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**Engineering Statement
Minor Modification of KQAF-LD
Channel 35 at La Junta, CO
March 2023**

I. Background

This Engineering Statement has been prepared on behalf of Denver Digital Television, LLC, licensee of low-power station KQAF-LD La Junta. This material has been prepared in connection with an application for minor change in the licensed facility. The attached map exhibit demonstrates that the proposed facility has 50.8 dBu contour overlap with the licensed facility, and that the proposed site is within 30 miles of the licensed site. Therefore, this application qualifies as a minor change.

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.

This study was conducted using a study cell size of 1.0 km and a terrain extraction increment of 1.0 km.

The results of this study indicate that the proposed facility is predicted to cause zero additional interference to any of the listed stations, beyond the allowed values of 0.5% to full-power and Class A stations, and 2.0% to low-power stations. Based on the foregoing interference study, it is believed that the proposed facility can operate without risk of interference to other stations.

Study created: 2023.03.31 10:19:11

Study build station data: LMS TV 2023-03-09

Proposal: KQAF-LD D35 LD APP LA JUNTA, CO
File number: KQAF-10KW
Facility ID: 22867
Station data: User record
Record ID: 1474
Country: U.S.

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

Individual records excluded:
20100505AHF KTLF-LD N34z TX LIC PUEBLO, CO BLTTL20100505AHF
NOTE THAT THIS ANALOG FACILITY HAS BEEN EXCLUDED FROM THE STUDY, SINCE IT SHOULD NO LONGER BE IN OPERATION.

Stations potentially affected by proposal:

| IX | Call | Chan | Svc | Status | City, State | File Number | Distance |
|-----|----------|------|-----|--------|-------------------------|------------------|----------|
| No | K28GE-D | N28+ | TX | LIC | WOODLAND PARK, CO | BLTTL19991203AAV | 90.5 km |
| No | KWGN-TV | D34 | DT | LIC | DENVER, CO | BLANK0000128311 | 171.9 |
| Yes | KTLF-LD | D34z | LD | LIC | PUEBLO, CO | BLANK0000144938 | 10.3 |
| No | K34NL-D | D34 | LD | LIC | SARGENTS, CO | BLANK0000063158 | 155.8 |
| No | K34GI-D | D34 | LD | LIC | TRINIDAD, CO | BLANK0000151284 | 116.0 |
| No | K34GI-D | N34+ | TX | LIC | TRINIDAD, CO | BLTTL20050613ABW | 116.0 |
| No | K35OR-D | D35 | LD | LIC | AGUILAR, CO | BLANK0000074729 | 99.6 |
| No | K35FI-D | D35 | LD | LIC | AKRON, CO | BLDTT20110210ACK | 255.2 |
| No | K35IX-D | D35 | LD | LIC | BASALT, CO | BLDTT20091221ABH | 250.2 |
| No | K35CH-D | D35 | LD | LIC | CORTEZ, MANCOS, ETC, CO | BLDTT20090522ABN | 331.6 |
| No | K35LJ-D | D35 | LD | LIC | CRESTED BUTTE, CO | BLDTT20120522ADQ | 221.4 |
| No | K3500-D | D35 | LD | LIC | DEL NORTE, CO | BLANK0000074726 | 162.6 |
| Yes | KCNC-TV | D35 | DT | LIC | DENVER, CO | BLANK0000086445 | 171.6 |
| No | KXZQ-LD | D35 | LD | LIC | DURANGO, CO | BLANK0000152205 | 315.0 |
| No | K35GO-D | D35 | LD | LIC | HAXTUN, CO | BLDTT20110928AKH | 308.3 |
| No | K35OK-D | D35 | LD | LIC | JULESBURG, CO | BLANK0000117516 | 346.2 |
| Yes | K35OM-D | D35 | LD | LIC | LA VETA, CO | BLANK0000074727 | 95.5 |
| No | K35JS-D | D35 | LD | LIC | LAMAR, CO | BLDTT20110509ADE | 187.0 |
| No | K35MZ-D | D35 | LD | LIC | LAS ANIMAS, CO | BLANK0000146723 | 117.1 |
| No | K35NQ-D | D35 | LD | LIC | Mesa, CO | BLANK0000072774 | 331.1 |
| No | K35NS-D | D35 | LD | LIC | MONTROSE, CO | BLANK0000059717 | 272.5 |
| No | K35ON-D | D35 | LD | LIC | PAONIA, CO | BLANK0000063247 | 278.1 |
| No | K35OQ-D | D35 | LD | LIC | SAN LUIS, CO | BLANK0000074728 | 142.2 |
| No | K35PE-D | D35 | LD | LIC | SNOWMASS VILLAGE, CO | BLANK0000163801 | 229.4 |
| No | K35OL-D | D35 | LD | LIC | YUMA, CO | BLANK0000117622 | 255.5 |
| No | KNME-TV | D35 | DT | LIC | ALBUQUERQUE, NM | BLANK0000131933 | 380.5 |
| No | K35FP | D35 | LD | LIC | TUCUMCARI, NM | BLANK0000001694 | 357.9 |
| No | DKENY-LP | D36- | LD | APP | ALAMOSA, CO | BLANK0000054351 | 146.4 |
| No | K36JB-D | D36 | LD | LIC | CRIPPLE CREEK, CO | BLDTT20100108AAS | 76.5 |
| No | KDVR | D36 | DT | LIC | DENVER, CO | BLANK0000128319 | 171.5 |
| No | KSBK-LD | N43z | TX | LIC | COLORADO SPRINGS, CO | BLTTL20030604ACP | 58.3 |

