Doug Vernier
P.O. Box 1033
Cedar Falls, Iowa 50613
Telecommunication Consultants

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Engineering Statement, on behalf of Public Broadcasting of Colorado

This application proposes an increase in the TPO and ERP. No other changes are requested.

Using the **GLOBE terrain** elevation database, we have determined that the HAAT should be corrected to 204 m. No change is proposed to the licensed AMSL of 2,256 m. The Commission's GLOBE 30 arc-second terrain database was selected using 36 evenly spaced radials. The proposed power and antenna HAAT produce a 60 dBu contour that travels 28.14 kilometers which is under the maximum class contour distance.

Page # 2 of this document is a list of antenna heights along each radial used to determine the final height above average terrain as expressed in this application. Page #3 is a coverage map of Proposed 70 dBu service contour.

Regarding service to the principal city, the original 2006 application used the Longley-Rice alternative method to determine city grade coverage. This application was accepted by the Commission and a license was granted. (see 301 form, BPH 20061002BTRX.) Since the instant proposal requests an increase of TPO and ERP of 50%, the principal city will be served by a higher signal level, therefore continuing to qualify the facility.

Page #4 is a **minimum separations study** showing that section 73.207 spacings are fully met.

Regarding exposure to **R.F. emissions** considerations, the proposed antenna (which is also KVOQ's existing antenna) is a half-wave ERI 1082-8CP with 0.8 wave-spacing. It has extremely low emissions in the downward directions. Nevertheless, if we use OET-65 EPA analysis, considering the EPA type 1 (Ring stub or any unknown), it shows that the radiation toward the zenith at head height is 19.1 $\mu w/cm^2$. This amounts to 1.9 percent of maximum for a controlled area of 1000 $\mu w/cm^2$ and that is well less that a 5% contribution to the power density at the multiple antenna site. The site is fully fenced, locked and gated, with all signs posted, therefore no further analysis was deemed necessary. Page #5 -#7 is an attachment containing a table and graph of the antenna's power density emissions toward the nadir at head height. The applicant and the owners of the other stations at the site have an agreement to reduce power or terminate transmissions to protect workers at the location.

Consequently, this application meets all requirements for a construction permit grant.

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HAAT Calculation using FCC's on-line calculator - GLOBE Terrain and 36 radials:

Latitude **39° 43' 59"** North
Longitude **105° 14' 12"** West (NAD 83)

