

### **Tabulation of Spacings for Commercial (Non-Reserved) Portion of Allocation**

REFERENCE		DISPLAY DATES
44 16 33.0 N.	CLASS = C3 Int = B1	DATA 05-14-12
85 42 48.0 W.	Current Spacings to 3rd Adj.	SEARCH 05-14-12
----- Channel 220 - 91.9 MHz -----		

Call	Channel	Location	Azi	Dist	FCC	Margin
WGCP	CP -N 220C3	Cadillac	MI 0.0	0.00	152.5	-152.5
10/14/2011: Accepted on channel 220-B1 (44-16-33 N, 85-42-48 W) by Industry Canada in 9/29/2011 letter. Note: not short-spaced.						
WGCP	LIC-Z 220A	Cadillac	MI 86.5	17.94	141.5	-123.6
WTWS	LIC-N 221A	Houghton Lake	MI 88.6	77.53	88.5	-11.0
WBNZ	LIC-Z 222C2	Frankfort	MI 316.5	51.48	55.5	-4.0
1224786	RSV-A 274A	Evart	MI 129.5	43.14	11.5	31.6
One Step Application						
AL5656	VAC 274A	Evart	MI 129.5	43.14	11.5	31.6
Drop In						
1222209	APP 274A	Evart	MI 129.5	43.14	11.5	31.6
One Step Application						
WGHN-FM	LIC 221A	Grand Haven	MI 197.6	141.95	88.5	53.5
WMOM	LIC 274A	Pentwater	MI 229.0	68.65	11.5	57.2
WFDX	LIC 223C1	Atlanta	MI 52.1	135.74	75.5	60.2
WLTU	LIC 221A	Manitowoc	WI 264.4	153.97	88.5	65.5
WLAW	LIC 223A	Newaygo	MI 188.5	108.53	41.5	67.0
AL4884	AL 221C	Sault Ste Marie	ON 22.9	281.22	194.5	86.7
SPEC. NEGTD SHORT-SPACED ALLOC. - LTD TO 100KW/300M OR EQUIV.						

All margins are shown with rounding included  
RSV-R = reserved - needs protection, RSV-A = allocation

Blue Text indicates the facility to be modified by this Form 340 filing.  
This facility need not be protected.

Yellow Highlighted Text indicates \$73.215 short-spaced contour protections toward WTWS(FM) - Houghton Lake, MI CH221A and WBNZ(FM) - Frankfort, MI CH222C2 as included in Exhibit(s) 20.2 and 20.3. As both WTWS(FM) and WBNZ(FM) are presently licensed under the provisions of \$73.215, protection has been afforded each facility at the present operating parameters.

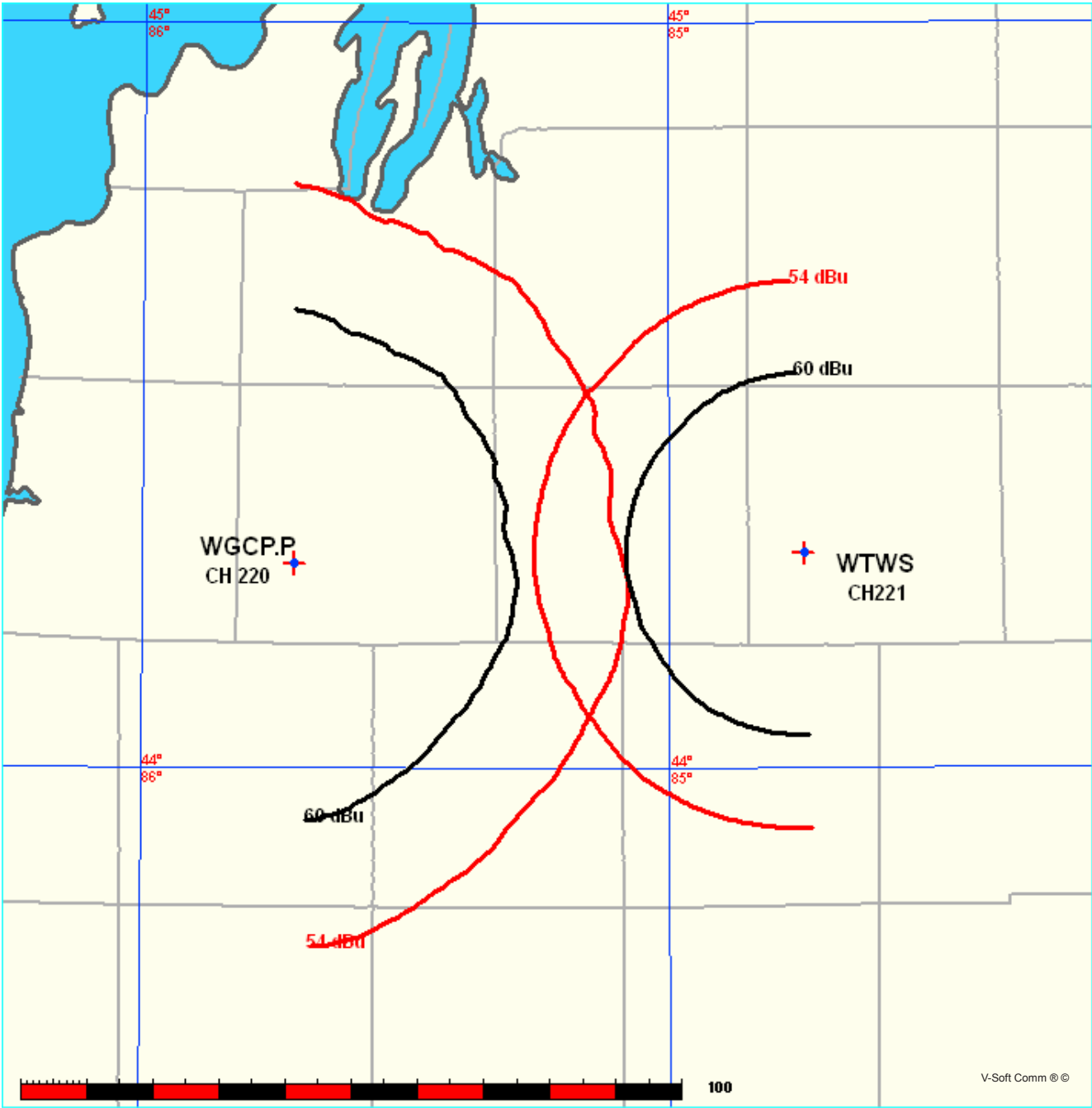
# Exhibit 20.2 - §73.215 Short-Spaced Contour Protection Study Toward WTWS(FM) - Houghton Lake, MI CH221A (Present Facilities)

