

**MULLANEY ENGINEERING, INC.**

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**ENGINEERING EXHIBIT EE-1:**

**FINE ARTS BROADCASTING  
BRISTOL, VERMONT**

**Ch. 248C3 8.7 KW 158 M HAAT**

**SEPTEMBER 14, 2006**

ENGINEERING STATEMENT IN SUPPORT OF  
AN AMENDMENT TO A PENDING APPLICATION FOR A  
NEW AUCTION 62 FM STATION

**ONE-STEP UPGRADE**

**TOTAL ENGINEERING REPLACEMENT**

Facility ID: 166037

ATTACHED TO EXHIBIT 25 OF FCC FORM 301



**ENGINEERING EXHIBIT EE-1:**

**FINE ARTS BROADCASTING  
BRISTOL, VERMONT**

**Ch. 248C3 25 KW 100 M HAAT**

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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 a 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 Fine Arts Broadcasting, to prepare the instant engineering exhibit in support of an amendment to a pending “one-step” upgrade application for Construction Permit for a new C3 FM radio station licensed to Bristol, Vermont (FCC Facility ID Number: 166037).

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. I declare under penalty of perjury that the foregoing is true and correct.



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John J. Mullaney, Consulting Engineer

Executed on the 14th day of September 2006.

**ENGINEERING EXHIBIT EE-1:**

**FINE ARTS BROADCASTING  
BRISTOL, VERMONT**

**Ch. 248C3 25 KW 100 M HAAT**

**NARRATIVE STATEMENT:**

**I. General:**

This engineering statement has been prepared on behalf of Fine Arts Broadcasting. The purpose of this statement is to amend its pending request for a Construction Permit to build a new Auction 62 FM broadcast facility on Channel 248C3 at Bristol, Vermont, as a **one-step** upgrade. **This amendment proposes a change of site. Canadian concurrence** as a special negotiated short spacing was already received for the currently pending site. A waiver to permit a small amount of **received interference** from Canada is required. Using Longley-Rice analysis the proposed facility provides 70 dBu service to **85.5%** of the land area within Bristol village, Vermont. The upgraded C3 facility will operate with an ERP of 8.7 KW and an HAAT of 158 Meters.

The application is not a major environmental action, as defined by Section 1.1307 of the Commission's Rules. The proposed facility is in full compliance with both the "controlled" & "un-controlled" FCC Radiation Guidelines.

Answers to questions contained in F.C.C. Form 301, are incorporated in the following paragraphs and figures.

## **II. Engineering Discussion:**

### **A. Proposed Location:**

The applicant proposes to locate an existing tower at Bromwell Mountain near Williston, Vermont. **Figure 1** is a topographic map showing the proposed site. The NAD-27 geographic coordinates are:

Latitude: 44° 24' 23.1" (by survey)  
Longitude: 73° 08' 11.3"

The Regional Office of the FAA was notified of this proposal (2006-ANE-1020-OE) to correct the base elevation. Upon approval by the FAA the Antenna Structure Registration (#1042275) will be updated.

### **B. Antenna System and Tower:**

A dual polarized 3-bay half-wave spaced FM antenna will be side mounted near the top of a new tower. **Figure 3** is a sketch of the proposed tower. The antenna has a non-directional power gain of 1.0 H/V.

The antenna will be fed by 45.7 Meters (150 Feet) of 1-5/8" coaxial cable, with a rated efficiency of 94 percent for this length.

### **C. Transmitter:**

The applicant plans to install a type accepted 1 KW FM transmitter. The transmitter will be operated at 0.94 KW which is within its rated power.

**D. Effective Radiated Power:**

Giving consideration for the maximum antenna gain, transmitter power and line loss, the maximum Effective Radiated Power is 8.7 KW for the Horizontal and 8.7 KW for the Vertical Component.

**E. Channel Allocation:**

**Figure 4** is a channel allocation study for Ch. 248C3 from the proposed site. This application is in full compliance with Section 73.207(a) regarding domestic spacing. However, the proposed site is **short spaced to one Canadian station**, CHOM on 249C1 at Montreal, QC. The proposed C3 site is only separated by a distance of 127.3 km while the required separation is 181 km. The applicant requests that its application be sent to Canada as a **specialty negotiated short spaced allotment**. No interference is caused to Canada and only a small amount of interference is received by the proposed Ch. 248C3 facility from Canada. **Figure 4-A** is a channel allocation study for another properly spaced site that can serve as the **special C3 reference point**. This reference point is close enough to Bristol to encompass the entire city within the 23 km C3 allotment circle.