Height of antenna radiation center above mean sea level: **2256** meters AMSL

Number of Evenly Spaced Radials = **36** 0° is referenced to True North

Results

Calculated HAAT = **204 meters**

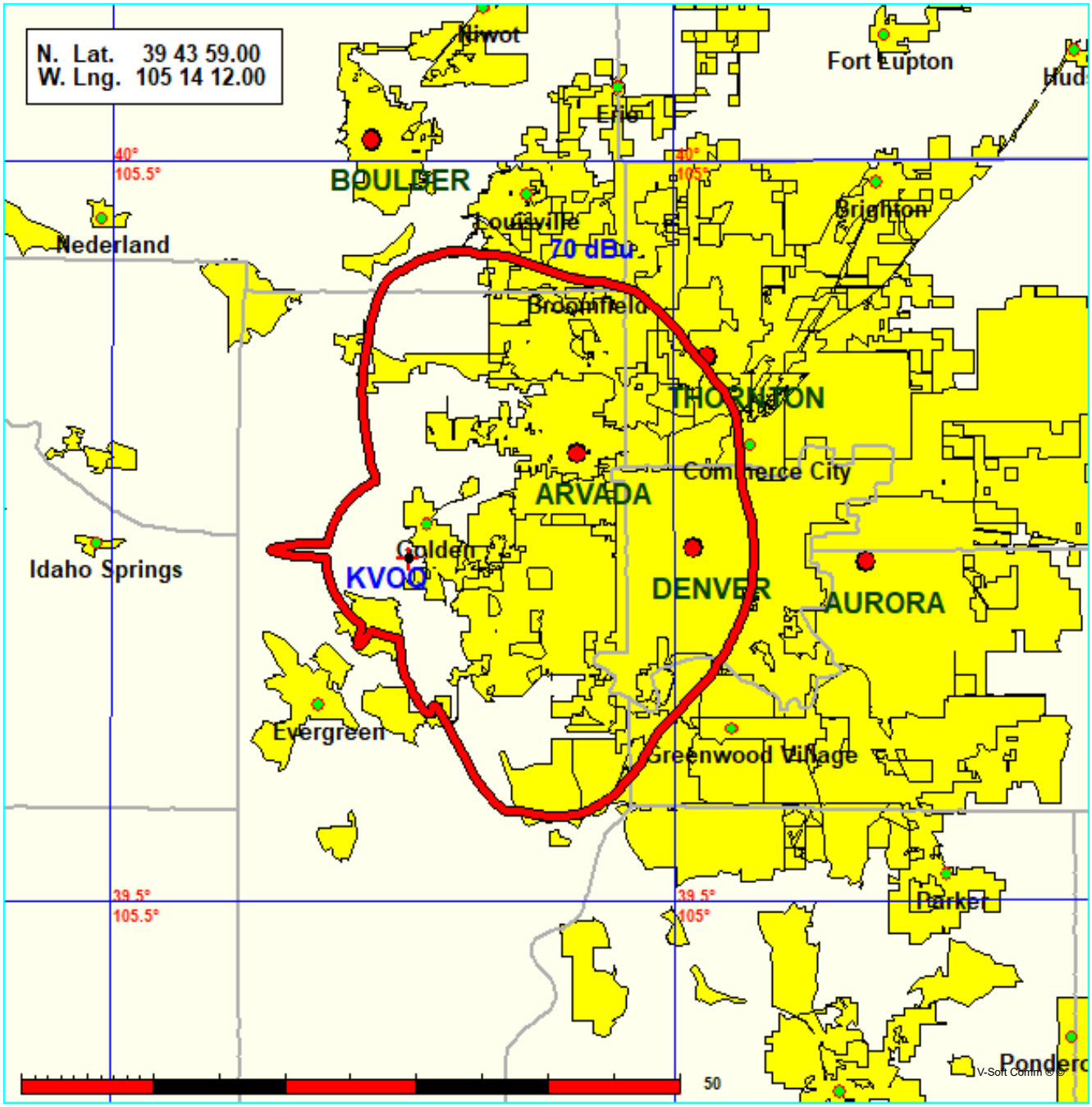
Antenna Height Above Average Terrain calculated
using 1 km GLOBE terrain data

Individual "Radial HAAT" Values, in meters

0°	368.0 m
10°	424.8 m
20°	444.7 m
30°	461.5 m
40°	526.0 m
50°	536.6 m
60°	545.7 m
70°	543.3 m
80°	517.4 m
90°	527.0 m
100°	509.6 m
110°	476.2 m
120°	432.9 m
130°	425.9 m
140°	437.5 m
150°	393.2 m
160°	297.5 m
170°	98.8 m
180°	67.9 m
190°	-1.9 m
200°	-26.2 m
210°	47.4 m
220°	-17.1 m
230°	-73.2 m
240°	-176.4 m
250°	-108.1 m
260°	-34.4 m
270°	45.7 m
280°	23.3 m
290°	-106.7 m
300°	-179.1 m
310°	-208.0 m
320°	-118.7 m
330°	-35.7 m
340°	66.6 m
350°	223.1 m

