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**Engineering Statement
K14SE-D McDermitt, NV
Statement regarding Protection of Land Mobile Radio Facilities
January 2019**

This Engineering Statement has been prepared on behalf of Quinn River TV Maintenance District (“Quinn River”), licensee of TV translator station K42KW-D, which holds a displacement construction permit on Channel 14 as K14SE-D. Construction of the displacement facility has been completed, and this exhibit has been prepared in order to address the condition on the construction permit which requires Quinn River to “take adequate measures to identify and substantially eliminate objectionable interference which may be caused to existing land mobile radio facilities in the 460 to 470 MHz band,” and to provide documentation that objectionable interference will not be caused.

Analysis

The K14SE-D transmitting antenna is located on a pole atop High Peak (Oregon), to the north of the community of McDermitt, Nevada. We have conducted a search in the Commission’s ULS database for fixed sites where 460 to 470 MHz band LMR frequencies are in use in the area surrounding the High Peak site, and the results of that study are shown in the following table.

Callsign	Licensee	Fixed Site	Distance from High Peak Site
KNFV331	Crawford, Eldon	(2) Winnemucca Mtn	126 km
		(3) Osgood Mountain	112 km
WPGB212	Day Management Corp.	(1) South Mountain	92 km

WPGQ551	Intermountain Communications	(1) War Eagle Mtn	126 km
WPKT265	Day Management Corp.	(1) Stukel Mtn	325 km
WPVL388	Day Management Corp.	(1) War Eagle Mtn (4) French John Hill	125 km 158 km
WQBH868	Winnemucca Farms, Inc.	(1) One Potato Rd	133 km
WQUC742	Berrett Ranches	(1) Mahogany Mtn (2) McCutcheon Flat Hills	128 km 73 km

Among these licenses, several include channels above 469.000 MHz, including one license utilizing 469.800 MHz, which is only 0.2 MHz below the lower edge of Channel 14 (470 to 476 MHz). These are frequencies which are used to receive communications from mobile receivers.

A worst-case analysis has been performed, to evaluate protection of the closest frequency in use in the area (469.800 MHz), assuming use at the closest fixed site, WQUC742 site 2, which is located 73 km north of High Peak.

For K14SE-D operation with the authorized stringent emission mask, the attenuation requirement at 0.2 MHz from the channel edge is -47.0 dB. The station's assigned power on Channel 14 is 40 watts ERP (-13.98 dBk or 46.02 dBm). The total channel power within the 6 MHz DTV bandwidth needs to be adjusted to provide the equivalent channel power within the 12.5 kHz channel bandwidth used by the LMR station; the adjustment factor to provide the signal power in a 12.5 kHz bandwidth is $10^* \text{LOG}(6000/12.5) = 26.8 \text{ dB}$. Based on this adjustment factor, the assigned digital ERP and the mask attenuation requirement shown herein, the worst-case out-of-band transmitter noise generated by the digital station within the receiver bandwidth at the highest land mobile receive frequency (469.800 MHz) is: $(46.02 \text{ dBm} - 26.8 \text{ dB} - 47.0 \text{ dB}) = -27.78 \text{ dBm}$. This spurious energy would appear at the front end of the LMR receivers as broadband noise.

The free space loss between the proposed High Peak Ch14 antenna and the nearest 460-470 MHz band fixed receive antenna (based on antennas with a dipole gain reference at each end of the path) is 118.8 dB for the 73 kilometer path distance. Assuming an ERP of -27.78 dBm for the Ch14 station based on the out-of-band transmitter noise calculation shown above, the calculated interfering signal power level at the nearest fixed receive antenna is -146.58 dBm.

The noise floor for a typical UHF land mobile base station operating in 12.5 kHz narrowband analog or digital mode is around -126 dBm. The interfering signal level power from K14SE-D would be 20 dB below the noise floor.

Conclusion

The foregoing calculations demonstrate that the interfering signal level power from K14SE-D would be 20 dB below the noise floor of the nearest fixed LMR station in the 460 to 470 MHz band, and thus interference to these LMR stations is highly unlikely. This was a worst-case analysis, which assumed:

- a) protection of the highest 460 to 470 MHz band LMR frequency in use in the area;
- b) the nearest fixed 460 to 470 MHz band LMR site in the area; and
- c) that K14SE-D would have its main lobe pointed at the LMR site.¹

Many of these LMR licenses also include mobile units, often permitted to operate at quite significant distances from their associated fixed stations, in one case up to 320 kilometers (200 miles). Given the significantly mountainous terrain in northern Nevada and southeast Oregon, with typical valley-to-summit heights of 600 meters (2000 feet) or more, it is highly questionable that any given mobile unit would be able to talk back to its associated fixed station throughout the entire service radius. Quinn River nevertheless commits to working with any existing LMR licensees in the 460 to 470 MHz band who may be impacted by operation of K14SE-D, to determine whether the translator does in fact cause any problem, and to determine what measures can be taken to resolve reports of interference.

