Statement of Hammett & Edison, Inc., Consulting Engineers

The firm of Hammett & Edison, Inc., Consulting Engineers, has been retained by the Clark County School District, licensee of Station KLVX, Channel 11, Las Vegas, Nevada, to prepare the technical portions of an application to relocate its E920225 Ku-band satellite uplink station from the old KLVX studios at 4210 Channel 10 Drive, Las Vegas, to the new KLVX studios at 3050 East Flamingo Road, Las Vegas, a move of 1.2 km.

Justification for Requested EIRP Levels

Because of heavy rain conditions that can sometimes exist in the Las Vegas, Nevada, area, a 300-watt high-power amplifier will be used, resulting in a maximum main beam equivalent isotropic radiated power (EIRP) of 75.5 dBW. Only the power necessary to establish reliable communications with the satellite transponder will be used; during good-weather conditions, it is anticipated that the operating power will typically be at least 10 dB below the maximum power.

Prevailing Exposure Standards

The U.S. Congress requires that the Federal Communications Commission ("FCC") evaluate its actions for possible significant impact on the environment. In Docket 93-62, effective October 15, 1997, the FCC adopted the human exposure limits for field strength and power density recommended in Report No. 86, "Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," published in 1986 by the Congressionally chartered National Council on Radiation Protection and Measurements ("NCRP"). Separate limits apply for occupational and public exposure conditions, with the latter limits generally five times more restrictive. The more recent standard, developed by the Institute of Electrical and Electronics Engineers and approved as American National Standard ANSI/IEEE C95.1-2006, "Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz," includes similar exposure limits. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health.

For 14.0–14.5 GHz Ku-Band satellite transmitting antennas, the prevailing standard for occupational exposures of unlimited duration is 5 mW/cm^2, and 1 mW/cm^2 for public exposures of unlimited duration.

Proposed Uplink Facilities

It is proposed to use a General Dynamics/VertexRSI Model 6.1KPK 6.1-meter diameter satellite earth station Ku-Band transmitting antenna. Although a Varian Model VZU-6993F3 traveling wave tube

power amplifier with a maximum transmitter power output (TPO) of 300 watts will be used, the transmission line will be 40 meters of Andrew Type EW132 elliptical waveguide, with a loss of 6.3 dB. Thus, the maximum antenna input power for any combination of signals would be 70.8 watts (18.5 dBW). The antenna would be mounted on the ground, in a walled area of the south side of the new KLVX studios at 3050 East Flamingo Road, Las Vegas, Clark County, Nevada.

The eastern-most geostationary communication satellite that the proposed antenna would communicate with would be at 72°W longitude, and the western-most satellite would be at 135°W longitude. The antenna orientation to the eastern-most satellite would be 122.2°T with an elevation angle of 28.5°, the antenna orientation to a satellite at the approximate middle of the domestic satellite arc would be 163.2°T with an elevation angle of 46.7°, and the antenna orientation to the western-most satellite would be 211.5°T with an elevation angle of 43.1°. The greatest elevation angle would occur when communicating with a satellite at 115°W, where an elevation angle of 48.1° would be achieved. Thus, communication with the eastern-most satellite represents the antenna orientation with the lowest elevation angle.

NIST Nomograph

The worst-case power density was determined using a method developed by the staff of the National Bureau of Standards (NBS, now the National Institute for Standards and Technology, "NIST"), "An Efficient and Accurate Method for Calculating and Representing Power Density in the Near-Field Zone of Microwave Antennas."* Figure 2 from Page 6 of that report is applicable to the proposed installation, and it is reproduced here in Figure 1. According to the NIST paper, this nomograph is applicable to all aperture antennas with diameter-to-wavelength ratios of 30 or greater. Since a 6.1-meter diameter antenna at 14.25 GHz has a diameter-to-wavelength ratio of approximately 290 to 1, the nomograph is clearly applicable.

Figure 1 characterizes the power density variation in the near-field. The extent of the near-field covered by this nomograph extends to a D^2/λ ratio of unity, where D is the antenna diameter and λ is the wavelength, expressed in compatible units (*i.e.*, either both in meters or both in centimeters). For Ku-Band uplinks the mid-band wavelength is 0.021 m (2.1 cm), so for the proposed 6.1-m antenna, D^2/λ equals approximately 1.77 km (1.10 miles). Thus, the distance over which this nomograph is applicable includes the entire KLVX studio site.