**1. Canadian Protection:**

**Figure 5** is a map which illustrates the protected 54 dBu contour of CHOM which is approximated as a 86 km circle (solid **“red”** contour). Since Canadian stations are protected to the 54 dBu contour and since the protection ratio for first adjacent channel protection is -6 dB the appropriate interference contour is 48 dBu (54-6 dBu). Thus, the map also shows the proposed 48 dBu interference F(50,10) contour as proposed by this application.

The “blue” dashed 48 dBu contour is based upon an interpolation of the primary terrain radial HAATs on 315, 0 & 45 degrees true. The HAATs on these primary terrain radials is 231.8, 207.0 & 132.0 meters respectively. The direct bearing from the C3 site to CHOM is 343.8 degrees true. The “green” dashed contour is based upon actual terrain data. It should be noted that on the three primary terrain radials the two contours are identical (as expected).

It should be noted that the last 30 km (35%) of the 86 km protection afforded the Canadian station is located **inside** the United States and as such is not entitled to protection from interference. Only that portion of the protected 86 km radius which is located within Canada is protected from interference.

This application recognizes that its 48 dBu contour overlaps the 86 km radius of CHOM. However, only the “yellow” shaded area is located within Canada itself. According to the US-Canadian Agreement, the Canadian station is protected from interference only on land areas **within** Canada and not necessarily from mere overlap by an interference contour. The “brown” shaded area is the resulting interference area which will be caused to the Canadian station. However, since all of this area is **located inside** the United States such interference **is not “objectionable”** under the US-Canadian Agreement. Thus, based upon this map there is no valid reason for Canada to object to a **maximum 8.7 kW C3 facility** allotment at the proposed site despite the short spacing.

## **2. Interference Received from Canada:**

**Figure 6** is a map which illustrates the received interference that will result if this application is granted. Since this application is for a C3 facility the appropriate

domestic protected contour is the **60 dBu** contour. Thus, the appropriate interference contour from Canada using the normal 6 dB first adjacent protection ratio is the **54 dBu** F(50,10) contour. In addition, the notified ERP of CHOM is 41.2 kW and thus, that ERP will be used in lieu of the normal 100 kW maximum C1 ERP. Unlike the protection towards Canada the protection of the domestic facility will rely upon **contours derived from actual terrain & actual ERP**.

The “**red**” dashed line is the interference contour from CHOM. However, only the outside portion of this **overlap** to the 60 dBu contour will be subject to actual interference. The **land area** subject to interference is shaded in “**yellow**” highlighting and has been determined to be 40 sq.km. Since the proposed 60 dBu contour will encompass 4,299 sq.km the interference to 49 sq.km represents **1.14% of the proposed service area**.

### **3. Request for Waiver to Receive Interference from a Foreign Country:**

This application requests a **waiver for it to receive interference** to less than 1.2 percent of its proposed 60 dBu land area from a foreign country. In order to avoid receiving any overlap the ERP would have to be reduced from the proposed 8.7 kW to 2.8 kW resulting in a **38% reduction in land area** served within the United States.

The proposed C3 site is located within 68 km of the Canadian border. Because of this proximity and the existence of other domestic stations the proposal to receive interference from Canada **does not have any preclusionary affects** on other domestic FM stations because domestic stations rely on a spacing table and all domestic stations are fully spaced by this application. While operation at a

reduced ERP or with a directional antenna would eliminate this minor amount of interference such a requirement **would not serve the public interest** since the preclusion affects on domestic stations would remain unchanged with or without the overlap/interference.

**The granting of such a waiver is consistent with past decisions.**

In July 1988, an application by WEDA at Grove City, PA, was granted despite receiving **6.6%** interference from Canada. In September 1989, an application by KCDA at Coeur D'alene, ID, was granted despite receiving **1.8%** interference from Canada. In June 1989, an application by WVEN at Franklin, PA, was granted despite receiving **0.6%** interference from Canada.

As specified by the Auction 62 public notice, the applicant conducted its own **due diligence** of the Ch. 248A allotment at Bristol, Vermont, and based upon previous decisions by the FCC's Audio Division, it was concluded that grant of the requested C3 upgrade was **consistent with past decisions and would serve the public interest**. Based upon this due diligence the applicant developed its bidding strategy and is now the winning bidder.