¹ In fact, the nearest fixed site is located almost directly opposite the main lobe of the K14SE-D antenna, in a region where the K14SE-D pattern is approximately 20 dB down from maximum power.

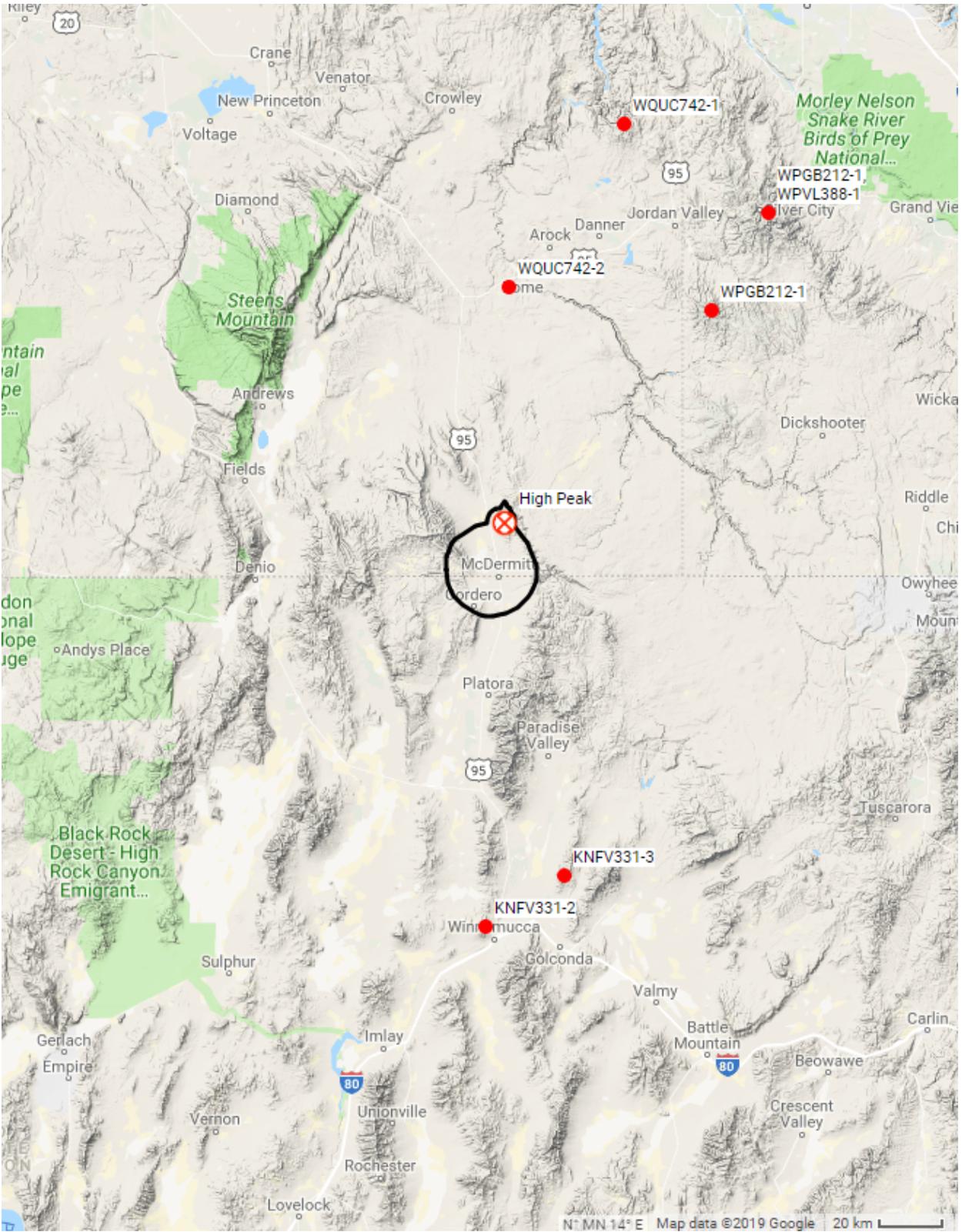
Statement of Engineer

This Engineering Statement has been prepared by the undersigned. I am a Partner in the firm of Hatfield & Dawson Consulting Engineers, and am registered as a Professional Engineer in the State of Washington. I hereby declare that the facts set out in the foregoing Engineering Statement, except those of which official notice may be taken, are true and correct.

Signed this 16th Day of January, 2019



Erik C. Swanson, P.E.



Map of K14SE-D McDermitt 48.7 dBu contour, in relation to the nearest fixed sites using frequencies in the 460-470 MHz LMR spectrum.