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ENGINEERING EXHIBIT EE:

RADIO STATION WFRO-FM
BAS BROADCASTING, INC.
FREMONT, OHIO

Ch. 256B1 6.5 KW 177 M HAAT

JUNE 11, 2002

ENGINEERING STATEMENT IN SUPPORT OF
AN APPLICATION FOR A
CHANGE OF SITE WITH
GF SHORT SPACED & LR CITY GRADE SHOWINGS

File No. BMLH-890329KF - Facility ID: 73388

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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 BAS Broadcasting, Inc., to prepare the instant engineering exhibit in support of an application for Construction Permit for a change of site of a grandfathered short spaced FM radio station - WFRO-FM licensed to Fremont, Ohio (FCC Facility ID Number: 73388).

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.

/s/ John J. Mullaney

John J. Mullaney, Consulting Engineer

Executed on the 11th day of June 2002.

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RADIO STATION WFRO-FM
BAS BROADCASTING, INC.
FREMONT, OHIO

Ch. 256B1 6.5 KW 177 M HAAT

NARRATIVE STATEMENT:

I. General:

This engineering statement has been prepared on behalf of BAS Broadcasting, Inc., licensee of WFRO-FM on Ch. 256B1 at Fremont, Ohio. The purpose of this statement is to request a Construction Permit authorizing a change of site. WFRO-FM proposes to operate from a new site with an ERP of 6.5 KW and an HAAT of 177 Meters. This application proposes facilities which are in compliance with the contour protection requirements of Section 73.213(a) regarding grandfathered pre-1964 short spaced stations. In addition, this application uses OET 69 - Longley-Rice to demonstrate that greater than 70 dBu service will be provided to its city of license.

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. Since the proposed facility contributes less than 5% of the "controlled" standard it is **categorically excluded** from further consideration.

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

II. Engineering Discussion:

A. Proposed Location:

WFRO-FM proposes to locate on an existing tower on the west side of Port Clinton, Ohio. The Antenna Structure Registration (ASR) number is 1012161. A topographic map showing the proposed site is not necessary. The NAD-27 geographic coordinates are:

Latitude:	41°	30'	26.8"
Longitude:	82°	57'	47.3"

The city of license, Fremont, Ohio, is located approximately 22 kilometers (13.7 miles) southwest of the proposed site. The Regional Office of the FAA was not notified of this proposal since an existing tower will be used with no change in overall height.

B. Antenna System and Tower:

A dual polarized 4-bay half-wave spaced FM antenna will be side mounted near the top of the tower. Figure 3 is a sketch of the proposed tower. The antenna has a non-directional power gain of 1.3 H/V.

The antenna will be fed by 182.9 Meters (600 Feet) of 1e" coaxial cable, with a rated efficiency of 75.2 percent for this length..

C. Transmitter:

WFRO-FM plans to install a type accepted 10 KW FM transmitter. The transmitter will be operated at 6.65 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 6.5 KW for the Horizontal and 6.5 KW for the Vertical Component.

A Class-B1 FM station is restricted to a maximum of 25 KW (ERP) up to a maximum Height Above Average Terrain (HAAT) of 100 Meters. This proposal will operate with an HAAT that exceeds the maximum and consequently must reduce its ERP in order to obtain equivalent coverage within the 1.0 mV/m contour.

Current F.C.C. policy permits stations that are beyond 320 kilometers from the Mexican or Canadian Borders to use the F(50,50) curves to determine what reduced power at their HAAT will provide the equivalent maximum 1.0 mV/M coverage allowed. Since the station is within 320 kilometers of the Canadian Border the equivalent interference curves have also been used.

Using the curve, it was determined that Class B1 operations at an HAAT of 177 Meters requires the ERP to be 2.0 to 8.2 KW. Because of a grandfathered short spacing the ERP will be limited to 6.5 kW.

E. Channel Allocation:

Figure 4 is a channel allocation study from the proposed site. The proposed site is remains short spaced under the rules to one station and this short spacing qualifies for processing under Section 73.213(a) of the rules regarding grandfathered pre-1964 stations.

Originally WFRO-FM was authorized to operate on Channel 256 as a full Class B FM facility. However, in the 1980's it downgraded to a Class B1 facility. However, the GF short spacing were so severe that even as a downgraded B1 it remained 24.0 km short spaced to WFMK on 256B at East Lansing, MI, and 7.2 km short spaced to WHKO on 256B at Dayton, OH. The site WFRO now seeks to operate from will still be short spaced 28.8 km to WFMK but is no longer short spaced to WHKO.

1. <u>Contour Protection - Section 73.213</u>:

Figure 5 is a map of the protected 57 dBu and the co-channel interfering 34 dBu contour proposed by this application and that of the WFRO licensed facility. In addition, the map shows the protected 54 & interference 37 dBu contours for WFMK & WHKO. Since this is a GF analysis protected & interfering contours are based upon "actual" licensed ERP and HAAT for WFMK & WHKO.