West Central Michigan Media Ministries

FMCommander Single Allocation Study - 06-15-2012 - NED 03 SEC  
WGCP.P's Overlaps (In= 3.06 km, Out= 0.47 km)

WGCP.P CH 220 C3 73.215 N  
Lat= 44 16 33.0, Lng= 85 42 48.0  
2.65 kW 286.2 M HAAT, 634 M COR  
Prot.= 60 dBu, Intef.= 54 dBu

WTWS CH 221 A 73.215 N BLH20080919AFJ  
Lat= 44 17 21.0, Lng= 84 44 32.0  
0.92 kW 228 M HAAT, 576.7 M COR  
Prot.= 60 dBu, Intef.= 54 dBu



# Exhibit 20.2 - §73.215 Short-Spaced Contour Protection Study Toward WTWS(FM) - Houghton Lake, MI CH221A (Present Facilities)

06-15-2012

Terrain Data: NED 03 SEC

FMOver Analysis

WGCP.P

WTWS BLH20080919AFJ

Channel = 220C3  
Max ERP = 2.65 kW  
RCAMSL = 634 M  
N. Lat. 44 16 33.0  
W. Lng. 85 42 48.0  
Protected  
60 dBu

Channel = 221A  
Max ERP = 0.92 kW  
RCAMSL = 576.7 M  
N. Lat. 44 17 21.0  
W. Lng. 84 44 32.0  
Interfering  
54 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
045.0	002.6500	0237.1	035.0	294.2	000.9200	0230.7	057.4	47.16	
046.0	002.6500	0235.8	035.0	293.9	000.9200	0230.7	056.9	47.37	
047.0	002.6500	0232.1	034.7	293.4	000.9200	0230.7	056.4	47.56	
048.0	002.6500	0228.4	034.4	292.9	000.9200	0230.7	056.0	47.73	
049.0	002.6500	0225.7	034.2	292.5	000.9200	0230.7	055.5	47.91	
050.0	002.6500	0225.1	034.2	292.1	000.9200	0230.7	055.0	48.11	
051.0	002.6500	0224.0	034.1	291.7	000.9200	0230.9	054.5	48.31	
052.0	002.6500	0225.4	034.2	291.5	000.9200	0231.0	054.0	48.54	
053.0	002.6500	0225.8	034.3	291.2	000.9200	0231.0	053.4	48.75	
054.0	002.6500	0226.1	034.3	290.9	000.9200	0231.0	052.9	48.96	
055.0	002.6500	0225.1	034.2	290.4	000.9200	0231.0	052.5	49.14	
056.0	002.6500	0225.7	034.2	290.1	000.9200	0231.0	052.0	49.35	
057.0	002.6500	0225.3	034.2	289.7	000.9200	0230.9	051.5	49.53	
058.0	002.6500	0223.9	034.1	289.2	000.9200	0230.8	051.1	49.69	
059.0	002.6500	0222.9	034.0	288.7	000.9200	0230.6	050.7	49.84	
060.0	002.6500	0222.9	034.0	288.2	000.9200	0230.5	050.3	50.02	
061.0	002.6500	0224.2	034.1	287.8	000.9200	0230.6	049.8	50.22	
062.0	002.6500	0224.3	034.1	287.4	000.9200	0230.6	049.3	50.40	
063.0	002.6500	0223.6	034.1	286.8	000.9200	0230.5	049.0	50.55	
064.0	002.6500	0221.8	034.0	286.2	000.9200	0230.5	048.7	50.67	
065.0	002.6500	0216.2	033.5	285.3	000.9200	0230.5	048.6	50.69	
066.0	002.6500	0211.2	033.1	284.5	000.9200	0230.7	048.5	50.72	
067.0	002.6500	0207.7	032.8	283.8	000.9200	0230.7	048.4	50.77	
068.0	002.6500	0208.9	032.9	283.3	000.9200	0230.7	048.0	50.94	
069.0	002.6500	0211.4	033.1	282.9	000.9200	0230.8	047.5	51.14	
070.0	002.6500	0212.0	033.2	282.3	000.9200	0230.9	047.2	51.28	
071.0	002.6500	0211.4	033.2	281.7	000.9200	0231.0	046.9	51.40	
072.0	002.6500	0212.1	033.2	281.1	000.9200	0231.2	046.6	51.54	
073.0	002.6500	0213.1	033.3	280.5	000.9200	0231.4	046.2	51.69	
074.0	002.6500	0213.3	033.3	279.8	000.9200	0231.7	046.0	51.81	
075.0	002.6500	0212.5	033.2	279.2	000.9200	0231.9	045.8	51.90	
076.0	002.6500	0210.5	033.1	278.4	000.9200	0232.2	045.7	51.94	
077.0	002.6500	0208.1	032.9	277.6	000.9200	0232.5	045.7	51.96	
078.0	002.6500	0205.7	032.7	276.9	000.9200	0232.6	045.7	51.97	
079.0	002.6500	0203.3	032.5	276.1	000.9200	0232.5	045.7	51.96	

**Munn-Reese, Inc.**

Broadcast Engineering Consultants  
Coldwater, MI 49036

# Exhibit 20.2 - §73.215 Short-Spaced Contour Protection Study Toward WTWS(FM) - Houghton Lake, MI CH221A (Present Facilities)

