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**Engineering Statement
Minor Modification of K03IM-D
Channel 3 at Eugene, OR
July 2021**

I. Background

This Engineering Statement has been prepared on behalf of 5Nines, LLC ("5Nines"), permittee of low-power digital station K03IM-D. This material has been prepared in connection with an application for minor modification or the original construction permit.

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, 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.

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Study created: 2021.07.23 15:05:46

Study build station data: LMS TV 2021-07-22

Proposal: K03IM-D D3 LD CP EUGENE, OR
File number: K03IM-MOD
Facility ID: 185855
Station data: User record
Record ID: 1283
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	K23PN-D	N2	TX	LIC	LA PINE, OR	BLTTV19790205JH	140.3 km
No	K02JG-D	D2	LD	LIC	PROPSECT, OR	BLDTV20111103AKU	152.2
No	K03HX-D	D3	LD	LIC	ETNA, CA	BLDTV20081001ACJ	287.5
No	KIEM-TV	D3	DT	LIC	EUREKA, CA	BLCDT20090622AGO	375.7
No	DDK03FU	N3	TX	APP	MOUNTAIN GATE, ETC., CA	BLTTV19810713IN	372.6
No	DDK03FU	D3	LD	APP	MOUNTAIN GATE, ETC., CA	BDFCDTV20110812ACW	372.4
No	K28NO-D	N3	TX	LIC	ROGUE RIVER, OR	BLTTV4263	178.2
No	K14QH-D	N4	TX	LIC	BUTTE FALLS, OR	BLTTV19800702IC	169.5
No	K04BJ-D	D4	LD	CP	LA PINE, OR	BPDTV20140522AEM	133.8
No	K04BJ-D	D4	LD	LIC	LA PINE, OR	BLDTV20090821ABK	140.3
No	K04OS-D	D4	LD	LIC	REEDSPORT, OR	BLDTV20100210AAB	88.3

No non-directional AM stations found within 0.8 km

Directional AM stations within 3.2 km:

KOPB 1600 L DAN D EUGENE, OR BML20071130BID
KOPB 1600 L DAN N EUGENE, OR BML20071130BID

Record parameters as studied:

Channel: D3
Mask: Stringent
Latitude: 44 3 1.40 N (NAD83)
Longitude: 123 5 32.30 W
Height AMSL: 152.9 m
HAAT: 0.0 m
Peak ERP: 0.100 kW
Antenna: Omnidirectional
Elev Pattn: Generic

43.0 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	0.100 kW	36.1 m	16.2 km
45.0	0.100	-205.4	15.1
90.0	0.100	5.2	15.1
135.0	0.100	-28.6	15.1
180.0	0.100	-95.5	15.1
225.0	0.100	-57.6	15.1
270.0	0.100	29.2	15.1
315.0	0.100	38.2	16.7

Database HAAT does not agree with computed HAAT

Database HAAT: 0 m Computed HAAT: -35 m

Distance to Canadian border: 465.2 km

Distance to Mexican border: 1364.3 km

Conditions at FCC monitoring station: Ferndale WA

Bearing: 4.1 degrees Distance: 546.8 km

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Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 100.3 degrees Distance: 1530.1 km

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.

Power density levels produced by the proposed K03IM-D facility were calculated for an elevation of 2 meters above ground using the manufacturer's vertical plane pattern for the horizontally-polarized Scala/Kathrein TVO-1 antenna proposed in this application. The highest calculated ground-level power density from the proposed antenna alone occurs at a point 0 meters from the base of the antenna support structure. At this point the power density from the proposed facility is calculated to be 7.6 $\mu W/cm^2$, which is 3.8% of 200 $\mu W/cm^2$ (the FCC maximum for uncontrolled environments at the Channel 3 frequency).

The antenna will be installed 25 feet (7.6 meters) above the building rooftop. The highest calculated rooftop-level power density from the proposed antenna alone occurs at a point 0 meters from the base of the antenna support structure. At this point the power density from the proposed

facility is calculated to be $106.5 \mu\text{W}/\text{cm}^2$, which is 53.3% of $200 \mu\text{W}/\text{cm}^2$ (the FCC maximum for uncontrolled environments at the Channel 3 frequency).

The antenna will be installed 15 feet (4.6 meters) above the roof of the building's mechanical penthouse, which is located 5 meters away from the tower structure. Given the 5 meter horizontal separation, the highest calculated penthouse-rooftop-level power density from the proposed antenna alone occurs at a point 5 meters from the antenna support structure. At this point the power density from the proposed facility is calculated to be $105.2 \mu\text{W}/\text{cm}^2$, which is 52.6% of $200 \mu\text{W}/\text{cm}^2$ (the FCC maximum for uncontrolled environments at the Channel 3 frequency). There is no permanently installed access (stairs or ladder) to the roof of the mechanical penthouse

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.

