William E. McBride
Wireless Consultant
421 McDonald Drive
In wood, WV 25428
304-229-6307

ENGINEERING EXHIBIT

EFFECT OF THE

ADDITION OF ANTENNAS

BY RADIO STATION WCUL

TO AN EXISTING TOWER

ON THE OPERATION OF

RADIO STATION WRNL

RICHMOND, VIRGINIA

March 14, 2005

INTRODUCTION

This engineering report is written on behalf of Mainquad Communications, Inc., (WCUL) to demonstrate its compliance with the "Special operating conditions or restrictions" in its current Construction Permit BMPH-20050131AVQ, condition number seven (7). This condition is based upon 47 C.F.R. 73.1692 (d), which requires AM coordination with all directional broadcast stations within 3.2 kilometers from the constructed or modified tower.

WCUL has added its antennas and additional feed line to an existing tower owned by Clear Channel Communications, located at North Latitude 37º 36' 52.00", West Longitude 77º 30' 56.00" (ASRN 1026628). This site is located 0.10 kilometers at a bearing of 310.08-degree from Radio Station WRNL, Richmond, Virginia.

WRNL is licensed to Richmond, Virginia. The station operates on an assigned frequency of 910 kilohertz with a daytime transmitter output power of 5.00 kilowatts, non-directional, and a nighttime transmitter output power of 1.50 kilowatts, directional. The re-radiation as a percentage of the antenna field strength was 18.46-percent for the daytime non-directional antenna pattern, and 92.21-percent of the minimum directional antenna field strength for the nighttime directional antenna pattern. Because of the potential effect of the tower on the WRNL antenna pattern, the tower was previously detuned. Additionally, WRNL is also owned by Clear Channel Communications.

TOWER DETUNING

The tower is detuned by two separate systems of skirts and associated networks in order to eliminate distortion of the WRNL directional antenna pattern. The lower system begins approximately fifteen feet above ground level and ends approximately 400 feet above ground level. It consists of three wires located symmetrically about the tower, grounded at the top of the skirt to the tower, and connected together at the bottom of the skirt with a wire loop. The bottom of the skirt is connected to a network tuning box. The upper detuning system also consists of a set of three wires, beginning at approximately 450 feet above ground level and

ending at 650 feet above ground level. The top of this skirt is also grounded at the top to the tower, with the bottom of this skirt connected with a loop of wire. The bottom of this skirt also attaches to a tuning box, identical to the bottom box, with the exception that the vacuum variable capacitor is motor driven, and controlled by a switch located in the lower tuning box.

DETUNING ADJUSTMENTS

The detuning system was adjusted in accordance with manufacturer's instructions. Sample loops are provided with output ports that are connected to a Potomac FIM-41 field strength meter. The means of adjustment is to connect the sample port to the external antenna connector on the FIM-41. A reference on the meter is established. Because of the significant amount of signal and close proximity to WRNL, it is not possible to accurately calibrate the FIM-41, thus, a reference point was established on the meter. The lower skirt was adjusted first by adjusting the vacuum variable capacitor for a minimum null of the FIM-41. Next, the top skirt was adjusted, again by establishing a reference point, and then adjusting the skirt for a minimum null. Finally, the lower skirt was readjusted to determine if there was any interaction between the two detuning skirts. It was found to be minimal.

Following the adjustment of the detuning skirt, the station operating parameters were checked against FCC licensed values. They were found to be within tolerance; however, minor adjustments were made on the phasor to bring the pattern parameters directly at licensed values. These adjustments were performed by the WRNL Chief Operator (Chief Engineer), Michael Fleming. Station parameters are shown in Table 1 of this report.

PRE AND POST-CONSTRUCTION FIELD STRENGTH MEASUREMENTS

Pre-construction field strength measurements were not completed for WRNL as part of the process of installing the WCUL antenna. To help ensure that the installation of the WCUL antenna has not adversely affected the WRNL pattern, WRNL has asked that a partial proof of

performance be completed in accordance with the requirements of 47 C.F.R. 73.154, and for post-construction field strength measurements to be referenced back to the original March 27, 1996 proof of performance.

This engineering document is in support of that request, and in support of the condition seven (7) in the WCUL construction permit.

As specified in FCC rules, a minimum of eight field strength measurements were taken on four radials. WRNL has two monitor points, thus two monitored radials, the 9.5-degree and the 260-degree radials. The rules additionally require that two adjacent radials be measured; therefore, the 60-degree and 290-degree radials were measured, which are adjacent to the monitored radials. All measurements were within the specified 3 to 15 kilometer distance with the exception of the 9.5-dgree radial. Measurements on this radial had to be extended beyond 15.0 kilometers due to the difficulty in locating certain points.