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
080.0	002.6500	0201.3	032.3	275.4	000.9200	0232.4	045.7	51.95
081.0	002.6500	0200.1	032.2	274.7	000.9200	0232.5	045.7	51.97
082.0	002.6500	0199.9	032.2	274.0	000.9200	0232.8	045.6	52.03
083.0	002.6500	0200.4	032.2	273.3	000.9200	0233.0	045.4	52.09
084.0	002.6500	0201.7	032.4	272.6	000.9200	0233.2	045.2	52.19
085.0	002.6500	0203.5	032.5	271.9	000.9200	0233.3	045.0	52.29
086.0	002.6500	0205.9	032.7	271.2	000.9200	0233.5	044.8	52.40
087.0	002.6500	0208.3	032.9	270.5	000.9200	0233.5	044.5	52.50
088.0	002.6500	0210.5	033.1	269.8	000.9200	0233.6	044.3	52.59
089.0	002.6500	0211.8	033.2	269.0	000.9200	0233.6	044.2	52.63
090.0	002.6500	0214.3	033.4	268.3	000.9200	0233.6	044.0	52.71
091.0	002.6500	0216.1	033.5	267.5	000.9200	0233.5	043.9	52.76
092.0	002.6500	0217.8	033.7	266.7	000.9200	0233.4	043.8	52.79
093.0	002.6500	0219.5	033.8	265.9	000.9200	0233.4	043.8	52.81
094.0	002.6500	0220.6	033.9	265.2	000.9200	0233.3	043.8	52.81
095.0	002.6500	0221.4	033.9	264.4	000.9200	0233.5	043.8	52.80
096.0	002.6500	0221.9	034.0	263.6	000.9200	0233.4	043.9	52.75
097.0	002.6500	0222.2	034.0	262.9	000.9200	0232.9	044.0	52.68
098.0	002.6500	0221.8	034.0	262.1	000.9200	0232.5	044.2	52.59
099.0	002.6500	0221.3	033.9	261.4	000.9200	0232.3	044.4	52.49
100.0	002.6500	0221.4	033.9	260.7	000.9200	0231.7	044.6	52.38
101.0	002.6500	0221.3	033.9	260.0	000.9200	0231.5	044.8	52.28
102.0	002.6500	0221.7	034.0	259.3	000.9200	0231.0	045.0	52.18
103.0	002.6500	0222.4	034.0	258.5	000.9200	0230.6	045.2	52.08
104.0	002.6500	0222.8	034.0	257.8	000.9200	0230.4	045.5	51.97
105.0	002.6500	0223.3	034.1	257.2	000.9200	0230.1	045.7	51.85
106.0	002.6500	0223.3	034.1	256.5	000.9200	0229.5	046.0	51.71
107.0	002.6500	0223.0	034.0	255.9	000.9200	0228.9	046.3	51.55
108.0	002.6500	0223.4	034.1	255.3	000.9200	0228.2	046.6	51.40
109.0	002.6500	0223.0	034.0	254.7	000.9200	0227.9	047.0	51.24
110.0	002.6500	0222.5	034.0	254.1	000.9200	0227.9	047.3	51.09
111.0	002.6500	0221.5	033.9	253.6	000.9200	0228.1	047.8	50.92
112.0	002.6500	0220.4	033.9	253.1	000.9200	0228.4	048.2	50.76
113.0	002.6500	0218.6	033.7	252.7	000.9200	0228.4	048.7	50.57
114.0	002.6500	0217.1	033.6	252.2	000.9200	0228.4	049.2	50.38
115.0	002.6500	0216.6	033.6	251.8	000.9200	0229.1	049.6	50.23
116.0	002.6500	0216.9	033.6	251.3	000.9200	0229.7	050.0	50.10
117.0	002.6500	0216.9	033.6	250.8	000.9200	0230.1	050.4	49.94
118.0	002.6500	0216.9	033.6	250.4	000.9200	0230.2	050.8	49.77
119.0	002.6500	0216.5	033.6	250.0	000.9200	0230.7	051.3	49.61
120.0	002.6500	0217.3	033.6	249.5	000.9200	0231.1	051.7	49.46
121.0	002.6500	0217.1	033.6	249.1	000.9200	0231.2	052.2	49.27
122.0	002.6500	0217.2	033.6	248.7	000.9200	0231.6	052.6	49.10
123.0	002.6500	0218.4	033.7	248.3	000.9200	0232.0	053.1	48.94
124.0	002.6500	0219.8	033.8	247.8	000.9200	0232.3	053.5	48.78
125.0	002.6500	0218.1	033.7	247.6	000.9200	0232.4	054.1	48.56

# Exhibit 20.2 - §73.215 Short-Spaced Contour Protection Study Toward WTWS(FM) - Houghton Lake, MI CH221A (Present Facilities)

06-15-2012

Terrain Data: NED 03 SEC

FMOver Analysis

WTWS BLH20080919AFJ

WGCP.P

Channel = 221A  
Max ERP = 0.92 kW  
RCAMSL = 576.7 M  
N. Lat. 44 17 21.0  
W. Lng. 84 44 32.0  
Protected  
60 dBu

