

Technical Report Supporting a Minor Modification of a Licensed FM Translator

Pursuant to 47 C.F.R. Section 74:

for

*W225CS.L – Columbus, OH
(Facility ID: 142648)*

*Change in Site Locations,
Increase in Antenna COR Height
and New Directional Antenna Pattern.*

*as a
Commercial, Fill-In
AM Translator for
WWCD(AM) – Columbus, OH*

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EXPLANATION OF PROPOSAL: This LMS filing and accompanying technical report supports a Minor Modification of a Licensed Facility (Construction Permit Application) for FM Translator W225CS.L – Columbus, OH (Facility ID: 142648). A change in site locations, increase in antenna COR height and new directional antenna pattern are proposed. Continued operation on the present frequency of CH225D (92.9 MHz) with a directional power of 0.250 kW ERP circular polarization (H&V) is requested. The FM Translator will operate from a COR of 407.4 meters AMSL at the new site location. This filing specifies continued rebroadcast of Class B, AM Primary Station WWCD(AM) – Columbus, OH (1580 kHz); Facility ID No. 22341. The Translator will specify continued service to the community of Columbus, OH.

FACILITY COMPLIANCE SHOWINGS: The proposed Translator remains in compliance with 47 C.F.R. Section 74.1232 as noted herein. A map of the proposed 60 dBμ service contour in relation to the present 60 dBμ service contour has been included in **Exhibit 1**. The minor change proposed service area will overlap a portion of the presently licensed service area as noted in the exhibit. The proposed 60 dBμ contour of the Translator lies wholly inside the larger of the AM primary daytime 2.0 mV/m contour or a 25 mile radius around the AM site. The primary station service contour relationship has been plotted in **Exhibit 2**. Regarding permission to retransmit; both the Primary Station and Translator are under common control of ICS Communications, Inc.; therefore, permission to rebroadcast is implied.

The proposed facility will be located on the tower bearing Antenna Structure Registration Number 1020488. In support of this filing, a copy of the ASRN has been included in **Exhibit 3**. A depiction of the tower and antenna configuration has been included in **Exhibit 4**. Further notification to the FAA or ASR governing authorities is not required as this proposal will not increase the overall tower height.

The applicant would like to note use of the FCC 30 second terrain database for all allocation, contour and HAAT showings contained herein. A copy of the proposed HAAT calculation, demonstrating compliance with 47 C.F.R. Section 74.1235, has been included in **Exhibit 5**.

The applicant certifies compliance with 47 C.F.R. Section 74.1234 regarding access to the transmitter site, at all hours and in all seasons; and/or providing means to turn on and off, at will, the transmitting apparatus from a point which is readily accessible at all hours and in all seasons. In addition, the transmitter is equipped with suitable automatic circuits which will place it in a non-radiating condition in the absence of a signal on the input channel; with the transmitting apparatus adequately protected against tampering by unauthorized persons.

ALLOCATION COMPLIANCE SHOWINGS: The proposed Translator remains in compliance with 47 C.F.R. Section 74.1204 & 74.1205 toward all allocation protection concerns with the exception of WCOL-FM – Columbus, OH (CH222B) and WODC(FM) – Ashville, OH (CH227B). A general allocation study for this proposal is found in **Exhibit 6**. There are four (4) additional facilities, existing or proposed, close enough to merit further study. Therefore, a supplemental contour protection study has been provided toward each facility as included in **Exhibit(s) 7(a-d)**.

The applicant would like to note the existence of a 47 C.F.R. Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Request toward WCOL-FM – Columbus, OH (CH222B) and WODC(FM) – Ashville, OH (CH227B) as noted in **Exhibit 8**. Protection of the worst case calculated 131.8 dBμ F(50:10) Interference Contour, corresponding to the worst case calculated 91.8 dBμ F(50:50) Protected Contour, has been demonstrated through a downward radiation study. Full protection will be afforded all concerns as this area will not reach the ground nor a 158.7 meter artificial plane representing the highest unoccupied floor of the building mounted operation when taking into account the downward radiation characteristics of the antenna as supplied by the antenna manufacturer. A copy of the manufacturer's antenna specifications has been included in **Exhibit 9**.

Regarding protection of international concerns, the facility is and will remain within 320 km from the common border between the United States and Canada. However full protection will be afforded all Canadian concerns as noted in **Exhibit 6**.

ENVIRONMENTAL COMPLIANCE SHOWINGS: The proposed facility complies with the maximum permissible radiofrequency electromagnetic exposure limits for controlled and uncontrolled environments as set forth under §1.1310 and/or §1.1307(b)(3) of the Commission's rules and the RF radiation protection guidelines as set forth in OET Bulletin No. 65 (Edition 97-01), and the accompanying Supplement A, (Edition 97-01). Compliance has been demonstrated in the attached **RF Appendix 1** of this filing. The facility is, or will be, properly marked with signs. Entry is, or will be, restricted by means of fencing, locked doors or gates. In addition, coordination with other users of the site will be secured to reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic fields in excess of FCC guidelines.

Regarding compliance with the NEPA, Nationwide Programmatic Agreement and NHPA Section 106 for tower co-location, compliance with the Agreement is not required where no new tower construction is being proposed and the tower is not being substantially altered. Specifically, compliance is not necessary where only an antenna and feed-line are being added to an existing structure, as here. However, should the Commission determine compliance is necessary, upon notification to the applicant, the applicant will file FCC Form 621.

CERTIFICATION OF TECHNICAL CONSULTANT: *I declare, under penalty of perjury, that the contents of this report are true and accurate to the best of my knowledge and belief. I further certify I have over twenty-four years of experience as a broadcast technical consultant before the Federal Communications Commission ("the FCC"); and am familiar with the Code of Federal Regulations Title 47 ("the Rules") as pertaining to this report and its contents herein. The underlying data utilized in this report was taken directly from FCC databases or indirectly through third party software vendors securing data directly from FCC databases. This firm cannot be held liable for errors or omissions resulting from the underlying data. The information contained herein is believed accurate to the date reported below.*



Justin W. Asher
Technical Consultant
January 5, 2024

Exhibit 1

Service Contour Study: Present vs Proposed Operations

W225CS.P
Columbus, OH
Facility ID: 142648
Proposed Operation
Channel: 225D (92.9 MHz)
Latitude: 39-57-44 N
Longitude: 083-00-08 W
AMSL Height: 407.4 m
ERP: 0.25 kW
Pattern: Directional

60 dBμ F(50:50) Contour
Total Population: 651,210
Total Area: 644.2 sq. km

FCC 30 SEC Terrain Database
US Census 2020 PL Database
NED 1983 Coordinate Datum

W225CS.L
Columbus, OH
Facility ID: 142648
BLFT20170821AAV
Channel: 225D (92.9 MHz)
Latitude: 39-57-40.10 N
Longitude: 083-00-03 W
AMSL Height: 389.0 m
ERP: 0.25 kW
Pattern: Directional

60 dBμ F(50:50) Contour
Total Population: 378,451
Total Area: 277.1 sq. km

Terrain
199 406 m

Asher Broadcast Consulting LLC
justinasher@consultant.com
1 (202) 875-2986

Hilliard

Upper Arlington

Grandview Heights

Valley View

New Rome

Urbancrest

Grove City

Harrisburg

Columbus

Lockbourne

Westerville

Thirlington
erlea

Huber Ridge
Minerva Park

New Albany

Gahanna

Whitehall

Reynoldsburg

Bric

Pickerington

Canal Winchester

Proposed 60 dBμ F(50:50) Contour

Present 60 dBμ F(50:50) Contour

Scale 1:200,000

0 3 6 9 km

V-Soft Communications LLC ©

Exhibit 2
Service Contour Study:
Proposed vs Primary Operations

WWCD(AM) - 1580 kHz
Columbus, Ohio
Station Class: B
Region 2 Class: B
Facility ID: 22341
File Number: BL-20070615ADX
40-03-42.0 N 82-56-41.0 W (NAD 27)
40-03-42.2 N 82-56-40.7 W (NAD 83)
Power: 3.2 kW, Directional
Hours: Daytime
Pattern Type: Standard
Towers: 2 Augmentations: 0
RMS Theoretical: 553.19 mV/meter
RMS Standard: 581.15 mV/meter

W225CS.P
Columbus, OH
Proposed Operation
Facility ID: 142648
Latitude: 39-57-44 N
Longitude: 083-00-08 W
ERP: 0.25 kW
Channel: 225D (92.9 MHz)
AMSL Height: 407.4 m
Horiz. Pattern: Directional

FCC 30 SEC Terrain Database
US Census 2020 PL Database
NAD 1983 Coordinate Datum

Perry

Scale 1:475,000



V-Soft Communications LLC ©

25 mile Radius from AM Site

Primary 2 mV/m Daytime Contour

WWCD(AM) +

Franklin
W225CS.P +

Proposed 60 dBu F(50:50) Contour

Asher Broadcast Consulting LLC
justinasher@consultant.com
1 (202) 875-2986

Exhibit 3

Copy of Existing Antenna Structure Registration

(public record copy)

Registration Detail

Reg Number	1020488	Status	Constructed
File Number	A0024478	Constructed	05/19/1986
EMI	No	Dismantled	
NEPA	No		

Antenna Structure

Structure Type BTWR - Building with Tower

Location (in NAD83 Coordinates)

Lat/Long 39-57-44.0 N 083-00-08.0 W

City, State COLUMBUS , OH

Zip 43215

Center of AM Array

Address 50 WEST BROAD STREET

County FRANKLIN

Position of Tower in Array

Heights (meters)

Elevation of Site Above Mean Sea Level

227.1

Overall Height Above Mean Sea Level

409.7

Overall Height Above Ground (AGL)