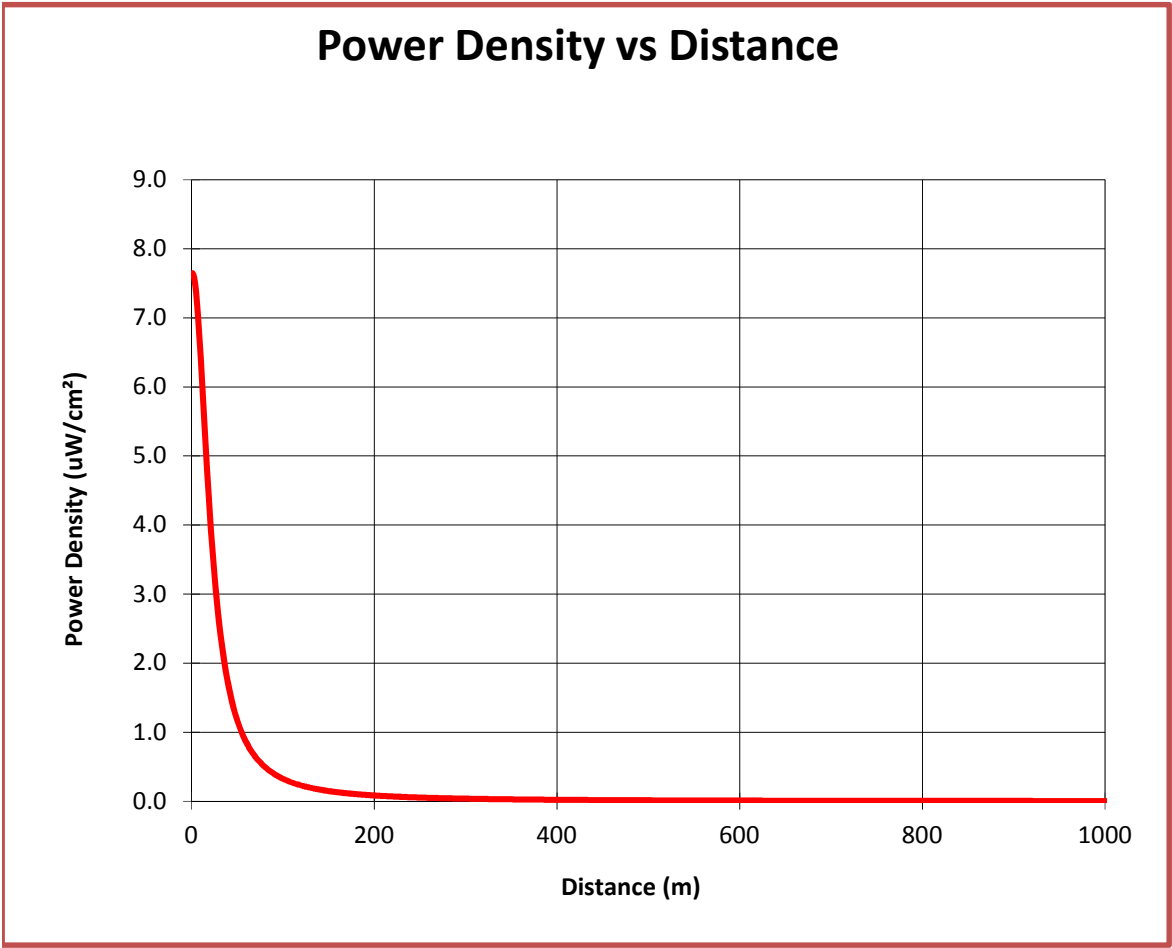
July 26, 2021

Erik C. Swanson, P.E.

