

Exhibit 13-B
Section 74.1204
Contour Protection to WIBC

This comprehensive exhibit has been prepared to demonstrate that the proposed W228CX modification will not cause prohibited interference to second adjacent full power FM station WIBC, Channel 226B, Indianapolis, IN. This statement demonstrates that a lack of population and/or other factors allow this proposal to be compliant with Section 74.1204. The process commonly called “Living Way,” allows for the use of U/D Analysis, also known as “signal strength ratio methodology.” In this instant case the facilities to be protected are second adjacent and are to be afforded protection from signals 40 dB stronger than they present in the location of the proposed antenna location.

The proposed W228CX facility will be located 11.3 km. from WIBC. The WIBC FCC F(50,50) protected contour at the site is 89.3 dBu. Using the FCC's FM propagation curves program (see attached), the W228CX F(50,50) interfering contour with respect to WIBC extends just 38 meters from the antenna. The W228CX transmit antenna will be located 195 meters above ground.

It is believed that the proposed modification to W228CX will not cause prohibited interference to WIBC as no interference reaches the ground. Therefore it is believed the proposed W228CX modification is in compliance with Section 74.1204 contour protection with respect to WIBC.

Select Contour Type:

- F(50,50) Service Contour -- FM and NTSC (analog) TV
- F(50,10) Interfering Contour**
- F(50,90) Digital TV Service Contour

Select Channel Range:
(not TV Virtual Channel)

- FM Radio or TV Transmit Channels 2-6**
- TV Transmit Channels 7-13
- TV Transmit Channels 14-69

Find This:

- Field Strength, given a Distance (in km)
- Distance, Given a Field Strength (in dBu)**
- FM ERP, given Distance and Field Strength [F(50,50) Service Contour]

.250

ERP (kW)

Distance (km)

213

129.3

Field (dBu)

HAAT (meters)

Find Result

Clear Form

Results:

Calculated Distance = 0.038 km

Free Space equation used to compute distance.

This function uses the FCC's CURVES program to make calculations of the F(50,50) FM and NTSC (analog) TV service curves, the F(50,10) interfering signal curves, and the F(50,90) digital TV service curves. Printable copies of these propagation curves are available at [FM and TV Propagation Curves Graphs \(/media/radio/fm-and-tv-propagation-curves-graphs\)](#).

Exhibit 13-C Section
74.1204
Contour Protection to WRWM

This comprehensive exhibit has been prepared to demonstrate that the proposed W228CX modification will not cause prohibited interference to WRWM, Channel 230B1, Lawrence, IN. This statement demonstrates that a lack of population and/or other factors allow this proposal to be compliant with Section 74.1204. The process commonly called “Living Way,” allows for the use of U/D Analysis, also known as “signal strength ratio methodology.” In this instant case the facilities to be protected are second adjacent and are to be afforded protection from signals 40 dB stronger than they present in the location of the proposed antenna location.

The WRWM FCC F(50,50) protected contour at the W228CX application site is 72.2 dBu. Therefore the W228CX F(50,10) interfering contour with respect to WRWM is the 112.2 dBu contour. Using the FCC's FM propagation curves program (see attached), the 112.2 dBu contour was calculated to extend 272 meters from the antenna. The proposed W228CX transmit antenna will be located 195 meters above ground level. As shown on the accompanying spreadsheet and chart, using the vertical elevation pattern data for the Kathrein-Scala CA-FM vertically polarized one bay antenna (see attached), the ERP and contour distances have been calculated every 10 degrees from 0 degrees to 90 degrees. The contour distance ranges from a maximum distance of 272 meters at 0 degrees to 0 meters at 90 degrees. That data was calculated in the attached charts to plot the distance the interfering contour extends into free space. The contour does not reach the ground. The 112.2 dBu interfering contour comes to within approximately 65 meters (213.2 ft.) of ground level at approximately 260 meters from the tower base. The elevation within 272 meters of the tower base varies by only +/- four meters.