182.6

Overall Height Above Ground w/o Appurtenances

163.3

Painting and Lighting Specifications

FAA Chapters 3, 4, 5, 13

Paint and Light in Accordance with FAA Circular Number 70/7460-1J

FAA Notification

FAA Study 97-AGL-1366-OE

FAA Issue Date 04/16/1997

Owner & Contact Information

FRN

Owner Entity Type

Owner

BOARD OF EDUCATION OF THE CITY SCHOOL DISTRICT OF COLUMBUS

Attention To: LARRY KOSLAP

270 EAST STATE STREET

COLUMBUS , OH 43215

P: (614)365-5710

F:

E:

Contact

P:

F:

E:

Last Action Status

Status Constructed

Purpose New

Mode Interactive

Received 05/08/1997

Entered 05/08/1997

Related Applications

05/08/1997 A0024478 - New (NE)

Comments

Comments

None

History

Date

None

Event

Pleadings

Pleading Type

None

Filer Name

Description

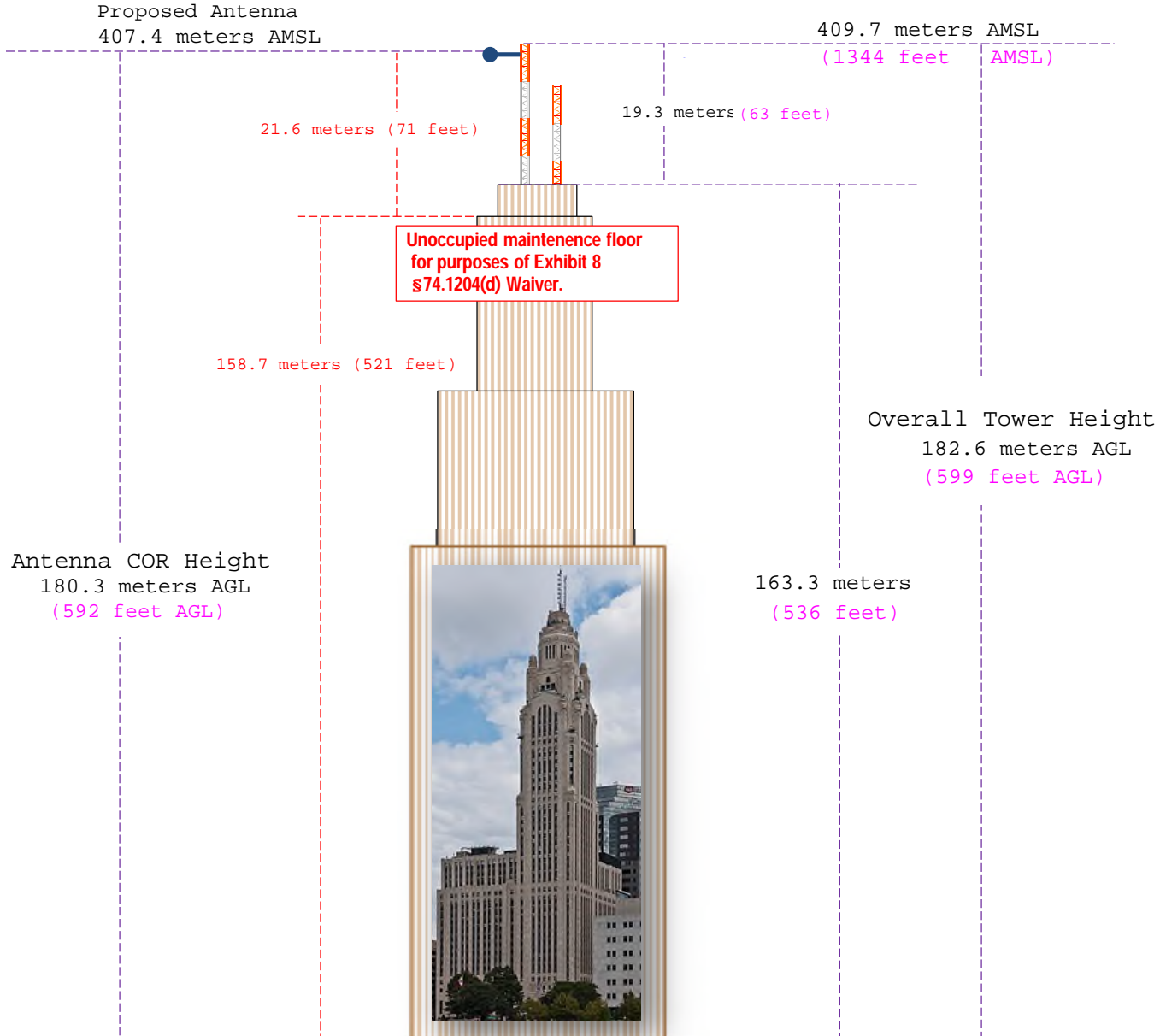
Date Entered

Automated Letters

None

Exhibit 4

Vertical Plan of Antenna System



Ground Elevation: 227.1 meters AMSL (745 feet AMSL)		
Address: 50 WEST BROAD STREET		
City: COLUMBUS	Latitude (D M S) Longitude (D M S)	
County: FRANKLIN	NAD 27 datum values: --- -- -- -- --	
State: OHIO	NAD 83 datum values: 39-57-44.0 N 083-00-08.0 W	
Antenna Structure Registration 1020488	Drawing Is Not To Scale	Asher Broadcast Consulting, LLC justinasher@consultant.com 1(202)875-2986

Exhibit 5

HAAT and Miscellaneous Coordinate Information

HAAT Calculation (NAD 1983):

N. Lat. = 395744.0 W. Lng. = 830008.0
 HAAT and Distance to Contour,
 FCC, FM 2-10 Mi, 51 pts Method - FCC 30 SEC

Azi.	AV EL	HAAT	ERP kW	dBk	Field	60-F5
000	262.9	144.5	0.0025	-26.02	0.100	4.85
030	245.7	161.7	0.0189	-17.23	0.275	8.70
060	250.1	157.3	0.2500	-6.02	1.000	16.36
090	240.7	166.7	0.2500	-6.02	1.000	16.93
120	222.6	184.8	0.2500	-6.02	1.000	17.85
150	214.1	193.3	0.2500	-6.02	1.000	18.23
180	212.4	195.0	0.2500	-6.02	1.000	18.31
210	230.0	177.4	0.2500	-6.02	1.000	17.50
240	247.5	159.9	0.1225	-9.12	0.700	13.68
270	255.0	152.4	0.0352	-14.54	0.375	9.84
300	249.4	158.0	0.0400	-13.98	0.400	10.37
330	248.0	159.4	0.0042	-23.74	0.130	5.88

Ave El= 239.87 M HAAT= 167.53 M AMSL= 407.4

NAD 1983 to NAD 1927 Conversion:

Various Coordinate Conversion Calculations (NAD 1983):

Position Type	Lat Lon
Degrees Lat Long	39.96222222°, -083.00222222°
Degrees Minutes	39°57.73333', -083°00.13333'
Degrees Minutes Seconds	39°57'44.0000", -083°00'08.0000"
UTM	17S 328990mE 4425483mN
UTM centimeter	17S 328990.60mE 4425483.83mN
MGRS	17SLE2899025483
Grid North	-1.3°
GARS	194LV23
Maidenhead	EM89LX90RW63
GEOREF	GJGK59865773
Plus Code	86FRXX6X+V4
Plus Code Extended	86FRXX6X+V4JXG65
what3words	steep.such.chips

Exhibit 6

Tabulation of Proposed Allocation

Grey Text indicates Allotment (ALO), Reservation (RSV), Deleted (DEL) or the facility to be modified herein. These concerns need not be protected.

Blue Text indicates contour protection studies toward select stations as included in ***Exhibit(s) 7(a-d)***.

Yellow Text denotes the existence of a 47 C.F.R. Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Request as included in ***Exhibit 8***.

REFERENCE		CH# 225D - 92.9 MHz, Pwr= 0.25 kW DA, HAAT= 167.5 M, COR= 407.4 M				DISPLAY DATES				
39 57 44.00 N.		Average Protected F(50-50)= 16.97 km				DATA 01-02-24				
83 00 08.00 W.		Standard Directional				SEARCH 01-02-24				
CH CITY	CALL	TYPE ANT STATE	AZI <--	DIST FILE #	LAT LNG	PWR (kW) HAAT (M)	INT (km) COR (M)	PRO (km) LICENSEE	*IN* (Overlap	*OUT* in km)
222B Columbus	WCOL-FM	LIC_CN OH	294.6 114.6	2.38 BLH19890808KA	39 58 16.20 83 01 39.70	22.000 230	6.0 475	66.9 Ihm Licenses, LLC	-13.6*	-65.4*
225D Columbus	W225CS	LIC DCN OH	135.5 315.5	0.16 BLFT20170821AAV	39 57 40.10 83 00 03.00	0.250	389	---Reference--- Ics Communications, Inc.		
227B Ashville	WODC	LIC NCN OH	168.9 348.9	9.75 BLH20061114ACH	39 52 34.20 82 58 48.70	32.000 184	5.9 413	65.3 Ihm Licenses, LLC	-14.4*	-57.4*
225B Eaton	WGTZ	LIC_CN OH	263.8 82.9	120.41 BLH19850204KW	39 50 10.20 84 24 15.80	40.000 168	138.0 463	67.4 Alpha Media Licensee LLC	-28.0*	4.7
225D Delaware	W225CM	LIC DCN OH	354.4 174.3	37.64 BLFT20160621AAE	40 17 57.00 83 02 45.00	0.250	42.4 362	12.3 Delmar Communications, Inc	-9.7*	9.2
224L1 Columbus	WCBS-LP	LIC_CN OH	359.6 179.6	14.65 BLL20170615ABB	40 05 38.60 83 00 12.40	0.068 36	302	-0.2 The Neighborhood Network	0.7	
224L1 Galloway	WEFC-LP	LIC_CN OH	274.5 94.3	20.31 BLL20151123CUL	39 58 34.20 83 14 23.60	0.100 22	298	1.5 Christian Church Of Evange	0.3	
224B1 South Zanesville	WHIZ-FM	LIC_CN OH	108.8 289.4	84.27 BMLH20040415AEI	39 42 52.20 82 04 09.50	16.000 124	56.6 405	42.7 Marquee Broadcasting Ohio,	10.0	10.7
278A Pickerington	WNND	LIC ZCN OH	93.2 273.4	23.76 BLH20061122ADG	39 57 00.20 82 43 28.60	4.200 119	59.9 409	39.5 Franklin Communications, I	9.5R	14.3M
224D Chillicothe	W224BR	LIC DVN OH	179.6 359.6	70.16 BLFT20091217ABB	39 19 52.20 82 59 48.60	0.250 66	19.7 307	13.2 Ihm Licenses, LLC	32.1	29.8
224A Bucyrus	WQEL	LIC_CN OH	3.7 183.8	89.29 BLH20060303AAO	40 45 49.20 82 55 59.70	3.000 93	36.5 402	24.2 Franklin Communications, I	47.6	57.8
225C1 Lexington	WVLK-FM	LIC_CN KY	210.0 29.1	245.64 BMLH19800902AF	38 02 22.20 84 24 10.70	100.000 259	169.7 553	70.4 Cumulus Licensing LLC	58.5	119.9
226A Racine	WJEH-FM	LIC_CN OH	143.7 324.3	139.16 0000188821	38 56 56.30 82 03 01.50	4.100 122	44.2 334	28.9 Vandalia Media Partners 2,	76.8	83.2
279A Philo	WZVL	LIC ZEN OH	92.2 272.8	86.99 BLH20110805ABV	39 55 42.00 81 59 07.00	2.400 160	59.9 413	39.5 Marquee Broadcasting Ohio,	9.5R	77.5M
222D Coshocton	W222CE	LIC_CN OH	71.0 251.8	101.10 BLFT20160712AAK	40 15 08.20 81 52 31.40	0.100	0.7 324	5.9 Clyde Educational Broadcas	83.9	94.1

