November 2019
KXLB(FM) Channel 264C1
Churchill, Montana
Allocation Study

Background

KXLB is licensed on Channel 264C1 at Churchill, and holds a construction permit to relocate to a new transmitter site. This application proposes modification of the outstanding construction permit, to specify operation from a tower which is approximately 250 meters from the current construction permit site.

Spacing Study

The attached spacing study shows that the proposed Channel 264C1 transmitter site meets the co-channel and adjacent channel spacing requirements for Class C1 stations as prescribed in §73.207 of the Commission's Rules.

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SEARCH PARAMETERS
Channel: 264C1 100.7 MHz
Latitude: 45 38 20 (NAD27)
Longitude: 111 15 55
Safety Zone: 32 km
Job Title: KXLB 264C1 HIGH FLAT

Call Status	City St	FCC File No.	Channel Freq.	ERP(kW) HAAT(m)		Latitude Longitude	Bearing deg-True	Dist (km)	Req (km)
KYPM	LIVINGSTON	210C3	1.900			45-35-51	94.4	56.30	24
LIC	MT	BLED-30513ADH	89.9	265.0		110-32-45		32.30	CLEAR
K262AZ	BOZEMAN	262D	0.205			45-41-54	70.2	19.63	0
LIC	MT	BLFT-90605AAK	100.3	0.0		111-01-41		0.00	TRANS
KEAJ-LP	CELL SITE	262L1	0.100			46-24-09	326.4	102.31	0
LIC	MT	BLL-50804ADG	100.3	-25.8		112-00-11		0.00	LPFM
K262AB	WALKERVILLE	262D	0.099		DA	46-01-29	294.2	106.74	0
LIC	MT	BLFT-10707ABH	100.3	257.0		112-31-24		0.00	TRANS
KSNA	IDAHO FALLS	264C1	100.000			43-21-06	193.3	260.93	245
LIC	ID	BLH-10330ACH	100.7	193.0		112-00-29		15.93	CLEAR
K264CZ	BUTTE	264D	0.250		DA	46-00-27	294.6	100.18	0
CP	MT	BNPFT-80509ACK	100.7	848.0		112-26-30		0.00	TRANS
KXLB	CHURCHILL	264C1	100.000			45-40-24	82.8	31.26	245
LIC	MT	BLH-90426AAA	100.7	248.0		110-52-02		-213.74	SHORT
ABSOLUTE MINIMUM 73.215 SPACING = 224 KM									
KXLB	CHURCHILL	264C1	40.000			45-38-16	240.2	0.25	245
CP	MT	BPH-90814ABH	100.7	221.0		111-16-05		-244.75	SHORT
KRUL-LP	HELENA	264L1	0.100			46-36-22	331.8	122.35	0
LIC	MT	BLL-70323AAN	100.7	-59.4		112-01-15		0.00	LPFM
KBOQ	LIMA	265A	0.100			44-38-01	223.4	152.83	133
LIC	MT	BLH-81105AAL	100.9	-207.0		112-35-28		19.83	CLEAR
K265AS	LIVINGSTON	265D	0.021		DA	45-40-26	85.6	54.57	0
LIC	MT	BLFT-820524JH	100.9	175.0		110-34-01		0.00	TRANS
K267BE	BIG SKY	267D	0.010			45-16-28	193.9	41.72	0
LIC	MT	BLFT-20910ADG	101.3	634.0		111-23-35		0.00	TRANS

==== END OF FM SPACING STUDY FOR CHANNEL 264 ====

November 2019
KMMS-FM Channel 234C3 Bozeman, Montana
KISN Channel 244C3 Belgrade, Montana
KXLB Channel 264C1 Churchill, Montana
RF Exposure Study

Facilities Proposed

Form 301 applications are being filed by the three stations named above, proposing operation from a combined antenna system at the High Flat communications site, 18 kilometers southwest of central Bozeman, Montana. Operation is proposed with a 6-element circularly-polarized omni-directional antenna.