Channel = 220C3  
Max ERP = 2.65 kW  
RCAMSL = 634 M  
N. Lat. 44 16 33.0  
W. Lng. 85 42 48.0  
Interfering  
54 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
224.0	000.9200	0236.1	027.3	107.0	002.6500	0223.0	061.2	49.99	
225.0	000.9200	0235.6	027.3	106.8	002.6500	0222.9	060.8	50.13	
226.0	000.9200	0234.7	027.2	106.5	002.6500	0222.9	060.5	50.28	
227.0	000.9200	0233.8	027.2	106.2	002.6500	0223.1	060.1	50.43	
228.0	000.9200	0232.8	027.1	106.0	002.6500	0223.3	059.7	50.58	
229.0	000.9200	0231.7	027.1	105.7	002.6500	0223.5	059.3	50.73	
230.0	000.9200	0231.6	027.0	105.4	002.6500	0223.4	058.9	50.87	
231.0	000.9200	0230.4	027.0	105.1	002.6500	0223.3	058.6	51.00	
232.0	000.9200	0229.7	026.9	104.8	002.6500	0223.3	058.2	51.14	
233.0	000.9200	0229.4	026.9	104.5	002.6500	0223.2	057.9	51.28	
234.0	000.9200	0230.8	027.0	104.3	002.6500	0223.1	057.4	51.44	
235.0	000.9200	0231.1	027.0	104.0	002.6500	0222.8	057.1	51.57	
236.0	000.9200	0230.7	027.0	103.7	002.6500	0222.7	056.7	51.70	
237.0	000.9200	0229.7	026.9	103.3	002.6500	0222.5	056.4	51.81	
238.0	000.9200	0229.1	026.9	102.9	002.6500	0222.3	056.1	51.93	
239.0	000.9200	0228.1	026.9	102.6	002.6500	0222.0	055.8	52.03	
240.0	000.9200	0227.8	026.8	102.2	002.6500	0221.8	055.5	52.15	
241.0	000.9200	0228.0	026.8	101.8	002.6500	0221.6	055.2	52.27	
242.0	000.9200	0229.4	026.9	101.5	002.6500	0221.4	054.8	52.40	
243.0	000.9200	0231.3	027.0	101.2	002.6500	0221.3	054.4	52.55	
244.0	000.9200	0231.3	027.0	100.8	002.6500	0221.3	054.1	52.67	
245.0	000.9200	0232.2	027.1	100.4	002.6500	0221.3	053.8	52.79	
246.0	000.9200	0232.5	027.1	100.0	002.6500	0221.4	053.5	52.91	
247.0	000.9200	0232.5	027.1	099.6	002.6500	0221.4	053.3	53.02	
248.0	000.9200	0232.2	027.1	099.2	002.6500	0221.3	053.0	53.11	
249.0	000.9200	0231.3	027.0	098.7	002.6500	0221.4	052.8	53.20	
250.0	000.9200	0230.7	027.0	098.2	002.6500	0221.7	052.6	53.29	
251.0	000.9200	0230.1	027.0	097.8	002.6500	0221.9	052.4	53.38	
252.0	000.9200	0228.7	026.9	097.3	002.6500	0222.1	052.3	53.44	
253.0	000.9200	0228.4	026.9	096.8	002.6500	0222.3	052.1	53.52	
254.0	000.9200	0227.9	026.8	096.3	002.6500	0222.1	052.0	53.58	
255.0	000.9200	0228.0	026.8	095.8	002.6500	0221.9	051.8	53.64	
256.0	000.9200	0229.0	026.9	095.4	002.6500	0221.5	051.6	53.71	

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Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
257.0	000.9200	0229.9	027.0	094.9	002.6500	0221.4	051.4	53.79
258.0	000.9200	0230.4	027.0	094.4	002.6500	0221.0	051.2	53.84
259.0	000.9200	0230.8	027.0	093.9	002.6500	0220.5	051.0	53.88
260.0	000.9200	0231.5	027.0	093.4	002.6500	0220.1	050.9	53.93
261.0	000.9200	0231.9	027.1	092.9	002.6500	0219.3	050.7	53.95
262.0	000.9200	0232.5	027.1	092.4	002.6500	0218.3	050.6	53.95
263.0	000.9200	0232.9	027.1	091.9	002.6500	0217.6	050.5	53.96
264.0	000.9200	0233.5	027.2	091.3	002.6500	0216.7	050.4	53.97
265.0	000.9200	0233.4	027.2	090.8	002.6500	0215.7	050.3	53.94
266.0	000.9200	0233.4	027.2	090.2	002.6500	0214.8	050.3	53.92
267.0	000.9200	0233.4	027.2	089.7	002.6500	0213.5	050.3	53.87
268.0	000.9200	0233.5	027.2	089.2	002.6500	0212.2	050.2	53.82
269.0	000.9200	0233.6	027.2	088.6	002.6500	0211.2	050.2	53.78
270.0	000.9200	0233.5	027.2	088.1	002.6500	0210.6	050.2	53.75
271.0	000.9200	0233.5	027.2	087.5	002.6500	0209.6	050.3	53.70
272.0	000.9200	0233.3	027.1	087.0	002.6500	0208.3	050.3	53.63
273.0	000.9200	0233.1	027.1	086.5	002.6500	0207.0	050.4	53.54
274.0	000.9200	0232.8	027.1	085.9	002.6500	0205.7	050.4	53.46
275.0	000.9200	0232.5	027.1	085.4	002.6500	0204.4	050.5	53.36
276.0	000.9200	0232.5	027.1	084.9	002.6500	0203.3	050.6	53.28
277.0	000.9200	0232.6	027.1	084.4	002.6500	0202.3	050.7	53.20
278.0	000.9200	0232.3	027.1	083.8	002.6500	0201.5	050.8	53.12
279.0	000.9200	0232.0	027.1	083.3	002.6500	0200.8	050.9	53.03
280.0	000.9200	0231.6	027.1	082.8	002.6500	0200.2	051.1	52.94
281.0	000.9200	0231.2	027.0	082.3	002.6500	0199.9	051.2	52.87
282.0	000.9200	0230.9	027.0	081.8	002.6500	0199.9	051.4	52.80
283.0	000.9200	0230.8	027.0	081.3	002.6500	0200.0	051.6	52.74
284.0	000.9200	0230.7	027.0	080.9	002.6500	0200.1	051.8	52.67
285.0	000.9200	0230.6	027.0	080.4	002.6500	0200.6	052.0	52.62
286.0	000.9200	0230.5	027.0	079.9	002.6500	0201.4	052.2	52.58
287.0	000.9200	0230.6	027.0	079.5	002.6500	0202.1	052.4	52.53
288.0	000.9200	0230.6	027.0	079.0	002.6500	0203.3	052.6	52.50
289.0	000.9200	0230.7	027.0	078.5	002.6500	0204.5	052.8	52.47
290.0	000.9200	0230.9	027.0	078.1	002.6500	0205.5	053.0	52.42
291.0	000.9200	0231.0	027.0	077.7	002.6500	0206.5	053.3	52.37
292.0	000.9200	0230.8	027.0	077.3	002.6500	0207.6	053.5	52.31
293.0	000.9200	0230.7	027.0	076.8	002.6500	0208.4	053.8	52.24
294.0	000.9200	0230.7	027.0	076.4	002.6500	0209.5	054.1	52.18
295.0	000.9200	0230.7	027.0	076.0	002.6500	0210.4	054.4	52.10
296.0	000.9200	0230.6	027.0	075.7	002.6500	0211.4	054.7	52.03
297.0	000.9200	0230.4	027.0	075.3	002.6500	0212.1	055.0	51.94
298.0	000.9200	0230.1	027.0	074.9	002.6500	0212.6	055.3	51.83
299.0	000.9200	0230.1	027.0	074.6	002.6500	0213.0	055.6	51.72
300.0	000.9200	0229.9	027.0	074.3	002.6500	0213.3	056.0	51.60
301.0	000.9200	0229.7	026.9	073.9	002.6500	0213.3	056.3	51.47
302.0	000.9200	0229.3	026.9	073.6	002.6500	0213.3	056.7	51.33
303.0	000.9200	0228.8	026.9	073.3	002.6500	0213.3	057.1	51.19
304.0	000.9200	0228.3	026.9	073.1	002.6500	0213.2	057.4	51.03

