

**November 2009**  
**FM Translator K221FJ**  
**Tacoma, Washington Channel 221D**  
**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 proposed translator transmitter site is located within the 60 dBu protected contour of second-adjacent channel station KXOT 219C2 Tacoma. The proposed site is 8.69 km from the KXOT transmitter site at a bearing of 218 degrees True. Given the KXOT antenna's 215 meter HAAT and 23 kW ERP along this radial, that station places a 93.4 dBu contour at the translator transmitter site. The corresponding interfering contour from the translator is  $93.4 + 40 = 133.4$  dBu. A free space calculation indicates that this contour will extend at most 18.4 meters from the translator antenna, and will not reach ground level. Therefore, the proposed facility is believed to satisfy the requirements of §74.1204(d) with respect to KXOT.

The proposed translator transmitter site is located within the 60 dBu protected contour of second-adjacent channel station KQMV 223C Bellevue. The proposed site is 47.63 km from the KQMV transmitter site at a bearing of 232 degrees True. Given the KQMV antenna's 775 meter HAAT and 60 kW ERP along this radial, that station places a 79.0 dBu contour at the translator transmitter site. The corresponding interfering contour from the translator is  $79.0 + 40 = 119.0$  dBu. Given that the transmitting antenna will be installed at a height of 64 meters above ground, and taking into consideration the vertical plane pattern of the Scala CL-FM(V) antenna, the attached calculations demonstrate that the interference area will not reach ground level. Therefore, the proposed facility is believed to satisfy the requirements of §74.1204(d) with respect to KQMV.

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.

The 34 dBu F(50,10) contour from the proposed facility does not enter Canadian territory, and therefore referral of the instant application to Canadian authorities for coordination is not believed to be necessary.

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SEARCH PARAMETERS FM Database Date: 091116

Channel: 221A 92.1 MHz Page 1

Latitude: 47 14 32

Longitude: 122 27 57

Safety Zone: 50 km

Job Title: K221FJ AT ASR 1033247

Call Status	City St	FCC File No.	Channel Freq.	ERP(kW) HAAT(m)	Latitude Longitude	Bearing deg-True	Dist (km)	Req (km)
K218CU LIC	DELPHI WA	BLFT-11226AAI	218D 91.5	0.003 769.0	46-58-22 123-08-17	239.8	59.17 0.00	0 TRANS
NEW-T APP	CEDARVILLE WA	BNPFT-00407AAS	219D 91.7	0.005 212.0	46-49-21 123-15-50	232.6	76.53 0.00	0 TRANS
NEW-T APP	SHORELINE WA	BNPFT-00218AAZ	219D 91.7	0.099 159.0	DA 47-41-46 122-19-00	12.5	51.70 0.00	0 TRANS
KXOT LIC	TACOMA WA	BLED-60817AEN	219C2 91.7	23.000 223.0	DA 47-18-14 122-23-43	37.8	8.69 -46.31	55 SHORT
KMUN LIC	ASTORIA OR	BLED-30707AAM	220C2 91.9	7.200 332.0	46-15-46 123-53-09	225.3	153.71 47.71	106 CLEAR
K220HE LIC	CHEHALIS WA	BLFT-81003AAQ	220D 91.9	0.013 399.0	DA 46-33-16 123-03-26	210.7	88.75 0.00	0 TRANS
K220HD LIC	FALL CITY WA	BMLFT-81014AAR	220D 91.9	0.004 778.0	DA 47-30-34 121-58-56	50.6	47.08 0.00	0 TRANS
KPTZ CP	PORT TOWNSEND WA	BNPED-71017AGZ	220A 91.9	2.000 71.0	DA 48-06-20 122-51-47	342.9	100.52 28.52	72 CLEAR
KDNA LIC	YAKIMA WA	BMLD-60906ABQ	220C1 91.9	18.500 280.0	46-31-42 120-31-03	117.5	168.38 35.38	133 CLEAR
KDNAaux LIC	YAKIMA WA	BXLED-60906ABP	220C1 91.9	0.185 270.0	46-31-42 120-31-03	117.5	168.38 0.00	0 AUX
	VICTORIA BC	RM-	221C 92.1	0.000 0.0	48-30-20 123-28-23	332.2	159.40 -87.60	247 SHORT
CJRQFM	VICTORIA BC	-	221C 92.1	0.000 0.0	48-25-00 123-22-00	333.1	146.97 -100.03	247 SHORT
CJRQFM	VICTORIA BC	-	221C 92.1	87.000 636.0	DA 48-45-13 123-29-25	336.0	184.63 -62.37	247 SHORT
K221BG LIC	ABERDEEN WA	BLFT-80508ABK	221D 92.1	0.125 138.0	DA 46-59-18 123-47-37	254.8	104.65 0.00	0 TRANS