Terrain database is FCC NGDC 30 Sec , R= 73.215 qualifying spacings or FCC minimum Spacings in KM, M= Margin in KM
 Contour distances are on direct line to and from reference station. Reference zone= East Zone, Co to 3rd adjacent.
 All separation margins (if shown) include rounding.
 Ant Column: (D= DA Standard, Z= DA 73.215, N= Not DA 73.215, _= Omni), Polarization (C,H,V,E), Beamtilt(Y,N,X)
 "*"affixed to 'IN' or 'OUT' values = site inside restricted contour.
 « = Station meets FCC minimum distance spacing for its class.

Exhibit 7a
Contour Protection Studies Toward Select Allocation Concern(s)

FMCommander Single Allocation Study - 01-02-2024 - FCC NGDC 30 Sec
W225CS.P's Overlaps (In= -28.03 km, Out= 4.71 km)

W225CS.P CH 225 D DA
Lat= 39 57 44.00, Lng= 83 00 08.00
0.25 kW 167.5 m HAAT, 407.4 m COR
Prot.= 60 dBu, Intef.= 34 dBu

WGTZ CH 225 B BLH19850204KW
Lat= 39 50 10.20, Lng= 84 24 15.80
40.0 kW 168 m HAAT, 463 m COR
Prot.= 54 dBu, Intef.= 40 dBu

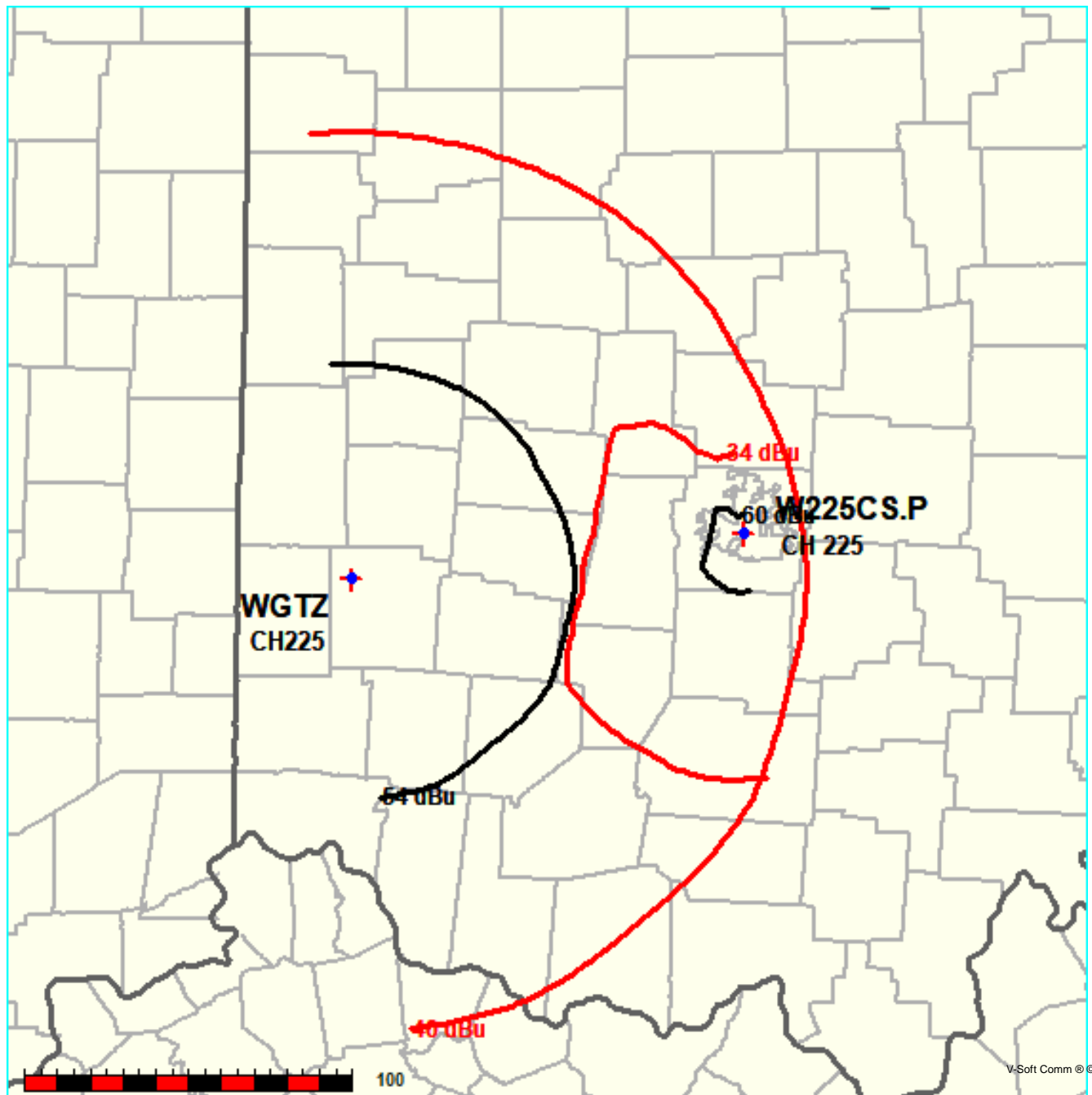


Exhibit 7a

Contour Protection Studies Toward Select Allocation Concern(s)

01-02-2024

Terrain Data: FCC NGDC 30 Sec

FMOver Analysis

W225CS.P

WGTZ BLH19850204KW

Channel = 225D

Max ERP = 0.25 kW

RCAMSL = 407.4 m

N. Lat. 39 57 44.00

W. Lng. 83 00 08.00

Protected
60 dBu

Channel = 225B

Max ERP = 40 kW

RCAMSL = 463 m

N. Lat. 39 50 10.20

W. Lng. 84 24 15.80

Interfering
40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
223.0	000.2500	0169.0	017.1	088.8	040.0000	0195.7	108.1	46.19*	30.56
224.0	000.2500	0168.0	017.0	088.7	040.0000	0195.7	107.9	46.23*	30.73
225.0	000.2500	0167.3	017.0	088.5	040.0000	0195.7	107.7	46.27*	30.91
226.0	000.2500	0166.7	016.9	088.4	040.0000	0195.7	107.5	46.32*	31.09
227.0	000.2500	0166.2	016.9	088.3	040.0000	0195.7	107.4	46.36*	31.27
228.0	000.2500	0165.9	016.9	088.1	040.0000	0195.7	107.2	46.41*	31.45
229.0	000.2500	0165.4	016.9	088.0	040.0000	0195.7	107.0	46.45*	31.62
230.0	000.2500	0164.7	016.8	087.9	040.0000	0195.7	106.8	46.49*	31.78
231.0	000.2352	0163.9	016.5	087.7	040.0000	0195.7	106.9	46.47*	31.70
232.0	000.2209	0163.3	016.2	087.4	040.0000	0195.7	107.0	46.44*	31.61
233.0	000.2070	0162.8	015.8	087.2	040.0000	0195.4	107.1	46.41*	31.49
234.0	000.1936	0162.4	015.5	087.0	040.0000	0195.1	107.2	46.38*	31.34
235.0	000.1806	0162.0	015.2	086.8	040.0000	0194.8	107.3	46.34*	31.20
236.0	000.1681	0161.6	014.9	086.6	040.0000	0194.6	107.4	46.31*	31.04
237.0	000.1560	0161.3	014.6	086.4	040.0000	0194.3	107.6	46.27*	30.88
238.0	000.1444	0160.9	014.3	086.2	040.0000	0194.0	107.7	46.23*	30.71
239.0	000.1332	0160.4	014.0	086.0	040.0000	0193.8	107.9	46.18*	30.52
240.0	000.1225	0159.9	013.7	085.8	040.0000	0193.5	108.0	46.13*	30.33
241.0	000.1156	0159.5	013.5	085.6	040.0000	0193.3	108.1	46.11*	30.21
242.0	000.1089	0159.1	013.3	085.5	040.0000	0193.1	108.2	46.08*	30.09
243.0	000.1024	0158.8	013.0	085.3	040.0000	0192.9	108.3	46.05*	29.96
244.0	000.0961	0158.4	012.8	085.2	040.0000	0192.7	108.4	46.02*	29.83
245.0	000.0900	0158.0	012.6	085.0	040.0000	0192.5	108.6	45.98*	29.68
246.0	000.0841	0157.6	012.4	084.9	040.0000	0192.3	108.7	45.94*	29.52
247.0	000.0784	0157.1	012.2	084.7	040.0000	0192.1	108.8	45.90*	29.35
248.0	000.0729	0156.5	011.9	084.6	040.0000	0191.9	109.0	45.86*	29.16
249.0	000.0676	0155.9	011.7	084.4	040.0000	0191.7	109.2	45.82*	28.97
250.0	000.0625	0155.3	011.4	084.3	040.0000	0191.5	109.3	45.77*	28.77
251.0	000.0613	0154.8	011.4	084.2	040.0000	0191.4	109.4	45.76*	28.73
252.0	000.0600	0154.3	011.3	084.1	040.0000	0191.2	109.4	45.75*	28.69
253.0	000.0588	0153.9	011.2	084.0	040.0000	0191.1	109.4	45.74*	28.65
254.0	000.0576	0153.6	011.1	083.9	040.0000	0191.0	109.4	45.73*	28.61

