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August 15, 2012

KGHP(FM)
Peninsula School District No. 401
14015 62nd Ave NW
Gig Harbor, WA 98332

Subject: KGHP Power Density Calculation

This letter has been prepared on behalf of Peninsula School District No. 401, licensee of FM station KGHP, to present calculations of the ground-level power density levels in the vicinity of the KGHP antenna. It should be noted that no site visit was performed in connection with preparation of this analysis, and data regarding the KGHP antenna system is taken from Federal Communications Commission ("FCC") databases or was provided by representatives of the school district.

KGHP is licensed by the FCC to operate on FM Channel 210A (89.9 MHz), utilizing a directional antenna system manufactured by Jampro, model JLCP-2(DA).[1] This antenna is licensed to operate with its radiation center at a height of 14 meters (46 feet) above ground. Licensed power is 1.35 kW in the horizontal polarization, and 0.8 kW in the vertical polarization.

The FCC has established two separate tiers of Maximum Permissible Exposure ("MPE") limits to electromagnetic fields at FM frequencies. The "controlled environments" MPE limit of 1000 $\mu W/cm^2$ applies when individuals are exposed as a consequence of their employment and have been made fully aware of the potential for exposure and can exercise control over their exposure. The "uncontrolled environments" MPE limit of 200 $\mu W/cm^2$ applies when the general public is exposed or where individuals are exposed as a consequence of their employment but may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

The FCC's MPE limits are based on exposure limits recommended by the National Council on Radiation Protection and Measurements ("NCRP") and the exposure limits developed by the Institute of Electrical and Electronics Engineers ("IEEE") and adopted by the American National

[1] While a photograph of the KGHP antenna shows an antenna which does not match the physical appearance of the current Jampro JLCP antenna, the Jampro senior engineer has confirmed that he believes that this is indeed a Jampro antenna of a type no longer manufactured. It is likely that Jampro has "recycled" the model designation.

Standards Institute ("ANSI"). In reaching its decision on adopting these guidelines, the FCC considered the large number of comments submitted in its rulemaking proceeding, and particularly those submitted by the US Environmental Protection Agency ("EPA"), the Food and Drug Administration ("FDA"), and other federal health and safety agencies.

Power Density Calculations

The power density calculations shown below were made using the techniques outlined in FCC Office of Engineering and Technology Bulletin No. 65 and the FCC computer software program "FMModel".[2] "Ground level" calculations in this report have been made at a reference height of 2 meters (6 feet) above ground to provide a worst-case estimate of exposure for persons standing on the ground in the vicinity of the tower. The equation shown below was used to calculate the ground level power density figures from each antenna.

$$S(\mu W / cm^2) = \frac{33.40981 \times AdjERP(Watts)}{D^2}$$

Where: *AdjERP(Watts)* is the maximum lobe effective radiated power times the element pattern factor times the array pattern factor.

D is the distance in meters from the center of radiation to the calculation point.

Ground level power densities have been calculated for locations extending from the base of the tower to a distance of 1000 meters. Values past this point are increasingly negligible.

Since the Jampro JLCP antenna used by KGHP is not included among the antenna types in the FMModel program, calculations of the power density produced by the KGHP antenna system assume a Type 1 element pattern, which is the "worst case" element pattern for a "ring stub" antenna.

The highest calculated ground level power density occurs at a distance of 3 meters from the base of the antenna support structure. At this point the power density is calculated to be 252 $\mu W/cm^2$, which is 25.2% of 1000 $\mu W/cm^2$ (the FCC MPE for controlled environments) and 126% of 200 $\mu W/cm^2$ (the FCC MPE for uncontrolled environments). The calculated ground level power density does not fall below the FCC MPE for uncontrolled environments until a distance of 8 meters (26 feet) from the antenna support structure.

Controlled Environments Standard: As regards individuals who are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure, and who can exercise control over their exposure, based on these calculations there would be no need for KGHP to power down while work is performed near or at the base of the antenna support structure.