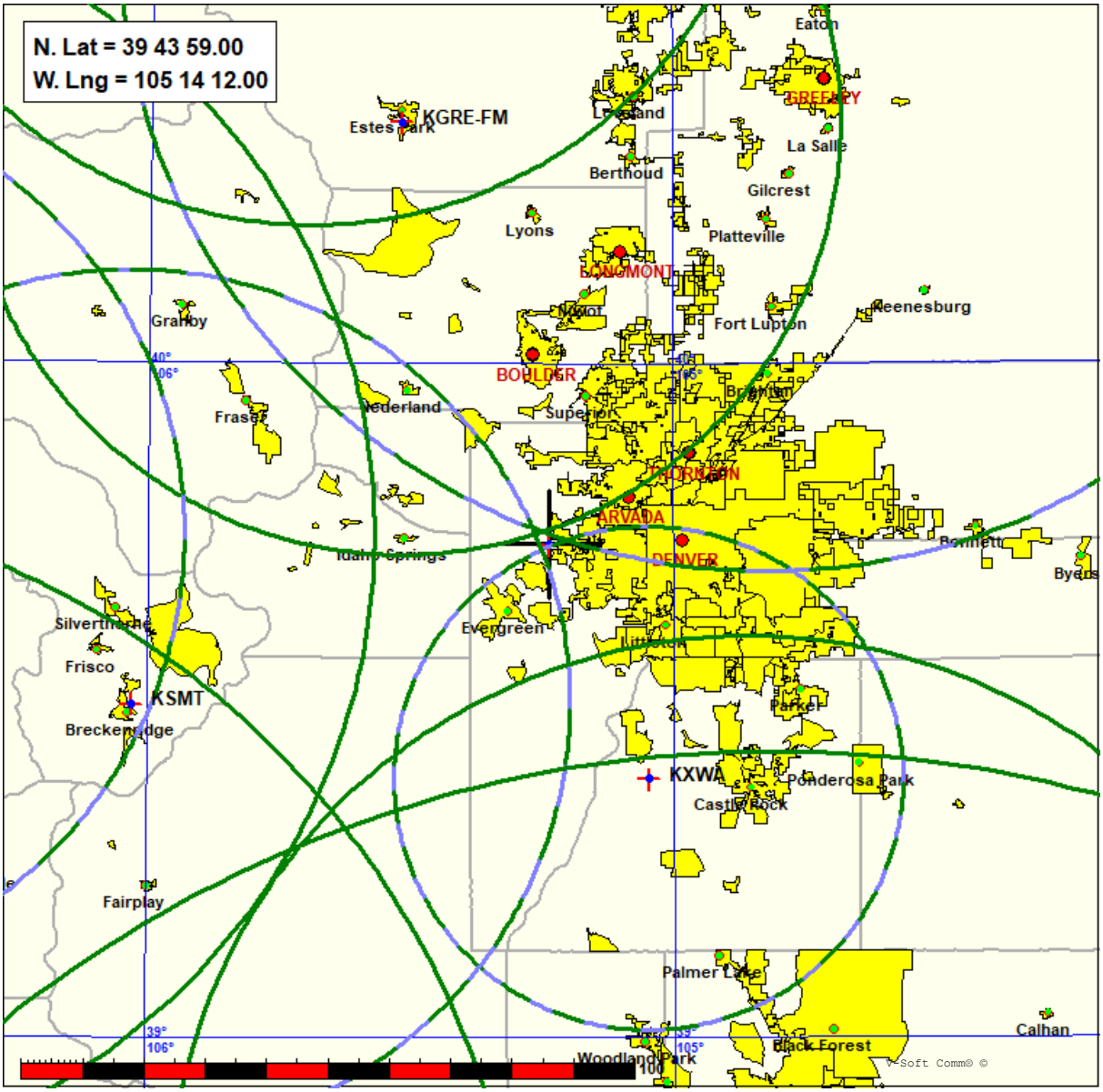
Coverage Study - GLOBE 30 Sec
02-15-2021

KVOQ CH272 A , 1.45 kW, 204m HAAT, 2256.0m COR AMSL
Service Contour = 70 dBu.