At Page 3 of the NIST paper, the formula $S = 38.6 - 20\log_{10}D$ is given for calculating the maximum power density for 1 watt of antenna input power, where S is the power density in dBm/cm^2 and

* Publication number NBSIR-85/8036, December 1985. This paper was written by Richard L. Lewis and Allen C. Newell, and was sponsored by the U.S. Environmental Protection Agency (EPA).

D is the antenna diameter in centimeters. For higher input powers a $10\log_{10}(P)$ factor must be applied, where P is the antenna input power in watts. Thus for the maximum antenna input power of 70.8 watts the main beam the power density would be $38.6 - 20\log_{10}(610) + 10\log_{10}(70.8)$, or +1.4 dBm/cm^2. This is 1.4 dB higher than the 1.0 mW/cm^2 (0 dBm/cm^2) NCRP guideline for uncontrolled (public) exposures. Thus, the closest applicable and conservative contour line in Figure 1 defining the NCRP public limit is the -2.5 dB contour, and the closest and conservation applicable contour line defining the five-times higher occupational limit is the 0 dB contour; that is, due to the limited antenna input power of 70.8 watts and the large antenna diameter, there is no area where the power density would exceed the occupational limit.

For the NCRP public limit of 0 dBm/cm^2, Figure 1 shows that the maximum distance in the main beam to the -2.5 dB contour is a Z-axis distance of $0.28D^2/\lambda$, or 496 m. Given the worst case antenna elevation angle of 28.5° when communicating with the eastern-most geostationary satellite, this point would occur at a height well above ground level. Since, as shown by the attached Figure 2, the KLVX studio site and surrounding area is relatively flat, and since on the south side of East Flamingo Road there are only one and two-story structures, the above-the-public limit main beam would occur hundreds of feet above ground, where of course public access would not exist. As also shown by Figure 2, the distance to the nearest structure at the 122°T lowest elevation angle direction is approximately 540 feet. At this horizontal distance from the satellite uplink antenna the main beam would be more than 300 feet above ground, and more than 250 feet above the rooftop of the two-story apartments/condominiums.

The closest structure in the satellite arc look angle is a single-story building due South of the satellite antenna area, approximately 250 feet distant. However, in this direction of approximately 187°T, the elevation angle of the uplink antenna would be a much steeper 47°. For this elevation angle the center of the main beam at a horizontal distance of 250 feet would be about 280 feet AGL, or again more than 250 feet above the roof of the across-the-street structure. Thus, the power density caused by the uplink operation at any publicly accessible area would be at least three orders of magnitude below the public limit.

The nomograph shows that perpendicular to the main beam the distance to the -2.5 dB contour does not exceed about 0.18D, or 1.1 meters. Thus, a 2.2-meter diameter virtual cylinder extending upwards at 28° or greater above the horizontal and from the pedestal height of approximately 10 feet AGL would define the worst-case distance to the public exposure limit. Since, as demonstrated above, no public exposures would occur in this space, the uplink antenna is inherently compliant with respect to public exposures. The already planned mitigation measures of enclosing the uplink antenna in a walled-off area with a locked access gate, plus an RF exposure warning sign on gate or the pedestal

supporting the uplink antenna (or both), will be sufficient to achieve compliance with FCC guidelines regarding human exposure to radio frequency energy.

Occupational Exposures

As previously noted, due to the relatively low maximum antenna input power, there is no portion of the uplink antenna where the 5 mW/cm^2 occupational limit is predicted to occur. Thus, no special occupational safety precautions are required, even when the uplink antenna is transmitting.

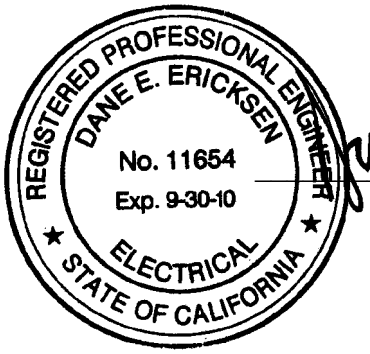
Summary

Operation of the proposed uplink will comply with the public exposure guidelines, even at the maximum possible power, since the uplink antenna will be inside a walled area with a locked gate, and no portion of the 2.2-meter virtual cylinder defining the worst-case radial distance to the public exposure limit will illuminate the KLVX studio building nor any other nearby structures.

