KSMX FM Engineering Exhibit

Exposure to Radio Frequency Radiation

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The replacement of the KSMX FM broadcast antenna requires an analysis of Radio Frequency Radiation (RFR) exposure to the general public and occupational workers.

KSMX FM is co-located on a tower which provides support for the antenna systems of broadcast stations KVIH DT, K220FT, and K228DQ. The percent contribution from each radio source will be summed to determine the total exposure of Radio Frequency Radiation (RFR) to workers and the public.

KSMX FM utilizes a Shively 12 bay model 6810 circularly polarized antenna with a Center of Radiation (CR) at 169 meters Above Ground Level (AGL). The Effective Radiated Power (ERP) of 100 kW (horizontal and vertical fields) is reduced by antenna vertical pattern relative field factor of 0.13 at the tower base.

$$S = \frac{(33.4)\,(F)^2\,(ERP)}{R^2}$$

$$= \frac{(33.4)\,(0.13)^2\,(200{,}000)}{(169)^2}$$

$$= 3.95 \text{ uW/cm}^2$$

Using equation (10) on page 23 of OET Bulletin 65 Edition 97-0, August 1997, the KSMX FM calculated power density at the tower base is 3.95 uW/cm^2. The power density at the tower base is approximately 2% of the uncontrolled Maximum Permissible Exposure (MPE) to the general public.

KVIH DT utilizes a GE model TY-70-H horizontally polarized antenna with a CRAGL of 208 meters. The ERP of 5 kW is reduced by the antenna vertical pattern relative field factor of 0.20 at the tower base, generally assumed for VHF television antennas, as per OET Bulletin 65, Supplement A, Edition 97-01.

$$= \frac{(33.4)\,(0.20)^2\,(5{,}000)}{(208)^2}$$

$$= 0.15 \text{ uW/cm}^2$$

The KVIH DT calculated power density at the tower base is 0.15 uW/cm^2. The power density at the tower base is approximately 0.1% of the uncontrolled MPE to the general public.

FM translator K220FT utilizes a SWR model FMEC circularly polarized antenna with a CRAGL of 31 meters. The ERP of 0.180 kW (horizontal and vertical fields) is reduced by the antenna vertical pattern relative field factor of 0.50 at the tower base.

$$= \frac{(33.4)\ (0.50)^2\ (360)}{(31)^2}$$

$$= 3.13\ \text{uW/cm}^2$$

The K220FT calculated power density at the tower base is 3.13 uW/cm^2. This power density at the tower base is approximately 1.6% of the uncontrolled MPE to the general public.

FM translator K228DQ utilizes a Scala model HDCA-5V vertically polarized Yagi-Uda antenna with a CRAGL of 91 meters. The ERP of 0.174 kW is reduced by the antenna vertical pattern relative field factor of 0.50 at the tower base.

$$= \frac{(33.4)\ (0.50)^2\ (174)}{(91)^2}$$

$$= 0.18\ \text{uW/cm}^2$$

The K228DQ calculated power density at the tower base is 0.18 uW/cm^2. This power density at the tower base is approximately 0.1% of the uncontrolled MPE to the general public.

The calculated total Radio Frequency Radiation (uncontrolled) exposure to the general public at the tower base is 7.41 uW/cm^2, less than 4% of the Maximum Permissible Exposure limit of 200 uW/cm^2.

KSMX FM complies with the FCC requirements for uncontrolled RFR exposure to the general public.

For occupational workers, equation (3) page 31 OET Bulletin 65 Supplement A Edition 97-01 provides the Minimum Antenna Height (MAH), ground to center of radiation, necessary to reduce ground-level RF fields below a given power density. This equation includes the ground reflection factor of 2.54 that represents worse case exposure resulting from incident and ground-reflected radiation.

$$\text{MAH} = \left[\ (33.4)\ (F)^2\ (\text{ERP})\ /\ S\ \right]^{1/2}$$

For KSMX FM, the calculated MAH for horizontal and vertical fields is

$$= \left[\ (33.4)\ (0.13)^2\ (200{,}000)\ /\ (1000)\ \right]^{1/2}$$

$$= 10.6 \text{ meters or } 35 \text{ feet}$$

For KVIH DT, the calculated MAH for the horizontal field is

$$= \left[(33.4) (0.20)^2 (5{,}000) / (1000) \right]^{1/2}$$

$$= 2.6 \text{ meters or } 9 \text{ feet}$$

For K220FT, the calculated MAH for the horizontal and vertical fields is

$$= \left[(33.4) (0.50)^2 (360) / (1000) \right]^{1/2}$$

$$= 1.7 \text{ meters or } 6 \text{ feet}$$

For K228DQ the calculated MAH for the vertical field is

$$= \left[(33.4) (0.50)^2 (174) / (1000) \right]^{1/2}$$

$$= 1.2 \text{ meters or } 4 \text{ feet}$$

KSMX FM will reduce power or cease transmissions during antenna or tower inspections and maintenance to prevent occupation workers from being exposed to RFR levels that exceed the MPE.

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