

MULLANEY ENGINEERING, INC.

9049 SHADY GROVE COURT
GAITHERSBURG, MD 20877

ENGINEERING EXHIBIT EE:

**RADIO STATION KSKX(FM)
OPTIMA COMMUNICATIONS, INC.
SECURITY, COLORADO**

Ch. 288C2 1.65 kW-DA 676 M HAAT

AUGUST 22, 2005

ENGINEERING STATEMENT IN SUPPORT OF
AN APPLICATION FOR A
AN UPGRADE TO C2 FACILITIES
PER DOCKET 04-367
REQUESTS WAIVER OF 73.215

File No. BLH-19910829KF - Facility ID: 50402

ATTACHED TO EXHIBIT 25 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 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 Optima Communications, Inc., licensee of KSKX(FM) to prepare the instant engineering exhibit in support of an application for Construction Permit for an upgraded C2 FM radio station licensed to Security, Colorado (FCC Facility ID Number: 50402).

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.



John J. Mullaney, Consulting Engineer

Executed on the 22th day of August 2005.

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**RADIO STATION KSKX(FM)
OPTIMA COMMUNICATIONS, INC.
SECURITY, COLORADO**

Ch. 288C2 1.65 kW-DA 676 M HAAT

NARRATIVE STATEMENT:

I. General:

This engineering statement has been prepared on behalf of Optima Communications, Inc., licensee of Radio Station KSKX(FM) at Security, Colorado. The purpose of this statement is to request a Construction Permit to build an upgraded FM broadcast facility on Channel 288C2 at Security, Colorado (per Docket 04-367). The upgraded facility will operate with an ERP of 1.65 kW-DA and an HAAT of 676 Meters. This application proposes C2 facilities which **request a waiver** of the contour protection requirements of Section 73.215 (received interference) so as to maintain its existing C3 service to over 20,000 persons. The requested waiver would permit KSKX to **continue to receive minor overlap** so as to maintain its long established 60 dBu service to the area.

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:

KSKX(FM) proposes to remain at its existing C3 site utilizing a directional antenna system. The NAD-27 geographic coordinates are:

Latitude: 38° 44' 40"

Longitude: 104° 51' 41"

The city of license, Security, Colorado, is located approximately 13 kilometers East of the proposed site. The Regional Office of the FAA was not notified of this proposal since no change in overall height is proposed. The current Antenna Structure Registration number is **1023337**.

B. Antenna System and Tower:

A dual polarized 4-bay ERI, LP-4AE-SP FM (half wave spaced) antenna will be side mounted near the top of the tower. **Figure 3** is a sketch of the tower. The antenna has an approximate directional power gain of 2.0 H/V.

Figure 6-A & 6-B are polar plot of the relative horizontal field pattern for two separate antenna patterns. **Pattern A** requires a waiver of 73.215 since it maintains the existing contour overlap that KSKX C3 already receives. **Pattern B** requires no waiver since it results in no received overlap. The antenna will be mounted in accordance with recommendations from the directional antenna manufacturer. In addition, no top mounted platforms or other antennas will exist in close proximity of the FM antenna unless approved by the antenna manufacturer.

C. Effective Radiated Power:

Giving consideration for the maximum antenna gain, transmitter power and line loss, the maximum Effective Radiated Power is 1.65 kW-DA for the Horizontal and 1.65 kW-DA for the Vertical Component.

A Class-C2 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.

Using the curve, it was determined that Class C2 operations at an HAAT of 676 Meters requires the ERP to be greater than 0.43 and no greater than 1.65 KW.

D. Channel Allocation & 73.215 Waiver:

Appendix A contains a detailed discussion of the existing C3 allocation and the proposed C2 allocation which result in the need to continue to permit the existing overlap, using "Delta H" and the exceptions to 73.215 used in Puerto Rico and the Virgin Islands.

E. 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.

F. Terrain Profile to City of License:

The N-90-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.

G. 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.

H. FM Blanketing Contour:

KSKX(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 tower in which Blanketing interference is possible is fairly small (51 km) and is at an established electronic site. Given the existing C3 operation and the height of the proposed antenna, no problems are anticipated.

I. Other Services in Area:

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

This is an established electronic site (Cheyenne Mountain). Besides what already exists at the site, there are no known transmission facilities within 60 meters (197 feet) of the proposed antenna.

There are many 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, KSKX(FM) will investigate and correct such cases in accordance with the Commission's Rules.

J. Environmental Assessment Statement:

KSKX(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. Because of the age of the site and the fact that the existing antenna will be replaced by an antenna which is not that significantly different, the Section 106 study as required by **NHPA is not applicable**. Specifically with regard to RF Exposure 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	$900/(\text{Freq}^2)$
30 to 300	1.0 VHF TV & FM
300 to 1,500	$\text{Freq}/300$ UHF TV
1500 to 100,000	5.0

KSKX(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, **there are several other facilities with higher power.** However, as will be shown this facility is categorically excluded.

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/cm²
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 105.5 MHz and an “un-controlled” Power Density of 0.2 milli-watts results in a minimum distance of 23.5 meters (77.1 feet) from the antenna. Inasmuch as the lowest element on the proposed antenna will be approximately 51.8 meters (170 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 3.6% of the FCC “controlled” standard. However, given that a half wave spaced antenna will be used, use of the more realistic form factor of $F=0.5$ results in a contribution of 0.92%. 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% of the controlled standard. The entire area around the tower/antenna is restricted from access by the general public. A dual polarized 4-bay ERI, LP-4AE-SP FM (half wave spaced) antenna will be installed.

The tower is 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, KSKX(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.

K. Compliance with Radio Duopoly Rules:

Optima Communications has no other radio interest. Duopoly showing not required.

III. SUMMARY:

Optima Communications, Inc., licensee of KSKX(FM) proposes to construct an upgraded C2 FM facility on Channel 288C2 at Security, Colorado (per Docket 04-367). This application proposes C2 facilities which **request a waiver** of the contour protection requirements of Section 73.215 (received interference) so as to maintain its existing C3 service to over 20,000 persons. The requested waiver would permit KSKX to **continue to receive minor overlap** so as to maintain its long established 60 dBu service to the area. KSKX believes the waiver it seeks will serve the public interest. In other respects this engineering proposal is in full compliance with the Commission's Rules.


John J. Mullaney, Consulting Engineer

August 22, 2005.