitWerkes, Inc.

2805 NW 6th Street, Gainesville, FL 32609

(352) 371-3456 / (fax) 380-0230

Exhibit EE-1: Engineering Statement in support of
FCC FORM 349

APPLICATION FOR AUTHORITY TO CONSTRUCT OR MAKE CHANGES IN AN FM TRANSLATOR OR FM BOOSTER
STATION
(For a New FM Translator)

This Exhibit supports minor modifications, to existing application BPFT-20170718AES that was dismissed for Translator W223CJ by Circuitwerkes, Inc. (the Applicant) serving the community of West Palm Beach, FL. The facility ID is 158103.

The applicant seeks reconsideration of the dismissal and hereby modifies its application so that the proposed translator's service contour remains within the 25 mile ring around AM station WSVU.

Only the antenna pattern has been modified so as to remain within the WSVU 25 mile ring. No other changes are requested at this time.

The predicted 60dBu contour of the proposed facility overlaps portions of the licensed 60dBu contour, as it did previously. The requested changes constitute a minor modification of the licensed facility.

The proposed facility is in compliance with 47 C.F.R. Section 1.1306 with regards to radio-frequency electromagnetic exposure in that the contribution to the rf environment is less than 5% of the maximum public exposure.

This application was prepared using FCC 3-arc-second terrain data.

This translator is a fill in for WSVU (facility ID 129188). Figure 3 shows that the W223CJ 1mV service contour is within the WSVU 25 mile ring.

Figure 1 is a color coded map showing the protected contours and interfering contours of all relevant FM facilities. No prohibited overlap exists between this proposed facility and any other facility on co-channel or a 1st adjacency. The 100dBu interfering contour overlaps 3rd adjacent WFEZ and 2nd adjacent WRLX. A "Living Way" waiver is requested and engineering data demonstrating that there is no interference to any occupied structure or major road is included.

Figure 4 demonstrates that there is overlap of the 60dBu contours between the original location and this proposal.

The proposal is sufficiently distant from all facilities mentioned in 73.1030(a), (b) & (c) so that notification under 73.1030 is not required.