CH 272 A 102.3 MHz

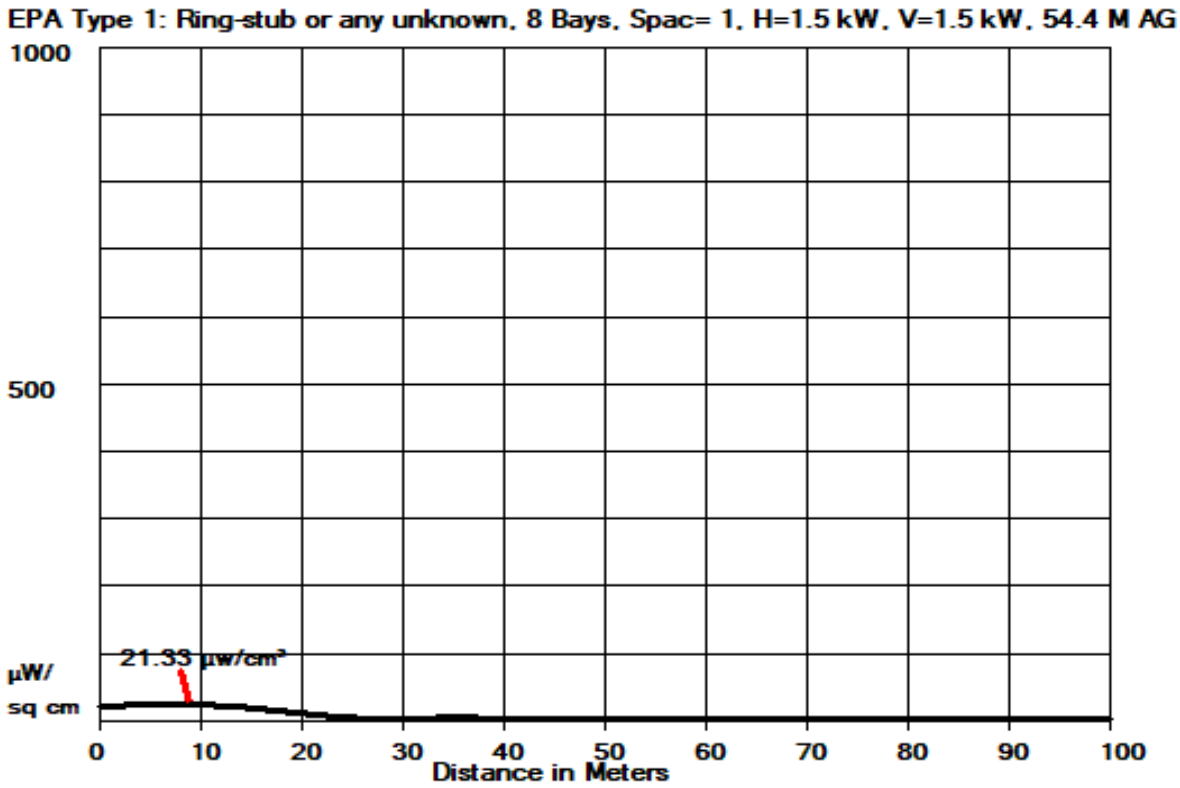
Current Spacings to 3rd Adj.
Minimum Separations Study for KVOQ
Public Broadcasting Of Colorado, Inc.



Data Date:02-15-21 Job Date:02-15-21

Call	CH#	Type	Location		Azi	D-KM	FCC	Margin
KXWA	270C3	LIC-N	Centennial	CO	157.3	41.87	41.5	0.37
KSMT	271A	LIC-Z	Breckenridge	CO	249.0	73.00	71.5	1.5
KTRR	273C2	LIC-N	Loveland	CO	19.3	107.02	105.5	1.5
KGRE-FM	271A	LIC	Estes Park	CO	341.0	73.76	71.5	2.3
KBIQ	274C	LIC	Manitou Springs	CO	163.5	114.34	94.5	19.8
KQSE	273C2	LIC	Gypsum	CO	270.7	134.01	105.5	28.5
KSPK-FM	272C1	LIC	Walsenburg	CO	171.1	236.50	199.5	37.0
KVLE-FM	272C3	LIC	Gunnison	CO	227.5	197.25	141.5	55.8
KARS-FM	275C1	LIC	Laramie	WY	343.1	132.88	74.5	58.4
KSKE-FM	269C1	LIC-Z	Eagle	CO	270.7	134.01	74.5	59.5

All separation margins include rounding



HORZ. DISTANCE FROM FM RADIATOR VS POWER DENSITY (Microwatt/Square cm)

Dist(Meters)	PD (H)	PD (V)	Total(uW/cm2)	Percent Max.(1000)
0	3.63	15.47	19.10	1.9
1	3.71	15.63	19.34	1.9
2	3.79	15.78	19.57	2.0
3	3.86	15.90	19.77	2.0
4	3.93	16.00	19.93	2.0
5	4.00	16.21	20.21	2.0
6	4.08	16.57	20.65	2.1
7	4.15	16.86	21.00	2.1
8	4.19	17.05	21.24	2.1
9	4.20	17.14	21.33	2.1
10	4.17	16.81	20.99	2.1
11	4.10	16.27	20.37	2.0
12	3.99	15.57	19.57	2.0
13	3.83	14.72	18.56	1.9
14	3.63	13.72	17.35	1.7
15	3.37	12.56	15.93	1.6
16	3.08	11.27	14.35	1.4
17	2.75	9.91	12.65	1.3
18	2.39	8.50	10.89	1.1
19	2.02	7.08	9.10	0.9
20	1.65	5.75	7.40	0.7
21	1.30	4.48	5.78	0.6
22	0.97	3.33	4.30	0.4
23	0.68	2.33	3.01	0.3
24	0.44	1.51	1.95	0.2
25	0.26	0.87	1.13	0.1