Exhibit 7a
Contour Protection Studies Toward Select Allocation Concern(s)

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	
255.0	000.0564	0153.4	011.1	083.8	040.0000	0190.9	109.5	45.72*	28.57
256.0	000.0552	0153.2	011.0	083.6	040.0000	0190.9	109.5	45.71*	28.52
257.0	000.0541	0153.0	011.0	083.5	040.0000	0190.8	109.5	45.71*	28.48
258.0	000.0529	0152.9	010.9	083.4	040.0000	0190.8	109.6	45.70*	28.44
259.0	000.0518	0152.8	010.8	083.3	040.0000	0190.8	109.6	45.69*	28.40
260.0	000.0506	0152.7	010.8	083.2	040.0000	0190.8	109.7	45.68*	28.35
261.0	000.0488	0152.7	010.7	083.1	040.0000	0190.7	109.7	45.66*	28.27
262.0	000.0473	0152.7	010.6	083.0	040.0000	0190.7	109.8	45.64*	28.19
263.0	000.0456	0152.7	010.5	082.9	040.0000	0190.7	109.9	45.62*	28.09
264.0	000.0441	0152.8	010.4	082.8	040.0000	0190.6	110.0	45.60*	28.01
265.0	000.0424	0152.8	010.3	082.8	040.0000	0190.6	110.1	45.57*	27.91
266.0	000.0410	0152.8	010.2	082.7	040.0000	0190.6	110.2	45.55*	27.81
267.0	000.0396	0152.8	010.1	082.6	040.0000	0190.5	110.3	45.53*	27.70
268.0	000.0380	0152.7	010.0	082.5	040.0000	0190.5	110.4	45.50*	27.58
269.0	000.0365	0152.6	009.9	082.4	040.0000	0190.4	110.5	45.47*	27.45
270.0	000.0352	0152.4	009.8	082.3	040.0000	0190.4	110.6	45.45*	27.33
271.0	000.0352	0152.2	009.8	082.2	040.0000	0190.3	110.7	45.44*	27.30
272.0	000.0352	0151.9	009.8	082.1	040.0000	0190.3	110.7	45.43*	27.26
273.0	000.0352	0151.7	009.8	082.1	040.0000	0190.2	110.7	45.42*	27.22
274.0	000.0352	0151.5	009.8	082.0	040.0000	0190.2	110.8	45.41*	27.17
275.0	000.0352	0151.5	009.8	081.9	040.0000	0190.1	110.8	45.40*	27.13
276.0	000.0352	0151.5	009.8	081.8	040.0000	0190.1	110.8	45.39*	27.09
277.0	000.0352	0151.6	009.8	081.7	040.0000	0190.1	110.9	45.38*	27.05
278.0	000.0352	0151.6	009.8	081.6	040.0000	0190.0	110.9	45.37*	27.00
279.0	000.0352	0151.7	009.8	081.5	040.0000	0190.0	111.0	45.36*	26.95
280.0	000.0352	0151.6	009.8	081.5	040.0000	0190.0	111.0	45.35*	26.90
281.0	000.0352	0151.2	009.8	081.4	040.0000	0189.9	111.1	45.34*	26.83
282.0	000.0352	0150.6	009.8	081.3	040.0000	0189.9	111.2	45.32*	26.74
283.0	000.0352	0149.8	009.8	081.2	040.0000	0189.9	111.3	45.30*	26.66
284.0	000.0352	0149.1	009.7	081.1	040.0000	0189.8	111.3	45.28*	26.57
285.0	000.0352	0148.7	009.7	081.1	040.0000	0189.8	111.4	45.26*	26.48
286.0	000.0352	0148.6	009.7	081.0	040.0000	0189.8	111.5	45.25*	26.41
287.0	000.0352	0149.0	009.7	080.9	040.0000	0189.8	111.5	45.23*	26.35
288.0	000.0352	0149.9	009.8	080.8	040.0000	0189.7	111.6	45.22*	26.30
289.0	000.0352	0150.9	009.8	080.7	040.0000	0189.7	111.6	45.21*	26.25
290.0	000.0352	0151.6	009.8	080.6	040.0000	0189.7	111.7	45.20*	26.19
291.0	000.0355	0152.3	009.9	080.6	040.0000	0189.6	111.7	45.19*	26.14
292.0	000.0361	0152.7	009.9	080.5	040.0000	0189.6	111.8	45.18*	26.10
293.0	000.0365	0153.1	010.0	080.4	040.0000	0189.5	111.8	45.17*	26.04
294.0	000.0371	0153.3	010.0	080.3	040.0000	0189.5	111.9	45.15*	25.98
295.0	000.0374	0153.6	010.0	080.2	040.0000	0189.4	112.0	45.14*	25.91
296.0	000.0380	0154.1	010.1	080.1	040.0000	0189.4	112.0	45.13*	25.85
297.0	000.0386	0154.8	010.2	080.0	040.0000	0189.3	112.1	45.11*	25.79
298.0	000.0390	0155.8	010.2	079.9	040.0000	0189.3	112.1	45.10*	25.72

Exhibit 7a

Contour Protection Studies Toward Select Allocation Concern(s)

01-02-2024 Terrain Data: FCC NGDC 30 Sec FMOver Analysis

WGTZ BLH19850204KW

W225CS.P

Channel = 225B
 Max ERP = 40 kW
 RCAMSL = 463 m
 N. Lat. 39 50 10.20
 W. Lng. 84 24 15.80
 Protected
 54 dBu

Channel = 225D
 Max ERP = 0.25 kW
 RCAMSL = 407.4 m
 N. Lat. 39 57 44.00
 W. Lng. 83 00 08.00
 Interfering
 34 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
038.0	040.0000	0178.3	066.2	296.2	000.0381	0154.2	087.1	20.28	
039.0	040.0000	0178.3	066.2	296.0	000.0380	0154.1	085.9	20.60	
040.0	040.0000	0178.4	066.2	295.8	000.0379	0154.0	084.8	20.92	
041.0	040.0000	0178.4	066.2	295.6	000.0378	0153.9	083.7	21.24	
042.0	040.0000	0178.5	066.2	295.4	000.0377	0153.7	082.6	21.56	
043.0	040.0000	0178.7	066.2	295.2	000.0375	0153.6	081.5	21.88	
044.0	040.0000	0178.9	066.3	294.9	000.0374	0153.6	080.4	22.19	
045.0	040.0000	0179.2	066.3	294.6	000.0373	0153.5	079.3	22.51	
046.0	040.0000	0179.3	066.3	294.3	000.0372	0153.4	078.2	22.83	
047.0	040.0000	0179.5	066.3	294.0	000.0371	0153.3	077.2	23.15	
048.0	040.0000	0179.6	066.3	293.7	000.0369	0153.2	076.1	23.45	
049.0	040.0000	0179.7	066.3	293.3	000.0366	0153.1	075.1	23.75	
050.0	040.0000	0179.7	066.3	292.9	000.0364	0153.0	074.0	24.04	
051.0	040.0000	0179.6	066.3	292.4	000.0363	0152.9	073.0	24.34	
052.0	040.0000	0179.2	066.3	291.9	000.0361	0152.7	072.0	24.62	
053.0	040.0000	0178.2	066.2	291.4	000.0357	0152.5	071.1	24.87	
054.0	040.0000	0176.9	066.1	290.8	000.0354	0152.1	070.2	25.10	
055.0	040.0000	0175.5	065.9	290.1	000.0352	0151.7	069.4	25.33	
056.0	040.0000	0174.6	065.8	289.5	000.0352	0151.3	068.5	25.58	
057.0	040.0000	0173.9	065.7	288.9	000.0352	0150.7	067.6	25.84	
058.0	040.0000	0173.5	065.7	288.2	000.0352	0150.1	066.8	26.08	
059.0	040.0000	0173.2	065.7	287.5	000.0352	0149.4	066.0	26.32	
060.0	040.0000	0173.0	065.7	286.8	000.0352	0148.9	065.1	26.57	
061.0	040.0000	0173.2	065.7	286.1	000.0352	0148.6	064.3	26.82	
062.0	040.0000	0173.5	065.7	285.4	000.0352	0148.6	063.5	27.09	
063.0	040.0000	0173.9	065.7	284.6	000.0352	0148.7	062.7	27.37	
064.0	040.0000	0174.2	065.8	283.8	000.0352	0149.2	061.9	27.66	
065.0	040.0000	0174.5	065.8	283.0	000.0352	0149.8	061.2	27.95	
066.0	040.0000	0174.9	065.8	282.2	000.0352	0150.4	060.5	28.24	

Exhibit 7a

Contour Protection Studies Toward Select Allocation Concern(s)