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D35
Mask: Full Service
Latitude: 38 16 48.40 N (NAD83)
Longitude: 104 33 10.90 W
Height AMSL: 1472.5 m
HAAT: 0.0 m
Peak ERP: 10.0 kW
Antenna: KAT-2X2 250.0 deg

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Elev Pattn: Generic

50.8 dBu contour:

| Azimuth | ERP | HAAT | Distance |
|---------|----------|----------|----------|
| 0.0 deg | 0.350 kW | -111.8 m | 13.0 km |
| 45.0 | 0.117 | -9.5 | 10.0 |
| 90.0 | 0.049 | 69.4 | 12.1 |
| 135.0 | 0.262 | 37.0 | 13.3 |
| 180.0 | 5.08 | 4.0 | 24.6 |
| 225.0 | 7.17 | -3.8 | 26.2 |
| 270.0 | 6.30 | 9.5 | 25.6 |
| 315.0 | 5.92 | -24.3 | 25.3 |

Database HAAT does not agree with computed HAAT
Database HAAT: 0 m Computed HAAT: -4 m

Distance to Canadian border: 1191.4 km

Distance to Mexican border: 744.0 km

Conditions at FCC monitoring station: Grand Island NE
Bearing: 58.8 degrees Distance: 600.9 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 343.8 degrees Distance: 213.0 km
ERP: 1.28 kW Field strength: -11.4 dBu, 0.0 mV/m

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.

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.

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Power density levels produced by the proposed KQAF-LD facility were calculated for an elevation of 2 meters above ground using the manufacturer's vertical plane pattern for the horizontally-polarized Kathrein 2X2 panel antenna array proposed in this application. The highest calculated power density from the proposed antenna alone occurs at a point 25 meters from the base of the antenna support structure. At this point the power density from the proposed facility is calculated to be 10.4 $\mu\text{W}/\text{cm}^2$, which is 2.6% of 399 $\mu\text{W}/\text{cm}^2$ (the FCC maximum for uncontrolled environments at the Channel 35 frequency).

These calculations show that the maximum calculated power density produced at two meters above ground level by the proposed operation of KQAF-LD 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 of the Commission's Rules exempts 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.

March 31, 2023

Erik C. Swanson, P.E.