K03IM-D Eugene
Ground-Level Power Density Calculations
Using Manufacturer's Vertical Plane Pattern

Antenna	TVO1		
ERP	100	Watts H (avg)	
	-	Watts V (avg)	
Antenna AGL	22.9	meters less 2m is	20.9 meters above the reference plane
MBT	0	degrees	

Calculated
Maximum is 7.6 uW/cm² at 0 meters from the tower



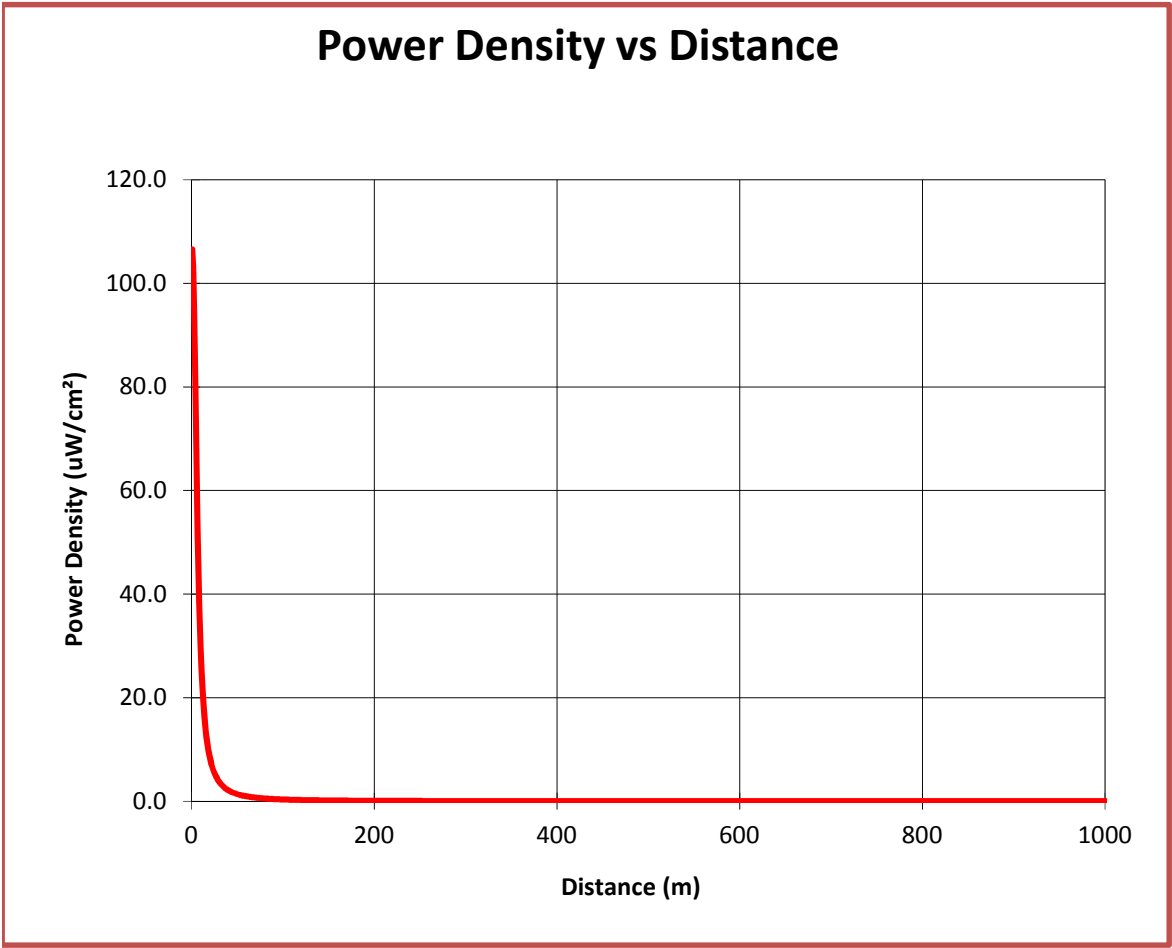
K03IM-D Eugene
Ground-Level Power Density Calculations
Using Manufacturer's Vertical Plane Pattern