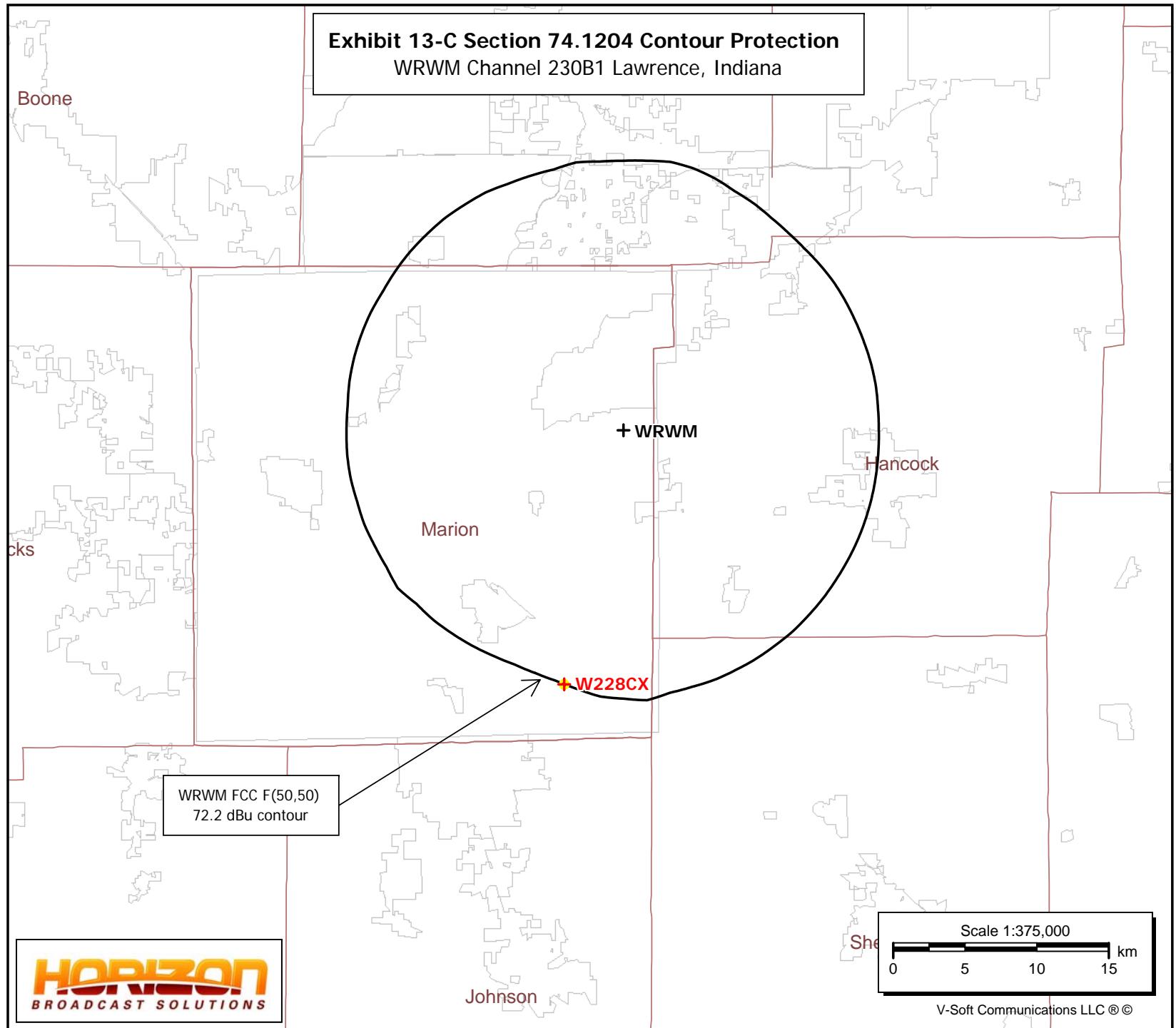
It is believed that the proposed modification to W228CX will not cause prohibited interference to WRWM as no interference reaches the ground. Therefore it is believed the proposed

W228CX modification is in compliance with Section 74.1204 contour protection with respect to WRWM.

W228CX
Indianapolis, IN
Latitude: 39-40-06 N
Longitude: 086-01-44 W
ERP: 0.25 kW
HAAT: 210.48 m
Channel: 228
Frequency: 93.5 MHz
AMSL Height: 454.0 m
Elevation: 259.0 m
Horiz. Pattern: Directional
Vert. Pattern: No
Prop Model: None

WRWM
Lawrence, IN
BLH20120301AEG
Latitude: 39-49-39 N
Longitude: 085-58-51 W
ERP: 8.40 kW
HAAT: 140.0 m
Channel: 230
Frequency: 93.9 MHz
AMSL Height: 393.0 m
Elevation: 255.0 m
Horiz. Pattern: Omni
Vert. Pattern: No
Prop Model: None