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
067.0	040.0000	0175.4	065.9	281.3	000.0352	0151.0	059.8	28.52
068.0	040.0000	0176.4	066.0	280.4	000.0352	0151.5	059.1	28.80
069.0	040.0000	0177.7	066.1	279.5	000.0352	0151.7	058.4	29.07
070.0	040.0000	0179.4	066.3	278.6	000.0352	0151.7	057.7	29.33
071.0	040.0000	0181.2	066.5	277.6	000.0352	0151.6	057.0	29.58
072.0	040.0000	0182.8	066.6	276.6	000.0352	0151.5	056.4	29.81
073.0	040.0000	0183.8	066.7	275.6	000.0352	0151.5	055.8	30.01
074.0	040.0000	0184.5	066.8	274.5	000.0352	0151.5	055.4	30.19
075.0	040.0000	0185.3	066.9	273.4	000.0352	0151.6	054.9	30.37
076.0	040.0000	0186.1	067.0	272.2	000.0352	0151.9	054.5	30.54
077.0	040.0000	0186.9	067.0	271.0	000.0352	0152.1	054.2	30.69
078.0	040.0000	0187.9	067.1	269.8	000.0354	0152.4	053.8	30.85
079.0	040.0000	0188.6	067.2	268.6	000.0371	0152.7	053.5	31.17
080.0	040.0000	0189.3	067.3	267.4	000.0390	0152.8	053.3	31.49
081.0	040.0000	0189.8	067.3	266.1	000.0408	0152.8	053.2	31.75
082.0	040.0000	0190.2	067.4	264.9	000.0427	0152.8	053.1	31.98
083.0	040.0000	0190.7	067.4	263.6	000.0447	0152.8	053.0	32.21
084.0	040.0000	0191.2	067.5	262.3	000.0467	0152.7	053.0	32.40
085.0	040.0000	0192.5	067.6	261.0	000.0488	0152.7	052.9	32.61
086.0	040.0000	0193.8	067.7	259.8	000.0509	0152.8	052.9	32.80
087.0	040.0000	0195.1	067.8	258.5	000.0524	0152.9	053.0	32.91
088.0	040.0000	0195.7	067.9	257.2	000.0538	0153.0	053.1	32.97
089.0	040.0000	0195.7	067.9	256.0	000.0553	0153.2	053.4	33.00
090.0	040.0000	0195.7	067.9	254.7	000.0567	0153.4	053.7	33.01
091.0	040.0000	0195.7	067.9	253.5	000.0582	0153.8	054.1	33.00
092.0	040.0000	0195.4	067.9	252.4	000.0596	0154.2	054.5	32.96
093.0	040.0000	0194.9	067.8	251.2	000.0610	0154.7	055.0	32.90
094.0	040.0000	0194.4	067.8	250.1	000.0623	0155.2	055.5	32.83
095.0	040.0000	0193.6	067.7	249.1	000.0673	0155.8	056.1	32.97
096.0	040.0000	0192.3	067.6	248.1	000.0726	0156.4	056.7	33.08
097.0	040.0000	0190.9	067.4	247.1	000.0778	0157.0	057.4	33.15
098.0	040.0000	0189.5	067.3	246.2	000.0830	0157.5	058.2	33.19
099.0	040.0000	0187.7	067.1	245.3	000.0881	0157.9	059.0	33.17
100.0	040.0000	0186.3	067.0	244.5	000.0932	0158.3	059.7	33.15
101.0	040.0000	0185.5	066.9	243.6	000.0983	0158.6	060.5	33.12
102.0	040.0000	0184.9	066.9	242.8	000.1036	0158.9	061.3	33.08
103.0	040.0000	0184.8	066.8	242.0	000.1088	0159.1	062.1	33.04
104.0	040.0000	0185.0	066.9	241.2	000.1142	0159.4	062.9	32.99
105.0	040.0000	0185.2	066.9	240.4	000.1194	0159.7	063.7	32.93
106.0	040.0000	0185.6	066.9	239.7	000.1257	0160.1	064.5	32.89
107.0	040.0000	0186.3	067.0	239.0	000.1336	0160.4	065.3	32.90
108.0	040.0000	0187.1	067.1	238.3	000.1415	0160.8	066.1	32.89
109.0	040.0000	0188.1	067.2	237.6	000.1495	0161.1	067.0	32.86
110.0	040.0000	0189.4	067.3	236.9	000.1574	0161.3	067.9	32.81
111.0	040.0000	0190.7	067.4	236.2	000.1653	0161.6	068.8	32.74

Exhibit 7b
Contour Protection Studies Toward Select Allocation Concern(s)

FMCommander Single Allocation Study - 01-02-2024 - FCC NGDC 30 Sec
W225CS.P's Overlaps (In= -9.66 km, Out= 9.22 km)

W225CS.P CH 225 D DA
Lat= 39 57 44.00, Lng= 83 00 08.00
0.25 kW 167.5 m HAAT, 407.4 m COR
Prot.= 60 dBu, Intef.= 40 dBu

W225CM CH 225 D DA BLFT20160621AAE
Lat= 40 17 57.00, Lng= 83 02 45.00
0.25 kW 0 m HAAT, 362 m COR
Prot.= 60 dBu, Intef.= 40 dBu

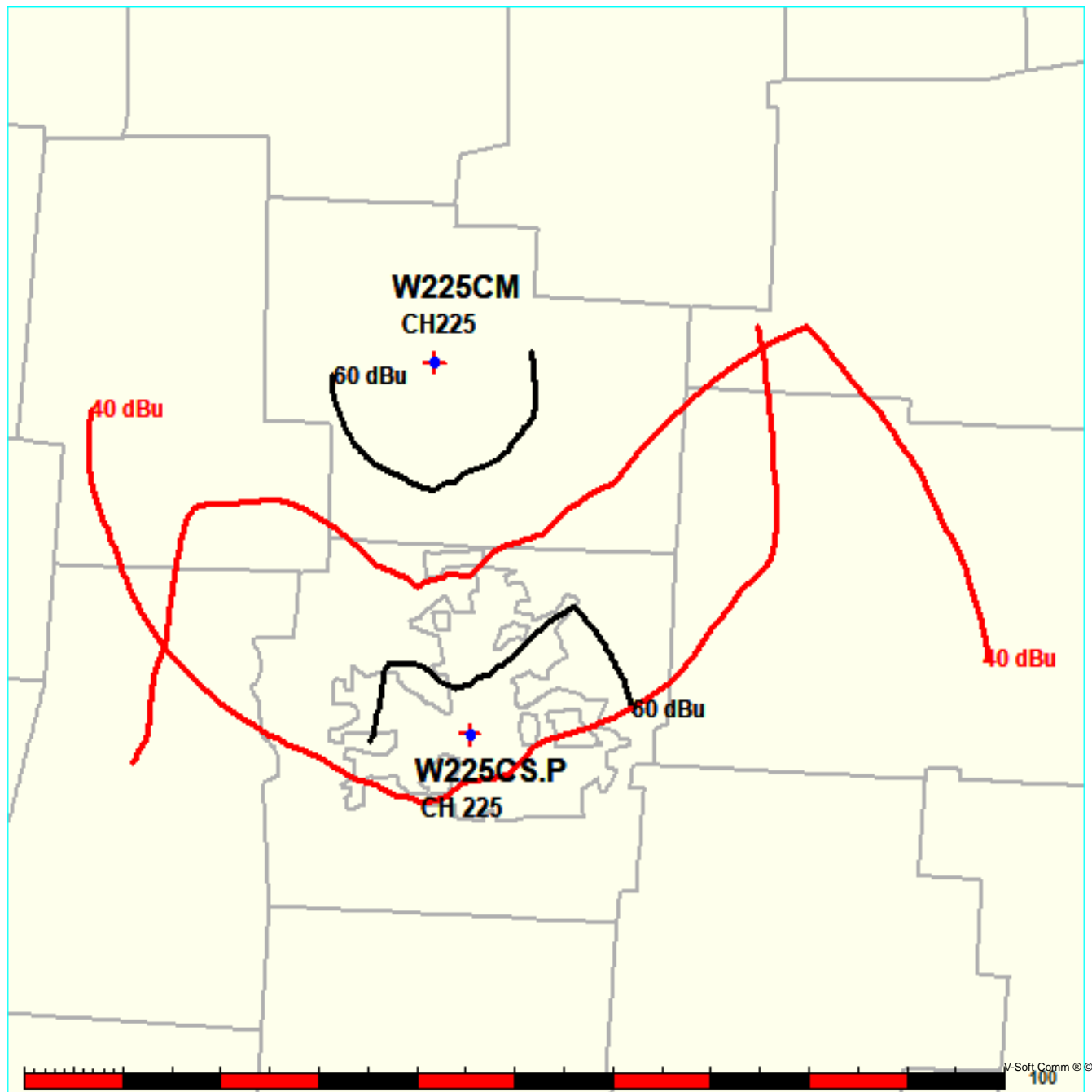


Exhibit 7b

Contour Protection Studies Toward Select Allocation Concern(s)

01-02-2024 Terrain Data: FCC NGDC 30 Sec FMOver Analysis

W225CS.P

W225CM BLFT20160621AAE

Channel = 225D
 Max ERP = 0.25 kW
 RCAMSL = 407.4 m
 N. Lat. 39 57 44.00
 W. Lng. 83 00 08.00
 Protected
 60 dBu

