

**MULLANEY ENGINEERING, INC.**

9049 SHADY GROVE COURT  
GAITHERSBURG, MD 20877

**ENGINEERING EXHIBIT EE:**

**RADIO STATION KJJJ (FM)  
STEPHEN M. GREELEY  
LAKE HAVASU CITY, ARIZONA**

**Ch. 272B 4.5 KW 467 M HAAT**

**JUNE 13, 2002**

**ENGINEERING STATEMENT IN SUPPORT OF  
AN APPLICATION FOR A  
CHANGE OF SITE & CHANGE CLASS FROM C2 TO B**

**File No. BMLH-20010514AAR - Facility ID: 63410**

**ATTACHED TO EXHIBIT 24 OF FCC FORM 301**

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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 Stephen M. Greeley, to prepare the instant engineering exhibit in support of an application for Construction Permit for modification of KJJJ FM licensed to Lake Havasu City, Arizona (FCC Facility ID Number: 63410).

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 13th day of June 2002.

**ENGINEERING EXHIBIT EE:**

**RADIO STATION KJJJ (FM)  
STEPHEN M. GREELEY  
LAKE HAVASU CITY, ARIZONA**

**Ch. 272B 4.5 KW 467 M HAAT**

**NARRATIVE STATEMENT:**

**I. General:**

This engineering statement has been prepared on behalf of Stephen M. Greeley, licensee of KJJJ (FM) on Channel 272C2 at Lake Havasu City, Arizona. The purpose of this statement is to request a Construction Permit authorizing a change of site. The new site is **located in California** and thus the station class must change from a Class C2 to a Class B. KJJJ will operate on Channel 272B with an ERP of 4.5 KW and an HAAT of 467 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. 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:**

KJJJ proposes to locate the tower atop Whale Mountain approximately 20 kilometers south of Needles, California and 8 kilometers west of the Colorado River which separates California from Arizona. Figure 1 is a topographic map showing the proposed site. The NAD-27 geographic coordinates are:

Latitude: 34° 40' 59"

Longitude: 114° 32' 36"

The city of license, Lake Havasu City, Arizona, is located approximately 30 kilometers southeast of the proposed site. The Regional Office of the FAA was **not notified** of this proposal since the FCC's "TOWAIR" program indicated notification was not required.

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

A dual polarized Shively 4-bay half-wave spaced FM antenna (6810-4) 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 1.3 H/V.

The antenna will be fed by 36.6 Meters (120 Feet) of 1" coaxial cable, with a rated efficiency of 90.2 percent for this length..

### **C. Transmitter:**

KJJJ plans to install a type accepted 4 KW FM transmitter. The transmitter will be operated at 3.84 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 4.5 KW for the Horizontal and 4.5 KW for the Vertical Component.

A Class-B FM station is restricted to a maximum of 50 KW (ERP) up to a maximum Height Above Average Terrain (HAAT) of 150 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 proposed site is near Mexico the interference contours were also used.

Using the curve, it was determined that Class B operations at an HAAT of 467 Meters requires the ERP to be greater than 1.1 and no greater than 4.5 KW.

**E. Channel Allocation:**

Figure 4 is a channel allocation study on 272B from the proposed site. This application is in full compliance with Section 73.207(a).

**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-137-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 completely encompass the City of License without major terrain obstruction.

**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:**

KJJJ 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 (0.8 km) and is in a sparsely populated area. 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.

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, KJJJ will investigate and correct such cases in accordance with the Commission's Rules.

**K. Environmental Assessment Statement:**

KJJJ 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. Specifically the proposed facility:

- 1) Will NOT be located in an officially designated wilderness area.
- 2) Will NOT be located in an officially designated wildlife preserve.



- 3) Will NOT affect districts, sites, buildings, structures or objects, significant in American history, architecture, archeology or culture, that are listed in the National Register of Historic places or are eligible for such listing.
- 4) Will NOT be located in a floodplain.
- 5) Will NOT result in construction that will involve a significant change in the surface features (eg. wetland fill, deforestation or water diversion).
- 6) Will NOT involve the use of high intensity white lights on a structure located in a residential neighborhood, as defined by the applicable zoning laws.
- 7) 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

KJJJ 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:

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

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<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 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 102.3 MHz and an “un-controlled” Power Density of 0.2 milli-watts results in a minimum distance of 38.8 meters (128 feet) from the antenna. Inasmuch as the lowest element on the proposed antenna will be approximately 26 meters (85 feet) above the ground level, additional analysis is required before one can conclude that no hazard will exist.

Figure 5 is a vertical elevation plot for an Shively 4 bay half-wave spaced FM antenna (6810-4 HW).

Figure 5-A is a plot of the predicted RF Exposure at 7 feet above ground level. The “solid” line assumes a vertical form factor of  $F=1.0$  while the “dashed” line uses the vertical form factor from Figure 5. As can be seen, the use of the 4 bay half-wave spaced FM antenna reduced the exposure at ground level below 10 uW/sq.cm or 1 percent of the standard for a “controlled” area. 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, KJJJ 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.

**III. SUMMARY:**

Stephen M. Greeley, licensee of KJJJ (FM) on Channel 272C2 at Lake Havasu City, Arizona. The purpose of this statement is to request a Construction Permit authorizing a change of site. The new site is located in California and thus the station class must change from a Class C2 to a Class B. KJJJ will operate on Channel 272B with an ERP of 4.5 KW and an HAAT of 467 Meters. This engineering proposal is in full compliance with the Commission's Rules.

/s/ John J. Mullaney

John J. Mullaney, Consulting Engineer

June 13, 2002.