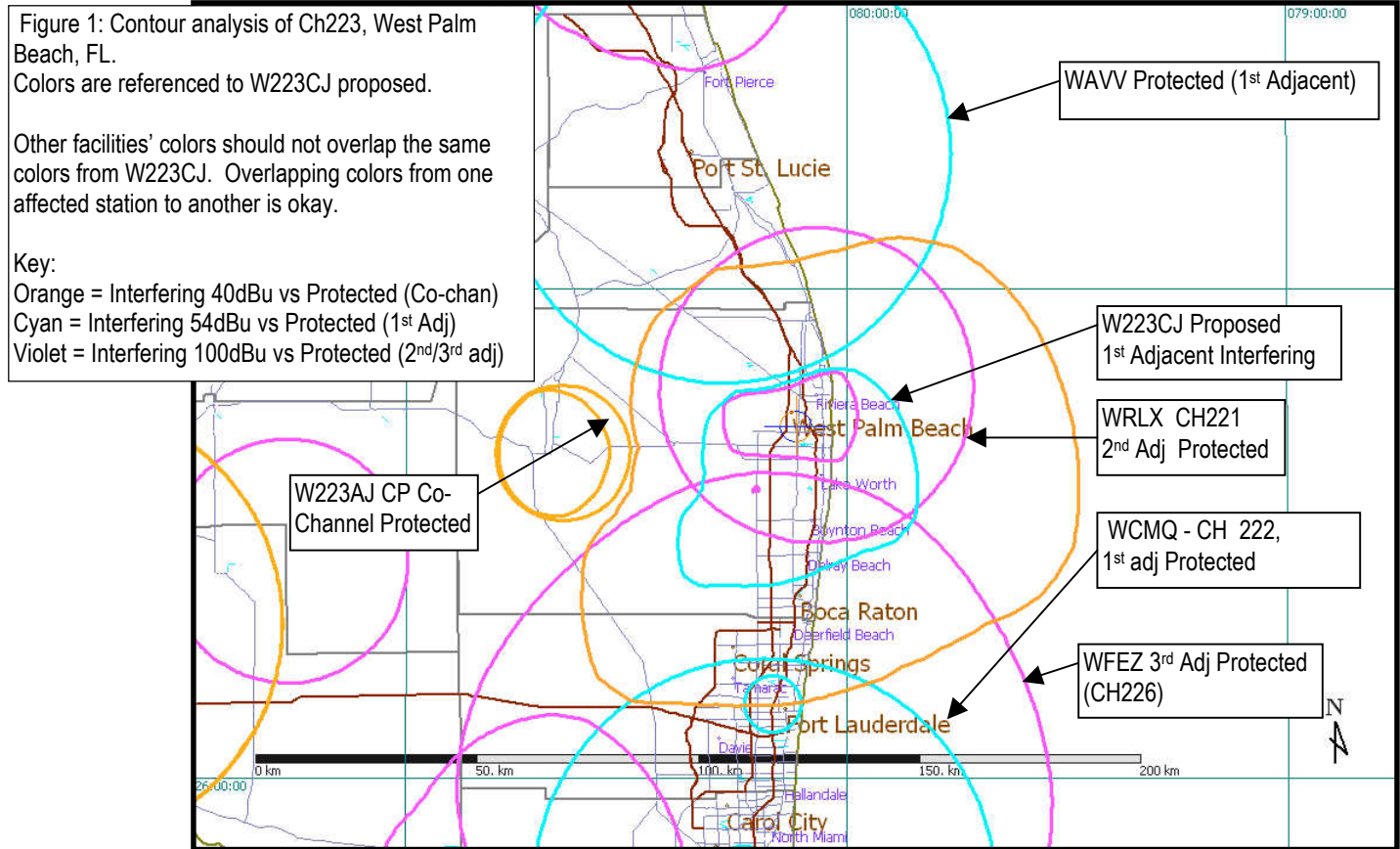
Kyle Magrill, President/applicant

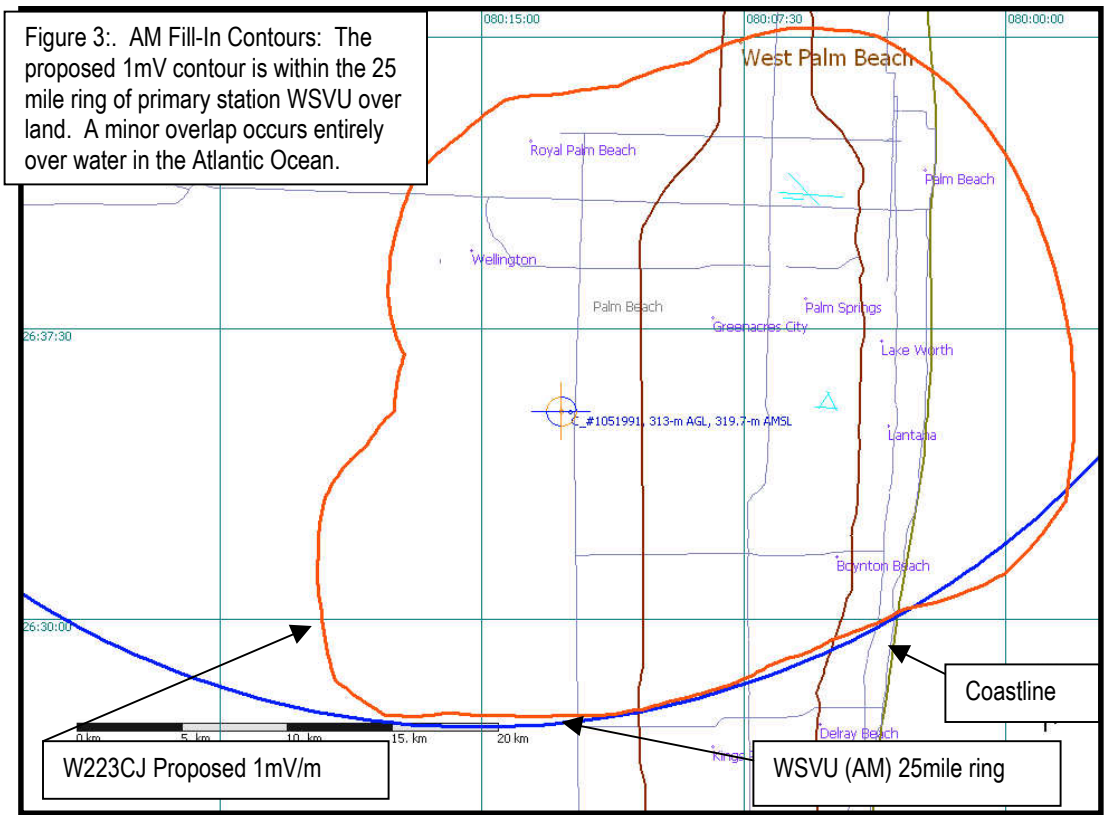
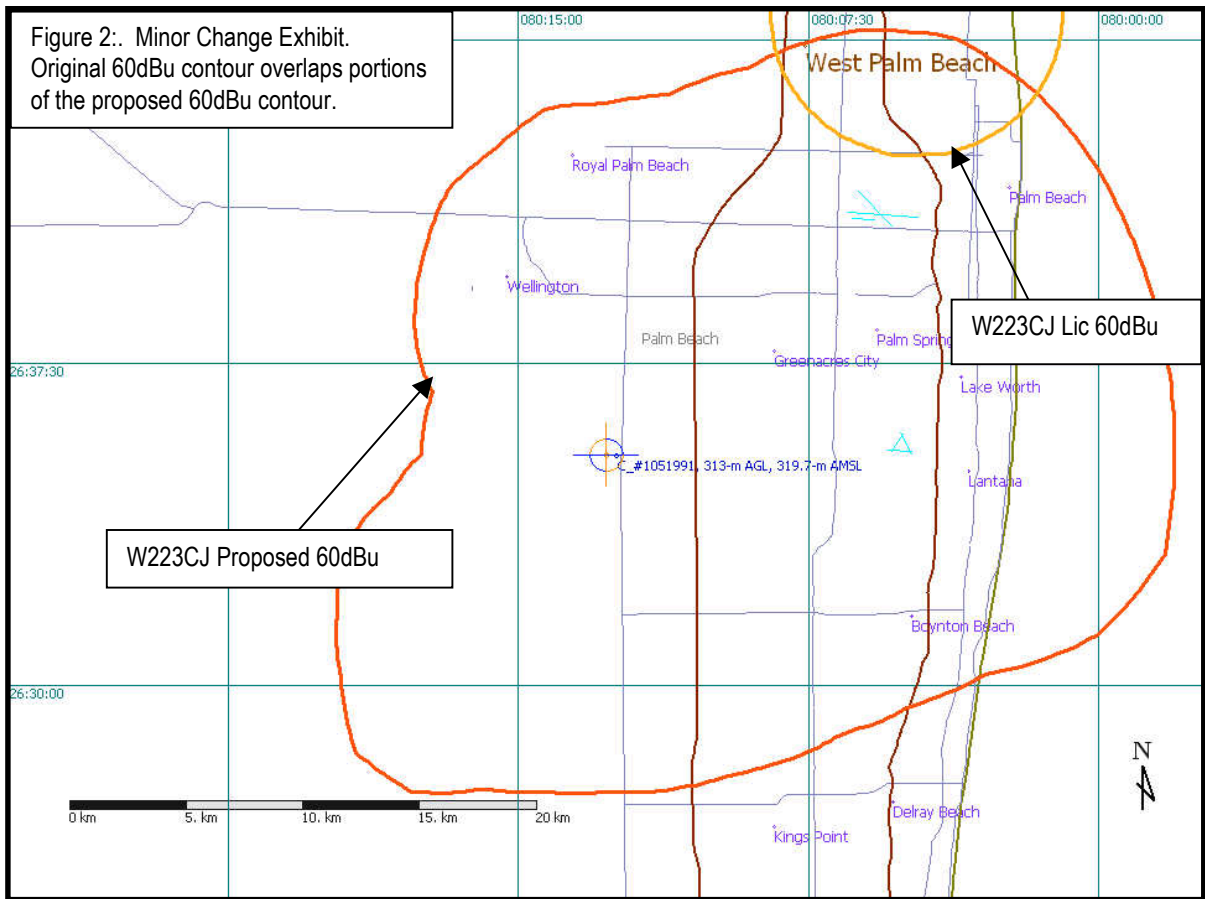
26 March 2018

CircuitWerkes, Inc.
2805 NW 6th Street
Gainesville, FL 32609
352-335-6555

Background:

Translator CP W223CJ is inside the West Palm Beach radio market. This application modifies application # BPFT-20170718AES and changes the antenna pattern. The applicant will accept any interference caused as a result of operations on channel 223.





