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Engineering Statement
Minor Modification of K21FO-D
Channel 21 at Winnemucca, NV
September 2018

I. Background

This Engineering Statement has been prepared on behalf of Humboldt County ("HC"), licensee of digital TV translator station K21FO-D at Winnemucca, NV. This material has been prepared in connection with an application for minor modification.

II. Interference Study

Study has been made of all cochannel and adjacent-channel facilities in the vicinity of the proposed operation, including a detailed Longley-Rice interference study to demonstrate that the proposed operation will not cause interference to any authorized or pending proposed facilities. This study was performed using the Commission's TVStudy software.

The results of this study indicate that the proposed facility is predicted to cause zero additional interference to any of the listed stations. Based on the foregoing interference study, it is believed that the proposed facility can operate without risk of interference to other stations.

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Study created: 2018.09.24 13:53:53

Study build station data: LMS TV 2018-09-23 (151)

      Proposal: K21FO-D D21 LD APP WINNEMUCCA, NV
   File number: WINN21-WIDE-110W
   Facility ID: 28090
  Station data: User record
     Record ID: 754
       Country: U.S.

Build options:
Protect pre-transition records not on baseline channel

Stations potentially affected by proposal:

IX  Call      Chan      Svc Status  City, State                File Number          Distance
No  K18GW     N18       TX  LIC     BEOWAWE, NV                BLTTL20051006ADO     100.6 km
No  K20HX     N20       TX  LIC     BEOWAWE, NV                BLTTL20051006ADR     100.6
No  K46KH     D20       LD  CP      CARLIN, NV                 BLANK0000054861      130.1
No  K20LW-D   D20       LD  CP      IMLAY, NV                  BNPDTL20100512AHH     50.8
No  K50CZ-D   D20       LD  CP      MCDERMITT, NV              BLANK0000054091      126.6
No  KAME-TV   D20       DT  LIC     RENO, NV                   BLANK0000001059      234.0
No  KAME-TV   D20       DT  APP     RENO, NV                   BLANK0000035790      234.0
No  K39IR-D   D20       LD  CP      VALMY, NV                  BLANK0000054082       32.4
No  KFTV-DT   D21       DT  CP      HANFORD, CA                BLANK0000034318      460.6
No  KMAX-TV   D21       DT  LIC     SACRAMENTO, CA             BLANK0000041624      443.8
No  KSPX-TV   D21       DT  CP      SACRAMENTO, CA             BLANK0000030649      441.2
No  KAID      D21       DD  LIC     BOISE, ID                  BLEDT20120719ABH     334.4
No  K21ME-D   D21       LD  CP      TWIN FALLS, ID             BNPDTL20100507ACP    336.8
No  K41HH-D   D21       LD  CP      AUSTIN, NV                 BLANK0000054903      187.6
No  K43MM-D   D21       LD  APP     BEOWAWE, NV                BLANK0000054890       93.1
No  K21GJ-D   D21       LD  LIC     EUREKA, NV                 BLDTT20120427AAV     226.2
No  K42JS-D   D21       LD  CP      FALLON, NV                 BLANK0000054905      188.6
No  K43NA-D   D21       LD  APP     LUND & PRESTON, NV         BLANK0000054597      305.9
No  KRXI-TV   D21       LD  LIC     RENO, NV                   BLCDT20140116ABJ     260.9
No  K44KP-D   D21       LD  APP     RUTH, NV                   BLANK0000054600      305.0
No  K21MJ-D   D21       LD  CP      SPRING CREEK, NV           BNPDTL20100512AHQ    175.0
No  KTVZ      D21       DT  LIC     BEND, OR                   BLCDT20100122ABM     448.6
No  K22KP-D   D21       LD  CP      WENDOVER, UT               BLANK0000053185      314.9
No  K22GM-D   D22       LD  LIC     BATTLE MOUNTAIN, NV        BLDTT20120514ADF     100.6
No  K48LM     D22       LD  CP      CARLIN, NV                 BLANK0000054862      130.1
No  K51BW     D22       LD  CP      GOLCONDA, NV               BLANK0000054081       29.6
No  K22LH-D   D22       LD  CP      IMLAY, NV                  BNPDTL20100512AHF     50.8

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

      Channel: D21
         Mask: Stringent
     Latitude:  41  0 38.50 N (NAD83)
    Longitude: 117 46  4.20 W
  Height AMSL: 2095.8 m
         HAAT: 0.0 m
     Peak ERP: 0.110 kW
      Antenna: KAT-1X2KBBU 145.0 deg
  Elev Pattrn: Generic

49.5 dBu contour:
Azimuth      ERP        HAAT    Distance
  0.0 deg  0.000 kW   536.6 m   12.6 km
 45.0       0.011     760.2      27.6
 90.0       0.103     740.5      40.5
135.0       0.079     510.2      34.8
180.0       0.086     774.3      40.0
225.0       0.036     761.0      34.4
270.0       0.001     632.8      15.1
315.0       0.000     753.8       8.4

Database HAAT does not agree with computed HAAT
Database HAAT: 0 m   Computed HAAT: 684 m

Distance to Canadian border: 888.1 km

Distance to Mexican border: 936.4 km

Conditions at FCC monitoring station: Livermore CA
Bearing: 224.4 degrees   Distance: 500.6 km
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Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 91.1 degrees    Distance: 1059.8 km

No land mobile station failures found


Study cell size: 1.00 km
Profile point spacing: 1.00 km

Maximum new IX to full-service and Class A: 0.50%
Maximum new IX to LPTV: 2.00%

No IX check failures found.
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III. RF Exposure Study

The power density calculations shown below were made using the techniques outlined in OET Bulletin No. 65. "Ground level" calculations in this report have been made at a reference height of 2 meters 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.

Power density levels produced by the proposed facility were calculated for an elevation of 2 meters above ground (33.8 meters below the antenna radiation center). The worst case power density levels occur at depression angles between 45 and 90 degrees below the horizontal. The calculations in this report assume a worst-case relative field value of 0.200 at these angles, based on the manufacturer's vertical plane pattern for the horizontally-polarized Kathrein broadband panel antenna array proposed in this application. This relative field value yields a worst-case adjusted average effective radiated power of 4.4 Watts at depression angles between 45 and 90 degrees below the horizontal. Assuming this power and the shortest distance between the antenna radiation center and 2 meters above ground level (i.e. straight down), the highest calculated power density from the proposed antenna alone occurs at the base of the antenna support structure. At this point the power density from the proposed facility is calculated to be 0.1 µW/cm², which is <0.1% of 341.3 µW/cm² (the FCC maximum for uncontrolled environments at the Channel 21 frequency).

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These calculations show that the maximum calculated power density produced at two meters above ground level by the proposed operation alone is less than 5% of the applicable FCC exposure limit at all locations between 1 and 500 meters from the base of the antenna support structure. Section 1.1307(b)(3) of the Commission's Rules excludes applications for new facilities or modifications to existing facilities from the requirement of preparing an environmental assessment when the calculated emissions from the applicant's proposed facility are predicted to be less than 5% of the applicable FCC exposure limit. Therefore, the proposed facility is in compliance with Section 1.1301 *et seq* and no further analysis of RF exposure at this site is required in this application.

Pursuant to OET Bulletin No. 65, all station personnel and contractors are required to follow appropriate safety procedures before any work is commenced on the antenna tower, including reduction in power or discontinuance of operation before any maintenance work is undertaken. The permittee/licensee in coordination with other users of the site must reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency exposure in excess of FCC guidelines.

September 24, 2018
Erik C. Swanson, P.E.

Hatfield & Dawson Consulting Engineers