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SEARCH PARAMETERS FM Database Date: 091116

Channel: 221A 92.1 MHz Page 2

Latitude: 47 14 32

Longitude: 122 27 57

Safety Zone: 50 km

Job Title: K221FJ AT ASR 1033247

Call Status	City St	FCC File No.	Channel Freq.	ERP(kW) HAAT(m)	Latitude Longitude	Bearing deg-True	Dist (km)	Req (km)
K221DV LIC	DELPHI WA	BLFT-20814AAJ	221D 92.1	0.003 808.0	46-58-31 123-08-16	240.0	59.01 0.00	0 TRANS
K221BI LIC	EAST WENATCHEE WA	BLFT-21105AAE	221D 92.1	0.016 396.0	47-22-52 120-17-16	83.8	165.42 0.00	0 TRANS
K221FJ CP MOD	MANZANITA WA	BMPFT-90608AAJ	221D 92.1	0.092 DA 229.0	47-18-14 122-23-43	37.8	8.69 0.00	0 TRANS
KTYG-LP LIC	ONALASKA WA	BLL-61221ACZ	221L1 92.1	0.011 90.0	46-34-58 122-37-42	189.6	74.35 7.35	67 CLOSE
KGON LIC	PORTLAND OR	BLH-900820KF	222C 92.3	100.000 386.0	45-29-20 122-41-40	185.2	195.69 30.69	165 CLEAR
KQMV LIC	BELLEVUE WA	BLH-60824AEA	223C 92.5	60.000 698.0	47-30-17 121-58-03	51.9 SS	47.63 -47.37	95 SHORT
KQMVaux LIC	BELLEVUE WA	BLH-990803KJ	223C 92.5	8.400 374.0	47-32-41 122-06-28	38.6	43.15 0.00	0 AUX
KNBQ LIC	CENTRALIA WA	BLH-50126ABD	275C 102.9	70.000 668.0	46-58-31 123-08-16	240.0	59.01 30.01	29 CLEAR

44444 END OF FM SPACING STUDY FOR CHANNEL 221 44444

# Free Space Interference Area Calculator

## K221FJ Interference Area to KQMV

Antenna Height: 64 meters AGL  
 Contour Level: 119 dBu equals 0.9 V/m  
 ERP in Watts: 150 Watts