'Living Way Waiver' Requested:

The 100dBu interfering contour of the proposed facility is within the protected contours of 2nd Adjacent WRLX and 3rd Adjacent WFEZ. WFEZ has the weaker signal of the two, so demonstrating that no interference occurs to WFEZ also proves no interference exists to WRLX. Based on FCC interference rules (+40dB threshold over a protected 60dBu contour) no second or third adjacent interference can be caused outside of a proposal's 100 dBu F(50,10) contour. In this case, the W223CJ proposed interfering contour is entirely contained within the WFEZ 61dBu contour. Within the area of possible interference, WFEZ's lowest predicted contour is 61dBu. This makes the worst case threshold of interference 101.7dBu ($61 + 40 = 101$), or higher. 101dBu is the signal level that cannot intersect any occupied buildings or significant roadways.



Figure 6 is a map showing the relevant contours.

A directionalized, two-bay, half-wave spaced, antenna is proposed, such as a Shively model 6812.

Study 1:

Terms and Methodology

Max ERP: The power specified in the application, expressed in kW.

Angle below the Horizon: The radiation angle below the antenna's horizontal plane.

Field at Angle: The field supplied by the antenna manufacturer for each Angle below the Horizon.

ERP at Angle: The ERP for an Angle given Max ERP & Field:

$$\text{ERP@Angle} = \text{Max ERP} * \text{Field}^2$$

Signal at Point: The predicted signal level assuming Free

Space attenuation at a point:

$$\text{Signal} = 106.92 - (20 * \text{Log}(\text{Dist}(\text{km}))) + (10 * \text{Log}(\text{ERP@Angle}(\text{kW})))$$

$$\text{Log}(\text{ERP@Angle}(\text{kW})))$$

Distance to Point: The radiation path distance from the antenna to a point.

$$\text{DistToPoint} = \text{Antenna Rad Center in meters AGL} / (\cos(90^\circ - \text{Angle}^\circ))$$

Distance From Tower: The distance from the tower base to a point.

$$\text{DistToPoint} * \sin(90^\circ - \text{Angle}^\circ)$$

Interference Threshold = Protected station's predicted contour value at a point +40dBu

Over Threshold: The amount that the Proposal's signal exceeds the interference threshold.

$$\text{OverThresh} = \text{Signal} - \text{Interference Threshold value}$$

A negative Over Threshold value indicates no interference at the point.

Notes:

When finding a value for a point two meters above ground, then: $\text{DistToPoint} = \text{Antenna Rad Center in meters above the plane, not ground} / (\cos(90^\circ - \text{Angle}^\circ))$. Subtracting 2 meters from the antenna RC yields the desired result.

The application proposes 240W and must protect the WFEZ 61dBu contour, however the analysis was done at 250W which is more stringent than the requirement. Passing this analysis means that the proposal also passes the actual predicted conditions.

Results:

Table A (below) shows the angle and distance to a point 2meters AGL from the proposed antenna. The field strength is calculated at each end point and compared to the worst case protected contour of WFEZ (61dBu). Using the manufacturer's field data for the specified antenna, the results show that, at no point on (or near) the ground, will the signal level from the proposed facility exceed the interference threshold of 101dBu. No elevated public roads nor occupied multi-story buildings extend into the zone of interference. The zone of interference does not approach the ground and does not extend to any adjacent property. It can be concluded that no interference is predicted to occur to WFEZ or to WRLX as a result of this proposal. This study was run at 250W, but only 240W is proposed, therefore passing this study also passes at the reduced power of 240W.