Channel = 225D
 Max ERP = 0.25 kW
 RCAMSL = 362 m
 N. Lat. 40 17 57.00
 W. Lng. 83 02 45.00
 Interfering
 40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
313.0	000.0342	0163.2	010.2	186.9	000.2382	0098.7	030.8	45.66*	12.68
314.0	000.0324	0162.6	010.0	186.5	000.2386	0099.3	030.7	45.75*	12.87
315.0	000.0306	0162.6	009.9	186.1	000.2390	0099.9	030.7	45.84*	13.06
316.0	000.0289	0163.0	009.7	185.7	000.2394	0100.3	030.6	45.91*	13.20
317.0	000.0272	0163.7	009.6	185.3	000.2398	0100.5	030.6	45.96*	13.30
318.0	000.0256	0164.6	009.5	185.0	000.2401	0100.5	030.5	45.99*	13.37
319.0	000.0240	0165.6	009.4	184.6	000.2405	0100.5	030.5	46.02*	13.42
320.0	000.0225	0166.6	009.2	184.2	000.2409	0100.4	030.5	46.03*	13.45
321.0	000.0200	0167.2	009.0	183.7	000.2414	0100.7	030.5	46.03*	13.46
322.0	000.0177	0167.4	008.7	183.1	000.2420	0101.2	030.6	46.03*	13.49
323.0	000.0155	0167.2	008.4	182.5	000.2425	0101.8	030.8	46.02*	13.48
324.0	000.0135	0166.7	008.1	181.9	000.2431	0102.5	030.9	46.01*	13.49
325.0	000.0116	0165.6	007.7	181.3	000.2437	0103.1	031.1	45.97*	13.44
326.0	000.0098	0163.9	007.4	180.8	000.2443	0102.4	031.3	45.81*	13.12
327.0	000.0082	0162.0	007.0	180.2	000.2448	0101.8	031.6	45.64*	12.78
328.0	000.0067	0160.6	006.7	179.7	000.2452	0101.1	031.8	45.47*	12.42
329.0	000.0054	0159.8	006.3	179.1	000.2454	0100.5	032.1	45.28*	12.04
330.0	000.0042	0159.4	005.9	178.6	000.2457	0099.8	032.4	45.09*	11.63
331.0	000.0039	0159.0	005.8	178.4	000.2458	0099.0	032.4	44.98*	11.40
332.0	000.0037	0158.8	005.7	178.1	000.2459	0098.3	032.5	44.90*	11.21
333.0	000.0034	0159.0	005.5	177.9	000.2461	0097.6	032.6	44.80*	11.01
334.0	000.0031	0159.4	005.4	177.7	000.2462	0097.0	032.6	44.73*	10.84
335.0	000.0029	0160.0	005.3	177.4	000.2463	0096.5	032.7	44.65*	10.68
336.0	000.0027	0160.8	005.2	177.2	000.2464	0095.9	032.7	44.56*	10.48
337.0	000.0024	0161.9	005.1	177.0	000.2465	0095.3	032.8	44.47*	10.27
338.0	000.0022	0163.0	005.0	176.8	000.2466	0094.8	032.9	44.39*	10.09
339.0	000.0020	0164.2	004.9	176.6	000.2467	0094.3	033.0	44.31*	9.91
340.0	000.0018	0165.7	004.7	176.4	000.2468	0093.7	033.1	44.20*	9.69
341.0	000.0018	0167.1	004.8	176.2	000.2469	0093.4	033.0	44.19*	9.66
342.0	000.0018	0168.0	004.8	176.1	000.2470	0093.1	033.0	44.18*	9.63
343.0	000.0018	0168.4	004.8	176.0	000.2470	0092.8	033.0	44.16*	9.59
344.0	000.0018	0168.7	004.8	175.8	000.2471	0092.6	033.0	44.15*	9.57

Exhibit 7b

Contour Protection Studies Toward Select Allocation Concern(s)

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	
345.0	000.0018	0169.0	004.8	175.7	000.2472	0092.4	032.9	44.15*	9.55
346.0	000.0018	0169.0	004.8	175.5	000.2472	0092.3	032.9	44.14*	9.54
347.0	000.0018	0168.9	004.8	175.4	000.2473	0092.2	032.9	44.14*	9.54
348.0	000.0018	0168.9	004.8	175.3	000.2474	0092.2	032.9	44.15*	9.55
349.0	000.0018	0168.8	004.8	175.1	000.2474	0092.1	032.9	44.15*	9.55
350.0	000.0018	0168.6	004.8	175.0	000.2475	0092.1	032.9	44.15*	9.55
351.0	000.0019	0167.9	004.8	174.8	000.2476	0092.1	032.8	44.18*	9.61
352.0	000.0019	0166.4	004.8	174.7	000.2477	0092.0	032.8	44.18*	9.63
353.0	000.0020	0163.9	004.9	174.5	000.2477	0092.0	032.8	44.20*	9.66
354.0	000.0021	0161.0	004.9	174.4	000.2478	0092.0	032.8	44.19*	9.65
355.0	000.0022	0157.9	004.9	174.2	000.2479	0092.0	032.8	44.20*	9.66
356.0	000.0022	0154.8	004.9	174.1	000.2480	0092.0	032.8	44.19*	9.64
357.0	000.0023	0151.8	004.8	173.9	000.2480	0092.0	032.8	44.18*	9.62
358.0	000.0024	0149.1	004.8	173.8	000.2481	0092.0	032.8	44.18*	9.63
359.0	000.0024	0146.8	004.8	173.7	000.2482	0092.0	032.8	44.18*	9.61
000.0	000.0025	0144.5	004.9	173.5	000.2483	0092.0	032.8	44.18*	9.62
001.0	000.0027	0142.4	004.9	173.3	000.2483	0092.0	032.8	44.21*	9.69
002.0	000.0029	0141.8	005.0	173.2	000.2484	0092.0	032.7	44.25*	9.77
003.0	000.0031	0142.1	005.1	173.0	000.2485	0092.0	032.6	44.29*	9.87
004.0	000.0034	0142.2	005.2	172.8	000.2486	0092.0	032.5	44.34*	9.96
005.0	000.0036	0142.3	005.3	172.6	000.2487	0092.0	032.4	44.37*	10.04
006.0	000.0038	0142.4	005.4	172.4	000.2488	0092.0	032.3	44.41*	10.11
007.0	000.0041	0142.4	005.5	172.2	000.2489	0091.9	032.3	44.44*	10.17
008.0	000.0044	0142.3	005.6	172.0	000.2490	0091.9	032.2	44.46*	10.23
009.0	000.0046	0142.1	005.7	171.8	000.2491	0091.9	032.2	44.49*	10.28
010.0	000.0049	0141.8	005.8	171.6	000.2492	0091.8	032.1	44.51*	10.32
011.0	000.0050	0141.6	005.8	171.4	000.2493	0091.8	032.1	44.51*	10.32
012.0	000.0052	0141.7	005.9	171.2	000.2494	0091.7	032.1	44.50*	10.32
013.0	000.0053	0142.3	005.9	171.0	000.2495	0091.7	032.1	44.51*	10.32
014.0	000.0055	0143.0	006.0	170.8	000.2496	0091.6	032.1	44.50*	10.31
015.0	000.0056	0143.6	006.0	170.5	000.2497	0091.4	032.1	44.50*	10.29
016.0	000.0058	0144.4	006.1	170.3	000.2498	0091.3	032.1	44.49*	10.27
017.0	000.0059	0145.6	006.1	170.1	000.2499	0091.1	032.1	44.47*	10.25
018.0	000.0061	0147.2	006.2	169.9	000.2499	0090.9	032.0	44.46*	10.21
019.0	000.0062	0148.8	006.3	169.6	000.2498	0090.6	032.0	44.44*	10.15
020.0	000.0064	0150.2	006.4	169.4	000.2497	0090.3	032.0	44.40*	10.09
021.0	000.0073	0151.6	006.6	169.0	000.2495	0089.7	031.9	44.41*	10.09
022.0	000.0084	0153.0	006.9	168.6	000.2493	0089.0	031.7	44.41*	10.07
023.0	000.0094	0154.6	007.1	168.2	000.2491	0088.2	031.6	44.39*	10.01
024.0	000.0106	0156.1	007.3	167.7	000.2489	0087.4	031.5	44.36*	9.93
025.0	000.0119	0157.6	007.6	167.2	000.2486	0086.5	031.3	44.32*	9.83
026.0	000.0131	0158.9	007.8	166.8	000.2484	0085.5	031.3	44.27*	9.70
027.0	000.0145	0160.0	008.1	166.3	000.2482	0084.6	031.2	44.22*	9.56
028.0	000.0159	0160.9	008.3	165.8	000.2479	0083.7	031.1	44.16*	9.41
029.0	000.0174	0161.5	008.5	165.4	000.2477	0083.0	031.0	44.10*	9.27

Exhibit 7b

Contour Protection Studies Toward Select Allocation Concern(s)

01-02-2024 Terrain Data: FCC NGDC 30 Sec FMOver Analysis

W225CM BLFT20160621AAE

W225CS.P

Channel = 225D
 Max ERP = 0.25 kW
 RCAMSL = 362 m
 N. Lat. 40 17 57.00
 W. Lng. 83 02 45.00
 Protected
 60 dBu

Channel = 225D
 Max ERP = 0.25 kW
 RCAMSL = 407.4 m
 N. Lat. 39 57 44.00
 W. Lng. 83 00 08.00
 Interfering
 40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
129.0	000.2148	0083.8	011.4	009.7	000.0048	0141.9	030.7	31.87	
130.0	000.2162	0083.7	011.4	009.5	000.0048	0142.0	030.5	31.93	
131.0	000.2172	0083.7	011.4	009.3	000.0047	0142.0	030.4	31.99	
132.0	000.2181	0083.6	011.4	009.1	000.0047	0142.1	030.2	32.04	
133.0	000.2190	0083.4	011.4	008.9	000.0046	0142.1	030.0	32.09	
134.0	000.2200	0083.2	011.4	008.7	000.0045	0142.2	029.9	32.13	
135.0	000.2209	0083.2	011.4	008.5	000.0045	0142.2	029.7	32.17	
136.0	000.2218	0083.5	011.5	008.3	000.0044	0142.2	029.5	32.23	
137.0	000.2228	0084.2	011.5	008.2	000.0044	0142.3	029.3	32.31	
138.0	000.2237	0084.8	011.6	008.0	000.0044	0142.3	029.1	32.38	
139.0	000.2247	0085.3	011.6	007.8	000.0043	0142.3	029.0	32.44	
140.0	000.2256	0085.7	011.7	007.6	000.0042	0142.4	028.8	32.49	
141.0	000.2266	0086.1	011.7	007.4	000.0042	0142.4	028.6	32.54	
142.0	000.2275	0086.5	011.7	007.1	000.0041	0142.4	028.4	32.58	
143.0	000.2285	0086.6	011.8	006.9	000.0041	0142.4	028.3	32.61	
144.0	000.2294	0086.5	011.8	006.6	000.0040	0142.4	028.1	32.62	
145.0	000.2304	0086.2	011.8	006.2	000.0039	0142.4	028.0	32.62	
146.0	000.2314	0085.9	011.7	005.9	000.0038	0142.4	027.9	32.60	
147.0	000.2323	0085.6	011.7	005.6	000.0037	0142.4	027.7	32.58	
148.0	000.2333	0085.4	011.7	005.2	000.0037	0142.3	027.6	32.56	
149.0	000.2343	0085.3	011.7	004.9	000.0036	0142.3	027.5	32.55	
150.0	000.2352	0085.2	011.7	004.5	000.0035	0142.3	027.4	32.52	
151.0	000.2362	0085.1	011.8	004.2	000.0034	0142.2	027.3	32.50	
152.0	000.2372	0084.9	011.8	003.8	000.0033	0142.2	027.1	32.46	
153.0	000.2381	0084.7	011.7	003.5	000.0032	0142.2	027.0	32.41	
154.0	000.2391	0084.3	011.7	003.1	000.0031	0142.1	027.0	32.34	
155.0	000.2401	0083.9	011.7	002.7	000.0031	0142.0	026.9	32.27	
156.0	000.2411	0083.5	011.7	002.3	000.0030	0141.9	026.8	32.19	
157.0	000.2421	0083.2	011.7	001.9	000.0029	0141.8	026.7	32.10	