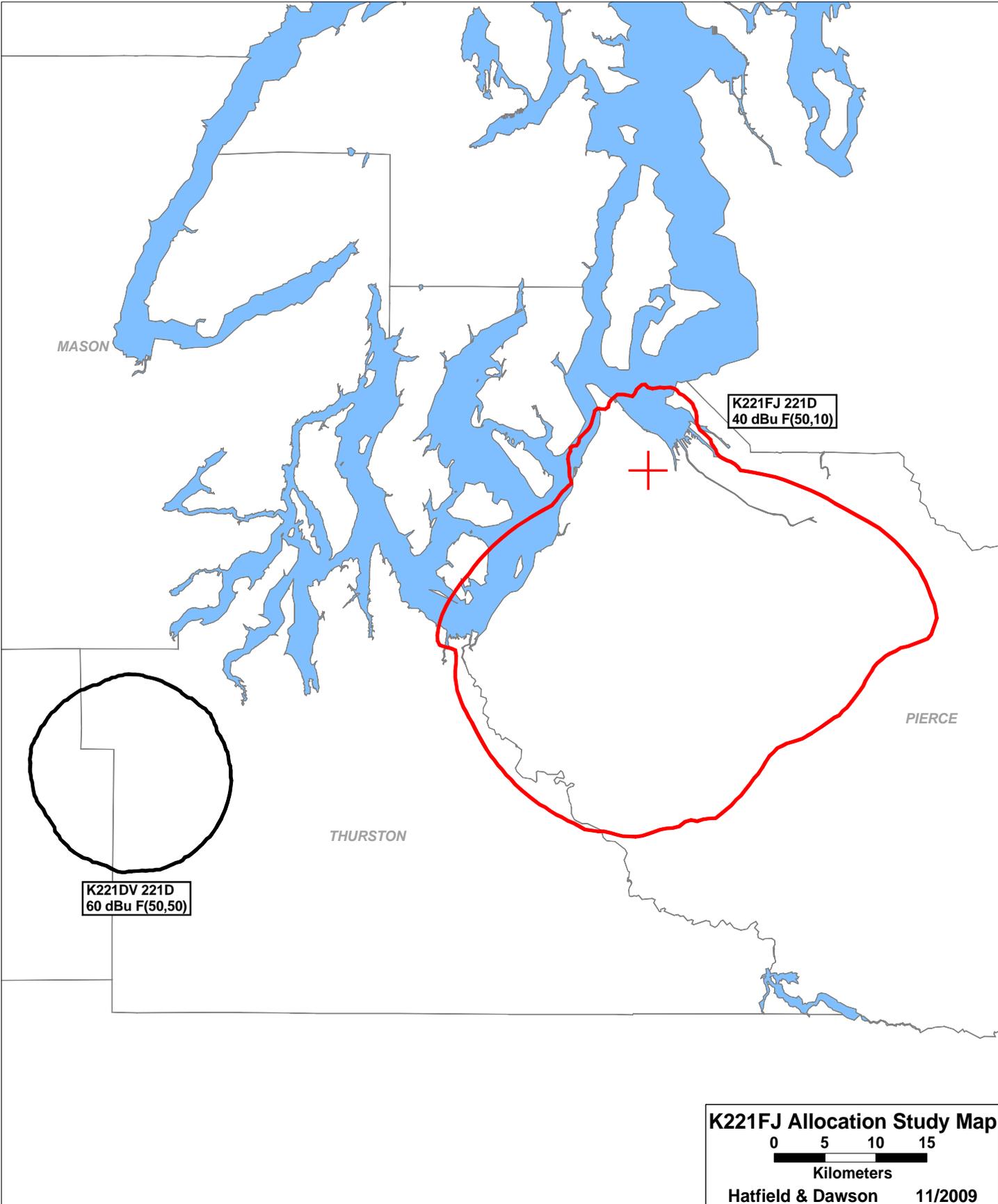
Maximum distance  
 to interfering contour is: 316.1 feet equals 96.3 meters