Exhibit 13-C Section 74.1204 Contour Protection
WRWM Channel 230B1 Lawrence, Indiana



Select Contour Type:	F(50,50) Service Contour -- FM and NTSC (analog) TV F(50,10) Interfering Contour F(50,90) Digital TV Service Contour
Select Channel Range: (not TV Virtual Channel)	FM Radio or TV Transmit Channels 2-6 TV Transmit Channels 7-13 TV Transmit Channels 14-69
Find This:	Field Strength, given a Distance (in km) Distance, Given a Field Strength (in dBu) FM ERP, given Distance and Field Strength [F(50,50) Service Contour]
.250 ERP (kW)	<input type="text"/> Distance (km)
213 HAAT (meters)	<input type="text"/> 112.2 Field (dBu)
<input type="button" value="Find Result"/> <input type="button" value="Clear Form"/>	

Results:

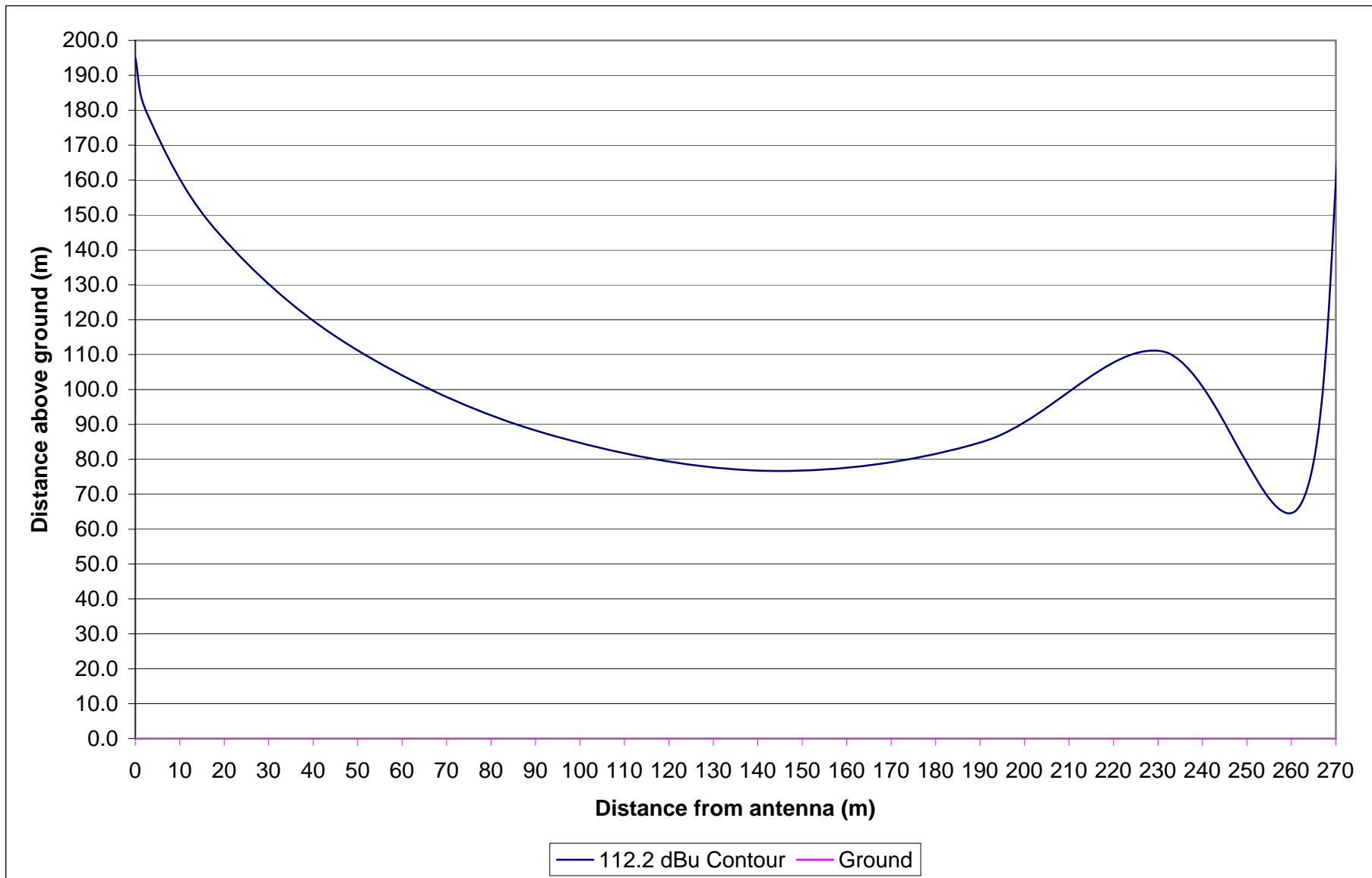
Calculated Distance = **0.272 km**

Free Space equation used to compute distance.