Exhibit EE-1, Study 1, W223CJ tower Diagram

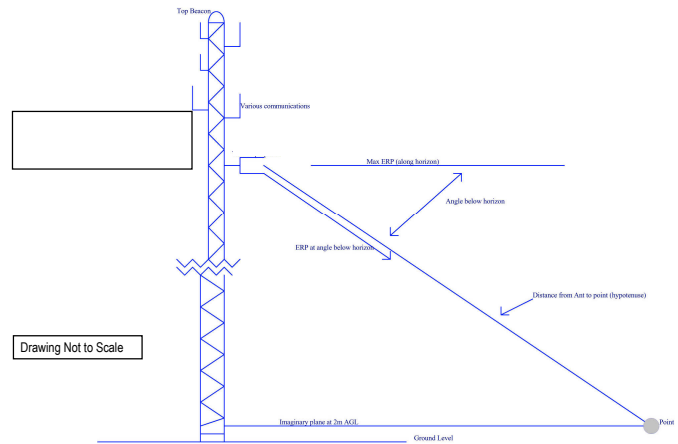


Table A D/U Analysis of Channel 223 for W223CJ vs WFEZ

Ch223

Shively 6812B

2 bay 1/2 Wave

358m
AGL

Threshold= 101.00

| Maxi- mum ERP (kW) | Angle below Horizon (de- grees) | Field at Angle | ERP at Angle (kW) | Field at Point (dB(uV)) | Distance to point (meters) | Distance from Tower (meters) | Over Thresh- old (dBuV) | Threshold AGL+2M | |
|--------------------------|---|-------------------|-------------------------|-------------------------------|----------------------------------|---------------------------------------|----------------------------------|------------------|---------|
| 0.250 | 0 | 1.000 | 0.250 | | | | | | |
| 0.250 | 1 | 0.999 | 0.250 | 74.72 | 20341.03 | 20337.94 | -26.28 | 101 | 355.000 |
| 0.250 | 2 | 0.998 | 0.249 | 80.73 | 10172.07 | 10165.87 | -20.27 | 101.000 | 355.000 |
| 0.250 | 3 | 0.995 | 0.248 | 84.23 | 6783.10 | 6773.80 | -16.77 | 101.000 | 355.000 |
| 0.250 | 4 | 0.992 | 0.246 | 86.70 | 5089.13 | 5076.74 | -14.30 | 101.000 | 355.000 |
| 0.250 | 5 | 0.987 | 0.244 | 88.59 | 4073.17 | 4057.67 | -12.41 | 101.000 | 355.000 |
| 0.250 | 6 | 0.981 | 0.241 | 90.11 | 3396.20 | 3377.60 | -10.89 | 101.000 | 355.000 |
| 0.250 | 7 | 0.975 | 0.238 | 91.39 | 2912.96 | 2891.24 | -9.61 | 101.000 | 355.000 |
| 0.250 | 8 | 0.967 | 0.234 | 92.47 | 2550.78 | 2525.96 | -8.53 | 101.000 | 355.000 |
| 0.250 | 9 | 0.958 | 0.229 | 93.41 | 2269.32 | 2241.38 | -7.59 | 101.000 | 355.000 |
| 0.250 | 10 | 0.949 | 0.225 | 94.23 | 2044.36 | 2013.31 | -6.77 | 101.000 | 355.000 |
| 0.250 | 11 | 0.938 | 0.220 | 94.95 | 1860.50 | 1826.32 | -6.05 | 101.000 | 355.000 |
| 0.250 | 12 | 0.927 | 0.215 | 95.59 | 1707.46 | 1670.14 | -5.41 | 101.000 | 355.000 |
| 0.250 | 13 | 0.915 | 0.209 | 96.17 | 1578.12 | 1537.67 | -4.83 | 101.000 | 355.000 |
| 0.250 | 14 | 0.902 | 0.203 | 96.67 | 1467.42 | 1423.83 | -4.33 | 101.000 | 355.000 |
| 0.250 | 15 | 0.888 | 0.197 | 97.12 | 1371.61 | 1324.88 | -3.88 | 101.000 | 355.000 |
| 0.250 | 16 | 0.847 | 0.179 | 97.26 | 1287.92 | 1238.03 | -3.74 | 101.000 | 355.000 |
| 0.250 | 17 | 0.858 | 0.184 | 97.88 | 1214.21 | 1161.15 | -3.12 | 101.000 | 355.000 |
| 0.250 | 18 | 0.843 | 0.178 | 98.21 | 1148.80 | 1092.58 | -2.79 | 101.000 | 355.000 |