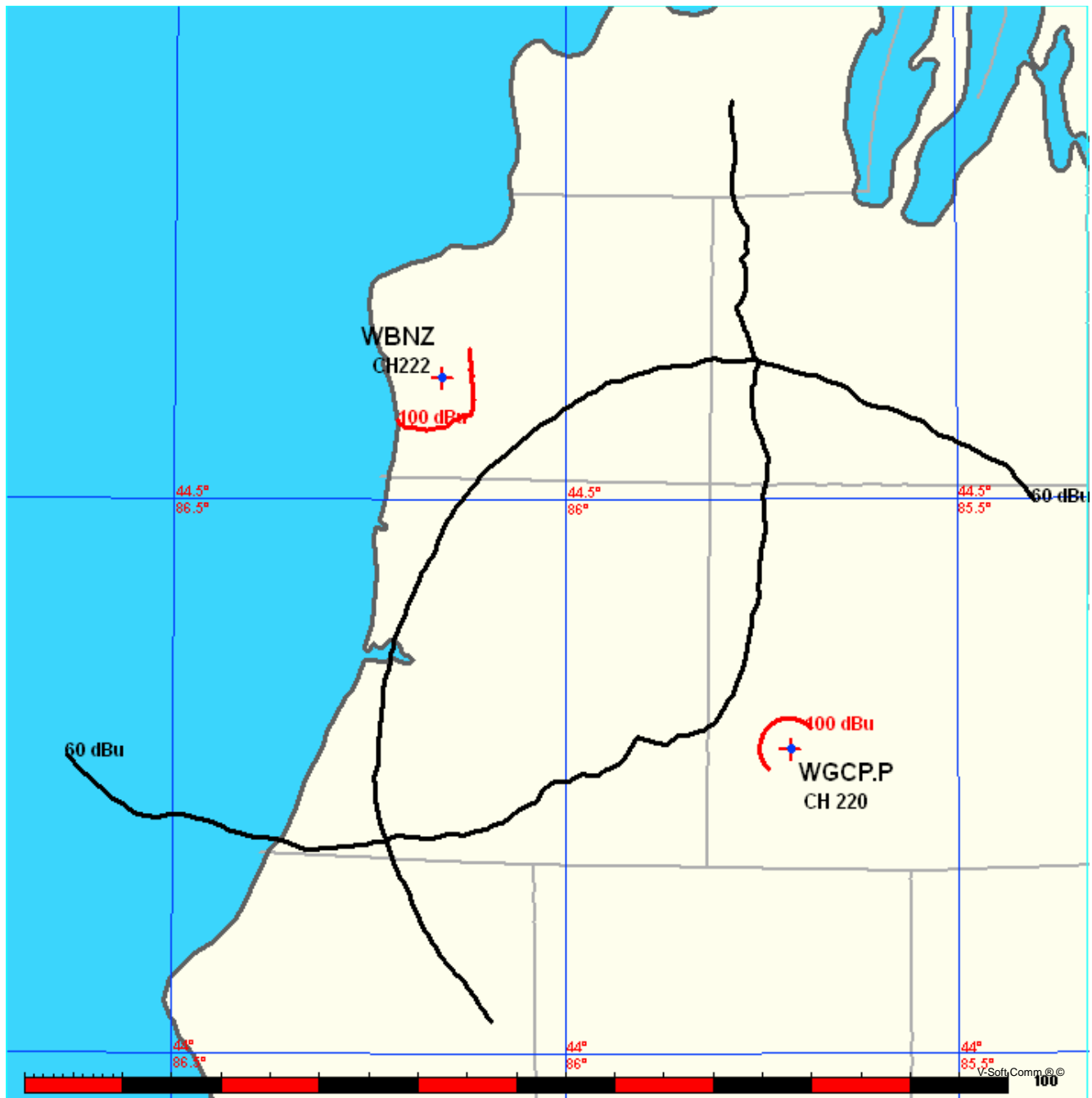
## Exhibit 20.3 - §73.215 Short-Spaced Contour Protection Study Toward WBNZ(FM) - Frankfort, MI - CH222C2 (Present Facilities)

West Central Michigan Media Ministries

FMCommander Single Allocation Study - 06-15-2012 - NED 03 SEC  
WGCP.P's Overlaps (In= 5.62 km, Out= 5.05 km)

WGCP.P CH 220 C3 73.215 N  
Lat= 44 16 33.0, Lng= 85 42 48.0  
2.65 kW 286.2 M HAAT, 634 M COR  
Prot.= 60 dBu, Intef.= 100 dBu

WBNZ CH 222 C2 73.215 Z BLH20110224AAK  
Lat= 44 36 38.0, Lng= 86 09 38.0  
50.0 kW 136 M HAAT, 346 M COR  
Prot.= 60 dBu, Intef.= 100 dBu



**Munn-Reese, Inc.**

Broadcast Engineering Consultants  
Coldwater, MI 49036

# Exhibit 20.3 - §73.215 Short-Spaced Contour Protection Study Toward WBNZ(FM) - Frankfort, MI - CH222C2 (Present Facilities)

