

**MULLANEY ENGINEERING, INC.**

9049 SHADY GROVE COURT  
GAITHERSBURG, MD 20877

**ENGINEERING EXHIBIT EE-LIC:**

**RADIO STATION WFCM-FM  
THE MOODY BIBLE INSTITUTE OF CHICAGO  
MURFREESBORO, TENNESSEE**

**Ch. 219C3 2.5 KW-DA 231 M HAAT**

**JANUARY 23, 2006**

**COMPLETE REPLACEMENTS FOR ENGINEERING ON FILE**

ENGINEERING STATEMENT IN SUPPORT OF  
A LICENSE APPLICATION FOR A  
**MODIFIED FM STATION**  
USING A DIRECTIONAL ANTENNA SYSTEM

File No. BLED-20050411AAI - Facility ID: 66111

**QUESTION 7 - EXHIBIT 8 OF FCC FORM 302-FM**

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## Declaration

I, John J. Mullaney, declare and state that I am a graduate electrical engineer with a B.E.E. and my qualifications are known to the Federal Communications Commission, and that I am an principal engineer in the firm of Mullaney Engineering, Inc., and that I have provided engineering services in the area of telecommunications since 1977. My qualifications as an expert in radio engineering are a matter of record with the Federal Communications Commission.

The firm of Mullaney Engineering, Inc., has been requested by The Moody Bible Institute of Chicago, to prepare the instant engineering exhibit in support of an amendment to a pending license application for FM Station WFCM-FM (FCC Facility ID Number: 66111).

All facts contained herein are true of my own knowledge except where stated to be on information or belief, and as to those facts, I believe them to be true. Information concerning the technical equipment installed and compliance with special conditions was obtained directly from the licensee. No on-site inspection of the facility by Mullaney Engineering was made. I declare under penalty of perjury that the foregoing is true and correct.



John J. Mullaney, Consulting Engineer

Executed on the 23rd day of January 2006.

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**NARRATIVE STATEMENT:**

This engineering statement has been prepared on behalf of The Moody Bible Institute of Chicago, permittee of Radio Station WFCM-FM at Murfreesboro, Tennessee (Facility ID 66111). This engineering is a **total replacement** for the engineering currently on file. The purpose of this statement is to inform the Commission that construction has been completed and that the new facility complies completely with its outstanding construction permit (BPED-20000703ADU). In accordance with the rules governing directional antenna facilities [Section 73.1620(a)(2)] WFCM-FM is currently operating at one half (50%) of the authorized ERP and will continue to do so until formal full power program test authority is issued by the Staff.

**Table A** is a summary of the technical facilities installed.

**Figure 1** is a plot of the directional horizontal plane pattern for the FM antenna which has been installed by WFCM-FM. This figure shows the limitations imposed by the C.P. and as can be seen none of the C.P. limits have been exceeded. The RMS of the measured pattern encompasses 91.5% of the CP composite pattern and thus, easily exceeds the 85% minimum specified by the rules [ Section 73.1690(C)(2)(ii)].

### **“Special Conditions”**

In accordance with the Special Operating Conditions on the construction permit, WFCM-FM coordinated the times and locations of construction such that no worker was exposed to excessive R.F. levels and it will continue to do so in the future. The facility is in full compliance with both the “controlled” & “un-controlled” FCC Radiation Guidelines. Using worst case assumptions (maximum downward radiation) this facility contributes less than 1% of the “controlled” standard at ground level and therefore, it is **categorically excluded** from further consideration even in “un-controlled” areas.

In addition, WFCM did not commence operation until WAPX-FM at Clarksville, TN, changed its channel from 219A to 220A. WAPX’s license is pending as BLED-20050303AAB.

## **Required Certifications**

**Appendix A** is a statement by a qualified local engineer that the antenna has been assembled in accordance with the manufacturer's instructions. It is further stated that RF exposure signs are in place and no workers were exposed during construction.

**Appendix B** is a statement by the antenna manufacturer (ERI) in which it provides the "as built" measured horizontal and vertical patterns. That certification provides the horizontal/vertical power gains and RMS values. The required orientation of the directional antenna is stated to be **N-274-E**. However, on page 3 of that statement ERI indicates that the surveyor's alignment is **90 degrees counter clockwise** or is at N-184-E which is the same as N-004-E. That statement also describes the methods used to measure the pattern. Panel antenna is comprised of one level of three separate radiators surrounding the interior supporting tower.

**Appendix C** is a statement from a local surveyor certifying that the antenna is oriented on a bearing of **N-004-E**. It should be noted that since this is a one level panel antenna it is quite common for the certified angle to be that of one of the panels and not the major lobe as traditionally done with a side mount ring antenna. The statement by the antenna manufacturer indicates that the antenna should be

pointed on **N-274-E**, however, as will be shown **N-004-E** is also correct.

In order to obtain the ERI orientation from the panel it is necessary to subtract 90 degrees so as to obtain a perpendicular angle. It should be noted that the orientation of N-004-E is the same as N-364-E. Then making the subtraction:  $364 - 90 = 274$  degrees True as stated by ERI. **Figure 2** is a diagram taken from the ERI report which has been annotated to explain this orientation.

### **“As Built” - Differences**

The constructed facility differs from those originally authorized only in the fact that the vertical ERP of 2.48 kW is slightly lower than the authorized ERP of 2.5 kW. However, this difference is permitted to be adjusted when filing the license application.

### **Environmental Assessment Statement**

This facility is in **full compliance** with the FCC's criteria for human exposure to RF Energy. The tower is surrounded by a locked fence to limit inadvertent access. Workers employed to climb the tower or work in a potential overexposure location will not be permitted to enter the work area until cleared by the station manager or other responsible person. Appropriate warning signs are posted to ensure safety. If deemed to be necessary, the station will

establish and enforce work rules and safety procedures applicable in a potential over-exposure area. It is recognized that maintenance or installation work on or near the antenna may require the station to completely shutdown or switch temporarily to an auxiliary antenna or an auxiliary transmitter site.

### **SUMMARY**

The Moody Bible Institute of Chicago, licensee of Radio Station WFCM-FM herein files its license application indicating that construction has been completed and that except as noted the facility complies with its outstanding construction permit. WFCM-FM is waiting formal full power authorization of program test authority.



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John J. Mullaney, Consulting Engineer

January 23, 2006.

## Table A

### Summary of Technical Facilities Installed

<b>Call:</b>	WFCM-FM		
<b>City/State:</b>	Murfreesboro, Tennessee		
<b>Facility ID:</b>	66111		
<b>Channel:</b>	219C3	91.7 MHz	
<b>C.P. Number:</b>	BPED-20000703ADU		
<b>Coordinates:</b>	35-48-01 / 86-37-17 NAD-27		
<b>Tower ASR:</b>	1043245		
<b>Tip Height:</b>	229.3 M AGL		
<b>Antenna C.R.:</b>	152 M AGL	468 M AMSL	231 M HAAT
<b>ERP:</b>	2.50 kW H	2.48 kW V	
<b>Antenna Make:</b>	ERI 1093-1CP-DA 1.0 lambda spacing Panel Antenna, 1 level, 3 around		
<b>OMNI/DA:</b>	DA		
<b>RMS:</b>	84.5 % CP	77.3% Pattern	91.5% Pat/CP
<b>Ant. Gain:</b>	0.759 H / 0.751 V		
<b>Coax Efficiency:</b>	79.2 %	Andrew HJ7-50A 1-5/8"	157 meters
<b>TPO:</b>	4.16 kW		