

MULLANEY ENGINEERING, INC.

9049 SHADY GROVE COURT
GAITHERSBURG, MD 20877

ENGINEERING EXHIBIT EE:

**MORTENSON BROADCASTING COMPANY
AM BROADCAST STATION KNAX
1630 KHZ, FORT WORTH, TEXAS**

**LICENSED: 1.0 KW-N/10 KW-D ND U
PROPOSED: 1.0 KW-N/10 KW-D ND U**

13 JANUARY 2003

FCC FACILITY ID NUMBER 87147

**ENGINEERING EXHIBIT
IN SUPPORT OF
AN APPLICATION FOR CONSTRUCTION PERMIT TO
CHANGE TRANSMITTER/ANTENNA SITE
AND CHANGE EFFECTIVE RADIATOR HEIGHT
OF AN EXISTING CLASS B EXPANDED BAND AM BROADCAST STATION**

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DECLARATION

I, Alan E. Gearing, declare and state that I am a graduate electrical engineer with a Bachelor of Science degree in Electrical Engineering from SUNY University at Buffalo, that I am a registered professional engineer in the District of Columbia (since 1979), and that I have provided engineering services in the areas of broadcasting and radio communications since 1973. My qualifications as an expert in radio engineering are a matter of record with the Federal Communications Commission. I am a senior engineer with the firm of Mullaney Engineering, Inc., consulting broadcast and radio communications engineers with offices in Gaithersburg, Maryland.

The firm of Mullaney Engineering, Inc., has been retained by MORTENSON BROADCASTING COMPANY to prepare the instant engineering exhibit and Section III-A of FCC Form 301 in support of *an application for construction permit to change transmitter/antenna site and change effective radiator height* for existing Class B expanded band AM broadcast station KNAX, licensed to Fort Worth, Texas [FCC Facility ID Number 87147]

All facts contained herein are true of my own knowledge except those stated to be on information and 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.



Alan E. Gearing, P.E.
District of Columbia Number 7406

Executed on the 13th day of January 2003

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NARRATIVE STATEMENT:

I. GENERAL:

This engineering statement has been prepared on behalf of MORTENSON BROADCASTING COMPANY (hereinafter "MBC"), licensee of AM Broadcast Station KNAX, FORT WORTH, TEXAS [FCC FACILITY ID NUMBER 87147]. KNAX is a Class B station currently licensed to operate in the expanded AM band on the frequency of 1630 kHz. Authorized operating powers are 10,000 watts daytime and 1000 watts nighttime. A non-directional antenna is employed for both day and night operating modes

KNAX currently shares a transmitter/antenna site in a diplexed arrangement with co-owned AM broadcast station KHVN (970 kHz, Fort Worth, Texas). This was the original proposed configuration as part of the expanded band migration proceedings. Unfortunately, the performance of KNAX from this site has not lived up to expectations. In order to improve KNAX's service, MBC now proposes **a new transmitter/antenna site and new effective radiator height** more

suitable for operation on KNAX's frequency of 1630 kHz - as opposed to KHVN's frequency of 970 kHz.

The modifications proposed herein fall within the definition of a minor change as given in the current version of §73.3571 of the FCC Rules and therefore the instant application is **not affected** by the "freeze" on expanded band major change applications [See FCC Public Notice DA 02-239; released February 1, 2002]. The proposed change in site meets the "20 kilometer" criteria and also meets all the distance separation requirements for expanded band stations. A waiver (if considered necessary) is requested of the Model I facilities specification of a radiator 90 electrical degrees in length. As discussed more fully below, use of a longer (and hence more efficient) radiator at the location specified herein **would not** result in more predicted interference to any station than would the use of a 90-degree radiator at a site located at the minimum required distance separations.

The proposed KNAX facilities will be constructed to comply with the *FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields* and the instant proposal is categorically excluded from environmental processing pursuant to the provisions of Section 1.1306 of the Commission's Rules. A more detailed discussion of environmental factors is included under the heading Environmental Considerations below.

Answers to questions on Section III-A of FCC Form 301 [June 2002 version] are incorporated in the following paragraphs, figures, and tables.

ENGINEERING DISCUSSION:

A. KNAX Transmitter/Antenna Location:

MBC proposes to relocate KNAX to a site at 3401 House Anderson Road in Euless, Texas. The geographic coordinates [NAD27 Datum] of the proposed KNAX transmitter/antenna site are:

Latitude: 32° 48' 35.7"

Longitude: 97° 07' 24.5"

Figure 1 is a portion of a 1:24,000 scale topographic map showing the location of the proposed KNAX site. Figure 2 is an aerial photograph showing the proposed site and vicinity.