This function uses the FCC's CURVES program to make calculations of the F(50,50) FM and NTSC (analog) TV service curves, the F(50,10) interfering signal curves, and the F(50,90) digital TV service curves. Printable copies of these propagation curves are available at [FM and TV Propagation Curves Graphs \(/media/radio/fm-and-tv-propagation-curves-graphs\)](#).

W228CX - Indianapolis, IN
Section 74.1204 Contour Protection to WRWM, Channel 230B1, Lawrence, IN

(112.2 dBu F(50,10) interfering contour shown)

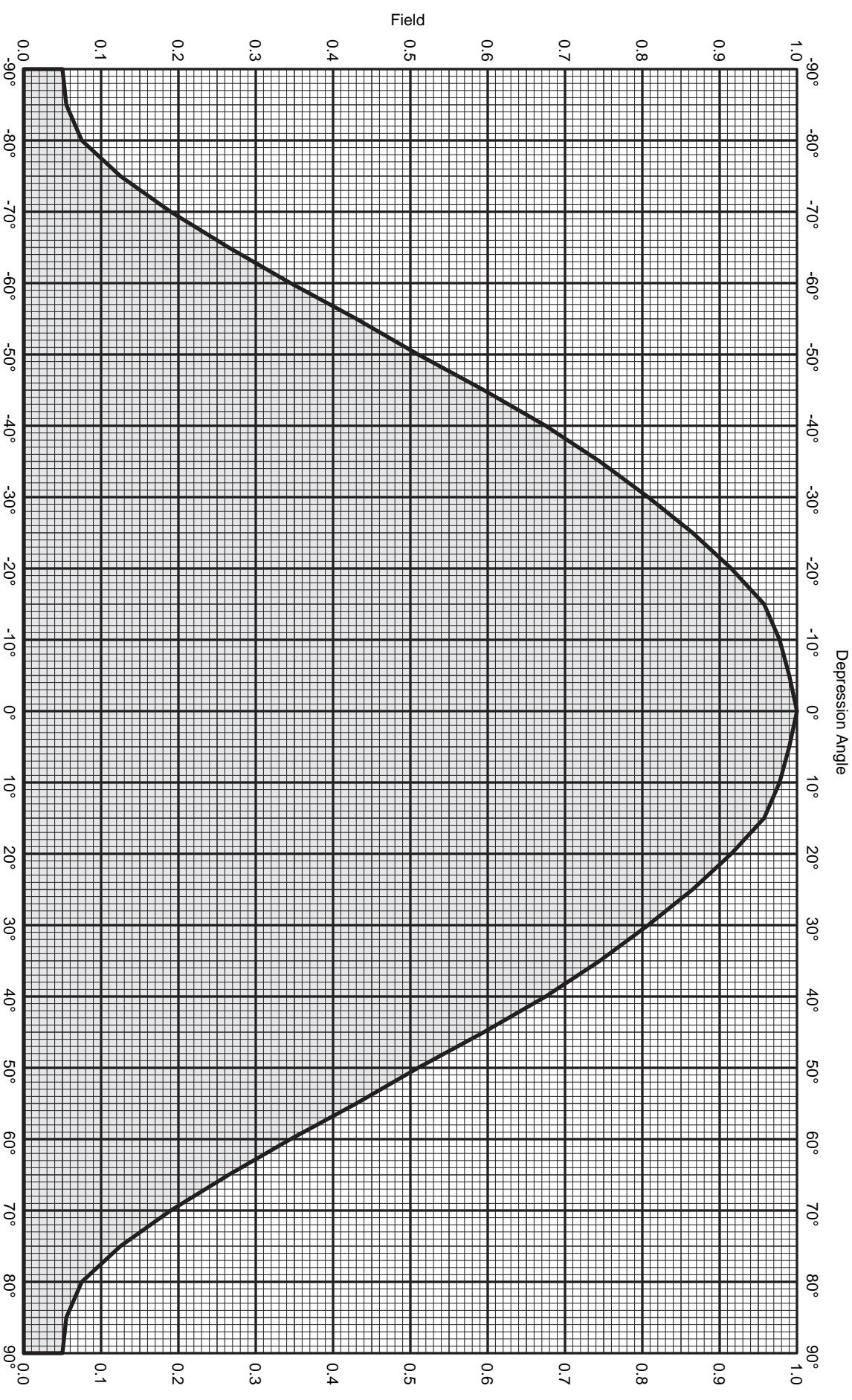


The W228CX interfering contour with respect to WRWM does not reach the ground.