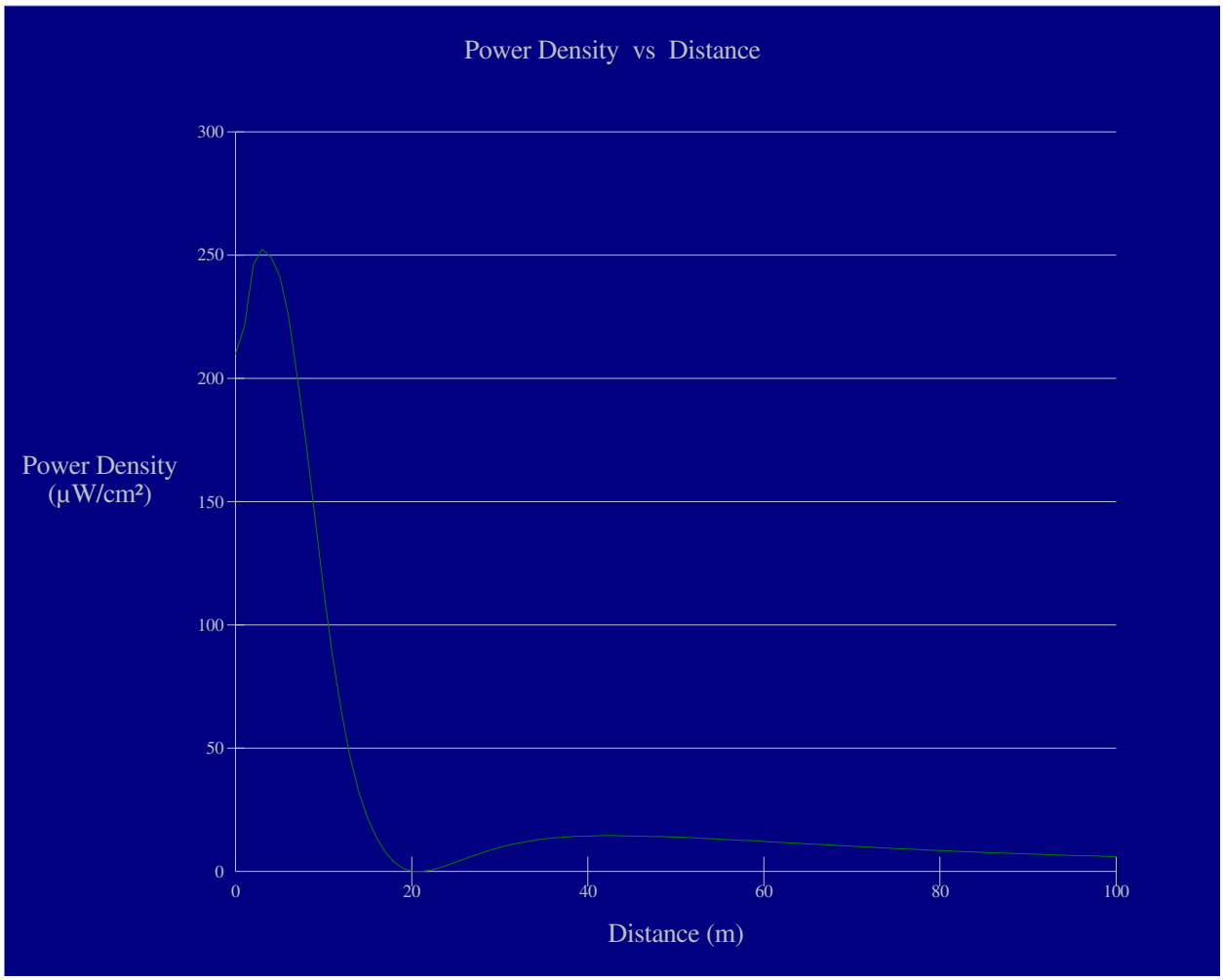
[2] Available at: http://transition.fcc.gov/oet/info/software/fmmodel/

Uncontrolled Environments Standard: As regards members of the general public, or individuals who are exposed as a consequence of their employment but may not be fully aware of the potential for exposure or who cannot exercise control over their exposure, based on these calculations access to the transmitter site should be restricted out to a distance of at least 26 feet from the antenna support structure. Should any such individuals need to approach closer to the transmitter site, KGHP should be reduced to 75% of authorized power.

It should be understood that this analysis is based strictly on a calculation. Calculations are typically fairly close to the actual ground-level power density levels, but the real-world environment is complex and calculations cannot account for localized re-radiation effects from metallic objects. On-site measurements of the KGHP ground-level power density levels may indicate that either a smaller or larger restricted area would pertain.

August 15, 2012

Erik C. Swanson, P.E.