All measurements were conducted by the undersigned, utilizing a Potomac Instruments FIM-41, serial number 2167, calibration date February 25, 2003.

ANALYSIS

Table 3 of this engineering report is a summation of the four measured radials. This summation demonstrates that all measurements were well within the FCC WRNL standard pattern. Figures 1 to 4 are the actual measurements, and tabulations with the comparison to the 1996 proof of performance. Table 1 shows the station operating parameters, along with the current common point current and impedance. Table 2 demonstrates that the WRNL monitor points were within the FCC licensed maximums as specified in its instrument of authorization.

SUMMARY

WCUL has added a new FM broadcast antenna to an existing tower owned by Clear Channel Communications. The tower was within the FCC coordination distance of 3.20 kilometers for AM directional broadcast antennas. Pre-construction field strength measurements were not completed. Partial proof of performance measurements were completed on Radio Station WRNL in accordance with 47 C.F.R. 73.154. This engineering report shows the results of those measurements, and demonstrates that the WRNL directional antenna pattern is within its standard pattern, and that all FCC licensed parameters and monitor points are within tolerance.

I, William E. McBride, am a self-employed broadcast/wireless consultant with over thirty years of broadcast related engineering experience. My qualifications are a matter of record with the FCC. This engineering statement and the attached figures comply with the Rules and Regulations of the Federal Communications Commission, and were prepared by me, and are believed to be true and correct to the best of my knowledge.

_____

William E. McBride
Broadcast/Wireless Consultant

Table 1

Summary of Operating Parameters
Radio Station WRNL
Richmond, Virginia
910 kilohertz ~ 1.5 kW DA

Tower	Field Ratio	Phasing
No 1 (reference)	1.0	0.0°
No 2	0.99	141.0°

Common Point Current: 5.70 amps

Common Point Impedance: 50 + j0 ohms

Table 2

Summary of Monitor Points
Radial
Richmond, Virginia
910 kilohertz ~ 1.5 kW DA

Radial (degree)	FCC Licensed Maximum (mV/m)	Measured (mV/m)
9.5	1.70	1.01
260.0	4.7	4.1

TABLE 3

SUMMARY OF MEASURED FIELD STRENGTH DATA

RADIO STATION WRNL
RICHMOND, VIRGINIA

910 Kilohertz ~ 1.5 kW DA

Radial (degree)	1996 DA Inverse Distance Field Strength (mV/m @ 1 km)	Average Log Ratio	2005 DA Inverse Distance Field Strength (mV/m @ 1 km)	Directional Standard Pattern Radiation (mV/m @ 1 km)
9.5 *	22.63	1.203	27.22	40.34
60.0	307.60	1.044	321.13	400.0
260.0 *	26.56	1.2219	32.45	43.52
290.0	121.90	1.052	128.23	156.40

* Monitored Radial:

Figure 1

TABULATION OF FIELD STRENGTH DATA

RADIO STATION WRNL

9.5-Degree Radial **910 Kilohertz**

Proof Point Number	Distance (Kilometers)	1996 Proof of Performance Measured Field Strength	Date	Time	2005 Measured Field Strength (mV/m)	Date	Time	2005/1996 Equivalent Average Ratio	Log Ratio (I Kw DA/DA)
24	4.070	2.800	24-Jul-96	1050	2.500	12-Mar-05	946	0.8929	-0.0492
25	5.000	1.450	24-Jul-96	1053	3.250	12-Mar-05	959	2.241	0.3505
28 (MP)	8.180	0.990	24-Jul-96	1117	1.010	12-Mar-05	1015	1.010	0.0043
29	8.950	0.260	24-Jul-96	1121	0.260	12-Mar-05	1025	1.000	0.0000
30	10.000	0.780	24-Jul-96	1126	1.010	12-Mar-05	1033	1.300	0.1139
31	13.100	0.690	24-Jul-96	1135	0.960	12-Mar-05	1048	1.391	0.1434
32	16.050	0.220	24-Jul-96	1147	0.255	12-Mar-05	1033	1.159	0.0641
33	18.950	0.120	24-Jul-96	1155	0.125	12-Mar-05	1048	1.042	0.0177
								1.255	0.0806
								Antilog	1.2039