KMMS-FM: The proposed operation will be on Channel 234C3 (94.7 MHz) with an effective radiated power of 5.3 kilowatts.

KISN: The proposed operation will be on Channel 244C3 (96.7 MHz) with an effective radiated power of 5.3 kilowatts.

KXLB: The proposed operation will be on Channel 264C1 (100.7 MHz) with an effective radiated power of 40 kilowatts.

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.

The proposed combined operation of KMMS-FM, KISN, and KXLB will be with a Kathrein/Sira FMC-06/06P antenna which is nominally 0.85 wavelength spaced between the elements. The Sira antenna is not explicitly recognized as an antenna type in the Commission's FMModel software, and so this study assumes that this is a "Type 1" antenna. Calculations of the power density produced by the stations proposed and licensed at this transmitter site are summarized in the following table:

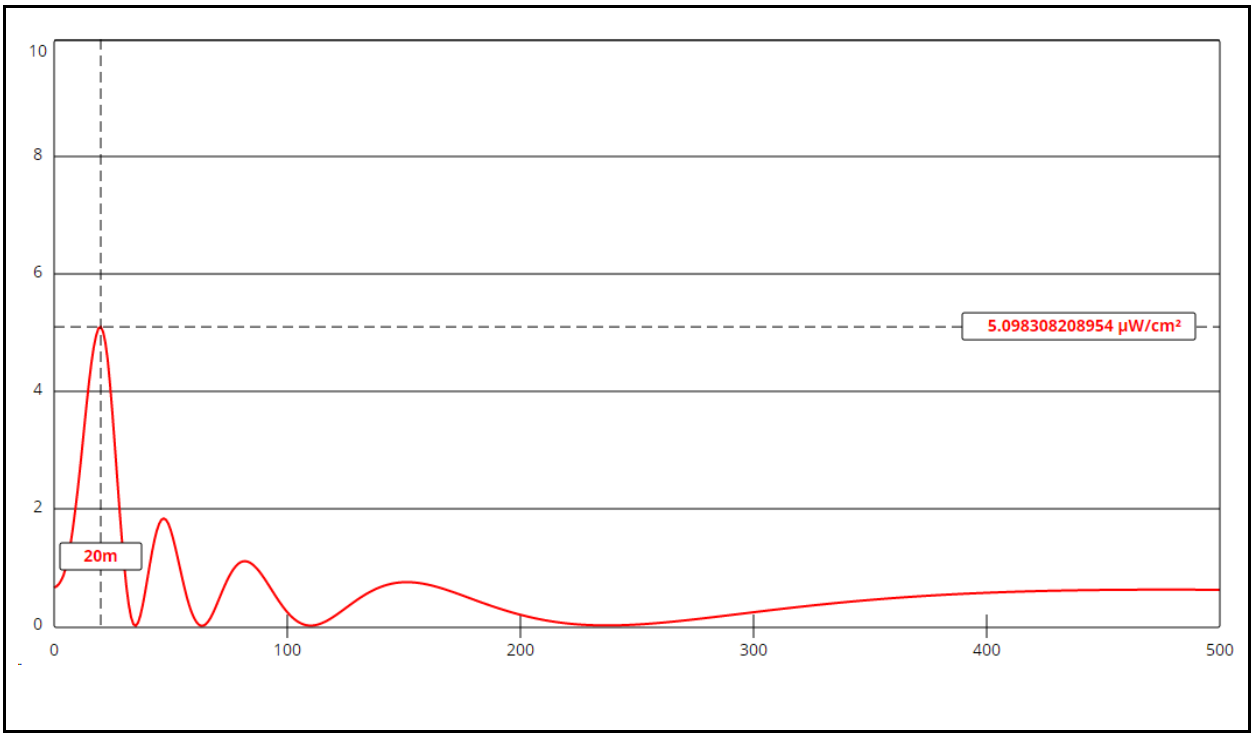
Call	Avg or Peak ERP Antenna Model	Relative Field	Height AGL	Calculated Max Exposure	Gen Pub FCC Limit	% of Limit
KMMS-FM 234C3	5.3 kW H 5.3 kW V Sira FMC-06/06P 6-bay 0.82-wave	FMModel Type 1	51 m	5.1 μW/cm²	200 μW/cm²	2.55%
KISN 244C3	5.3 kW H 5.3 kW V Sira FMC-06/06P 6-bay 0.84-wave	FMModel Type 1	51 m	5.1 μW/cm²	200 μW/cm²	2.55%
KXLB 264C1	40 kW H 40 kW V Sira FMC-06/06P 6-bay full-wave	FMModel Type 1	51 m	42.0 μW/cm²	200 μW/cm²	21.00%
KOFK-FM 201A	0.002 kW H 0.500 kW V SHI 6020-1 1-bay	FMModel Type 1	42 m	10.0 μW/cm²	200 μW/cm²	5.00%
KGVM 240C3	3.6 kW H 3.6 kW V BEX TFC2K-4-HW 4-bay half-wave	FMModel Type 2	56 m	2.2 μW/cm²	200 μW/cm²	1.10%
KCMM 256C2	13.0 kW H 13.0 kW V SHI 6810-3R-SS.85 3-bay 0.85-wave	FMModel Type 1	34 m	235.4 μW/cm² 19.1	200 μW/cm²	117.7%
K281CX (CP)	0.250 kW H 0.250 kW V SWR FM1 1-bay	FMModel Type 1	53 m	3.9 μW/cm²	200 μW/cm²	1.95%
K286CY (CP)	0.250 kW H 0.250 kW V ERI 100A-1 1-bay	FMModel Type 4	59 m	1.5 μW/cm²	200 μW/cm²	0.75%

