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**FM Translator K249FF
Channel 249D at Spokane, WA
To Rebroadcast KFIO(AM) 1050 kHz Dishman, WA
November 2021**

Allocation Study

The attached spacing study shows the spacing between the proposed translator site and the location of cochannel and adjacent channel stations and proposals. This study was made with the Commission's Class A spacing requirements, and individual situations were examined to determine the lack of prohibited contour overlap per the requirements of §74.1204 of the Rules. The attached allocation study map demonstrates compliance with the Commission's Rules for protection of FM broadcast stations and FM translators as outlined in §74.1204.

The attached spacing study demonstrates compliance with §73.207 of the Commission's Rules regarding spacing restrictions to stations which are 53 or 54 channels removed from the proposed operation.

KISC 251C Spokane

The proposed translator transmitter site is located within the 60 dBu protected contour of second-adjacent channel station KISC 251C Spokane. The following calculation, performed using the *Living Way* methodology, demonstrates interference protection to that station.

Protected Station	Distance & Bearing to Proposal	Station ERP and HAAT on that azimuth	Station Field Strength at Proposal	Corresponding Translator Interfering Contour	Distance to Translator Interfering Contour
KISC 251C	12.89 km 347 deg True	94 kW 660 meters	101.1 dBu F(50,50)	141.1 dBu	9.8 meters Free Space

The 141.1 dBu contour from the proposed facility extends only 9.8 meters from the antenna and does not reach ground level. There is no population within this contour. Therefore, the proposed facility is believed to satisfy the requirements of §74.1204(d) with respect to KISC.

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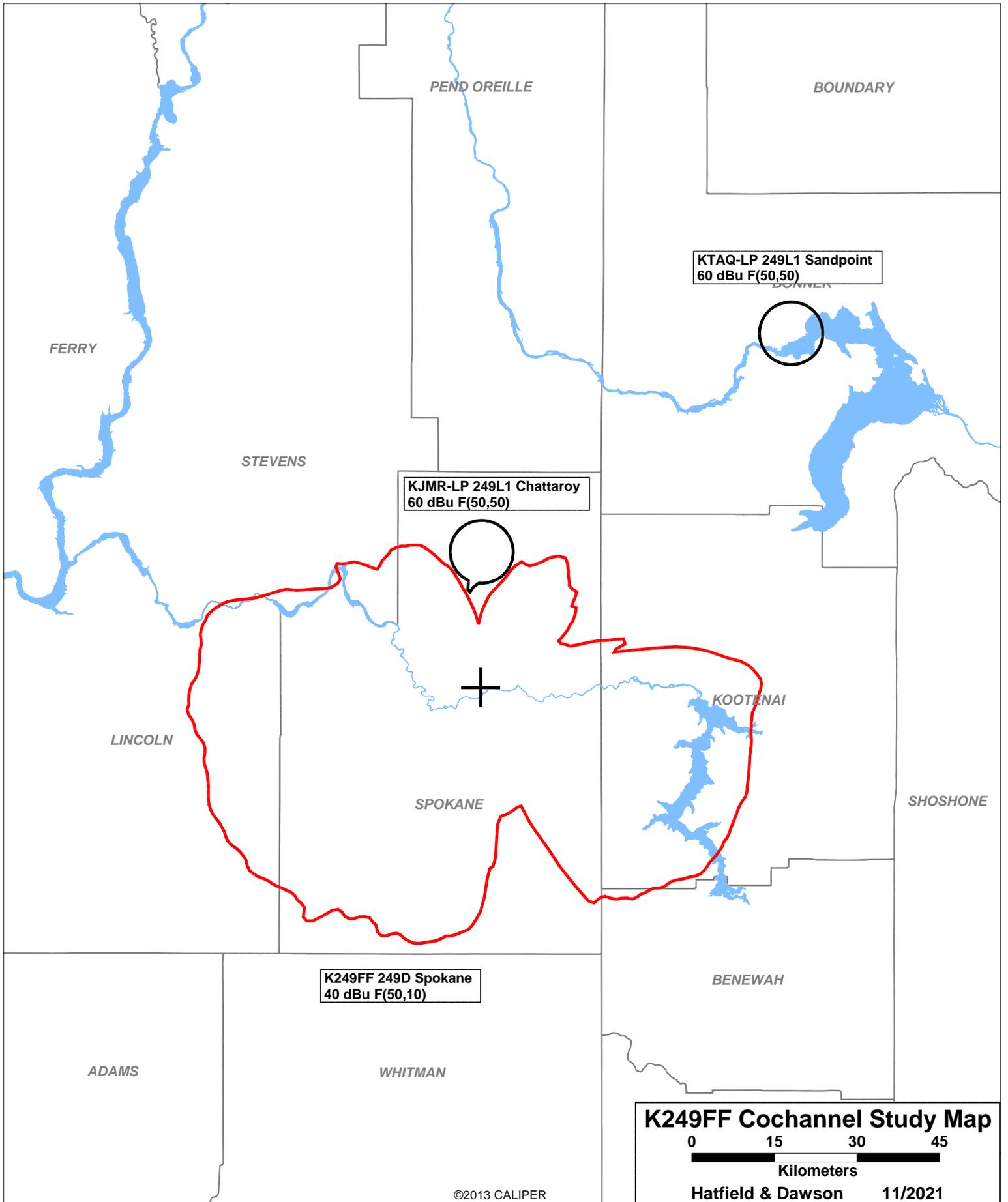
SEARCH PARAMETERS