Angle of Elevation (Degrees)	Relative Field	ERP (watts_	ERP (dBk)	112.2 dBu Contour (Meters)
-----	-----	-----	-----	-----
0	1.000	250	-6.021	272
-10	0.978	239	-6.214	266
-20	0.915	204	-6.792	246
-30	0.808	163	-7.872	220
-40	0.674	114	-9.435	184
-50	0.510	65	-11.869	139
-60	0.345	30	-15.264	94
-70	0.190	9	-20.446	52
-80	0.075	1	-28.519	17
-90	0.050	0	-32.041	0

Angle of Elevation (Degrees)	Relative Field	ERP (dBk)	ERP (watts)	112.2 dBu Contour (Meters)
0	1.000	-6.021	250	272
10	0.978	-6.214	239	266
20	0.915	-6.792	204	246
30	0.808	-7.872	163	220
40	0.674	-9.435	114	184
50	0.510	-11.869	65	139
60	0.345	-15.264	30	94
70	0.190	-20.446	9	52
80	0.075	-28.519	1	17
90	0.050	-32.041	0	0

Θ ($^{\circ}$)	Θ (radians)	R (m)	x'	y'	$y = 195 - y'$	Gnd
0	0	272	272	0	195.0	0
10	0.175	266	262.0	46.2	66.8	0
20	0.349	246	231.2	84.1	110.9	0
30	0.524	220	190.5	110	85	0
40	0.698	184	141.0	118.3	76.7	0
50	0.873	139	89.3	106.5	88.5	0
60	1.047	94	47.0	81.4	113.6	0
70	1.222	52	17.8	48.9	146.1	0
80	1.396	17	3.0	16.7	178.3	0
90	1.571	0	0.0	0	195	0