KSCY 295C3	4.0 kW H 4.0 kW V SHI 6813-4R-SS 4-bay 0.5-wave	FMModel 30 m Type 1	11.3 μW/cm²	200 μW/cm²	5.65%
KWYB-LD Ch28 (CP)	6.5 kW H KAT 750 10067	0.200 38.1 m	6.7 μW/cm²	369.3 μW/cm²	1.81%

These calculations show that the maximum calculated power density produced at two meters above ground level by the proposed operation of the stations at this site (were their maxima to coincide, which they do not) is 160% of the FCC standard for uncontrolled environments. However, this total is heavily biased by the Commission's reclassification of KCMM's Shively model 6810 antenna as a "Type 1" antenna producing a maximum of 235.4 μW/cm². At the time that antenna was installed the prior version of FMModel was in effect, under which the Shively model 6810 was a "Type 6" antenna producing a maximum of just 19.1 μW/cm². This firm's experience with field measurements of Shively model 6810 antennas supports a conclusion that these antennas have elevation pattern performance which closely matches the prior "Type 6" element model assumption. When evaluated under that standard, the maximum calculated power density produced at two meters above ground level would be **51.9% of the FCC standard for uncontrolled environments**.

Public access to the site is or will be restricted by a fence with a locked gate. The site is or will be marked with appropriate warning signs. 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 MPE guidelines.