Arithmetic Average DA 2005 / DA 1996: **1.255**

Log-Ratio Average DA 2005 / DA 1996: **1.203**

Reference Field: **22.63 mV/m**

Log-Ratio Times Reference Field: **27.22 mV/m**

Standard Pattern Maximum Permissible: **40.34 mV/m**

Figure 2

TABULATION OF FIELD STRENGTH DATA

RADIO STATION WRNL

60.0-Degree Radial **910 Kilohertz**

Proof Point Number	Distance (Kilometers)	1996 Proof of Performance Measured Field Strength	Date	Time	2005 Measured Field Strength (mV/m)	Date	Time	2005/1996 Equivalent Average Ratio	Log Ratio (I Kw DA/DA)
18	3.250	74.000	25-Jul-96	942	73.000	12-Mar-05	934	0.9865	-0.0059
19	3.930	49.000	25-Jul-96	952	45.000	12-Mar-05	923	0.918	-0.0370
20	5.050	36.000	25-Jul-96	958	38.000	12-Mar-05	914	1.010	0.0043
21	5.650	26.400	25-Jul-96	1003	27.200	12-Mar-05	858	1.000	0.0000
23	6.760	21.500	25-Jul-96	1012	21.200	12-Mar-05	852	1.300	0.1139
25	8.670	19.500	25-Jul-96	1025	19.700	12-Mar-05	844	1.010	0.0044
26	10.230	8.000	25-Jul-96	1037	9.400	12-Mar-05	837	1.175	0.0700
27	12.930	4.200	25-Jul-96	1047	4.200	12-Mar-05	829	1.000	0.0000
								1.050	0.0187
								Antilog	1.0441

Arithmetic Average DA 2005 / DA 1996: **1.050**

Log-Ratio Average DA 2005 / DA 1996: **1.044**

Reference Field: **307.603 mV/m**

Log-Ratio Times Reference Field: **321.16 mV/m**

Standard Pattern Maximum Permissible: **400.00 mV/m**

Figure 3

TABULATION OF FIELD STRENGTH DATA

RADIO STATION WRNL

260.0-Degree Radial **910 Kilohertz**

Proof Point Number	Distance (Kilometers)	1996 Proof of Performance Measured Field Strength	Date	Time	2005 Measured Field Strength (mV/m)	Date	Time	2005/1996 Equivalent Average Ratio	Log Ratio (I Kw DA/DA)
23	3.380	6.200	24-Jul-96	918	8.400	12-Mar-05	1330	1.3548	0.1319
24	3.550	4.700	24-Jul-96	921	7.400	12-Mar-05	1338	1.574	0.1971
25	4.180	2.850	24-Jul-96	927	6.400	12-Mar-05	1343	1.010	0.0043
26	4.820	2.950	24-Jul-96	930	5.000	12-Mar-05	1348	1.000	0.0000
27 (MP)	5.200	2.600	24-Jul-96	933	4.100	12-Mar-05	1359	1.300	0.1139
28	5.920	1.920	24-Jul-96	937	3.550	12-Mar-05	1404	1.849	0.2669
29	7.140	1.300	24-Jul-96	943	1.050	12-Mar-05	1411	0.808	-0.0928
30	8.000	0.850	24-Jul-96	947	1.010	12-Mar-05	1414	1.188	0.0749
								1.261	0.0870
								Antilog	1.2219

Arithmetic Average DA 2005 / DA 1996: **1.261**

Log-Ratio Average DA 2005 / DA 1996: **1.221**

Reference Field: **26.56 mV/m**

Log-Ratio Times Reference Field: **32.45 mV/m**

Standard Pattern Maximum Permissible: **43.52 mV/m**

Figure 4

TABULATION OF FIELD STRENGTH DATA

RADIO STATION WRNL

290.0-Degree Radial **910 Kilohertz**

Proof Point Number	Distance (Kilometers)	1996 Proof of Performance Measured Field Strength	Date	Time	2005 Measured Field Strength (mV/m)	Date	Time	2005/1996 Equivalent Average Ratio	Log Ratio (I Kw DA/DA)
21	4.000	20.100	24-Jul-96	939	20.900	12-Mar-05	1323	1.0398	0.0170
22	5.200	13.000	24-Jul-96	948	13.800	12-Mar-05	1313	1.062	0.0259
23	6.000	8.200	24-Jul-96	957	8.400	12-Mar-05	1307	1.010	0.0043
24	7.000	9.000	24-Jul-96	1022	8.000	12-Mar-05	1251	1.000	0.0000
25	8.000	5.100	24-Jul-96	1025	5.500	12-Mar-05	1251	1.300	0.1139
26	9.000	4.400	24-Jul-96	1030	4.700	12-Mar-05	1246	1.068	0.0286
27	9.520	3.900	24-Jul-96	1032	3.500	12-Mar-05	1232	0.897	-0.0470
28	11.570	2.500	24-Jul-96	1038	2.700	12-Mar-05	1220	1.080	0.0334
								1.057	0.0220
								Antilog	1.0520

Arithmetic Average DA 2005 / DA 1996: **1.057**

Log-Ratio Average DA 2005 / DA 1996: **1.052**

Reference Field: **121.90 mV/m**

Log-Ratio Times Reference Field: **128.23 mV/m**

Standard Pattern Maximum Permissible: **156.40 mV/m**