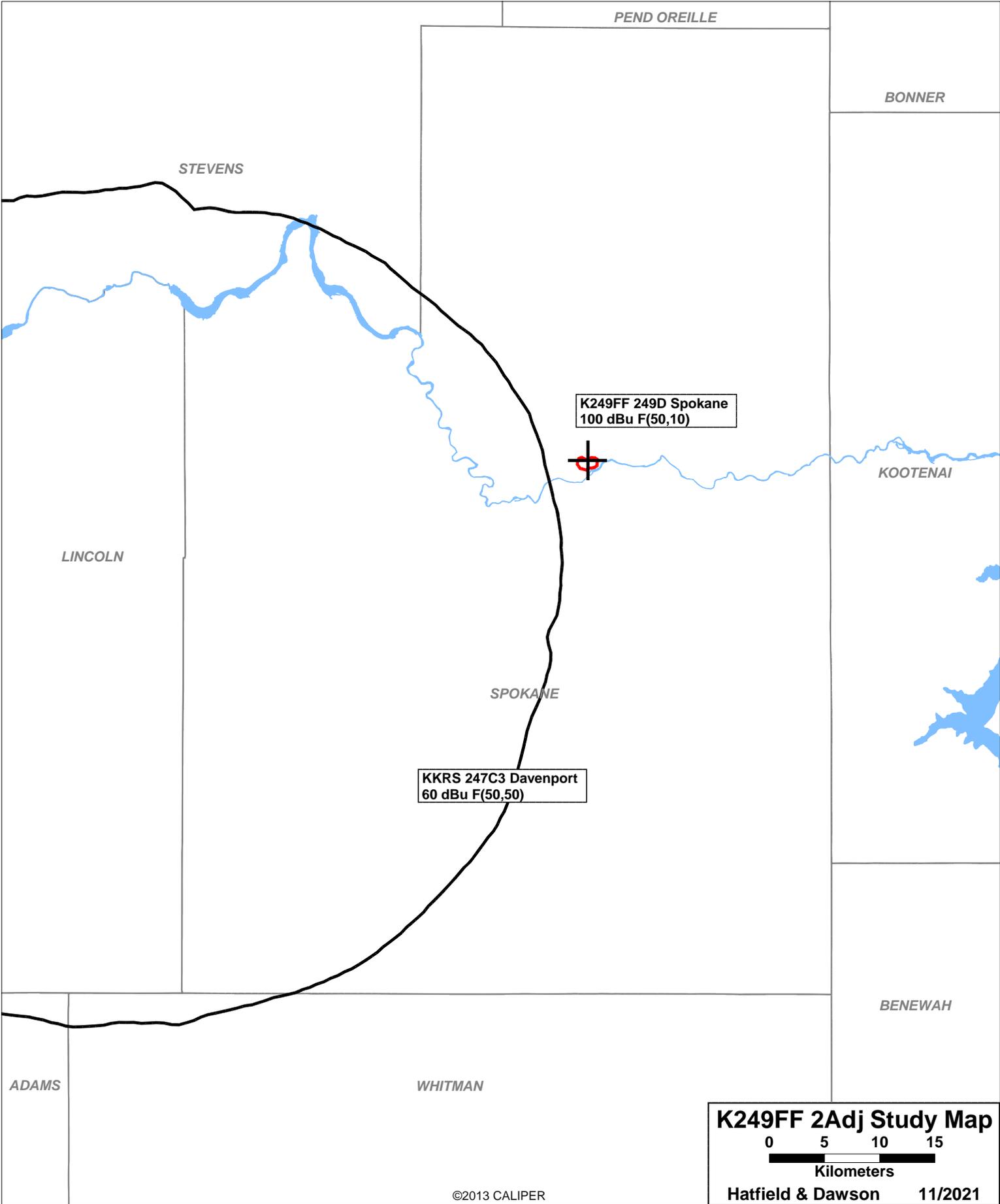
Channel: 249A 97.7 MHz
 Latitude: 47 41 38.6 (NAD83)
 Longitude: 117 20 6.8
 Safety Zone: 50 km
 Job Title: K249FF SPOKANE