Dist(Meters)	PD (H)	PD (V)	Total(uW/cm2)	Percent Max.
26	0.13	0.43	0.56	0.1
27	0.05	0.17	0.23	0.0
28	0.02	0.08	0.10	0.0
29	0.03	0.10	0.14	0.0
30	0.07	0.21	0.28	0.0
31	0.12	0.36	0.48	0.0
32	0.17	0.53	0.70	0.1
33	0.22	0.68	0.90	0.1
34	0.26	0.78	1.04	0.1
35	0.28	0.84	1.11	0.1
36	0.28	0.83	1.11	0.1
37	0.26	0.78	1.03	0.1
38	0.23	0.67	0.90	0.1
39	0.19	0.55	0.73	0.1
40	0.14	0.41	0.55	0.1
41	0.10	0.28	0.38	0.0
42	0.06	0.17	0.23	0.0
43	0.03	0.08	0.11	0.0
44	0.01	0.03	0.04	0.0
45	0.00	0.01	0.01	0.0
46	0.00	0.01	0.01	0.0
47	0.01	0.04	0.05	0.0
48	0.03	0.07	0.10	0.0
49	0.05	0.12	0.17	0.0
50	0.07	0.16	0.23	0.0
51	0.08	0.20	0.29	0.0
52	0.10	0.23	0.33	0.0
53	0.10	0.24	0.35	0.0
54	0.11	0.24	0.35	0.0
55	0.10	0.23	0.33	0.0
56	0.09	0.20	0.30	0.0
57	0.08	0.17	0.25	0.0
58	0.07	0.14	0.21	0.0
59	0.05	0.10	0.16	0.0
60	0.04	0.07	0.11	0.0
61	0.02	0.04	0.07	0.0
62	0.01	0.02	0.03	0.0
63	0.00	0.01	0.01	0.0
64	0.00	0.00	0.00	0.0
65	0.00	0.00	0.00	0.0
66	0.00	0.01	0.01	0.0
67	0.01	0.02	0.03	0.0
68	0.02	0.03	0.05	0.0
69	0.03	0.05	0.07	0.0
70	0.03	0.07	0.10	0.0
71	0.04	0.08	0.13	0.0
72	0.05	0.10	0.15	0.0
73	0.06	0.11	0.17	0.0
74	0.06	0.12	0.18	0.0
75	0.06	0.13	0.19	0.0
76	0.06	0.13	0.19	0.0
77	0.06	0.12	0.19	0.0

Dist(Meters)	PD (H)	PD (V)	Total(uW/cm2)	Percent Max.
78	0.06	0.12	0.18	0.0
79	0.05	0.11	0.16	0.0
80	0.05	0.09	0.14	0.0
81	0.04	0.08	0.12	0.0
82	0.03	0.07	0.10	0.0
83	0.03	0.05	0.08	0.0
84	0.02	0.04	0.06	0.0
85	0.01	0.03	0.04	0.0
86	0.01	0.02	0.03	0.0
87	0.01	0.01	0.02	0.0
88	0.00	0.01	0.01	0.0
89	0.00	0.00	0.00	0.0
90	0.00	0.00	0.00	0.0
91	0.00	0.00	0.00	0.0
92	0.00	0.00	0.01	0.0
93	0.00	0.01	0.01	0.0
94	0.01	0.01	0.02	0.0
95	0.01	0.02	0.03	0.0
96	0.02	0.03	0.04	0.0
97	0.02	0.03	0.05	0.0
98	0.02	0.04	0.07	0.0
99	0.03	0.05	0.08	0.0
100	0.03	0.06	0.09	0.0