Hatfield & Dawson Consulting Engineers

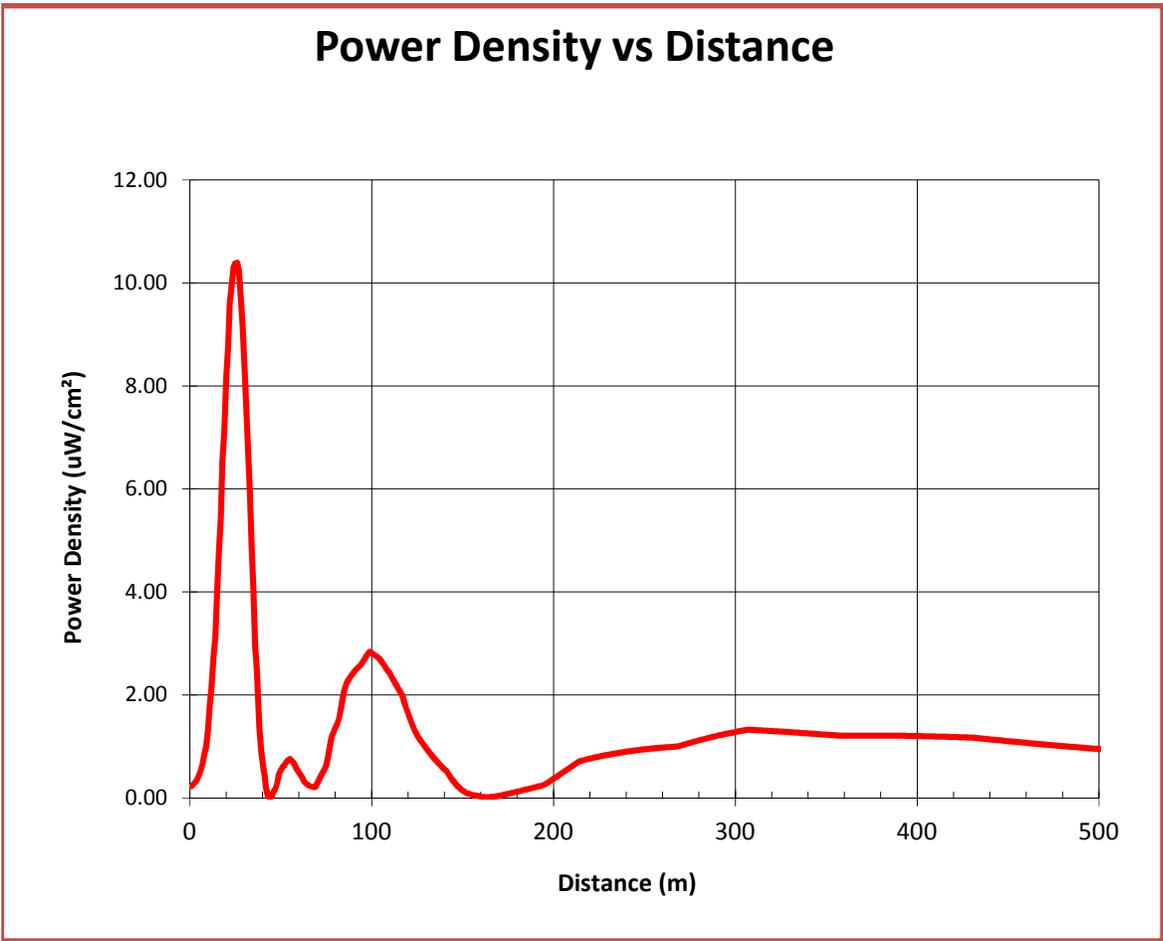
KQAF-LD Ch35 La Junta

Ground-Level Power Density Calculations

Using Manufacturer's Vertical Plane Pattern

| | | |
|-------------|------------------------|---------------------------------------|
| Antenna | Kathrein 2x2 Ch35 | |
| ERP | 10,000 Watts H (avg) | |
| | - Watts V (avg) | |
| Antenna AGL | 39.6 meters less 2m is | 37.6 meters above the reference plane |
| MBT | 0 degrees | |

Calculated Maximum is 10.39 $\mu\text{W}/\text{cm}^2$ at 25 meters from the tower



