

**SECOND SUPPLEMENTAL  
ENGINEERING STATEMENT  
AMENDMENT TO APPLICATION FOR  
SPECIAL TEMPORARY AUTHORITY  
FCC FILE NUMBER 0077-EX-ST-2005  
NATIONAL ASSOCIATION OF BROADCASTERS  
WASHINGTON, DC**

INTRODUCTION

This second supplemental engineering statement has been prepared pursuant to Section 5.63 of the Federal Communications Commission (FCC) rules on behalf of the National Association of Broadcasters (NAB) in support of a second amendment to the NAB's pending Application for Special Temporary Authority (STA) (FCC File No. 0077-EX-ST-2005) which was filed with the FCC's Office of Engineering and Technology on February 11, 2005.<sup>1</sup> The first supplemental engineering statement, which was filed on March 3, 2005, provided additional information on the purpose of the proposed experimental operation, and this second supplemental engineering statement expands on the information previously provided and provides additional justification in support of the application.

The NAB has requested the facilities specified in the application in order to study the effects of low power FM (LPFM) broadcast station transmissions on the received audio quality of full power FM broadcast stations operating three channels removed from the LPFM station.

## DISCUSSION

### RECEIVERS

Prior study of third adjacent channel interferers on received audio quality in portable and personal receivers has been limited. The FCC's Office of Engineering and Technology did not test inexpensive receivers with integral antennas,<sup>2</sup> and the tests conducted by The MITRE Corporation (MITRE) included only one boom box, one clock radio, and one personal receiver.<sup>3</sup> A grant of the experimental STA will allow NAB to evaluate the performance of a broader cross section of portable and personal consumer

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<sup>1</sup> The FCC dismissed the NAB's application without prejudice by letter (Reference Number 3448) on February 14, 2005. The application is subject to reinstatement to allow consideration of this amendment.

<sup>2</sup> See *Report and Order*, MM Docket No. 99-25, 15 FCC Rcd 2206 (2000), ¶84.

<sup>3</sup> See *Experimental Measurements of the Third-Adjacent Channel Impacts of Low-Power FM Stations, Volume One: Final Report*, The MITRE Corporation, May 2003, ¶2.1.5.

receivers. NAB plans to use late model consumer receivers that it currently has on hand as well as new consumer receivers that it will obtain through normal retail channels prior to the start of its surveys. The receivers that NAB currently has on hand are identified in the following table:

Type	Make	Model	Description
Portable	Emerson	PS6528	AM/FM stereo with cassette
Portable	Panasonic	RX-CS720	AM/FM stereo with cassette
Portable	Radio Shack	12-639A	AM/FM stereo
Portable	RCA	RP7700	AM/FM stereo with cassette
Portable	Sony	CFD-Z110	AM/FM stereo with cassette
Personal	Aiwa	HS-TX386	AM/FM stereo with cassette
Personal	Philips/Magnavox	AQ6688/17Z	AM/FM stereo with cassette
Personal	Sony	SRF-49	AM/FM stereo
Personal	Sony	SRF-HM55	AM/FM stereo headset
Personal	Sony	WM-FC191	AM/FM stereo with cassette

### SURVEY OBJECTIVES

NAB is requesting this experimental STA in order to obtain field strength and audio quality data for portable and personal receivers in motion. Prior data upon which the FCC has relied, most notably that obtained by MITRE, were collected from receivers that were stationary.<sup>4</sup> Further, once the position of the measurement vehicle was fixed, the

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<sup>4</sup> See *Test Procedure Plan, LPFM Third-adjacent Channel Interference Analysis*, The MITRE Corporation, October 29, 2002, ¶2.1.3.3.

receiving antennas were re-oriented to achieve the best reception.<sup>5</sup> The NAB plan calls for field strength data and audio samples to be collected while the receiver being evaluated is in motion and in normal use.