| 0.250 | 19 | 0.826 | 0.171 | 98.49 | 1090.40 | 1030.99 | -2.51 | 101.000 | 355.000 |
| 0.250 | 20 | 0.809 | 0.164 | 98.73 | 1037.95 | 975.35 | -2.27 | 101.000 | 355.000 |
| 0.250 | 21 | 0.791 | 0.156 | 98.94 | 990.60 | 924.81 | -2.06 | 101.000 | 355.000 |
| 0.250 | 22 | 0.773 | 0.149 | 99.13 | 947.66 | 878.66 | -1.87 | 101.000 | 355.000 |
| 0.250 | 23 | 0.754 | 0.142 | 99.28 | 908.55 | 836.33 | -1.72 | 101.000 | 355.000 |
| 0.250 | 24 | 0.735 | 0.135 | 99.41 | 872.80 | 797.34 | -1.59 | 101.000 | 355.000 |
| 0.250 | 25 | 0.716 | 0.128 | 99.51 | 840.00 | 761.30 | -1.49 | 101.000 | 355.000 |
| 0.250 | 26 | 0.696 | 0.121 | 99.58 | 809.82 | 727.86 | -1.42 | 101.000 | 355.000 |
| 0.250 | 27 | 0.676 | 0.114 | 99.63 | 781.95 | 696.73 | -1.37 | 101.000 | 355.000 |
| 0.250 | 28 | 0.656 | 0.108 | 99.67 | 756.17 | 667.66 | -1.33 | 101.000 | 355.000 |
| 0.250 | 29 | 0.636 | 0.101 | 99.68 | 732.25 | 640.44 | -1.32 | 101.000 | 355.000 |
| 0.250 | 30 | 0.615 | 0.095 | 99.65 | 710.00 | 614.88 | -1.35 | 101.000 | 355.000 |
| 0.250 | 31 | 0.594 | 0.088 | 99.61 | 689.27 | 590.82 | -1.39 | 101.000 | 355.000 |
| 0.250 | 32 | 0.574 | 0.082 | 99.56 | 669.91 | 568.12 | -1.44 | 101.000 | 355.000 |
| 0.250 | 33 | 0.553 | 0.076 | 99.47 | 651.81 | 546.65 | -1.53 | 101.000 | 355.000 |
| 0.250 | 34 | 0.532 | 0.071 | 99.36 | 634.84 | 526.31 | -1.64 | 101.000 | 355.000 |
| 0.250 | 35 | 0.512 | 0.066 | 99.25 | 618.92 | 506.99 | -1.75 | 101.000 | 355.000 |
| 0.250 | 36 | 0.491 | 0.060 | 99.10 | 603.96 | 488.62 | -1.90 | 101.000 | 355.000 |
| 0.250 | 37 | 0.471 | 0.055 | 98.94 | 589.88 | 471.10 | -2.06 | 101.000 | 355.000 |
| 0.250 | 38 | 0.451 | 0.051 | 98.77 | 576.62 | 454.38 | -2.23 | 101.000 | 355.000 |
| 0.250 | 39 | 0.431 | 0.046 | 98.56 | 564.10 | 438.39 | -2.44 | 101.000 | 355.000 |
| 0.250 | 40 | 0.411 | 0.042 | 98.33 | 552.28 | 423.07 | -2.67 | 101.000 | 355.000 |
| 0.250 | 41 | 0.391 | 0.038 | 98.08 | 541.11 | 408.38 | -2.92 | 101.000 | 355.000 |
| 0.250 | 42 | 0.372 | 0.035 | 97.82 | 530.54 | 394.27 | -3.18 | 101.000 | 355.000 |
| 0.250 | 43 | 0.353 | 0.031 | 97.53 | 520.53 | 380.69 | -3.47 | 101.000 | 355.000 |
| 0.250 | 44 | 0.335 | 0.028 | 97.23 | 511.04 | 367.61 | -3.77 | 101.000 | 355.000 |
| 0.250 | 45 | 0.317 | 0.025 | 96.91 | 502.05 | 355.00 | -4.09 | 101.000 | 355.000 |