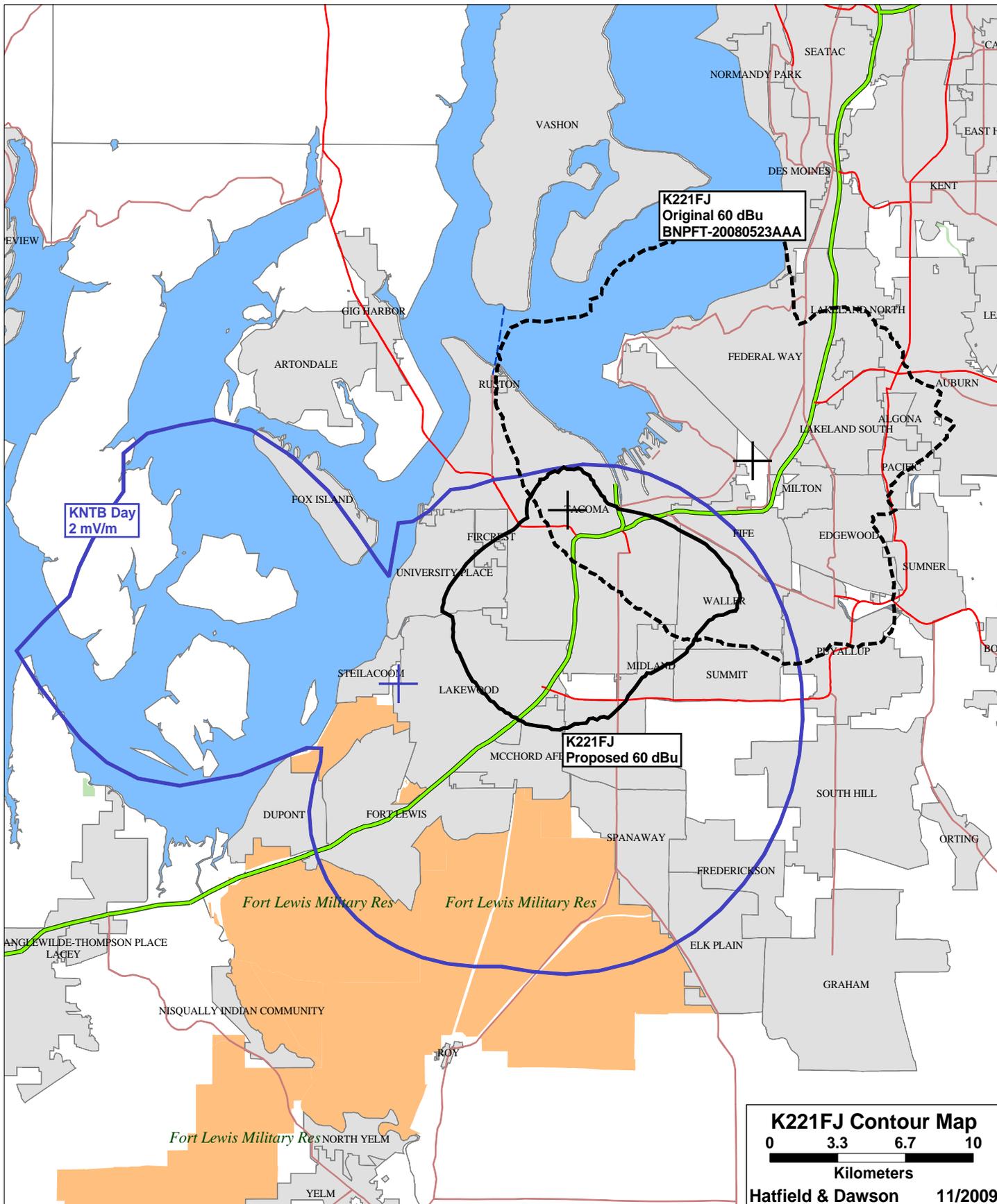
Depression Angle (degrees)	Scala CL-FMV Relative Field	Adjusted ERP (Watts)	Free Space Distance To 119 dBu Contour Along the depression angle	Contour AGL
-90	0.010	0.0	1.0 meters	63.0 meters
-89	0.010	0.0	1.0	63.0
-88	0.010	0.0	1.0	63.0
-87	0.010	0.0	1.0	63.0
-86	0.010	0.0	1.0	63.0
-85	0.010	0.0	1.0	63.0
-84	0.010	0.0	1.0	63.0
-83	0.010	0.0	1.0	63.0
-82	0.010	0.0	1.0	63.0
-81	0.010	0.0	1.0	63.0
-80	0.010	0.0	1.0	63.1
-79	0.010	0.0	1.0	63.1
-78	0.010	0.0	1.0	63.1
-77	0.010	0.0	1.0	63.1
-76	0.010	0.0	1.0	63.1
-75	0.010	0.0	1.0	63.1
-74	0.012	0.0	1.2	62.9
-73	0.014	0.0	1.3	62.7
-72	0.016	0.0	1.5	62.5
-71	0.018	0.0	1.7	62.4
-70	0.020	0.1	1.9	62.2
-69	0.025	0.1	2.4	61.8
-68	0.030	0.1	2.9	61.3
-67	0.035	0.2	3.4	60.9
-66	0.040	0.2	3.9	60.5
-65	0.045	0.3	4.3	60.1
-64	0.053	0.4	5.1	59.4
-63	0.061	0.6	5.9	58.8
-62	0.069	0.7	6.6	58.1
-61	0.077	0.9	7.4	57.5
-60	0.085	1.1	8.2	56.9
-59	0.099	1.5	9.5	55.8
-58	0.113	1.9	10.9	54.8
-57	0.127	2.4	12.2	53.7
-56	0.141	3.0	13.6	52.7
-55	0.155	3.6	14.9	51.8
-54	0.174	4.5	16.8	50.4
-53	0.193	5.6	18.6	49.2
-52	0.212	6.7	20.4	47.9
-51	0.231	8.0	22.3	46.7
-50	0.250	9.4	24.1	45.6
-49	0.272	11.1	26.2	44.2
-48	0.294	13.0	28.3	43.0
-47	0.316	15.0	30.4	41.7