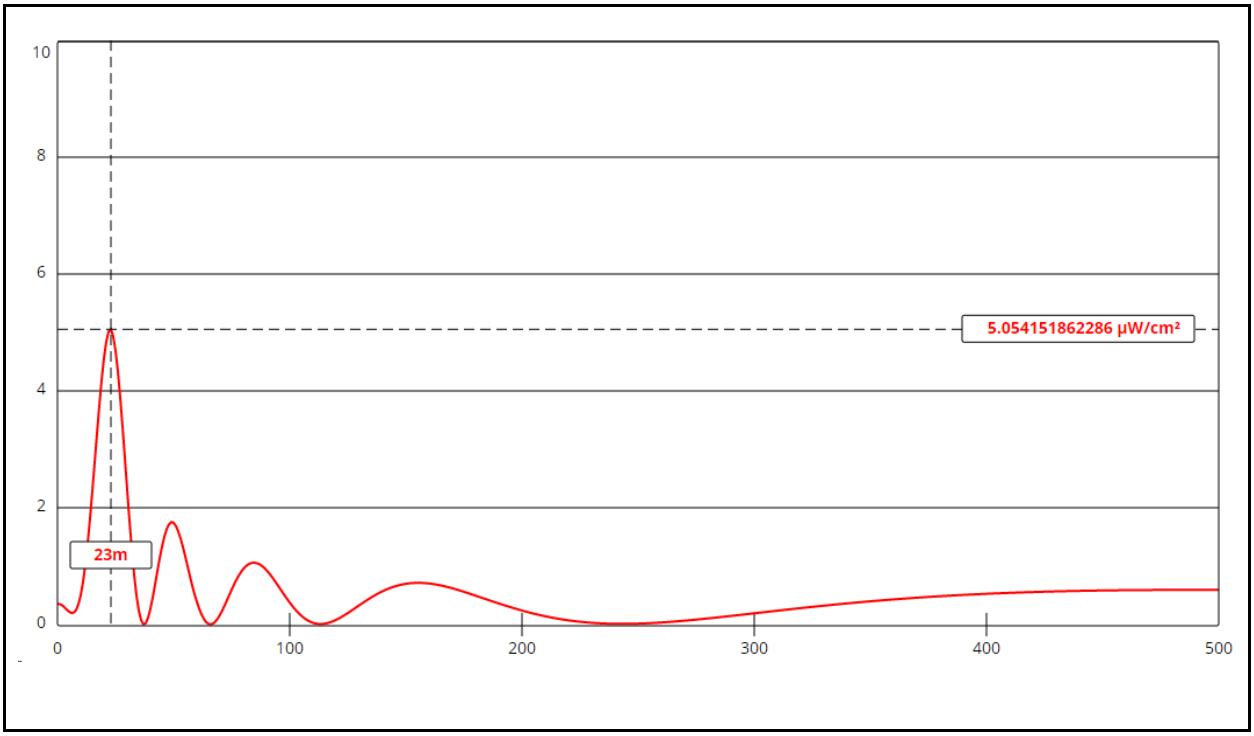


Ground-Level RF Exposure **OET FMModel**

KMMS-FM 234C3 Bozeman

Antenna Type:	Sira FMC-06/06P (Type 1)
No. of Elements:	6
Element Spacing:	0.82 wavelength
Distance:	500 meters
Horizontal ERP:	5.3 kW
Vertical ERP:	5.3 kW
Antenna Height:	51 meters AGL

Maximum Calculated Power Density is 5.1 µW/cm^2 at 20 meters from the antenna structure.