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Call Status	City St	FCC File No.	Channel Freq.	ERP(kW) HAAT(m)	Latitude Longitude	Bearing deg-True	Dist (km)	Req (km)
KKRS LIC	DAVENPORT WA		247C3 97.3	5.100 220.0	47 35 13.5 117 53 29.8	254.3	43.47 1.47	42 CLOSE
KOTF-LP LIC	HAYDEN ID	0000114609	248L1 97.5	0.100 -64.0	47 47 20.6 116 47 8.6	75.4	42.54 0.00	0 LPFM
KZBG LIC	LAPWAI ID	BLH-20181029ABG	249A 97.7	0.535 333.0	DA 46 27 21.5 117 2 51.5	170.9 SS	139.36 24.36	115 CLEAR
KJMR-LP LIC	CHATTAROY WA	BLL-20160216ABE	249L1 97.7	0.100 0.0	47 54 56.5 117 19 57.7	0.4	24.64 0.00	0 LPFM
KTAQ-LP LIC	SANDPOINT ID	BLL-20181001AIT	249L1 97.7	0.100 0.0	48 16 21.0 116 34 47.6	40.9	85.53 0.00	0 LPFM
ALC	CRESTON BC		249A 97.7	0.000 0.0	49 5 59.9 116 31 3.8	20.8	167.65 16.65	151 CLEAR
K249FF CP	SPOKANE WA	BPFT-20181022ABL	249D 97.7	0.250 0.0	DA 47 41 38.6 117 20 6.8	0.0	0.00 0.00	0 TRANS
K249FF LIC	SPOKANE WA	BLFT-20181001AMV	249D 97.7	0.250 0.0	DA 47 41 38.6 117 20 6.8	0.0	0.00 0.00	0 TRANS
CBRJ LIC	PHOENIX BC		250B 97.9	0.618 557.0	49 5 28.7 118 36 40.1	329.2	181.85 44.85	137 CLEAR
KISC LIC	SPOKANE WA	BMLH-20071016AII	251C 98.1	94.000 619.0	47 34 51.6 117 17 50.7	167.3	12.89 -82.11	95 SHORT

===== END OF FM SPACING STUDY FOR CHANNEL 249 =====





PEND OREILLE

BONNER

STEVENS

LINCOLN

KOOTENAI

SPOKANE

KKRS 247C3 Davenport
60 dBu F(50,50)

K249FF 249D Spokane
100 dBu F(50,10)

BENEWAH

ADAMS

WHITMAN

K249FF 2Adj Study Map

0 5 10 15

Kilometers

Hatfield & Dawson 11/2021

Facilities Proposed

The proposed operation will be on Channel 249D (97.7 MHz) with a maximum lobe effective radiated power of 250 watts. Operation is proposed with a Scala CA2V antenna array which will be mounted on an existing wooden pole on Beacon Hill, with FCC Antenna Structure Registration Number 1200038.

RF Exposure Calculations

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.

Ground level power densities have been calculated for locations extending from the base of the tower to a distance of 500 meters. Values past this point are increasingly negligible.