The site proposed herein is only 16.1 km from the licensed KNAX site, well within the 20 km limit for moving the transmitter/antenna location of an expanded band station.

Table 1 is a list of places, other broadcast stations, airfields, and towers within ten kilometers of the proposed KNAX site. There are no other known radio facilities within the general vicinity of the proposed site. The list of Table 1 shows that no other existing or proposed AM, FM, or TV broadcast station is located within three kilometers of the proposed site. Table 1 does show three towers located within three kilometers. These towers are used by cellular and other two-way radio services. No adverse interaction is expected between the proposed KNAX operation and these other nearby radio installations. In the event that any unexpected interaction does occur, MBC will cooperate fully with all affected parties to correct the situation.

B. KNAX Antenna:

The proposed KNAX antenna structure will be a grounded, self-supporting, steel pole. The overall height of pole will be 84.7 meters (278') above ground level (AGL). The effective electrical height of the pole will be 83.8 meters (275'). Figure 3 is a vertical plan sketch of the proposed KNAX antenna structure.

The Federal Aviation Administration (FAA) is being notified of the proposed antenna structure concurrently with the filing of the instant application. Registration of the KNAX antenna structure under the provisions of Part 17 of the FCC Rules will be made once the FAA has issued its determination.

The proposed KNAX antenna ground system will consist of 120 buried copper wire radials evenly spaced about the tower. Each radial will have a nominal length of 48.8 meters (160'), except where foreshortened at the property boundary or where lengthened to fill in the northwest and southwest corners of the site. The total area covered by the ground system is 8,140 square meters (87,616 square feet), which is equivalent to a circle having a radius of 50.9 meters (167'). 50.9 meters is equivalent to 99.6 electrical degrees at KNAX's operating frequency of 1630 kHz. A plat of the KNAX site showing the tower location and ground system layout is included herein as Figure 4.

At KNAX's operating frequency of 1630 kHz, a 83.8-meter radiator is equivalent to 164.0 electrical degrees. A computer program based on Figure 8 of §73.190 of the FCC Rules was used to determine the radiation efficiency for the proposed KNAX radiator. The theoretical efficiency of the antenna system was thus determined to be 361.6 mV/m at one kilometer for

one kilowatt, in compliance with the requirements of §73.189 of the FCC rules. Therefore, for the proposed 10 kW daytime operation, the radiated field strength will be 1143 mV/m @ km.

C. Blanketing Area

Computerized analysis of the population (2000 Census) contained within the KNAX blanketing area indicates that there are only 141 persons living within the daytime 1000 mV/m contour and no population within the nighttime 1000 mV/m contour. The proposed KNAX operation is therefore fully in compliance with the provisions of §73.24(g) and MBC will fully comply with the provisions of §73.88 concerning responding to reports of blanketing interference. The map of Figure 5 herein shows the location of the proposed KNAX blanketing contours.

D. Principal Community Coverage:

Figure 6-A, herein, is a map showing the location of the licensed and proposed KNAX daytime 5.0 mV/m and 2.0 mV/m contours. Figure 6-B shows the daytime 0.5 mV/m contour. From Figure 6-A, it is evident that the proposed KNAX daytime operation continues to provide 100 percent 5 mV/m coverage the principal community to be served - FORT WORTH, TEXAS.

Figure 7, herein, is a map showing the location of the licensed and proposed KNAX nighttime 5.0 mV/m and 2.65 mV/m 50% RSS contours. An computerized analysis reveals that the proposed KNAX nighttime 5.0 mV/m contour encompasses 242,967 persons, which is 54.3 percent of the total Fort Worth population of 447,619. An area analysis employing a compensating polar planimeter reveals that the proposed KNAX nighttime 5.0 mV/m

contour encompasses an area of 402 square kilometers (155 square miles), which is 53.1 percent of the total Fort Worth area of 757 square kilometers (292 square miles). The proposed KNAX nighttime operation complies with the requirement to provide at least 50 percent 5 mV/m coverage to the principal community to be served - FORT WORTH, TEXAS.

E. Daytime Allocation Study:

Table 2 is a tabulation of stations pertinent to the operation of Station KNAX on 1630 kHz at Fort Worth. Figures 8-A and 8-B are a series of conductivity maps showing the locations of applicable allocation contours for KNAX and the more critical stations from Table 2. (Note: It is the undersigned's understanding that full-scale reproduction of the FCC's M3 map is not required for electronic filing. A full-scale version of Figures 8-A and 8-B plotted on the FCC's M3 map will be provided upon request.)