Ground-Level RF Exposure **OET FMModel**

KGHP Gig Harbor

Antenna Type:	Jampro JLCP-2(DA) (ring-stub element model assumed)
No. of Elements:	2
Element Spacing:	1.0 wavelength
Distance:	1000 meters
Horizontal ERP:	1.35 kW
Vertical ERP:	0.8 kW
Antenna Height:	14 meters AGL

Maximum Calculated Power Density is 252 µW/cm^2 at 3 meters from the antenna structure

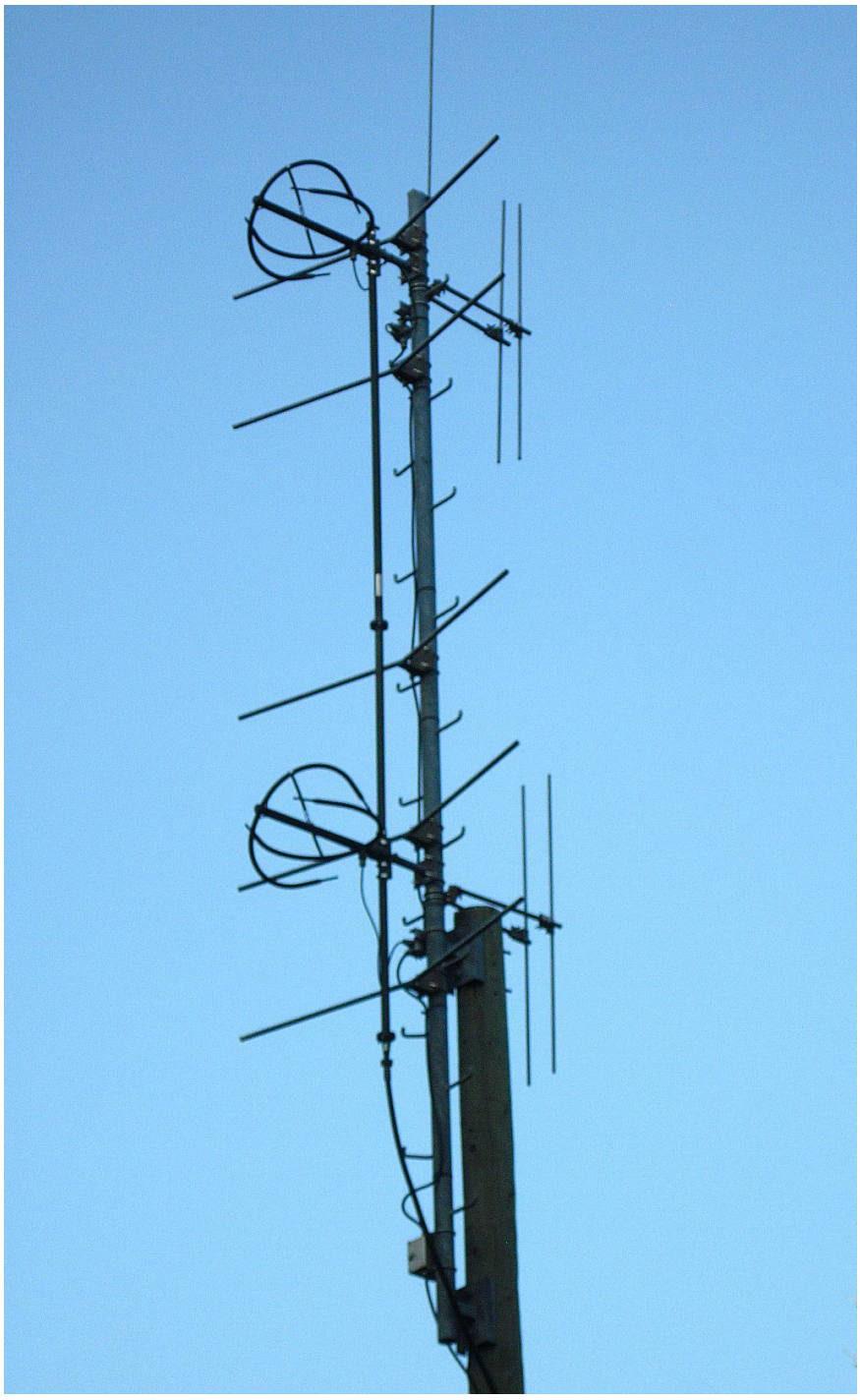


Photo provided of KGHP antenna