Distance From Tower (meters)	Hypotenuse (meters)	Depression Angle (with MBT adjust) (degrees)	Interpolated Rel Field	Adjusted ERP (watts)	Power Density uW/cm ²
0	20.90	90.00	1.000	100.0	7.65
1	20.92	87.26	1.000	100.0	7.63
2	21.00	84.53	1.000	100.0	7.58
3	21.11	81.83	1.000	100.0	7.49
4	21.28	79.17	1.000	100.0	7.38
5	21.49	76.55	1.000	100.0	7.23
6	21.74	73.98	1.000	100.0	7.07
7	22.04	71.48	1.000	100.0	6.88
8	22.38	69.05	1.000	100.0	6.67
9	22.76	66.70	1.000	100.0	6.45
10	23.17	64.43	1.000	100.0	6.22
11	23.62	62.24	1.000	100.0	5.99
12	24.10	60.14	1.000	100.0	5.75
13	24.61	58.12	1.000	100.0	5.51
14	25.16	56.18	1.000	100.0	5.28
15	25.73	54.33	1.000	100.0	5.05
16	26.32	52.56	1.000	100.0	4.82
17	26.94	50.88	1.000	100.0	4.60
18	27.58	49.26	1.000	100.0	4.39
19	28.25	47.73	1.000	100.0	4.19
20	28.93	46.26	1.000	100.0	3.99
21	29.63	44.86	1.000	100.0	3.81
22	30.34	43.53	1.000	100.0	3.63
23	31.08	42.26	1.000	100.0	3.46
24	31.82	41.05	1.000	100.0	3.30
25	32.59	39.90	1.000	100.0	3.15
26	33.36	38.79	1.000	100.0	3.00
27	34.14	37.74	1.000	100.0	2.87
28	34.94	36.74	1.000	100.0	2.74
29	35.75	35.78	1.000	100.0	2.61
30	36.56	34.86	1.000	100.0	2.50
31	37.39	33.99	1.000	100.0	2.39
32	38.22	33.15	1.000	100.0	2.29
33	39.06	32.35	1.000	100.0	2.19
34	39.91	31.58	1.000	100.0	2.10
35	40.77	30.84	1.000	100.0	2.01
36	41.63	30.14	1.000	100.0	1.93
37	42.49	29.46	1.000	100.0	1.85
38	43.37	28.81	1.000	100.0	1.78
39	44.25	28.19	1.000	100.0	1.71
40	45.13	27.59	1.000	100.0	1.64
41	46.02	27.01	1.000	100.0	1.58
42	46.91	26.46	1.000	100.0	1.52
43	47.81	25.92	1.000	100.0	1.46
44	48.71	25.41	1.000	100.0	1.41

K03IM-D Eugene
Rooftop-Level Power Density Calculations
Using Manufacturer's Vertical Plane Pattern

Antenna	TVO1		
ERP	100	Watts H (avg)	
	-	Watts V (avg)	
Antenna AGL	7.6	meters less 2m is	5.6 meters above the reference plane
MBT	0	degrees	

Calculated
Maximum is 106.5 $\mu\text{W}/\text{cm}^2$ at 0 meters from the tower



K03IM-D Eugene
Rooftop-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	5.60	90.00	1.000	100.0	106.54
1	5.69	79.88	1.000	100.0	103.24
2	5.95	70.35	1.000	100.0	94.48
3	6.35	61.82	1.000	100.0	82.78
4	6.88	54.46	1.000	100.0	70.54
5	7.51	48.24	1.000	100.0	59.28
6	8.21	43.03	1.000	100.0	49.60
7	8.96	38.66	1.000	100.0	41.58
8	9.77	34.99	1.000	100.0	35.04
9	10.60	31.89	1.000	100.0	29.73
10	11.46	29.25	1.000	100.0	25.43
11	12.34	26.98	1.000	100.0	21.93
12	13.24	25.02	1.000	100.0	19.05
13	14.15	23.30	1.000	100.0	16.67
14	15.08	21.80	1.000	100.0	14.69
15	16.01	20.47	1.000	100.0	13.03
16	16.95	19.29	1.000	100.0	11.63
17	17.90	18.23	1.000	100.0	10.43
18	18.85	17.28	1.000	100.0	9.40
19	19.81	16.42	1.000	100.0	8.52
20	20.77	15.64	1.000	100.0	7.75
21	21.73	14.93	1.000	100.0	7.07
22	22.70	14.28	1.000	100.0	6.48
23	23.67	13.68	1.000	100.0	5.96
24	24.64	13.13	1.000	100.0	5.50
25	25.62	12.63	1.000	100.0	5.09
26	26.60	12.15	1.000	100.0	4.72
27	27.57	11.72	1.000	100.0	4.39
28	28.55	11.31	1.000	100.0	4.10
29	29.54	10.93	1.000	100.0	3.83
30	30.52	10.57	1.000	100.0	3.59
31	31.50	10.24	1.000	100.0	3.37
32	32.49	9.93	1.000	100.0	3.17
33	33.47	9.63	1.000	100.0	2.98
34	34.46	9.35	1.000	100.0	2.81
35	35.45	9.09	1.000	100.0	2.66
36	36.43	8.84	1.000	100.0	2.52
37	37.42	8.61	1.000	100.0	2.39
38	38.41	8.38	1.000	100.0	2.26
39	39.40	8.17	1.000	100.0	2.15
40	40.39	7.97	1.000	100.0	2.05
41	41.38	7.78	1.000	100.0	1.95
42	42.37	7.59	1.000	100.0	1.86
43	43.36	7.42	1.000	100.0	1.78
44	44.35	7.25	1.000	100.0	1.70