Shively 6812B

2 bay 1/2 Wave

335m
AGL

Threshold= 101.50

| Maximum ERP | Angle below Horizon | Field at Angle | ERP at Angle | Field at Point | Distance to point | Distance from Tower | Over (dBuV) | | |
|----------------|---------------------------|-------------------|-----------------|-------------------|----------------------|---------------------------|-------------|---------|---------|
| 0.250 | 46 | 0.300 | 0.023 | 96.58 | 493.51 | 342.82 | -4.42 | 101.000 | 355.000 |
| 0.250 | 47 | 0.282 | 0.020 | 96.18 | 485.40 | 331.04 | -4.82 | 101.000 | 355.000 |
| 0.250 | 48 | 0.266 | 0.018 | 95.81 | 477.70 | 319.64 | -5.19 | 101.000 | 355.000 |
| 0.250 | 49 | 0.249 | 0.016 | 95.37 | 470.38 | 308.60 | -5.63 | 101.000 | 355.000 |
| 0.250 | 50 | 0.234 | 0.014 | 94.96 | 463.42 | 297.88 | -6.04 | 101.000 | 355.000 |
| 0.250 | 51 | 0.219 | 0.012 | 94.51 | 456.80 | 287.47 | -6.49 | 101.000 | 355.000 |
| 0.250 | 52 | 0.204 | 0.010 | 94.02 | 450.50 | 277.36 | -6.98 | 101.000 | 355.000 |
| 0.250 | 53 | 0.190 | 0.009 | 93.52 | 444.51 | 267.51 | -7.48 | 101.000 | 355.000 |
| 0.250 | 54 | 0.176 | 0.008 | 92.96 | 438.80 | 257.92 | -8.04 | 101.000 | 355.000 |
| 0.250 | 55 | 0.163 | 0.007 | 92.41 | 433.37 | 248.57 | -8.59 | 101.000 | 355.000 |
| 0.250 | 56 | 0.151 | 0.006 | 91.85 | 428.21 | 239.45 | -9.15 | 101.000 | 355.000 |
| 0.250 | 57 | 0.139 | 0.005 | 91.23 | 423.29 | 230.54 | -9.77 | 101.000 | 355.000 |
| 0.250 | 58 | 0.127 | 0.004 | 90.54 | 418.61 | 221.83 | -10.46 | 101.000 | 355.000 |
| 0.250 | 59 | 0.116 | 0.003 | 89.85 | 414.15 | 213.31 | -11.15 | 101.000 | 355.000 |
| 0.250 | 60 | 0.106 | 0.003 | 89.15 | 409.92 | 204.96 | -11.85 | 101.000 | 355.000 |
| 0.250 | 61 | 0.096 | 0.002 | 88.38 | 405.89 | 196.78 | -12.62 | 101.000 | 355.000 |
| 0.250 | 62 | 0.087 | 0.002 | 87.60 | 402.06 | 188.76 | -13.40 | 101.000 | 355.000 |
| 0.250 | 63 | 0.079 | 0.002 | 86.84 | 398.43 | 180.88 | -14.16 | 101.000 | 355.000 |
| 0.250 | 64 | 0.071 | 0.001 | 85.99 | 394.97 | 173.15 | -15.01 | 101.000 | 355.000 |
| 0.250 | 65 | 0.063 | 0.001 | 85.03 | 391.70 | 165.54 | -15.97 | 101.000 | 355.000 |
| 0.250 | 66 | 0.056 | 0.001 | 84.07 | 388.60 | 158.06 | -16.93 | 101.000 | 355.000 |
| 0.250 | 67 | 0.050 | 0.001 | 83.15 | 385.66 | 150.69 | -17.85 | 101.000 | 355.000 |
| 0.250 | 68 | 0.043 | 0.000 | 81.91 | 382.88 | 143.43 | -19.09 | 101.000 | 355.000 |
| 0.250 | 69 | 0.038 | 0.000 | 80.89 | 380.26 | 136.27 | -20.11 | 101.000 | 355.000 |
| 0.250 | 70 | 0.033 | 0.000 | 79.72 | 377.78 | 129.21 | -21.28 | 101.000 | 355.000 |
| 0.250 | 71 | 0.028 | 0.000 | 78.35 | 375.46 | 122.24 | -22.65 | 101.000 | 355.000 |
| 0.250 | 72 | 0.024 | 0.000 | 77.06 | 373.27 | 115.35 | -23.94 | 101.000 | 355.000 |
| 0.250 | 73 | 0.020 | 0.000 | 75.53 | 371.22 | 108.53 | -25.47 | 101.000 | 355.000 |
| 0.250 | 74 | 0.017 | 0.000 | 74.16 | 369.31 | 101.79 | -26.84 | 101.000 | 355.000 |
| 0.250 | 75 | 0.014 | 0.000 | 72.52 | 367.52 | 95.12 | -28.48 | 101.000 | 355.000 |
| 0.250 | 76 | 0.011 | 0.000 | 70.46 | 365.87 | 88.51 | -30.54 | 101.000 | 355.000 |
| 0.250 | 77 | 0.009 | 0.000 | 68.75 | 364.34 | 81.96 | -32.25 | 101.000 | 355.000 |
| 0.250 | 78 | 0.007 | 0.000 | 66.60 | 362.93 | 75.46 | -34.40 | 101.000 | 355.000 |
| 0.250 | 79 | 0.005 | 0.000 | 63.71 | 361.64 | 69.01 | -37.29 | 101.000 | 355.000 |
| 0.250 | 80 | 0.004 | 0.000 | 61.80 | 360.48 | 62.60 | -39.20 | 101.000 | 355.000 |
| 0.250 | 81 | 0.003 | 0.000 | 59.33 | 359.43 | 56.23 | -41.67 | 101.000 | 355.000 |
| 0.250 | 82 | 0.002 | 0.000 | 55.83 | 358.49 | 49.89 | -45.17 | 101.000 | 355.000 |
| 0.250 | 83 | 0.001 | 0.000 | 49.83 | 357.67 | 43.59 | -51.17 | 101.000 | 355.000 |
| 0.250 | 84 | 0.001 | 0.000 | 49.85 | 356.96 | 37.31 | -51.15 | 101.000 | 355.000 |
| 0.250 | 85 | 0.000 | 0.000 | 29.86 | 356.36 | 31.06 | -71.14 | 101.000 | 355.000 |
| 0.250 | 86 | 0.000 | 0.000 | 29.87 | 355.87 | 24.82 | -71.13 | 101.000 | 355.000 |
| 0.250 | 87 | 0.000 | 0.000 | 29.88 | 355.49 | 18.60 | -71.12 | 101.000 | 355.000 |
| 0.250 | 88 | 0.000 | 0.000 | 29.89 | 355.22 | 12.40 | -71.11 | 101.000 | 355.000 |
| 0.250 | 89 | 0.000 | 0.000 | 29.89 | 355.05 | 6.20 | -71.11 | 101.000 | 355.000 |