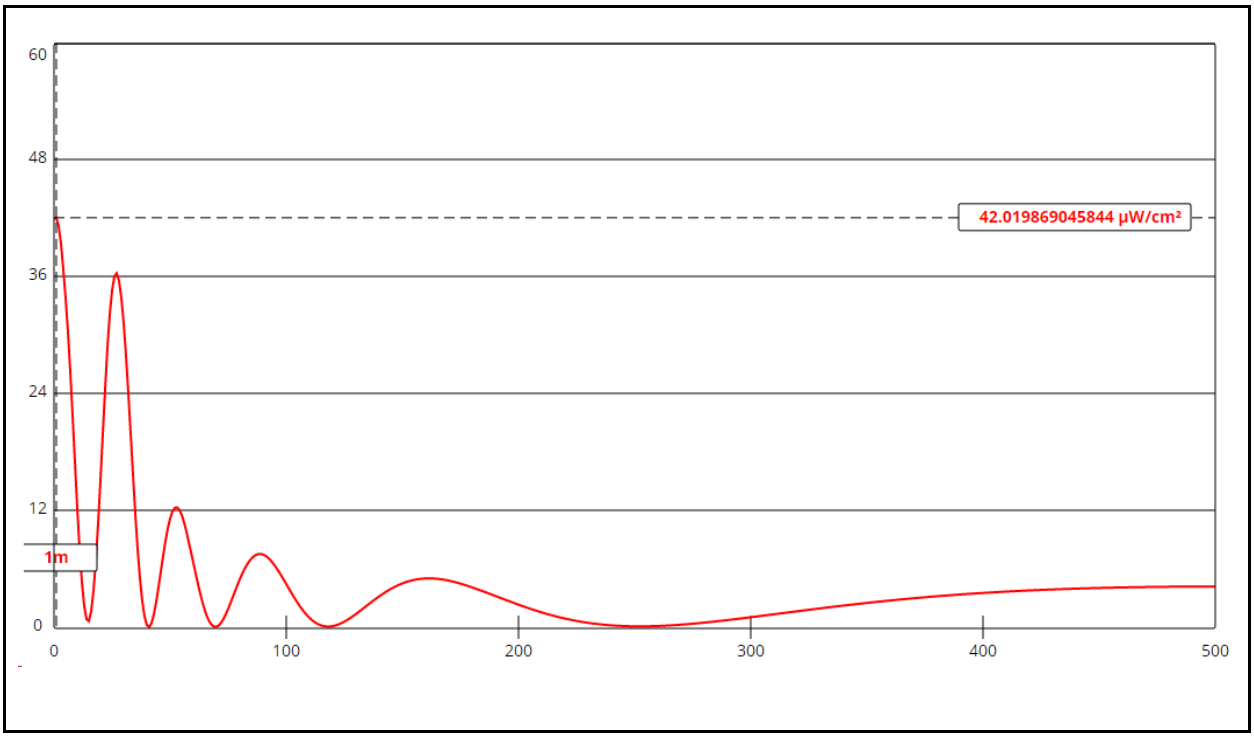


Ground-Level RF Exposure **OET FMModel**

KISN 244C3 Belgrade

Antenna Type:	Sira FMC-06/06P (Type 1)
No. of Elements:	6
Element Spacing:	0.84 wavelength
Distance:	500 meters
Horizontal ERP:	5.3 kW
Vertical ERP:	5.3 kW
Antenna Height:	51 meters AGL

Maximum Calculated Power Density is 5.1 µW/cm^2 at 23 meters from the antenna structure.