06-15-2012

Terrain Data: NED 03 SEC

FMOver Analysis

WGCP.P

WBNZ BLH20110224AAK

Channel = 220C3  
Max ERP = 2.65 kW  
RCAMSL = 634 M  
N. Lat. 44 16 33.0  
W. Lng. 85 42 48.0  
Protected  
60 dBu

Channel = 222C2  
Max ERP = 50 kW  
RCAMSL = 346 M  
N. Lat. 44 36 38.0  
W. Lng. 86 09 38.0  
Interfering  
100 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
272.0	002.6500	0356.6	041.9	189.9	050.0000	0117.4	036.3	67.72	
273.0	002.6500	0355.5	041.8	190.0	050.0000	0117.5	035.6	68.07	
274.0	002.6500	0354.8	041.8	190.0	050.0000	0117.6	034.8	68.42	
275.0	002.6500	0354.6	041.8	190.1	050.0000	0117.8	034.1	68.78	
276.0	002.6500	0354.6	041.8	190.3	050.0000	0117.8	033.4	69.14	
277.0	002.6500	0356.3	041.9	190.5	050.0000	0117.9	032.7	69.50	
278.0	002.6500	0355.9	041.8	190.5	050.0000	0118.0	031.9	69.86	
279.0	002.6500	0357.4	041.9	190.7	050.0000	0118.4	031.2	70.26	
280.0	002.6500	0355.6	041.8	190.6	050.0000	0118.0	030.5	70.63	
281.0	002.6500	0352.6	041.7	190.3	050.0000	0117.9	029.7	71.03	
282.0	002.6500	0352.8	041.7	190.3	050.0000	0117.9	029.0	71.46	
283.0	002.6500	0353.9	041.7	190.3	050.0000	0117.9	028.3	71.90	
284.0	002.6500	0353.1	041.7	190.2	050.0000	0117.8	027.6	72.35	
285.0	002.6500	0354.3	041.7	190.2	050.0000	0117.9	026.8	72.83	
286.0	002.6500	0353.1	041.7	189.9	050.0000	0117.4	026.1	73.27	
287.0	002.6500	0350.7	041.6	189.4	050.0000	0117.5	025.4	73.76	
288.0	002.6500	0349.8	041.5	189.1	050.0000	0116.5	024.7	74.19	
289.0	002.6500	0349.1	041.5	188.7	050.0000	0115.3	024.0	74.61	
290.0	002.6500	0348.8	041.5	188.4	050.0000	0114.1	023.3	75.04	
291.0	002.6500	0348.7	041.5	188.0	050.0000	0113.4	022.6	75.50	
292.0	002.6500	0347.0	041.4	187.3	050.0000	0113.3	021.9	76.02	
293.0	002.6500	0347.4	041.4	186.9	050.0000	0112.8	021.2	76.52	
294.0	002.6500	0346.8	041.4	186.2	050.0000	0110.1	020.5	76.84	
295.0	002.6500	0349.4	041.5	185.9	050.0000	0109.3	019.8	77.35	
296.0	002.6500	0347.5	041.4	184.9	050.0000	0108.4	019.1	77.79	
297.0	002.6500	0346.0	041.3	183.9	050.0000	0108.6	018.5	78.32	
298.0	002.6500	0343.9	041.2	182.6	050.0000	0108.4	017.9	78.81	
299.0	002.6500	0343.2	041.2	181.5	050.0000	0109.0	017.3	79.37	
300.0	002.6500	0347.2	041.4	181.0	050.0000	0108.8	016.5	79.97	
301.0	002.6500	0349.4	041.5	180.1	050.0000	0107.7	015.8	80.46	
302.0	002.6500	0350.8	041.6	178.9	050.0000	0106.4	015.2	80.90	
303.0	002.6500	0351.3	041.6	177.4	050.0000	0106.8	014.6	81.44	
304.0	002.6500	0352.7	041.7	175.9	050.0000	0105.9	013.9	82.10	
305.0	002.6500	0352.5	041.7	173.9	050.0000	0105.0	013.4	82.73	
306.0	002.6500	0352.2	041.6	171.7	050.0000	0101.4	012.9	83.13	
307.0	002.6500	0352.2	041.6	169.4	050.0000	0096.4	012.4	83.42	

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Coldwater, MI 49036



## Exhibit 20.3 - §73.215 Short-Spaced Contour Protection Study Toward WBNZ(FM) - Frankfort, MI - CH222C2 (Present Facilities)