Section VII Engineering Data:

Tech Box Data:

1. Channel: **223**

Primary Station: **FID: 129188**

WSVU

North Palm Beach, FL

960 kHz

2. Delivery Method: **Microwave**

3. Antenna Location Coordinates: (NAD27):

26° 35' 20" N

80° 12' 44" W

4. Antenna Structure Registration: **1220033**

5. Antenna Location Site Elevation Above Mean Sea Level: **5.5 meters**

6. Overall Tower Height Above Ground Level: **395 meters**

7. Height of Radiation Center Above Ground Level: **358 meters (V+H) AGL**

8. ERP:

0.24 kW (H)

0.24 kW (V)

9. Transmitting Antenna: **SHI 6812 or equiv, 2 bay, 1/2wave spaced, Directional**

10. Fill-in Translator: **Yes**

11. Interference: **Yes**

a)Section 74.1204, **Checked**. See EE-1, Figure 1.

b)Section 74.1205, **Not Checked**.

12. Unattended operation: **Yes**

13. Multiple Translators: **Yes**

14. NEPA: **Yes**. This proposal is excluded from environmental processing: "FM Model" was used to determine the rf exposure at 2 meters AGL. The maximum predicted rf near the base of the tower is less than 1uW/cm2 which is far less than 5% of the maximum public exposure level. The antenna will be mounted on an existing structure. No changes to structure, lighting, land or water are proposed. Applicant will cease radiating if workers are near the antenna.

Kyle Magrill

CircuitWerkes, Inc.

(352) 335-6555

kyle@circuitwerkes.com