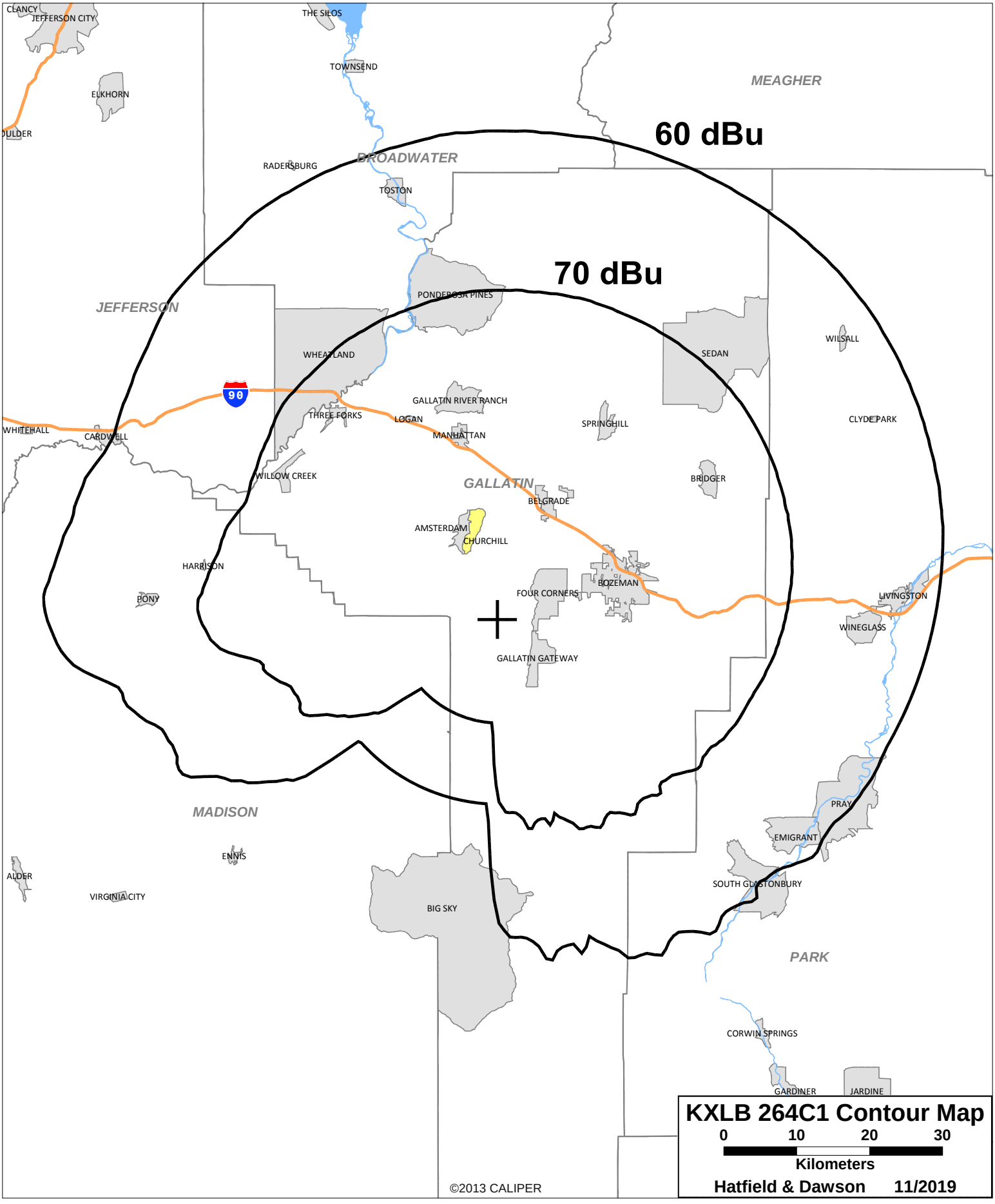


Ground-Level RF Exposure **OET FMModel**

KXLB 264C1 Churchill

Antenna Type:	Sira FMC-06/06P (Type 1)
No. of Elements:	6
Element Spacing:	0.87 wavelength
Distance:	500 meters
Horizontal ERP:	40 kW
Vertical ERP:	40 kW
Antenna Height:	51 meters AGL

Maximum Calculated Power Density is 42.0 µW/cm^2 at 1 meters from the antenna structure.