CA2-FM
FM

Maximum gain: 4.0 dBd

Vertical radiation pattern
0 degree electrical downtilt



CA2-FM

FM

Maximum gain: 4.0 dBd

Vertical polarization

Vertical radiation pattern
0 degree electrical downtilt

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
-90	0.050	-26.02	-22.02	0.01	-45	0.595	-4.51	-0.51	0.89
-89	0.051	-25.85	-21.85	0.01	-44	0.611	-4.28	-0.28	0.94
-88	0.052	-25.68	-21.68	0.01	-43	0.627	-4.05	-0.05	0.99
-87	0.053	-25.51	-21.51	0.01	-42	0.643	-3.84	0.16	1.04
-86	0.054	-25.35	-21.35	0.01	-41	0.659	-3.62	0.38	1.09
-85	0.055	-25.19	-21.19	0.01	-40	0.675	-3.41	0.59	1.14
-84	0.059	-24.58	-20.58	0.01	-39	0.689	-3.24	0.76	1.19
-83	0.063	-24.01	-20.01	0.01	-38	0.703	-3.06	0.94	1.24
-82	0.067	-23.48	-19.48	0.01	-37	0.717	-2.89	1.11	1.29
-81	0.071	-22.97	-18.97	0.01	-36	0.731	-2.72	1.28	1.34
-80	0.075	-22.50	-18.50	0.01	-35	0.745	-2.56	1.44	1.39
-79	0.085	-21.41	-17.41	0.02	-34	0.757	-2.41	1.59	1.44
-78	0.095	-20.45	-16.45	0.02	-33	0.770	-2.27	1.73	1.49
-77	0.105	-19.58	-15.58	0.03	-32	0.783	-2.13	1.87	1.54
-76	0.115	-18.79	-14.79	0.03	-31	0.795	-1.99	2.01	1.59
-75	0.125	-18.06	-14.06	0.04	-30	0.808	-1.86	2.14	1.64
-74	0.138	-17.20	-13.20	0.05	-29	0.819	-1.73	2.27	1.68
-73	0.151	-16.42	-12.42	0.06	-28	0.831	-1.61	2.39	1.73
-72	0.164	-15.70	-11.70	0.07	-27	0.842	-1.49	2.51	1.78
-71	0.177	-15.04	-11.04	0.08	-26	0.854	-1.38	2.62	1.83
-70	0.190	-14.42	-10.42	0.09	-25	0.865	-1.26	2.74	1.88
-69	0.205	-13.76	-9.76	0.11	-24	0.875	-1.16	2.84	1.92
-68	0.220	-13.15	-9.15	0.12	-23	0.885	-1.06	2.94	1.97
-67	0.235	-12.58	-8.58	0.14	-22	0.895	-0.96	3.04	2.01
-66	0.250	-12.04	-8.04	0.16	-21	0.905	-0.87	3.13	2.06
-65	0.265	-11.54	-7.54	0.18	-20	0.915	-0.77	3.23	2.10
-64	0.281	-11.03	-7.03	0.20	-19	0.924	-0.69	3.31	2.14
-63	0.297	-10.54	-6.54	0.22	-18	0.932	-0.61	3.39	2.18
-62	0.313	-10.09	-6.09	0.25	-17	0.940	-0.53	3.47	2.22
-61	0.329	-9.66	-5.66	0.27	-16	0.949	-0.45	3.55	2.26
-60	0.345	-9.24	-5.24	0.30	-15	0.957	-0.38	3.62	2.30
-59	0.362	-8.83	-4.83	0.33	-14	0.961	-0.34	3.66	2.32
-58	0.379	-8.43	-4.43	0.36	-13	0.965	-0.30	3.70	2.34
-57	0.396	-8.05	-4.05	0.39	-12	0.970	-0.27	3.73	2.36
-56	0.413	-7.68	-3.68	0.43	-11	0.974	-0.23	3.77	2.38
-55	0.430	-7.33	-3.33	0.46	-10	0.978	-0.20	3.80	2.40
-54	0.446	-7.01	-3.01	0.50	-9	0.980	-0.18	3.82	2.41
-53	0.462	-6.71	-2.71	0.54	-8	0.982	-0.15	3.85	2.42
-52	0.478	-6.41	-2.41	0.57	-7	0.985	-0.13	3.87	2.44
-51	0.494	-6.13	-2.13	0.61	-6	0.988	-0.11	3.89	2.45
-50	0.510	-5.85	-1.85	0.65	-5	0.990	-0.09	3.91	2.46
-49	0.527	-5.56	-1.56	0.70	-4	0.992	-0.07	3.93	2.47
-48	0.544	-5.29	-1.29	0.74	-3	0.994	-0.05	3.95	2.48
-47	0.561	-5.02	-1.02	0.79	-2	0.996	-0.03	3.97	2.49
-46	0.578	-4.76	-0.76	0.84	-1	0.998	-0.02	3.98	2.50
					0	1.000	0.00	4.00	2.51