List of Figures

In carrying out these engineering studies, the following attached figures were prepared under my direct supervision:

1. NIST nomograph
2. Satellite views of the KLVX studio site.

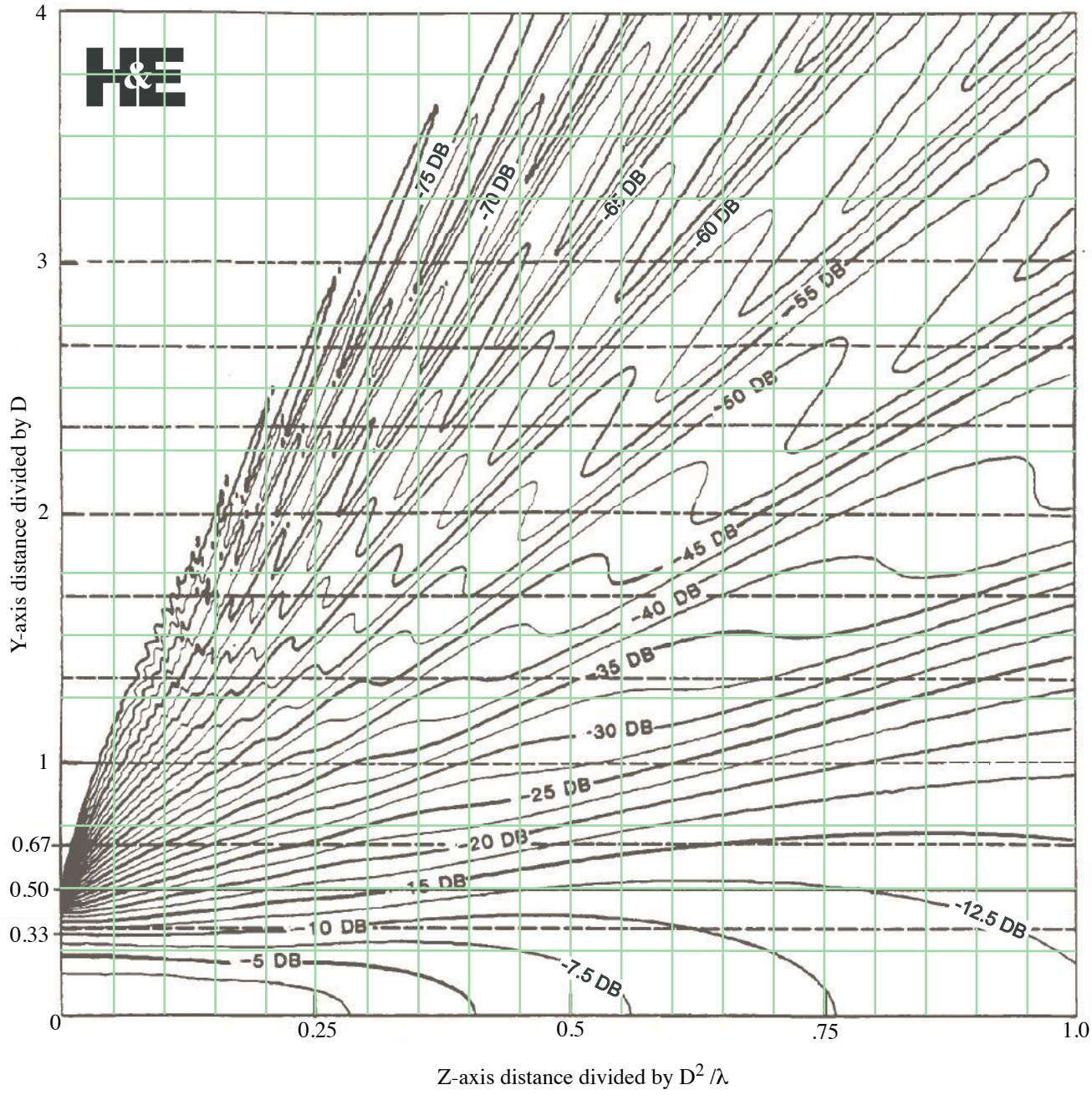


May 14, 2010

Dane E. Ericksen, P.E.

Ku-Band Satellite Uplink Station E920225 • Las Vegas, Nevada

Relative Power Density Contours in the Y-Z Plane for D >30λ



Nomograph from NTIS #NBSIR85-3036, page 6.
Additional notations by Hammett & Edison, Inc., Consulting Engineers, San Francisco

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Site Satellite Photographs (New KLVX Studios)

Satellite view of the new KLVX studios. Source: ACME Mapper.

There is a wall and an entryway fence with a locked gate around the satellite antennas. Source: ACME Mapper.