60 dBu
70 dBu
CLANCY
JEFFERSON CITY
ELKHORN
BOULDER
THE SILOS
TOWNSEND
MEAGHER
BROADWATER
RADERSBURG
TOSTON
JEFFERSON
PONDEROSA PINES
WHEATLAND
SEDAN
WILSALL
90
GALLATIN RIVER RANCH
THREE FORKS
LOGAN
MANHATTAN
SPRINGHILL
CLYDE PARK
WHITEHALL
CARDWELL
WILLOW CREEK
GALLATIN
BRIDGER
BELGRADE
AMSTERDAM
CHURCHILL
HARRISON
PONY
FOUR CORNERS
BOZEMAN
LIVINGSTON
WINEGLASS
GALLATIN GATEWAY
MADISON
PRAY
EMIGRANT
ENNIS
ALDER
VIRGINIA CITY
SOUTH GLASTONBURY
BIG SKY
PARK
CORWIN SPRINGS
GARDINER
JARDINE
KXLB 264C1 Contour Map
0 10 20 30
Kilometers
Hatfield & Dawson 11/2019
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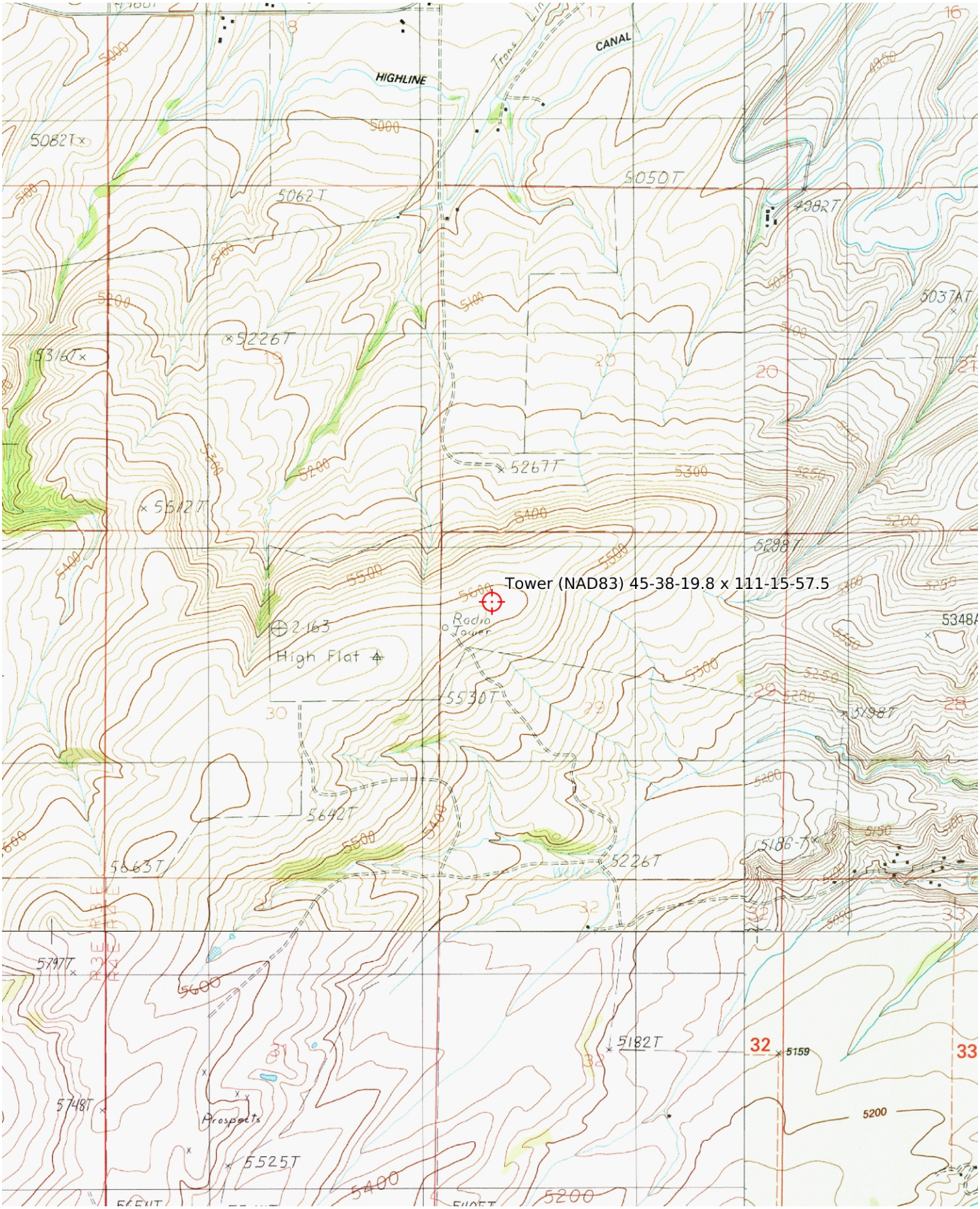

Mercator Projection
WGS84
USNG Zone 12TVR

SARTopo

0.5 1.0 1.5 2.0 2.5 km
0.5 1.0 1.5 mi

Scale **1:24000** 1 inch = 2000 feet

N MN 11°