Calculations of the power density produced by the proposed antenna system assume a Type 1 element pattern, which is the "worst case" element pattern used by the Commission's FMModel software to evaluate the Scala CA2V antenna proposed for use. The highest calculated ground level power density occurs at a distance of 2 meters from the base of the antenna support structure. At this point the power density is calculated to be 79.5 $\mu W/cm^2$.

Calculations of the power density produced by the translator and the other stations at this transmitter site are summarized in the following table:

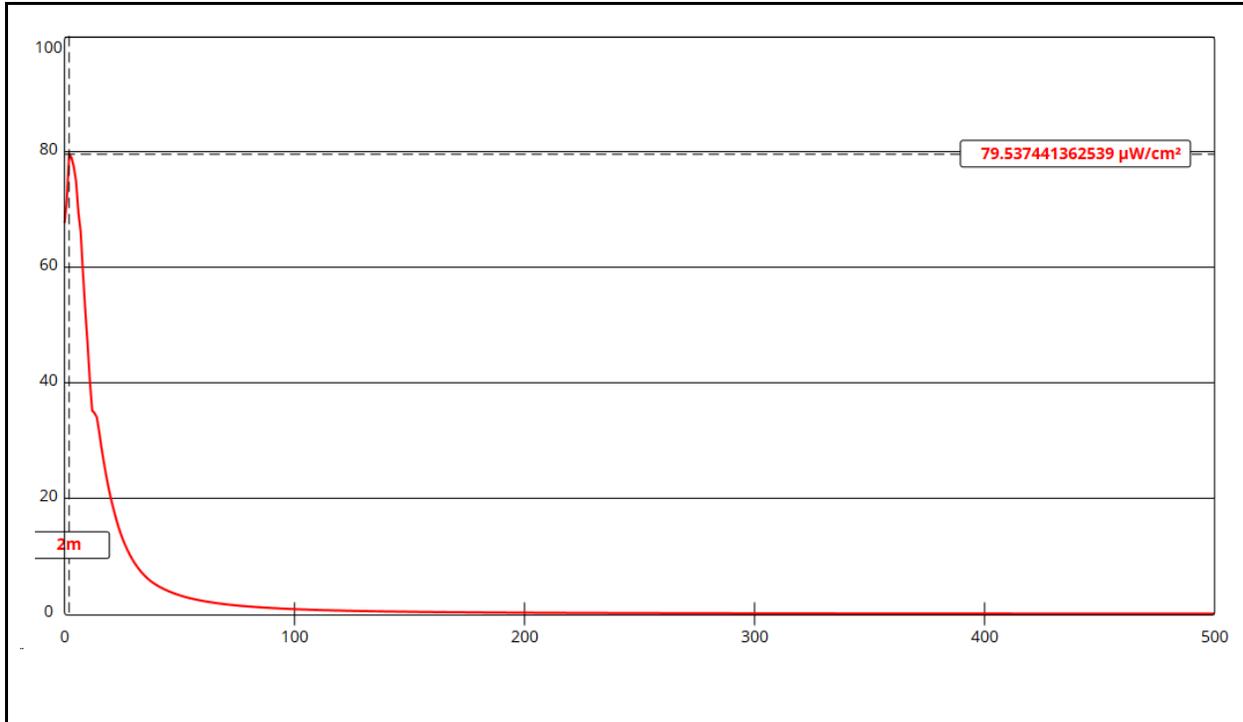
Call	Avg or Peak ERP Antenna Model	Relative Field	Height AGL	Calculated Max Exposure	Gen Pub FCC Limit	% of Limit
K249FF 249D	0.250 kW V Scala CA2V array	FMMModel Type 1	12 m	79.5 $\mu\text{W}/\text{cm}^2$	200 $\mu\text{W}/\text{cm}^2$	39.8%
K243CG 243D	0.250 kW H 0.250 kW V Nicom BKG77-1	FMMModel Type 2	9 m	93.8 $\mu\text{W}/\text{cm}^2$	200 $\mu\text{W}/\text{cm}^2$	46.9%
KSPO 293A	2.25 kW H 2.25 kW V JAM 4-bay halfwave	FMMModel Type 2	15 m	24.2 $\mu\text{W}/\text{cm}^2$	200 $\mu\text{W}/\text{cm}^2$	12.1%
KDYS-LD Ch32	12.3 kW H ERI AL8	0.125	19 m	22.2 $\mu\text{W}/\text{cm}^2$	385 $\mu\text{W}/\text{cm}^2$	5.8%

(For TV translators, the relative field value indicated is the maximum value which occurs at 45 degrees or more below the horizontal, based on the manufacturer's vertical plane pattern. The resulting adjusted ERP value is assumed to be radiated straight down to a point 2 meters above ground level at the base of the tower.)