Exhibit 7b

Contour Protection Studies Toward Select Allocation Concern(s)

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
158.0	000.2430	0082.9	011.7	001.4	000.0028	0142.0	026.6	32.03
159.0	000.2440	0082.4	011.7	001.0	000.0027	0142.4	026.6	31.96
160.0	000.2450	0082.0	011.6	000.6	000.0026	0143.2	026.5	31.90
161.0	000.2455	0081.5	011.6	000.2	000.0025	0144.1	026.5	31.85
162.0	000.2460	0081.3	011.6	359.8	000.0025	0145.1	026.4	31.85
163.0	000.2465	0081.3	011.6	359.3	000.0024	0146.1	026.4	31.88
164.0	000.2470	0081.6	011.6	358.9	000.0024	0147.0	026.3	31.93
165.0	000.2475	0082.5	011.7	358.5	000.0024	0147.9	026.2	32.03
166.0	000.2480	0084.0	011.8	358.1	000.0024	0148.8	026.0	32.15
167.0	000.2485	0086.0	011.9	357.7	000.0023	0149.8	025.8	32.27
168.0	000.2490	0087.9	012.1	357.3	000.0023	0150.9	025.7	32.38
169.0	000.2495	0089.7	012.2	356.9	000.0023	0152.0	025.5	32.49
170.0	000.2500	0091.0	012.3	356.5	000.0022	0153.4	025.4	32.61
171.0	000.2495	0091.7	012.3	356.0	000.0022	0154.8	025.3	32.70
172.0	000.2490	0091.9	012.3	355.5	000.0022	0156.3	025.3	32.76
173.0	000.2485	0092.0	012.3	355.0	000.0022	0157.9	025.3	32.82
174.0	000.2480	0092.0	012.3	354.5	000.0021	0159.4	025.3	32.82
175.0	000.2475	0092.1	012.3	354.0	000.0021	0160.9	025.3	32.81
176.0	000.2470	0092.8	012.4	353.5	000.0020	0162.3	025.3	32.87
177.0	000.2465	0095.3	012.5	353.0	000.0020	0163.8	025.1	33.00
178.0	000.2460	0097.9	012.7	352.5	000.0020	0165.3	025.0	33.09
179.0	000.2455	0100.3	012.8	352.0	000.0019	0166.5	024.9	33.13
180.0	000.2450	0101.5	012.9	351.4	000.0019	0167.3	024.8	33.16
181.0	000.2440	0102.7	013.0	350.9	000.0019	0168.0	024.8	33.15
182.0	000.2430	0102.4	012.9	350.4	000.0018	0168.4	024.9	33.02
183.0	000.2421	0101.3	012.8	349.9	000.0018	0168.7	025.0	32.86
184.0	000.2411	0100.5	012.8	349.5	000.0018	0168.7	025.1	32.78
185.0	000.2401	0100.5	012.8	349.0	000.0018	0168.8	025.2	32.74
186.0	000.2391	0100.0	012.7	348.5	000.0018	0168.8	025.3	32.66
187.0	000.2381	0098.6	012.6	348.1	000.0018	0168.8	025.5	32.55
188.0	000.2372	0097.5	012.5	347.7	000.0018	0168.9	025.6	32.44
189.0	000.2362	0097.0	012.5	347.3	000.0018	0168.9	025.7	32.36
190.0	000.2352	0096.9	012.5	346.9	000.0018	0168.9	025.8	32.30
191.0	000.2343	0096.6	012.4	346.5	000.0018	0169.0	026.0	32.22
192.0	000.2333	0095.9	012.4	346.1	000.0018	0169.0	026.1	32.12
193.0	000.2323	0094.8	012.3	345.7	000.0018	0169.0	026.3	32.01
194.0	000.2314	0093.7	012.2	345.4	000.0018	0169.0	026.4	31.89
195.0	000.2304	0092.9	012.2	345.1	000.0018	0169.0	026.6	31.79
196.0	000.2294	0092.4	012.1	344.7	000.0018	0168.9	026.8	31.68
197.0	000.2285	0092.1	012.1	344.4	000.0018	0168.8	026.9	31.58
198.0	000.2275	0092.0	012.1	344.0	000.0018	0168.7	027.0	31.49
199.0	000.2266	0092.0	012.1	343.7	000.0018	0168.6	027.1	31.40
200.0	000.2256	0092.0	012.1	343.3	000.0018	0168.5	027.3	31.30
201.0	000.2247	0092.1	012.0	343.0	000.0018	0168.4	027.4	31.21
202.0	000.2237	0092.0	012.0	342.7	000.0018	0168.3	027.6	31.11

Exhibit 7c
Contour Protection Studies Toward Select Allocation Concern(s)

FMCommander Single Allocation Study - 01-02-2024 - FCC NGDC 30 Sec
W225CS.P's Overlaps (In= -0.24 km, Out= 0.73 km)

W225CS.P CH 225 D DA
Lat= 39 57 44.00, Lng= 83 00 08.00
0.25 kW 167.5 m HAAT, 407.4 m COR
Prot.= 60 dBu, Intef.= 54 dBu

WCRS-LP CH 224 L1 BLL20170615ABB
Lat= 40 05 38.60, Lng= 83 00 12.40
0.068 kW 36.4 m HAAT, 302.4 m COR
Prot.= 60 dBu, Intef.= 54 dBu

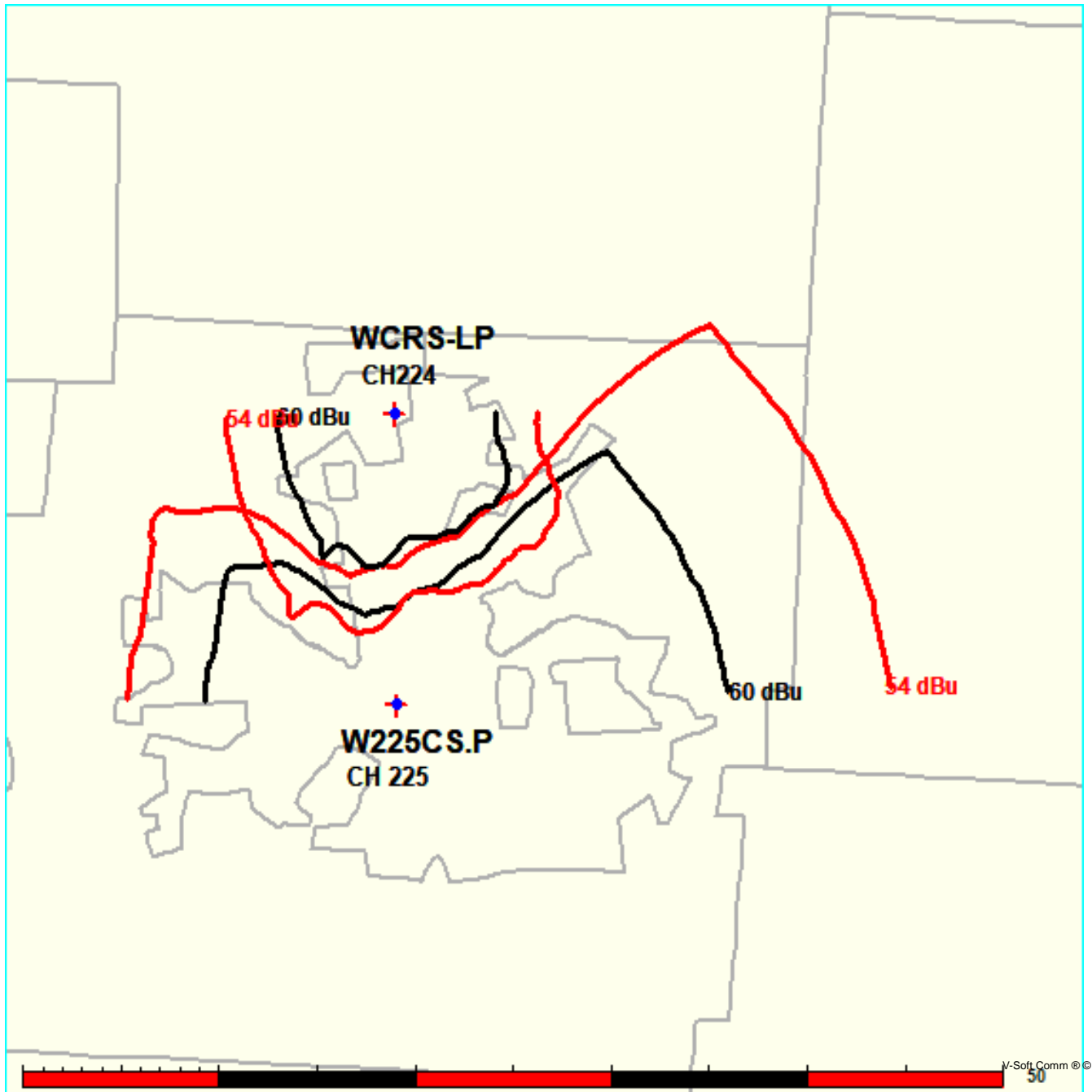


Exhibit 7c

Contour Protection Studies Toward Select Allocation Concern(s)