**KQAF-LD Ch35 La Junta
Ground-Level Power Density Calculations
Using Manufacturer's Vertical Plane Pattern**

| Distance From Tower (meters) | Hypotenuse (meters) | Depression Angle (with MBT adjust) (degrees) | Interpolated Rel Field | Adjusted ERP (watts) | Power Density uW/cm ² |
|------------------------------|---------------------|--|------------------------|----------------------|----------------------------------|
| 0 | 37.60 | 90.00 | 0.031 | 9.6 | 0.23 |
| 1 | 37.61 | 88.48 | 0.034 | 11.2 | 0.27 |
| 2 | 37.65 | 86.96 | 0.036 | 13.0 | 0.31 |
| 3 | 37.72 | 85.44 | 0.039 | 14.9 | 0.35 |
| 4 | 37.81 | 83.93 | 0.043 | 18.6 | 0.43 |
| 5 | 37.93 | 82.43 | 0.048 | 22.9 | 0.53 |
| 6 | 38.08 | 80.93 | 0.053 | 28.5 | 0.66 |
| 7 | 38.25 | 79.45 | 0.061 | 36.8 | 0.84 |
| 8 | 38.44 | 77.99 | 0.066 | 43.7 | 0.99 |
| 9 | 38.66 | 76.54 | 0.077 | 59.8 | 1.34 |
| 10 | 38.91 | 75.11 | 0.090 | 80.7 | 1.78 |
| 11 | 39.18 | 73.69 | 0.100 | 99.4 | 2.16 |
| 12 | 39.47 | 72.30 | 0.113 | 127.5 | 2.73 |
| 13 | 39.78 | 70.93 | 0.122 | 148.9 | 3.14 |
| 14 | 40.12 | 69.58 | 0.138 | 190.3 | 3.95 |
| 15 | 40.48 | 68.25 | 0.153 | 234.8 | 4.79 |
| 16 | 40.86 | 66.95 | 0.165 | 271.7 | 5.44 |
| 17 | 41.26 | 65.67 | 0.183 | 333.5 | 6.54 |
| 18 | 41.69 | 64.42 | 0.193 | 371.1 | 7.14 |
| 19 | 42.13 | 63.19 | 0.208 | 433.2 | 8.15 |
| 20 | 42.59 | 61.99 | 0.218 | 475.7 | 8.76 |
| 21 | 43.07 | 60.82 | 0.231 | 533.2 | 9.61 |
| 22 | 43.56 | 59.67 | 0.238 | 564.8 | 9.94 |
| 23 | 44.08 | 58.55 | 0.245 | 599.4 | 10.31 |
| 24 | 44.61 | 57.45 | 0.249 | 618.3 | 10.38 |
| 25 | 45.15 | 56.38 | 0.252 | 634.3 | 10.39 |
| 26 | 45.71 | 55.34 | 0.253 | 640.1 | 10.23 |
| 27 | 46.29 | 54.32 | 0.250 | 626.4 | 9.77 |
| 28 | 46.88 | 53.33 | 0.246 | 606.6 | 9.22 |
| 29 | 47.48 | 52.36 | 0.238 | 566.1 | 8.39 |
| 30 | 48.10 | 51.41 | 0.229 | 525.9 | 7.59 |
| 31 | 48.73 | 50.50 | 0.221 | 490.4 | 6.90 |
| 32 | 49.37 | 49.60 | 0.208 | 431.8 | 5.92 |
| 33 | 50.03 | 48.73 | 0.190 | 362.8 | 4.84 |
| 34 | 50.69 | 47.88 | 0.177 | 314.1 | 4.08 |
| 35 | 51.37 | 47.05 | 0.152 | 229.8 | 2.91 |
| 36 | 52.06 | 46.25 | 0.137 | 188.2 | 2.32 |
| 37 | 52.75 | 45.46 | 0.114 | 130.3 | 1.56 |
| 38 | 53.46 | 44.70 | 0.092 | 85.1 | 0.99 |
| 39 | 54.17 | 43.95 | 0.078 | 61.0 | 0.69 |
| 40 | 54.90 | 43.23 | 0.064 | 41.4 | 0.46 |
| 41 | 55.63 | 42.52 | 0.041 | 17.1 | 0.19 |
| 42 | 56.37 | 41.84 | 0.018 | 3.3 | 0.03 |
| 43 | 57.12 | 41.17 | 0.006 | 0.4 | 0.00 |
| 44 | 57.88 | 40.52 | 0.017 | 2.9 | 0.03 |