These calculations show that the maximum calculated power density produced at two meters above ground level by the proposed operation of K249FF and the present operation of the other stations at this site (were their maxima to coincide, which they do not) would slightly exceed the FCC standard for uncontrolled environments.

Since the maxima do not coincide, and since the three FM facilities all will operate from the same structure, an additional analysis of the calculated exposure data has been made, in which the contributions of each of the individual FM stations have been summed at incremental distances from the pole, and then added to the 5.8% "worst case" contribution from KDYS-LD. The results of that analysis (attached) demonstrate that the maximum calculated power density produced at two meters above ground level by the proposed operation of K249FF and the present operation of the other stations at this site is 89.1% of the FCC standard for uncontrolled environments.

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.



Ground-Level RF Exposure

OET FMModel

K249FF Spokane

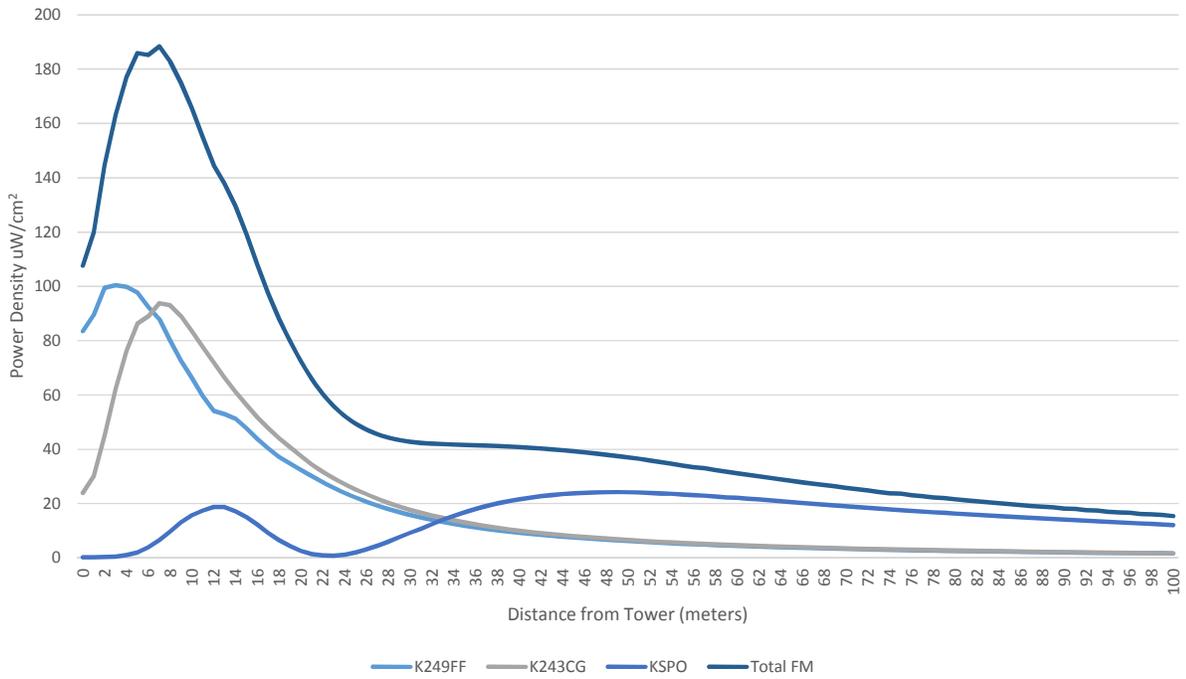
Antenna Type: Scala CA2V array (Type 1)
 No. of Elements: 1
 Element Spacing: 1.0 wavelength

Distance: 500 meters
 Horizontal ERP: zero W
 Vertical ERP: 250 W

Antenna Height: 12 meters AGL

Maximum Calculated Power Density is 79.5 $\mu\text{W}/\text{cm}^2$ at 2 meters from the antenna structure.