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
308.0	002.6500	0351.7	041.6	166.7	050.0000	0092.9	011.9	83.77
309.0	002.6500	0351.3	041.6	163.8	050.0000	0086.2	011.5	83.78
310.0	002.6500	0352.7	041.7	160.9	050.0000	0087.2	011.0	84.63
311.0	002.6500	0354.6	041.8	157.8	050.0000	0090.9	010.6	85.71
312.0	002.6500	0352.4	041.6	153.9	050.0000	0088.5	010.4	85.82
313.0	002.6500	0350.5	041.6	149.9	049.9100	0085.6	010.2	85.79
314.0	002.6500	0349.0	041.5	145.9	043.6455	0098.6	010.1	86.60
315.0	002.6500	0345.9	041.3	141.7	037.6465	0113.3	010.2	87.06
316.0	002.6500	0344.7	041.2	137.7	032.2168	0116.9	010.2	86.63
317.0	002.6500	0342.5	041.1	133.7	027.2855	0117.6	010.3	85.73
318.0	002.6500	0341.7	041.1	129.8	022.8981	0117.5	010.4	84.78
319.0	002.6500	0341.9	041.1	125.9	019.5614	0116.3	010.5	83.79
320.0	002.6500	0343.0	041.1	122.1	016.5148	0117.6	010.7	82.93
321.0	002.6500	0342.9	041.1	118.5	014.2089	0117.1	010.9	81.82
322.0	002.6500	0343.3	041.2	115.1	012.5469	0120.1	011.2	81.04
323.0	002.6500	0340.8	041.0	112.3	011.2538	0119.5	011.7	79.80
324.0	002.6500	0338.7	040.9	109.7	010.2006	0120.4	012.1	78.71
325.0	002.6500	0340.5	041.0	106.7	009.6722	0122.7	012.5	78.14
326.0	002.6500	0340.1	041.0	104.3	009.2545	0124.0	013.0	77.38
327.0	002.6500	0339.4	041.0	102.2	008.8887	0120.1	013.5	76.26
328.0	002.6500	0339.9	041.0	100.0	008.5293	0116.0	014.0	75.17
329.0	002.6500	0339.5	041.0	098.2	008.4914	0112.0	014.5	74.20
330.0	002.6500	0339.5	041.0	096.5	008.4563	0109.9	015.1	73.55
331.0	002.6500	0337.8	040.9	095.2	008.4304	0109.0	015.7	72.93
332.0	002.6500	0338.1	040.9	093.8	008.4008	0108.1	016.3	72.35
333.0	002.6500	0340.9	041.0	092.1	008.3657	0108.0	016.8	71.88
334.0	002.6500	0338.0	040.9	091.4	008.3518	0109.2	017.5	71.39
335.0	002.6500	0334.2	040.7	091.0	008.3431	0110.1	018.3	70.86
336.0	002.6500	0333.8	040.6	090.1	008.3253	0110.0	018.9	70.31
337.0	002.6500	0332.9	040.6	089.4	008.3256	0110.5	019.6	69.82
338.0	002.6500	0331.4	040.5	088.9	008.3278	0110.8	020.3	69.30
339.0	002.6500	0330.0	040.4	088.4	008.3298	0112.2	021.0	68.87
340.0	002.6500	0329.0	040.4	087.9	008.3317	0112.8	021.6	68.39
341.0	002.6500	0327.7	040.3	087.5	008.3333	0112.9	022.3	67.87
342.0	002.6500	0324.4	040.1	087.5	008.3335	0112.9	023.0	67.33
343.0	002.6500	0322.7	040.0	087.3	008.3344	0112.7	023.7	66.80
344.0	002.6500	0319.2	039.8	087.3	008.3342	0112.8	024.5	66.28
345.0	002.6500	0316.2	039.7	087.3	008.3342	0112.8	025.2	65.78
346.0	002.6500	0316.2	039.7	087.0	008.3355	0112.4	025.9	65.29
347.0	002.6500	0317.4	039.7	086.6	008.3372	0111.8	026.5	64.80
348.0	002.6500	0318.3	039.8	086.2	008.3386	0110.8	027.2	64.27
349.0	002.6500	0317.3	039.7	086.1	008.3390	0110.5	027.9	63.80
350.0	002.6500	0311.0	039.4	086.7	008.3368	0112.1	028.6	63.48
351.0	002.6500	0308.2	039.2	086.8	008.3362	0112.3	029.3	63.08
352.0	002.6500	0306.9	039.2	086.8	008.3361	0112.3	030.0	62.69
353.0	002.6500	0304.6	039.0	087.0	008.3356	0112.4	030.7	62.31
354.0	002.6500	0305.3	039.1	086.8	008.3362	0112.3	031.4	61.95
355.0	002.6500	0304.6	039.0	086.8	008.3362	0112.3	032.0	61.60

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Coldwater, MI 49036

# Exhibit 20.3 - §73.215 Short-Spaced Contour Protection Study Toward WBNZ(FM) - Frankfort, MI - CH222C2 (Present Facilities)

06-15-2012

Terrain Data: NED 03 SEC

FMOver Analysis

WBNZ BLH20110224AAK

WGCP.P

Channel = 222C2

Max ERP = 50 kW

RCAMSL = 346 M

N. Lat. 44 36 38.0

W. Lng. 86 09 38.0

Protected

60 dBu

Channel = 220C3

Max ERP = 2.65 kW

RCAMSL = 634 M

N. Lat. 44 16 33.0

W. Lng. 85 42 48.0

Interfering

100 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
091.0	008.3436	0110.1	032.0	354.4	002.6500	0306.1	036.8	62.92	
092.0	008.3640	0108.1	031.7	353.9	002.6500	0304.9	036.3	63.13	
093.0	008.3845	0107.9	031.7	353.7	002.6500	0304.5	035.8	63.38	
094.0	008.4050	0108.3	031.8	353.7	002.6500	0304.5	035.2	63.64	
095.0	008.4255	0108.8	031.9	353.6	002.6500	0304.4	034.7	63.91	
096.0	008.4460	0109.5	032.0	353.6	002.6500	0304.4	034.1	64.19	
097.0	008.4666	0110.4	032.1	353.6	002.6500	0304.5	033.5	64.47	
098.0	008.4872	0111.8	032.3	353.8	002.6500	0304.7	032.9	64.77	
099.0	008.5078	0113.3	032.6	353.9	002.6500	0305.0	032.3	65.08	
100.0	008.5284	0116.0	032.9	354.3	002.6500	0306.1	031.7	65.44	
101.0	008.6944	0118.2	033.4	354.7	002.6500	0305.3	031.0	65.78	
102.0	008.8621	0119.8	033.7	355.0	002.6500	0304.4	030.3	66.11	
103.0	009.0312	0122.1	034.1	355.4	002.6500	0302.1	029.6	66.44	
104.0	009.2020	0123.8	034.5	355.7	002.6500	0300.1	028.9	66.79	
105.0	009.3744	0122.6	034.5	355.4	002.6500	0302.7	028.4	67.22	
106.0	009.5485	0122.6	034.6	355.2	002.6500	0303.6	027.8	67.63	
107.0	009.7241	0122.5	034.8	355.0	002.6500	0304.6	027.1	68.05	
108.0	009.9012	0122.1	034.9	354.7	002.6500	0305.4	026.6	68.47	
109.0	010.0801	0121.3	034.9	354.2	002.6500	0306.0	026.0	68.88	
110.0	010.2605	0120.0	034.9	353.6	002.6500	0304.4	025.4	69.21	
111.0	010.6907	0119.8	035.2	353.6	002.6500	0304.3	024.7	69.70	
112.0	011.1298	0119.7	035.5	353.5	002.6500	0304.2	024.1	70.19	
113.0	011.5777	0120.1	035.9	353.6	002.6500	0304.3	023.3	70.72	
114.0	012.0344	0120.0	036.2	353.4	002.6500	0304.1	022.6	71.24	
115.0	012.5000	0120.1	036.5	353.3	002.6500	0304.2	021.9	71.78	
116.0	012.9744	0119.7	036.7	352.9	002.6500	0304.8	021.3	72.31	
117.0	013.4577	0118.4	036.8	352.2	002.6500	0306.3	020.7	72.83	
118.0	013.9498	0117.1	037.0	351.4	002.6500	0307.8	020.1	73.34	
119.0	014.4507	0117.2	037.3	351.0	002.6500	0308.3	019.4	73.91	
120.0	014.9604	0117.4	037.6	350.4	002.6500	0309.9	018.7	74.51	
121.0	015.6968	0117.1	037.9	349.9	002.6500	0311.3	018.0	75.14	
122.0	016.4508	0117.7	038.3	349.5	002.6500	0313.0	017.2	75.85	
123.0	017.2226	0116.5	038.6	348.5	002.6500	0318.4	016.5	76.51	