Figure 5A is a more detailed view of the contour overlap which will continue to exist between WFRO & WFMK.

Overlap to WFMK. Both the licensed and proposed facilities of WFRO cause contour overlap of WFMK's protected 54 dBu contour. The existing 34 dBu interference contour from WFRO is in green and the proposed is in orange. It is clearly evident that the amount of overlap is substantially reduced. The overlap was analyzed and it was determined that the licensed WFRO facility causes interference to 3,528 persons and 128 sq.km. Similarly it was determined that the proposed WFRO facilities will cause interference to 2,260 persons and 86 sq.km. This is a **reduction in interference** of 1,268 persons and 42 sq.km.

Overlap to WFRO. As previously stated no short spacing will exists with WHKO from the proposed site and therefore, no additional analysis is required. However, for the first time WFRO will receive contour overlap from WFMK (no overlap to licensed site). The **resulting interference encompasses** 379 persons and 4 sq.km.

The rules prohibit any increase in caused interference but will permit some increase in received interference provided the net interference does not increase based upon population or area. Combining the above interference numbers indicates that despite the new interference being received by WFRO the total interference has a **net decrease of 889 persons and 38 sq.km.**

A. Other Services to Interference Area:

The only interference area requiring an analysis of Other Services remaining is the Gain or New area of interference caused to WFMK (see Map 2A Gain, northeast portion of overlap). It was determined that this area is within the protected 54 dBu contour of "at least" seven Class B stations located within 35 miles of this interference area. Those stations are: WKAR/213B, WUOM/219B, WDRQ/226B, WCSX/234B, WKQI/238B, WKRK/246B & WWWW/275B.

The new area of interference received by WFRO **does not require** analysis since it is an area which is **not within** the present service area of WFRO's licensed facility. Thus, this new interference does not represent a "loss" area. In any event, it was determined that this area is within the protected 54 dBu contour of "at least" six Class B stations located within 16 miles of this interference area. Those stations are: WGTE/217B, WVKS/223B, WXKR/233B, WKKO/260B, WRVF/268B & WIOT/284B.

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. However, it was determined that the N-0-E degree radial did not have any land beyond 3 km and no US land was encompassed within the 34 dBu contour. Consequently, in accordance with Section 73.313(d)(2) **that radial was totally excluded** and the HAAT was based upon the remaining seven radials. In any event, this adjustment only lowered the HAAT by 0.3 meters.

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-215-E radial is the direct path to the City of License. From the proposed site the normally predicted 3.16 mV/M or 70 dBu City Grade Contour will NOT encompass 80% or more of the City of License.

Figure 2A is a map which illustrates the proposed coverage to the city of license as determined by OET-69 Longley-Rice. It clearly demonstrates that the entire city of license will **receive a signal level in excess of 74 dBu** (gray shading on map).

If the FCC Staff believes that a waiver of the rules is required to use a Longley-Rice analysis then WFRO-FM **requests such a waiver**.

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:

WFRO-FM 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 (1.0 km). Given the height of the proposed half-wave spaced FM 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 exist on the tower, there are no known transmission facilities within 60 meters (197 feet) of the proposed antenna.

There are no 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, WFRO-FM will investigate and correct such cases in accordance with the Commission's Rules.

K. Environmental Assessment Statement:

WFRO-FM 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 overall height the only remaining environmental issue is R.F. 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:

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

WFRO-FM 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:

$$D = \frac{SQRT(F2 * [HERP + VERP])}{1.667 * SQRT(PD) * 3.2808}$$

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^2
SQRT = Square Root
Freq = Frequency in mega-cycles/sec. (MHz)

The vertical radiation pattern of the FM antenna specified in this application is very 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 99.1 MHz and an "un-controlled" Power Density of 0.2 milli-watts results in a minimum distance of 46.7 meters (153 feet) from the antenna. Inasmuch as the lowest element on the proposed antenna will be approximately 167.6 meters (550 feet) above the ground level, it is self-evident that no hazard from radiation will exist to persons at ground level. At approximately 2 meters above the ground and assuming maximum downward radiation, the proposed FM facility contributes 1.5% of the FCC "controlled" standard. For FM, the "un-controlled" standard is 20% and, therefore, this proposal is in full compliance and is **categorically excluded** from further consideration since it is

less than 5%.

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, WFRO-FM 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.

III. SUMMARY:

BAS Broadcasting, Inc., licensee of WFRO-FM on Ch. 256B1 at Fremont, Ohio, requests a Construction Permit authorizing a change of site. WFRO proposes to operate from a new site with an ERP of 6.5 KW and an HAAT of 177 Meters. This application proposes facilities which are in compliance with the contour protection requirements of Section 73.213(a) regarding grandfathered pre-1964 short spaced stations. In addition, this application uses OET 69 - Longley-Rice to demonstrate that greater than 70 dBu service will be provided to its city of license. This engineering proposal is in full compliance with the Commission's Rules.

/s/ John J. Mullaney

John J. Mullaney, Consulting Engineer

June 11, 2002.