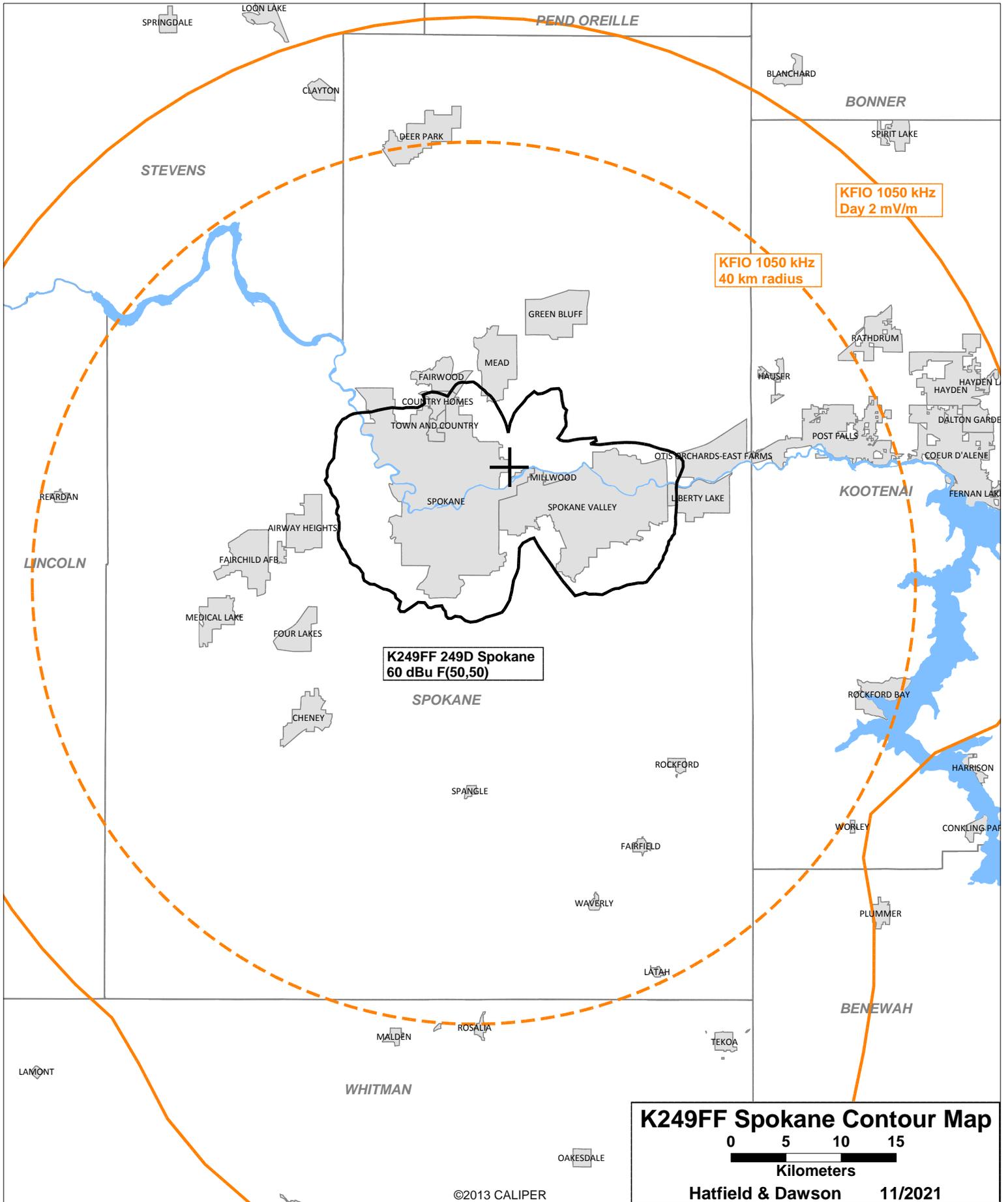
Sum of FM Ground Level Power Densities



Distance (meters)	K249FF uW/cm²	K243CG uW/cm²	K249FF uW/cm²	Total FM uW/cm²	Total FM % of Gen Pop	KDYS-LD % of Gen Pop	Total % of Gen Pop
0	83.5	23.9	0.2	107.6	53.8%	3.9%	57.7%
1	89.5	30.1	0.2	119.8	59.9%	3.9%	63.8%
2	99.4	45	0.3	144.7	72.4%	3.9%	76.3%
3	100.4	62.4	0.5	163.3	81.7%	3.9%	85.6%
4	99.8	76.3	1	177.1	88.6%	3.9%	92.5%
5	97.7	86.2	2	185.9	93.0%	3.9%	96.9%
6	92.4	88.9	3.9	185.2	92.6%	3.9%	96.5%
7	88	93.8	6.6	188.4	94.2%	3.9%	98.1%
8	80	93	9.7	182.7	91.4%	3.9%	95.3%
9	72.8	89	13.1	174.9	87.5%	3.9%	91.4%
10	66.4	83.5	15.7	165.6	82.8%	3.9%	86.7%
11	59.6	77.6	17.5	154.7	77.4%	3.9%	81.3%
12	54.1	71.9	18.7	144.7	72.4%	3.9%	76.3%
13	52.9	66.3	18.7	137.9	69.0%	3.9%	72.9%