These maps and Table 2 show the proposed KNAX operation meets both the minimum separation requirements for expanded band stations (i.e. 800 km cochannel, 200 km 1st adjacent channel, and 53 km 2nd adjacent channel) as well as the traditional contour overlap restrictions (including lack of prohibited contour overlap with 3rd adjacent channel station KRVA, 1600 kHz, Cockrell Hill, Texas). Note: The experimental synchronous station DKR2XVA on 1600 kHz at Fort Worth was preempted by the licensed KNAX operation and does not require protection.

F. Nighttime Allocation Analysis:

Allocations in the expanded AM band are based upon minimum distance separations which were determined to provide an acceptable compromise

between coverage and interference. For cochannel and first adjacent channel stations (pertinent to nighttime allocation considerations) these separations are 800 km and 200 km respectively. The closest cochannel station to the proposed KNAX operation is KCJJ, Iowa City, Iowa, at 1096 km and the closest 1st adjacent channel station is WTAW, 1620 kHz, at College Station, Texas, at 256 km.

Even though KNAX's proposed operation involves a radiator taller than the assumed 90 electrical degrees and hence results in greater radiated field strength, because the distances to potentially affected stations are in excess of the minimum requirements, the instant proposal will not cause any greater nighttime interference than would use of a 90 electrical degree radiator at a minimally spaced site. If considered necessary, MBC respectfully requests a waiver of the Model I facilities specification of a radiator 90 electrical degrees in length.

G. Conductivities and Unattenuated Field Strengths:

The FCC Conductivity Map, Figure M-3, was used to establish the effective conductivities for all stations in the absence of measurement data. Measurement data were readily available for only one station, KRVA, 1600 kHz, Cockrell Hill, Texas. In addition, new field strength measurements were taken on two radials from KRVA. The results of these measurements are summarized in the Appendices included herein. Maps showing the measurement point locations have not been included, but will be supplied upon request. Table 3 summarized the measured ground conductivity values employed in determining the location of the KRVA allocation contour.

Where applicable, the equivalent distance method was used to establish the distances to contours.

The FCC's AM station database has been used to obtain parameters of all stations considered in the allocation study except for the corrected KNAX operation which is specified herein.

H. Environmental Considerations:

MBC believes that operation of AM broadcast station KNAX, as specified herein, will not significantly affect the environment for the following reasons.

The site does not meet any of the criteria specified in Section 1.1307 of the FCC Rules. More specifically, the KNAX facilities are not known to fall within any of the categories enumerated in Sections 1.1307(a)(1)-(7) and will not involve the use of high intensity white lights. Furthermore, operation of the facility will not involve the exposure of workers or the general public to levels of radio frequency electromagnetic fields exceeding guidelines adopted by the Federal Communications Commission. [The current FCC guidelines are based upon criteria contained in the National Council of Radiation Protection and Measurements (NCRP) Report No.86 (1986) and ANSI/IEEE C95.1-1992.]

With regard to the last item, the KNAX tower will be surrounded by a gated fence, at least 3m (10') tall. The fence will not be less than three meters from any point on the tower or feed line. This is the "worst case" distance from Section 1 of Supplement A to OET Bulletin No. 65 (Edition 97-01) assuming: a 10 kW, 1630 kHz, AM station with an antenna tower between 0.25 and 0.5

wavelength in height. The fence gate will be kept locked and appropriate warning signs posted on each face of the fence. Procedures will be adopted to protect workers requiring access to the tower inside the fenced area, including reduction of power or cessation of operation, to comply with germane exposure guidelines.

III. SUMMARY:

MBC proposes to continue operating AM broadcast station KNAX at FORT WORTH, TEXAS. Operation will remain on a frequency of 1630 kHz and operating powers will remain at 10 kW daytime and 1.0 kW nighttime. The instant application specifies a change in site and use of a more efficient radiator.

Operation of KNAX as described herein would not have any significant impact on the environment. The proposed site is within 20 kilometers of the licensed KNAX site and fully meets the minimum separation requirements for expanded band AM stations. Furthermore, use of the proposed 164.0 electrical degree radiator from the site proposed herein will not cause any greater nighttime interference than would use of a 90 electrical degree radiator at a minimally spaced site. The proposed KNAX operation is believed to be fully in compliance with the Commission's rules and applicable international agreements.



Alan E. Gearing, P.E.