**F. Terrain Profile Data & Coverage:**

Terrain profile data was extracted from the NGDC 30 Second Digitized Terrain Data Base provided out of Boulder, Colorado. At least twenty-four bearings (every 15 degrees) were used to obtain the proposed coverage data. The standard eight bearings (every 45 degrees) were used to obtain the proposed HAAT.

The predicted service contours, as shown in the attached report, were computed using a mathematical model adapted for computer use of data shown in Figure 1 of Section 73.333. This is the Commission's computer program TV FM FS REPORT RS-76-01, dated January 1976.

**G. Terrain Profile to City of License:**

The N-171.5-E radial is the direct path to the City of License. From the proposed site the 3.16 mV/M or 70 dBu City Grade Contour **will not serve** any portion of the proposed city of license (see **Figure 2**) using the normal prediction method.

The proposed site qualifies for a supplemental coverage analysis using Longley-Rice. The delta H terrain roughness factor along the N-171.5-E radial is **395 meters**. FCC policy permits the use of a supplemental showing anytime the delta H is less than 20 meters or greater than 100 meters.

**Figure 2-A** is a topographic map on which the boundary of Bristol village have been outlined. In addition, 23 km allotment circle from the proposed reference point is also demonstrated to totally encompass these boundaries.

In 1995, the State of Vermont **dissolved the village** of Bristol. In addition, the 2000 Census no longer lists the village as a separate entity from the town (township). Upon reviewing the rule making which allotted Ch. 248A to Bristol it was clear that they intended to use the village as the community of license. Consequently, there are **no official boundaries for the village of Bristol**. With the assistance of the Bristol town manager, Fine Arts prepared the

current map (**Figure 2-A**). The Board of Selectmen reviewed the proposed boundaries and voted that they reasonably represent the boundaries of the village of Bristol, including its population and commercial area.

**Figure 2-B** is a map illustrating the signal levels as determined by Longley-Rice. The **blue** shaded area represents a signal level of 72 dBu or more while the **red** represents a signal level of 72 to 74 dBu. Using this it was determined that 85.5% of the land area within the boundaries of the village receive a signal level of at least 72 dBu. At present the Staff considers any coverage greater than or equal to 80% to be substantial compliance. If one were to use the 70 dBu - **red** outline the percentage coverage of the city would be higher.

The applicant believes that when consideration is given to the above, combined with the fact that its proposed coverage is **above the minimum** 80 percent, that this demonstrates that a waiver of this rule would be in the Public Interest.

#### **H. Coverage Area and Population:**

The area contained within the 60 dBu (1.0 mV/M) contour has been computed mathematically. The population within this contour was obtained through a computerized analysis of the census designated places population data contained in the 2000 census.

**I. FM Blanketing Contour:**

The applicant recognizes its obligation to resolve related interference complaints for a one year period within its 115 dBu “FM Blanketing Contour” as required by Section 73.318 of the FCC Rules.

The radius around the base of the tower in which Blanketing interference is possible is fairly small (1.2 km). Given the height of the proposed antenna, no problems are anticipated.

**J. Other Services in Area:**

There are no known AM Broadcast Stations within 3.2 kilometers of the proposed site.

Besides what already exists at this site, there are no known transmission facilities within 60 meters (197 feet) of the proposed antenna.

There are other known FM or TV transmitters within 10 kilometers (6.2 miles) of the proposed site, however, based upon the type of transmitter proposed, and the frequency & power involved no intermodulation interference problems with existing transmitting facilities is expected. In the unlikely event some problems would occur, the applicant will investigate and correct such cases in accordance with the Commission’s Rules.

**K. Environmental Assessment Statement:**

The applicant believes its proposal will not significantly affect the environment since it does not meet any of the criteria specified in Section 1.1307 of the rules. Since an existing tower will be used with no change in the overall height the only remain environmental issue is that of RF Exposure. Specifically the proposed facility:

1) Will NOT involve the exposure of workers or the general public to levels of Radio Frequency radiation in excess of the guidelines recommended by the FCC - OET Bulletin 65 (August 25, 1997).

The following is a more detailed discussion of this protection standard:

**A. National Environmental Policy Act of 1969:**

In 1969, Congress enacted the National Environmental Policy Act (NEPA), which requires the FCC to evaluate the potential environmental significance of the facilities it regulates and authorizes. Human exposure to Radio Frequency (RF) radiation had been identified as an issue that the FCC must consider.

Beginning with the filing of applications after January 1, 1986, broadcast stations were required to “certify compliance” with FCC prescribed guidelines on human exposure to RF radiation. The FCC standard was based upon the American National Standards Institute’s (ANSI) RF radiation protection guides (ANSI C95.1-1982). These exposure limits are expressed in terms of milli-watts per square centimeter.