14	51.3	61.1	17.2	129.6	64.8%	3.9%	68.7%
15	47.7	56.4	15	119.1	59.6%	3.9%	63.5%
16	43.8	51.8	12.3	107.9	54.0%	3.9%	57.9%
17	40.3	47.8	9.3	97.4	48.7%	3.9%	52.6%
18	37.3	44.1	6.6	88	44.0%	3.9%	47.9%
19	34.7	40.8	4.3	79.8	39.9%	3.9%	43.8%
20	32.3	37.5	2.6	72.4	36.2%	3.9%	40.1%
21	30.1	34.4	1.4	65.9	33.0%	3.9%	36.9%
22	27.9	31.7	0.9	60.5	30.3%	3.9%	34.2%
23	25.8	29.3	0.8	55.9	28.0%	3.9%	31.9%
24	23.9	27.2	1.2	52.3	26.2%	3.9%	30.1%
25	22.2	25.2	2	49.4	24.7%	3.9%	28.6%
26	20.7	23.5	3.1	47.3	23.7%	3.9%	27.6%
27	19.3	21.8	4.5	45.6	22.8%	3.9%	26.7%
28	18	20.3	6	44.3	22.2%	3.9%	26.1%
29	16.9	19	7.6	43.5	21.8%	3.9%	25.7%
30	15.8	17.7	9.2	42.7	21.4%	3.9%	25.3%
31	14.9	16.6	10.8	42.3	21.2%	3.9%	25.1%
32	14	15.6	12.4	42	21.0%	3.9%	24.9%
33	13.2	14.7	14	41.9	21.0%	3.9%	24.9%