CA2-FM

FM

Maximum gain: 4.0 dBd

Vertical polarization

Vertical radiation pattern
0 degree electrical downtilt

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
0	1.000	0.00	4.00	2.51	45	0.595	-4.51	-0.51	0.89
1	0.998	-0.02	3.98	2.50	46	0.578	-4.76	-0.76	0.84
2	0.996	-0.03	3.97	2.49	47	0.561	-5.02	-1.02	0.79
3	0.994	-0.05	3.95	2.48	48	0.544	-5.29	-1.29	0.74
4	0.992	-0.07	3.93	2.47	49	0.527	-5.56	-1.56	0.70
5	0.990	-0.09	3.91	2.46	50	0.510	-5.85	-1.85	0.65
6	0.988	-0.11	3.89	2.45	51	0.494	-6.13	-2.13	0.61
7	0.985	-0.13	3.87	2.44	52	0.478	-6.41	-2.41	0.57
8	0.982	-0.15	3.85	2.42	53	0.462	-6.71	-2.71	0.54
9	0.980	-0.18	3.82	2.41	54	0.446	-7.01	-3.01	0.50
10	0.978	-0.20	3.80	2.40	55	0.430	-7.33	-3.33	0.46
11	0.974	-0.23	3.77	2.38	56	0.413	-7.68	-3.68	0.43
12	0.970	-0.27	3.73	2.36	57	0.396	-8.05	-4.05	0.39
13	0.965	-0.30	3.70	2.34	58	0.379	-8.43	-4.43	0.36
14	0.961	-0.34	3.66	2.32	59	0.362	-8.83	-4.83	0.33
15	0.957	-0.38	3.62	2.30	60	0.345	-9.24	-5.24	0.30
16	0.949	-0.45	3.55	2.26	61	0.329	-9.66	-5.66	0.27
17	0.940	-0.53	3.47	2.22	62	0.313	-10.09	-6.09	0.25
18	0.932	-0.61	3.39	2.18	63	0.297	-10.54	-6.54	0.22
19	0.924	-0.69	3.31	2.14	64	0.281	-11.03	-7.03	0.20
20	0.915	-0.77	3.23	2.10	65	0.265	-11.54	-7.54	0.18
21	0.905	-0.87	3.13	2.06	66	0.250	-12.04	-8.04	0.16
22	0.895	-0.96	3.04	2.01	67	0.235	-12.58	-8.58	0.14
23	0.885	-1.06	2.94	1.97	68	0.220	-13.15	-9.15	0.12
24	0.875	-1.16	2.84	1.92	69	0.205	-13.76	-9.76	0.11
25	0.865	-1.26	2.74	1.88	70	0.190	-14.42	-10.42	0.09
26	0.854	-1.38	2.62	1.83	71	0.177	-15.04	-11.04	0.08
27	0.842	-1.49	2.51	1.78	72	0.164	-15.70	-11.70	0.07
28	0.831	-1.61	2.39	1.73	73	0.151	-16.42	-12.42	0.06
29	0.819	-1.73	2.27	1.68	74	0.138	-17.20	-13.20	0.05
30	0.808	-1.86	2.14	1.64	75	0.125	-18.06	-14.06	0.04
31	0.795	-1.99	2.01	1.59	76	0.115	-18.79	-14.79	0.03
32	0.783	-2.13	1.87	1.54	77	0.105	-19.58	-15.58	0.03
33	0.770	-2.27	1.73	1.49	78	0.095	-20.45	-16.45	0.02
34	0.757	-2.41	1.59	1.44	79	0.085	-21.41	-17.41	0.02
35	0.745	-2.56	1.44	1.39	80	0.075	-22.50	-18.50	0.01
36	0.731	-2.72	1.28	1.34	81	0.071	-22.97	-18.97	0.01
37	0.717	-2.89	1.11	1.29	82	0.067	-23.48	-19.48	0.01
38	0.703	-3.06	0.94	1.24	83	0.063	-24.01	-20.01	0.01
39	0.689	-3.24	0.76	1.19	84	0.059	-24.58	-20.58	0.01
40	0.675	-3.41	0.59	1.14	85	0.055	-25.19	-21.19	0.01
41	0.659	-3.62	0.38	1.09	86	0.054	-25.35	-21.35	0.01
42	0.643	-3.84	0.16	1.04	87	0.053	-25.51	-21.51	0.01
43	0.627	-4.05	-0.05	0.99	88	0.052	-25.68	-21.68	0.01
44	0.611	-4.28	-0.28	0.94	89	0.051	-25.85	-21.85	0.01
					90	0.050	-26.02	-22.02	0.01

W228CX
Indianapolis, IN
Latitude: 39-40-06 N
Longitude: 086-01-44 W
ERP: 0.25 kW
HAAT: 210.48 m
Channel: 228
Frequency: 93.5 MHz
AMSL Height: 454.0 m
Elevation: 259.0 m
Horiz. Pattern: Directional
Vert. Pattern: No
Prop Model: None

WMXQ
Hartford City, IN
BLH20161110AAB
Latitude: 40-25-16 N
Longitude: 085-25-40 W
ERP: 3.40 kW
HAAT: 134.6 m
Channel: 228
Frequency: 93.5 MHz
AMSL Height: 408.0 m
Elevation: 277.0 m
Horiz. Pattern: Directional
Vert. Pattern: No
Prop Model: None

WKHY
Lafayette, IN
BLH20140819ABR
Latitude: 40-23-12 N
Longitude: 086-58-14 W
ERP: 6.00 kW
HAAT: 76.0 m
Channel: 228
Frequency: 93.5 MHz
AMSL Height: 273.0 m
Elevation: 184.0 m
Horiz. Pattern: Omni
Vert. Pattern: No
Prop Model: None

Exhibit 13-D Section 74.1204 Contour Protection
WMXQ Channel 228A Hartford City, Indiana
WKHY Channel 228A Lafayette, Indiana