As stated before, the NAB plans to use the audio samples collected during the surveys to conduct evaluations of listener-perceived audio quality. Evaluations of this type were to be conducted by MITRE in Phase II of its LPFM field tests, however, on the basis of its Phase I findings, MITRE ultimately recommended that these listener tests not be done.<sup>6</sup>

#### TECHNICAL JUSTIFICATION FOR NAB EVALUATION

In July 2004, the NAB conducted a preliminary survey using two short spaced full power FM stations operating on third adjacent channels. The survey area was determined using the Longley-Rice propagation model to predict the area between two short spaced full power FM stations operating on third adjacent channels where the desired-to-undesired (D/U)

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<sup>5</sup> See MITRE test procedure plan at ¶2.1.3.11.

<sup>6</sup> See *Report to the Congress on the Low Power FM Interference Testing Program*, Pub. L. No. 106-553, Federal Communications Commission, February 19, 2004, p. 3.

field strength ratio was less than -40 dB.<sup>7</sup> The D/U predictions were transferred to a small scale local map, and a field survey location was chosen at random. Informal listening tests were conducted in the open field next to a church that is adjacent to the chosen location using two personal receivers (two different models of Sony Sports Walkman®). Distortion judged to be substantially greater than three percent was noted, and digital recordings were made of the received audio. Upon review of the recordings, the NAB concluded that further study of the receiver effects was warranted.

### THE NECESSITY FOR FIELD TESTS

The primary purpose of the NAB survey is to determine the extent to which commonly available portable and personal consumer receivers are affected in the real world by a third-adjacent channel low power FM station operating inside the so-called protected contour of a desired full power FM station. The signal variations and rapidly changing environmental conditions encountered by a portable or personal receiver in motion cannot be reproduced accurately or efficiently in the laboratory. The effects on

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<sup>7</sup> See attached figure entitled *Longley-Rice Third Adjacent Channel Interference Study*, dated July 2004.

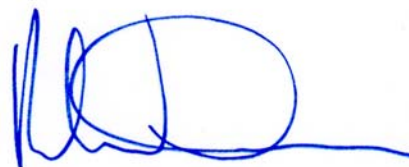
**DENNY & ASSOCIATES, P.C.**  
**CONSULTING ENGINEERS**  
**OXON HILL, MARYLAND**

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Second Supplemental Engineering Statement  
National Association of Broadcasters