34	12.5	13.8	15.4	41.7	20.9%	3.9%	24.8%
35	11.8	13	16.8	41.6	20.8%	3.9%	24.7%
36	11.2	12.3	18	41.5	20.8%	3.9%	24.7%
37	10.6	11.7	19.1	41.4	20.7%	3.9%	24.6%
38	10.1	11.1	20	41.2	20.6%	3.9%	24.5%
39	9.7	10.5	20.8	41	20.5%	3.9%	24.4%
40	9.3	10	21.5	40.8	20.4%	3.9%	24.3%
41	8.9	9.5	22.1	40.5	20.3%	3.9%	24.2%
42	8.5	9.1	22.7	40.3	20.2%	3.9%	24.1%
43	8.1	8.7	23.1	39.9	20.0%	3.9%	23.9%
44	7.8	8.4	23.5	39.7	19.9%	3.9%	23.8%
45	7.5	8	23.7	39.2	19.6%	3.9%	23.5%
46	7.2	7.7	24	38.9	19.5%	3.9%	23.4%
47	6.9	7.4	24.1	38.4	19.2%	3.9%	23.1%
48	6.7	7.1	24.2	38	19.0%	3.9%	22.9%
49	6.4	6.9	24.2	37.5	18.8%	3.9%	22.7%
50	6.2	6.6	24.2	37	18.5%	3.9%	22.4%
51	6	6.4	24.1	36.5	18.3%	3.9%	22.2%
52	5.8	6.1	23.9	35.8	17.9%	3.9%	21.8%
53	5.6	5.9	23.7	35.2	17.6%	3.9%	21.5%
54	5.4	5.7	23.6	34.7	17.4%	3.9%	21.3%
55	5.2	5.5	23.3	34	17.0%	3.9%	20.9%
56	5	5.3	23.1	33.4	16.7%	3.9%	20.6%
57	4.9	5.2	22.9	33	16.5%	3.9%	20.4%
58	4.7	5	22.6	32.3	16.2%	3.9%	20.1%
59	4.6	4.8	22.3	31.7	15.9%	3.9%	19.8%
60	4.4	4.7	22.1	31.2	15.6%	3.9%	19.5%
61	4.3	4.5	21.8	30.6	15.3%	3.9%	19.2%
62	4.1	4.4	21.5	30	15.0%	3.9%	18.9%
63	4	4.3	21.2	29.5	14.8%	3.9%	18.7%
64	3.9	4.1	20.9	28.9	14.5%	3.9%	18.4%
65	3.8	4	20.6	28.4	14.2%	3.9%	18.1%
66	3.7	3.9	20.2	27.8	13.9%	3.9%	17.8%
67	3.6	3.8	19.9	27.3	13.7%	3.9%	17.6%
68	3.5	3.7	19.6	26.8	13.4%	3.9%	17.3%
69	3.4	3.6	19.3	26.3	13.2%	3.9%	17.1%
70	3.3	3.5	19	25.8	12.9%	3.9%	16.8%
71	3.2	3.4	18.7	25.3	12.7%	3.9%	16.6%
72	3.1	3.3	18.4	24.8	12.4%	3.9%	16.3%
73	3	3.2	18.1	24.3	12.2%	3.9%	16.1%
74	2.9	3.1	17.8	23.8	11.9%	3.9%	15.8%
75	2.9	3.1	17.6	23.6	11.8%	3.9%	15.7%
76	2.8	3	17.3	23.1	11.6%	3.9%	15.5%
77	2.7	2.9	17.1	22.7	11.4%	3.9%	15.3%
78	2.7	2.8	16.8	22.3	11.2%	3.9%	15.1%
79	2.6	2.8	16.6	22	11.0%	3.9%	14.9%
80	2.5	2.7	16.3	21.5	10.8%	3.9%	14.7%
81	2.5	2.6	16.1	21.2	10.6%	3.9%	14.5%
82	2.4	2.6	15.9	20.9	10.5%	3.9%	14.4%
83	2.4	2.5	15.6	20.5	10.3%	3.9%	14.2%
84	2.3	2.4	15.4	20.1	10.1%	3.9%	14.0%
85	2.2	2.4	15.2	19.8	9.9%	3.9%	13.8%
86	2.2	2.3	14.9	19.4	9.7%	3.9%	13.6%
87	2.1	2.3	14.7	19.1	9.6%	3.9%	13.5%
88	2.1	2.2	14.5	18.8	9.4%	3.9%	13.3%
89	2.1	2.2	14.3	18.6	9.3%	3.9%	13.2%
90	2	2.1	14.1	18.2	9.1%	3.9%	13.0%
91	2	2.1	13.9	18	9.0%	3.9%	12.9%
92	1.9	2	13.7	17.6	8.8%	3.9%	12.7%
93	1.9	2	13.5	17.4	8.7%	3.9%	12.6%
94	1.8	1.9	13.3	17	8.5%	3.9%	12.4%
95	1.8	1.9	13.1	16.8	8.4%	3.9%	12.3%
96	1.8	1.9	12.9	16.6	8.3%	3.9%	12.2%

97	1.7	1.8	12.7	16.2	8.1%	3.9%	12.0%
98	1.7	1.8	12.5	16	8.0%	3.9%	11.9%
99	1.7	1.8	12.3	15.8	7.9%	3.9%	11.8%
100	1.6	1.7	12.1	15.4	7.7%	3.9%	11.6%



**K249FF 249D Spokane
60 dBu F(50,50)**

**KFIO 1050 kHz
40 km radius**

**KFIO 1050 kHz
Day 2 mV/m**

K249FF Spokane Contour Map

0 5 10 15

Kilometers

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