| | | | | | |
|----|--------|-------|-------|-------|------|
| 45 | 58.64 | 39.88 | 0.034 | 11.4 | 0.11 |
| 46 | 59.41 | 39.26 | 0.043 | 18.5 | 0.18 |
| 47 | 60.19 | 38.66 | 0.056 | 31.2 | 0.29 |
| 48 | 60.97 | 38.07 | 0.071 | 50.6 | 0.45 |
| 49 | 61.76 | 37.50 | 0.078 | 60.8 | 0.53 |
| 50 | 62.56 | 36.94 | 0.083 | 69.6 | 0.59 |
| 51 | 63.36 | 36.40 | 0.088 | 77.1 | 0.64 |
| 52 | 64.17 | 35.87 | 0.092 | 84.7 | 0.69 |
| 53 | 64.98 | 35.35 | 0.096 | 92.5 | 0.73 |
| 54 | 65.80 | 34.85 | 0.099 | 97.7 | 0.75 |
| 55 | 66.62 | 34.36 | 0.098 | 96.7 | 0.73 |
| 56 | 67.45 | 33.88 | 0.097 | 93.9 | 0.69 |
| 57 | 68.28 | 33.41 | 0.093 | 85.9 | 0.62 |
| 58 | 69.12 | 32.95 | 0.089 | 78.6 | 0.55 |
| 59 | 69.96 | 32.51 | 0.085 | 72.4 | 0.49 |
| 60 | 70.81 | 32.07 | 0.082 | 66.6 | 0.44 |
| 61 | 71.66 | 31.65 | 0.076 | 57.9 | 0.38 |
| 62 | 72.51 | 31.23 | 0.070 | 49.4 | 0.31 |
| 63 | 73.37 | 30.83 | 0.066 | 43.8 | 0.27 |
| 64 | 74.23 | 30.43 | 0.064 | 41.2 | 0.25 |
| 65 | 75.09 | 30.05 | 0.062 | 38.7 | 0.23 |
| 66 | 75.96 | 29.67 | 0.061 | 37.6 | 0.22 |
| 67 | 76.83 | 29.30 | 0.061 | 36.7 | 0.21 |
| 68 | 77.70 | 28.94 | 0.062 | 38.0 | 0.21 |
| 69 | 78.58 | 28.59 | 0.072 | 51.2 | 0.28 |
| 70 | 79.46 | 28.24 | 0.081 | 66.0 | 0.35 |
| 71 | 80.34 | 27.90 | 0.090 | 81.3 | 0.42 |
| 72 | 81.23 | 27.57 | 0.098 | 95.6 | 0.48 |
| 73 | 82.11 | 27.25 | 0.105 | 110.7 | 0.55 |
| 74 | 83.00 | 26.94 | 0.114 | 130.8 | 0.63 |
| 75 | 83.90 | 26.63 | 0.130 | 170.1 | 0.81 |
| 76 | 84.79 | 26.32 | 0.146 | 213.7 | 0.99 |
| 77 | 85.69 | 26.03 | 0.162 | 261.2 | 1.19 |
| 78 | 86.59 | 25.74 | 0.169 | 286.7 | 1.28 |
| 79 | 87.49 | 25.45 | 0.176 | 310.3 | 1.35 |
| 80 | 88.40 | 25.17 | 0.183 | 334.3 | 1.43 |
| 81 | 89.30 | 24.90 | 0.192 | 368.1 | 1.54 |
| 82 | 90.21 | 24.63 | 0.205 | 420.1 | 1.72 |
| 83 | 91.12 | 24.37 | 0.218 | 474.4 | 1.91 |
| 84 | 92.03 | 24.11 | 0.230 | 530.9 | 2.09 |
| 85 | 92.94 | 23.86 | 0.239 | 572.0 | 2.21 |
| 86 | 93.86 | 23.62 | 0.245 | 599.5 | 2.27 |
| 87 | 94.78 | 23.37 | 0.250 | 627.1 | 2.33 |
| 88 | 95.70 | 23.14 | 0.256 | 654.7 | 2.39 |
| 89 | 96.62 | 22.90 | 0.261 | 680.9 | 2.44 |
| 90 | 97.54 | 22.67 | 0.266 | 705.0 | 2.48 |
| 91 | 98.46 | 22.45 | 0.270 | 729.0 | 2.51 |
| 92 | 99.39 | 22.23 | 0.274 | 753.0 | 2.55 |
| 93 | 100.31 | 22.01 | 0.279 | 776.9 | 2.58 |
| 94 | 101.24 | 21.80 | 0.284 | 808.6 | 2.64 |
| 95 | 102.17 | 21.59 | 0.290 | 840.9 | 2.69 |
| 96 | 103.10 | 21.39 | 0.296 | 873.2 | 2.74 |