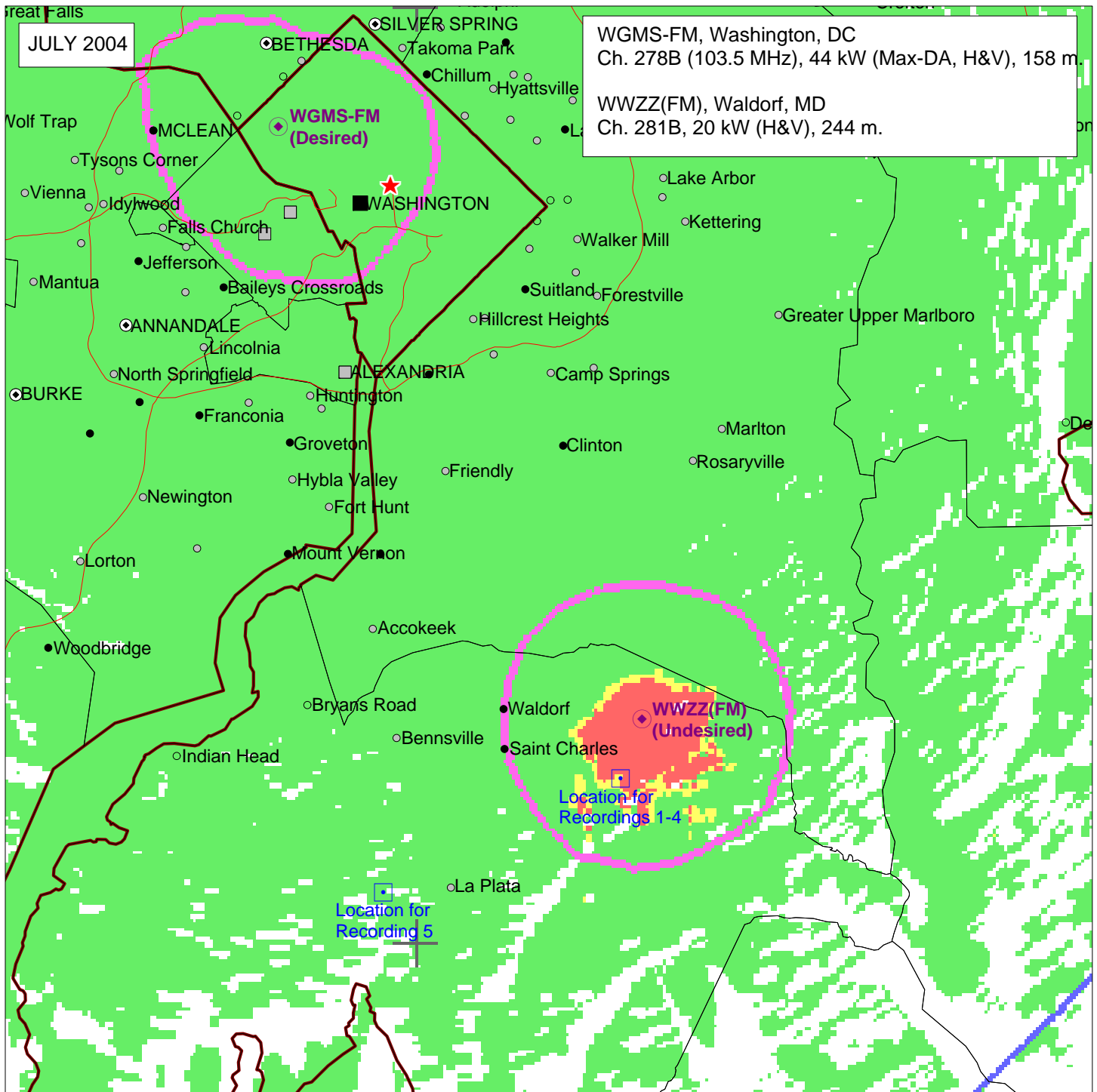
Page 6

reception introduced by the user; the changing orientation of the receiver and antenna; reflections from the ground, buildings, and other objects; and the signal variabilities introduced by foliage, building obstructions, and other local obstacles can only be approximated in the laboratory. In order to gather accurate and meaningful data on the performance of portable and personal receivers in the real world, the investigation must be conducted empirically under real world conditions and not in the theoretical and controlled environment of the laboratory.

  
Robert W. Denny, Jr., P.E.



March 29, 2005



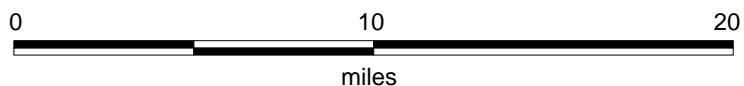
WGMS-FM, Washington, DC  
 Ch. 278B (103.5 MHz), 44 kW (Max-DA, H&V), 158 m

WWZZ(FM), Waldorf, MD  
 Ch. 281B, 20 kW (H&V), 244 m.

JULY 2004

**KEY**

- D/U > -40 dB
- 43 dB < D/U < -40 dB
- D/U < -43 dB
- Desired field strength less than 54 dBu
- 94 dBu F(50, 10) Contour
- Desired 54 dBu F(50,50) Contour



# LONGLEY-RICE THIRD ADJACENT CHANNEL INTERFERENCE STUDY

Prepared for  
 NATIONAL ASSOCIATION OF BROADCASTERS  
 Denny & Associates, P.C. Consulting Engineers