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Broadcast Engineering Consultants  
Coldwater, MI 49036

## Exhibit 20.3 - §73.215 Short-Spaced Contour Protection Study Toward WBNZ(FM) - Frankfort, MI - CH222C2 (Present Facilities)

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
124.0	018.0120	0117.9	039.1	348.1	002.6500	0318.4	015.7	77.23
125.0	018.8191	0117.4	039.4	347.0	002.6500	0317.3	015.0	77.76
126.0	019.6439	0116.0	039.6	345.3	002.6500	0315.9	014.4	78.40
127.0	020.4864	0114.9	039.7	343.6	002.6500	0321.6	013.9	79.27
128.0	021.3466	0115.9	040.2	342.3	002.6500	0323.7	013.1	80.38
129.0	022.2244	0116.7	040.6	340.7	002.6500	0328.4	012.3	81.57
130.0	023.1200	0117.3	041.0	338.7	002.6500	0330.8	011.6	82.67
131.0	024.2208	0117.2	041.4	336.3	002.6500	0333.2	011.0	83.74
132.0	025.3472	0117.9	041.9	333.7	002.6500	0339.2	010.3	85.00
133.0	026.4992	0117.9	042.2	330.4	002.6500	0338.6	009.7	85.93
134.0	027.6768	0117.7	042.6	326.5	002.6500	0339.3	009.2	86.78
135.0	028.8800	0118.1	043.0	322.2	002.6500	0342.9	008.6	87.71
136.0	030.1088	0117.5	043.2	317.3	002.6500	0341.8	008.3	88.22
137.0	031.3632	0118.0	043.6	311.8	002.6500	0352.6	007.9	89.04
138.0	032.6432	0116.4	043.8	306.2	002.6500	0352.5	007.9	89.04
139.0	033.9488	0115.5	044.0	300.5	002.6500	0349.0	007.9	88.96
140.0	035.2800	0115.6	044.3	294.4	002.6500	0347.0	007.9	88.98
141.0	036.6368	0115.0	044.5	288.7	002.6500	0349.2	008.1	88.74
142.0	038.0192	0112.4	044.5	284.6	002.6500	0354.2	008.6	88.00
143.0	039.4272	0109.8	044.4	281.2	002.6500	0352.2	009.1	87.05
144.0	040.8608	0106.1	044.1	278.9	002.6500	0357.3	009.9	85.99
145.0	042.3200	0102.8	043.8	277.1	002.6500	0356.3	010.6	84.83
146.0	043.8048	0098.1	043.3	276.4	002.6500	0355.6	011.5	83.44
147.0	045.3152	0097.1	043.4	273.8	002.6500	0354.9	012.0	82.65
148.0	046.8512	0095.5	043.4	271.8	002.6500	0357.0	012.7	81.81
149.0	048.4128	0090.7	042.8	272.2	002.6500	0356.3	013.6	80.48
150.0	050.0000	0085.3	042.0	273.2	002.6500	0355.3	014.7	79.14
151.0	050.0000	0081.6	041.3	274.1	002.6500	0354.8	015.7	78.14
152.0	050.0000	0083.5	041.7	271.5	002.6500	0357.6	016.1	77.86
153.0	050.0000	0086.4	042.2	268.5	002.6500	0356.7	016.5	77.52
154.0	050.0000	0088.8	042.7	266.1	002.6500	0367.7	017.0	77.38
155.0	050.0000	0089.7	042.9	264.7	002.6500	0368.8	017.6	76.89
156.0	050.0000	0089.6	042.9	263.9	002.6500	0369.6	018.3	76.33
157.0	050.0000	0089.6	042.8	263.3	002.6500	0370.4	019.0	75.77
158.0	050.0000	0090.8	043.1	262.1	002.6500	0370.1	019.7	75.23
159.0	050.0000	0089.4	042.8	262.3	002.6500	0370.0	020.5	74.61
160.0	050.0000	0086.7	042.3	263.2	002.6500	0370.4	021.3	73.96
161.0	050.0000	0087.4	042.4	262.5	002.6500	0369.9	022.0	73.42
162.0	050.0000	0088.6	042.7	261.6	002.6500	0369.4	022.7	72.89
163.0	050.0000	0086.9	042.3	262.1	002.6500	0370.1	023.5	72.33
164.0	050.0000	0086.4	042.2	262.0	002.6500	0370.1	024.2	71.80
165.0	050.0000	0087.4	042.4	261.4	002.6500	0369.3	025.0	71.28
166.0	050.0000	0089.9	042.9	260.1	002.6500	0368.4	025.6	70.77
167.0	050.0000	0093.8	043.6	258.5	002.6500	0365.2	026.4	70.20
168.0	050.0000	0094.5	043.8	258.1	002.6500	0364.1	027.1	69.67
169.0	050.0000	0095.8	044.0	257.7	002.6500	0363.1	027.9	69.16
170.0	050.0000	0097.6	044.3	257.1	002.6500	0361.8	028.7	68.64