(Straight down)

-46	0.338	17.1	32.6	40.6
-45	0.360	19.4	34.7	39.5
-44	0.382	21.9	36.8	38.4
-43	0.404	24.5	38.9	37.5
-42	0.426	27.2	41.0	36.5
-41	0.448	30.1	43.2	35.7
-40	0.470	33.1	45.3	34.9
-39	0.488	35.7	47.0	34.4
-38	0.507	38.6	48.8	33.9
-37	0.525	41.3	50.6	33.6
-36	0.544	44.4	52.4	33.2
-35	0.563	47.5	54.2	32.9
-34	0.579	50.3	55.8	32.8
-33	0.595	53.1	57.3	32.8
-32	0.612	56.2	59.0	32.8
-31	0.628	59.2	60.5	32.8
-30	0.645	62.4	62.1	32.9
-29	0.663	65.9	63.9	33.0
-28	0.681	69.6	65.6	33.2
-27	0.699	73.3	67.3	33.4
-26	0.717	77.1	69.1	33.7
-25	0.735	81.0	70.8	34.1
-24	0.752	84.8	72.4	34.5
-23	0.769	88.7	74.1	35.1
-22	0.786	92.7	75.7	35.6
-21	0.803	96.7	77.4	36.3
-20	0.820	100.9	79.0	37.0
-19	0.835	104.6	80.4	37.8
-18	0.850	108.4	81.9	38.7
-17	0.865	112.2	83.3	39.6
-16	0.880	116.2	84.8	40.6
-15	0.895	120.2	86.2	41.7
-14	0.906	123.1	87.3	42.9
-13	0.917	126.1	88.3	44.1
-12	0.928	129.2	89.4	45.4
-11	0.939	132.3	90.5	46.7
-10	0.950	135.4	91.5	48.1
-9	0.956	137.1	92.1	49.6
-8	0.962	138.8	92.7	51.1
-7	0.968	140.6	93.3	52.6
-6	0.974	142.3	93.8	54.2
-5	0.980	144.1	94.4	55.8
-4	0.984	145.2	94.8	57.4
-3	0.988	146.4	95.2	59.0
-2	0.992	147.6	95.6	60.7
-1	0.996	148.8	96.0	62.3
0	1.000	150.0	96.3	64.0

(Horizontal)





**K221FJ**  
Original 60 dBu  
BNPFT-20080523AAA

**KNTB Day**  
2 mV/m

**K221FJ**  
Proposed 60 dBu

**K221FJ Contour Map**  
0 3.3 6.7 10  
Kilometers  
Hatfield & Dawson 11/2009

**November 2009**  
**FM Translator K221FJ**  
**Tacoma, Washington Channel 221D**  
**NIER Study**

**Facilities Proposed**

The proposed operation will be on Channel 221D (92.1 MHz) with a maximum lobe effective radiated power of 150 Watts. Operation is proposed with an antenna to be mounted on an existing tower with FCC Antenna Structure Registration Number 1033247.

**NIER 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.

$$S(\text{mW} / \text{cm}^2) = \frac{33.40981 \times \text{AdjERP}(\text{Watts})}{D^2}$$

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.

Calculations of the power density produced by the K221FJ antenna system have been made assuming that the antenna will radiate 100% power straight down. Under this worst-case assumption, the highest calculated ground level power density will occur at the base of the tower (62 meters below the antenna). At this point the power density is calculated to be 1.3  $\mu\text{W}/\text{cm}^2$ , which is 0.1% of 1000  $\mu\text{W}/\text{cm}^2$  (the FCC standard for controlled environments) and 0.7% of 200  $\mu\text{W}/\text{cm}^2$  (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 radiation in excess of FCC guidelines.