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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	K35OO-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	ALAMOS, 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

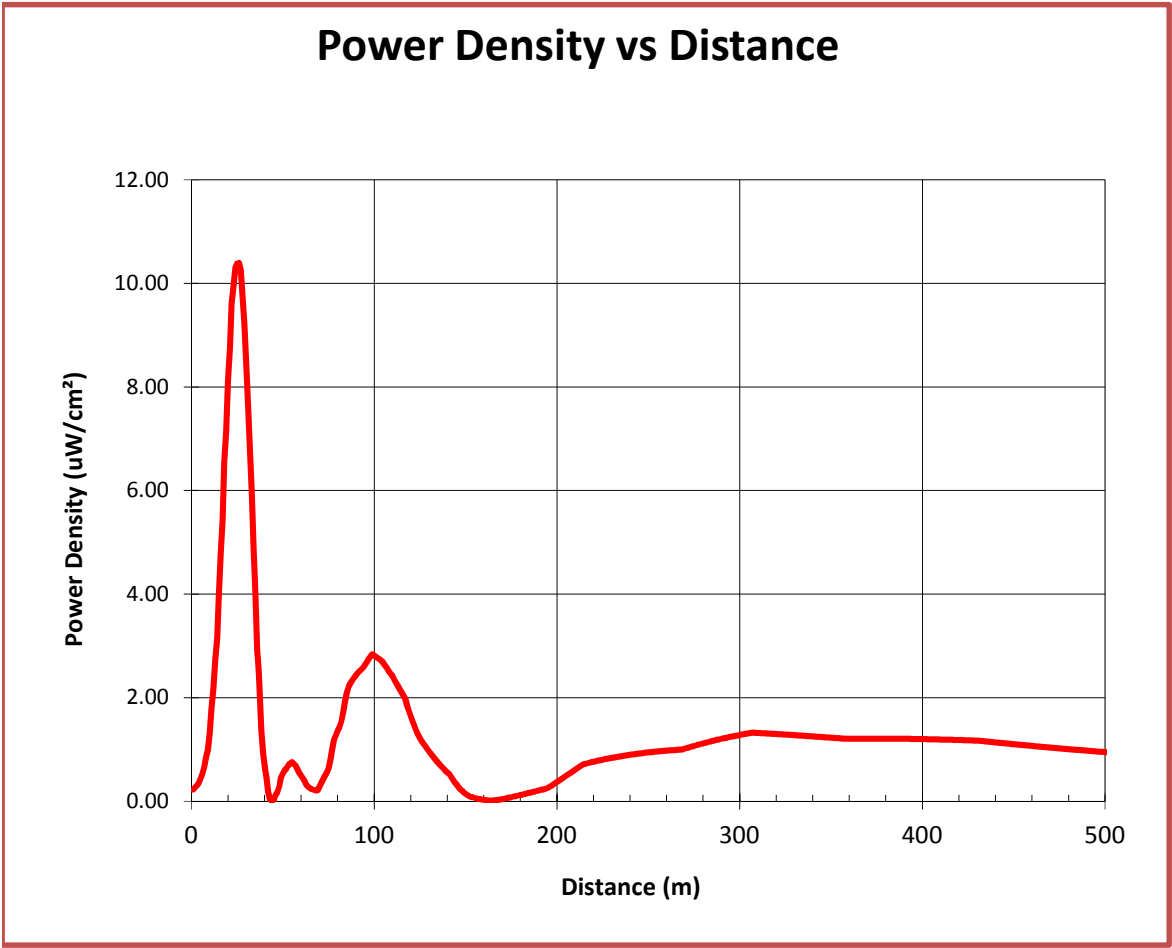
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KQAF-LD Ch35 La Junta
Ground-Level Power Density Calculations
Using Manufacturer's Vertical Plane Pattern

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