In October 1997, the FCC implemented a two tier evaluation criteria utilizing recommendations of the National Council on Radiation Protection and Measurement (NCRP). The “controlled” tier involves areas which have restricted access while the “un-controlled” tier involves areas which have unrestricted access. The Maximum Permissible Exposure (MPE) limits for “controlled” areas are the same as adopted in 1985, while the “un-controlled” limits for FM and TV frequencies are one-fifth or 20% of the limits for “controlled” areas.

These exposure limits are time-averaged over any six minute period and vary depending upon the frequency involved. The following are the Maximum Permissible Exposure (MPE) limits for “controlled” areas:

<b>Frequency Range (MHz)</b>	<b>Power Density (mW/sq.cm)</b>
*****	*****
0.3 to 3	100 AM
3 to 30	$900/(\text{Freq}^2)$
30 to 300	1.0 VHF TV & FM
300 to 1,500	$\text{Freq}/300$ UHF TV
1500 to 100,000	5.0

The applicant recognizes that compliance with the above criteria at sites involving multiple AM, FM and/or TV facilities is based upon the contributions of all such facilities. At the site discussed in this application, **the only significant facility** that will exist is the proposed FM facility.

## FM Broadcast Stations

For FM Broadcast Stations the following formula is used:

$$D = \frac{\text{SQRT}( F^2 * [\text{HERP} + \text{VERP}])}{1.667 * \text{SQRT}(\text{PD}) * 3.2808}$$

Where:

- D = the closest distance in meters that a human should come to an operating antenna (To obtain feet multiply by 3.2808)
- F = typical relative field factor in downward direction (F=1 is worst case main lobe)
- HERP = Horizontal ERP in watts (above a dipole)
- VERP = Vertical ERP in watts (above a dipole)
- PD = highest Power Density in milli-watts/cm<sup>2</sup>
- SQRT = Square Root
- Freq = Frequency in mega-cycles/sec. (MHz)

The vertical radiation pattern of the FM antenna specified in this application is narrow and, therefore, the power density as seen by an observer on the ground near the base of the tower will be less than 20 percent of the total ERP.

The application of the above equation (assuming maximum ERP), in our case, for a frequency of 97.5 MHz and an “un-controlled” Power Density of 0.2 milli-watts results in a minimum distance of 54 meters (177 feet) from the antenna. Inasmuch as the lowest element on the proposed antenna will be approximately 30.5 meters (100 feet) above the ground level, additional analysis is needed. **Figure 7** is a plot of the power density at ground level assuming the use of a 3 bay Dielectric antenna. It shows that the expected “real world” exposure will be **less than 2.3%** of the “controlled” standard. For FM, the “un-controlled” standard is 20% and, therefore, this proposal is in full compliance with both standards.

The tower will be surrounded by a locked fence to limit 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 will be posted to ensure safety. In addition, the applicant will establish and enforce work rules and safety procedures applicable in a potential over-exposure area. The rules will establish how close a worker can get to the antenna when it is operating at normal power and specify the power reduction required in order to make other locations safe. 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. All employees, contract and other persons having access to areas of potential exposure will be required to sign a site management guide indicating they are aware of and will comply with all safety rules. In the instance of a multiple use site, a single site access policy incorporating the above philosophy will be established. All procedures will be reviewed & updated as necessary.

**L. Compliance with National Historic Preservation Act - Section 106**

**Endangered Species Act- Section 7:**

Because this is an existing tower with no change in overall height and the side mounting of this FM antenna will have little visual impact, no additional environmental study is required.

**M. Compliance with Radio Duopoly Rules:**

The applicant has no other radio ownership in the area of question.

**III. SUMMARY:**

Fine Arts Broadcasting herein amends its pending application to construct a new Auction 62 FM broadcast facility on Channel 248C3 at Bristol, Vermont, as a **one-step** upgrade. **Canadian concurrence** for a special negotiated short spacing is required. A waiver to permit a small amount of **received interference** from Canada is required. Based upon a Longley-Rice coverage analysis, the proposed facility provides 72 dBu service to **85.5% percent** of the land area within the village of Bristol, Vermont. The applicant requests a waiver to serve less than 100% of the community, if the Staff believes a waiver is necessary. In other respects, this engineering proposal is in full compliance with the Commission's Rules.



John J. Mullaney, Consulting Engineer

September 14, 2006.