01-02-2024 Terrain Data: FCC NGDC 30 Sec FMOver Analysis

W225CS.P

WCRS-LP BLL20170615ABB

Channel = 225D
 Max ERP = 0.25 kW
 RCAMSL = 407.4 m
 N. Lat. 39 57 44.00
 W. Lng. 83 00 08.00
 Protected
 60 dBu

Channel = 224L1
 Max ERP = 0.068 kW
 RCAMSL = 302.4 m
 N. Lat. 40 05 38.60
 W. Lng. 83 00 12.40
 Interfering
 54 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
321.0	000.0200	0167.2	009.0	215.9	000.0680	0059.4	009.5	55.51*	0.86
322.0	000.0177	0167.4	008.7	214.1	000.0680	0061.1	009.4	55.86*	1.06
323.0	000.0155	0167.2	008.4	212.0	000.0680	0062.1	009.4	56.06*	1.18
324.0	000.0135	0166.7	008.1	209.8	000.0680	0066.6	009.3	56.61*	1.51
325.0	000.0116	0165.6	007.7	207.6	000.0680	0076.8	009.4	57.74*	2.20
326.0	000.0098	0163.9	007.4	205.3	000.0680	0067.5	009.4	56.57*	1.49
327.0	000.0082	0162.0	007.0	203.0	000.0680	0060.1	009.5	55.50*	0.86
328.0	000.0067	0160.6	006.7	200.8	000.0680	0059.5	009.6	55.21*	0.70
329.0	000.0054	0159.8	006.3	198.6	000.0680	0060.2	009.8	55.04*	0.60
330.0	000.0042	0159.4	005.9	196.5	000.0680	0062.4	010.0	55.00*	0.58
331.0	000.0039	0159.0	005.8	195.6	000.0680	0063.9	010.0	55.15*	0.67
332.0	000.0037	0158.8	005.7	194.8	000.0680	0065.3	010.0	55.31*	0.77
333.0	000.0034	0159.0	005.5	193.9	000.0680	0067.0	010.0	55.48*	0.87
334.0	000.0031	0159.4	005.4	193.1	000.0680	0068.5	010.0	55.63*	0.96
335.0	000.0029	0160.0	005.3	192.4	000.0680	0069.8	010.1	55.75*	1.04
336.0	000.0027	0160.8	005.2	191.5	000.0680	0070.9	010.1	55.80*	1.07
337.0	000.0024	0161.9	005.1	190.7	000.0680	0071.5	010.2	55.78*	1.06
338.0	000.0022	0163.0	005.0	190.0	000.0680	0071.7	010.2	55.73*	1.03
339.0	000.0020	0164.2	004.9	189.2	000.0680	0071.3	010.2	55.61*	0.96
340.0	000.0018	0165.7	004.7	188.5	000.0680	0070.6	010.3	55.39*	0.83
341.0	000.0018	0167.1	004.8	188.1	000.0680	0070.3	010.3	55.46*	0.87
342.0	000.0018	0168.0	004.8	187.7	000.0680	0070.1	010.2	55.51*	0.90
343.0	000.0018	0168.4	004.8	187.3	000.0680	0069.8	010.2	55.54*	0.92
344.0	000.0018	0168.7	004.8	186.9	000.0680	0069.4	010.1	55.57*	0.93
345.0	000.0018	0169.0	004.8	186.5	000.0680	0069.1	010.1	55.59*	0.94
346.0	000.0018	0169.0	004.8	186.0	000.0680	0068.8	010.1	55.61*	0.95
347.0	000.0018	0168.9	004.8	185.6	000.0680	0068.5	010.0	55.62*	0.96
348.0	000.0018	0168.9	004.8	185.1	000.0680	0068.1	010.0	55.62*	0.95
349.0	000.0018	0168.8	004.8	184.6	000.0680	0067.4	010.0	55.58*	0.93
350.0	000.0018	0168.6	004.8	184.2	000.0680	0066.6	010.0	55.51*	0.89

Exhibit 7c

Contour Protection Studies Toward Select Allocation Concern(s)

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
351.0	000.0019	0167.9	004.8	183.8	000.0680	0065.8	009.9	55.54* 0.90
352.0	000.0019	0166.4	004.8	183.3	000.0680	0064.8	009.9	55.47* 0.86
353.0	000.0020	0163.9	004.9	182.9	000.0680	0063.8	009.8	55.42* 0.83
354.0	000.0021	0161.0	004.9	182.4	000.0680	0062.5	009.8	55.26* 0.73
355.0	000.0022	0157.9	004.9	181.9	000.0680	0061.0	009.8	55.12* 0.65
356.0	000.0022	0154.8	004.9	181.4	000.0680	0059.8	009.8	54.94* 0.54
357.0	000.0023	0151.8	004.8	180.9	000.0680	0058.7	009.8	54.77* 0.45
358.0	000.0024	0149.1	004.8	180.4	000.0680	0057.7	009.8	54.66* 0.38
359.0	000.0024	0146.8	004.8	179.9	000.0680	0056.7	009.8	54.49* 0.28
000.0	000.0025	0144.5	004.9	179.4	000.0680	0055.6	009.8	54.36* 0.20
001.0	000.0027	0142.4	004.9	178.9	000.0680	0054.6	009.7	54.30* 0.17
002.0	000.0029	0141.8	005.0	178.3	000.0680	0052.9	009.6	54.19* 0.11
003.0	000.0031	0142.1	005.1	177.8	000.0680	0051.2	009.5	54.06* 0.04
004.0	000.0034	0142.2	005.2	177.2	000.0680	0049.9	009.5	53.99
005.0	000.0036	0142.3	005.3	176.5	000.0680	0048.7	009.4	53.91
006.0	000.0038	0142.4	005.4	175.9	000.0680	0047.6	009.3	53.86
007.0	000.0041	0142.4	005.5	175.2	000.0680	0047.0	009.2	53.86
008.0	000.0044	0142.3	005.6	174.5	000.0680	0046.5	009.1	53.88
009.0	000.0046	0142.1	005.7	173.7	000.0680	0046.5	009.1	53.98
010.0	000.0049	0141.8	005.8	173.0	000.0680	0046.6	009.0	54.10* 0.06
011.0	000.0050	0141.6	005.8	172.3	000.0680	0046.7	009.0	54.12* 0.07
012.0	000.0052	0141.7	005.9	171.6	000.0680	0046.7	009.0	54.14* 0.08
013.0	000.0053	0142.3	005.9	170.9	000.0680	0046.7	009.0	54.17* 0.09
014.0	000.0055	0143.0	006.0	170.1	000.0680	0046.7	009.0	54.18* 0.10
015.0	000.0056	0143.6	006.0	169.4	000.0680	0046.7	009.0	54.19* 0.10
016.0	000.0058	0144.4	006.1	168.6	000.0680	0046.7	009.0	54.20* 0.11
017.0	000.0059	0145.6	006.1	167.8	000.0680	0046.9	009.0	54.25* 0.14
018.0	000.0061	0147.2	006.2	167.0	000.0680	0047.4	009.0	54.37* 0.20
019.0	000.0062	0148.8	006.3	166.1	000.0680	0048.1	009.0	54.51* 0.28
020.0	000.0064	0150.2	006.4	165.3	000.0680	0048.6	009.0	54.61* 0.34
021.0	000.0073	0151.6	006.6	163.8	000.0680	0049.4	008.8	55.01* 0.55
022.0	000.0084	0153.0	006.9	162.1	000.0680	0050.1	008.7	55.37* 0.75
023.0	000.0094	0154.6	007.1	160.5	000.0680	0050.0	008.6	55.53* 0.84
024.0	000.0106	0156.1	007.3	158.7	000.0680	0049.5	008.5	55.62* 0.89
025.0	000.0119	0157.6	007.6	156.9	000.0680	0049.7	008.4	55.79* 0.98
026.0	000.0131	0158.9	007.8	155.1	000.0680	0050.4	008.4	56.02* 1.10
027.0	000.0145	0160.0	008.1	153.2	000.0680	0051.7	008.4	56.32* 1.27
028.0	000.0159	0160.9	008.3	151.4	000.0680	0052.0	008.4	56.39* 1.31
029.0	000.0174	0161.5	008.5	149.6	000.0680	0051.5	008.4	56.28* 1.25
030.0	000.0189	0161.7	008.7	148.0	000.0680	0050.8	008.4	56.09* 1.14
031.0	000.0303	0161.7	009.8	140.5	000.0680	0049.4	008.1	56.38* 1.29
032.0	000.0441	0161.6	010.7	133.7	000.0680	0052.9	008.0	57.16* 1.73
033.0	000.0608	0161.5	011.6	127.5	000.0680	0052.9	008.1	57.03* 1.66

Exhibit 7c

Contour Protection Studies Toward Select Allocation Concern(s)

01-02-2024 Terrain Data: FCC NGDC 30 Sec FMOver Analysis

WCRS-LP BLL20170615ABB

W225CS.P

Channel = 224L1
 Max ERP = 0.068 kW
 RCAMSL = 302.4 m
 N. Lat. 40 05 38.60
 W. Lng. 83 00 12.40
 Protected
 60 dBu

Channel = 225D
 Max ERP = 0.25 kW
 RCAMSL = 407.4 m
 N. Lat. 39 57 44.00
 W. Lng. 83 00 08.00
 Interfering
 54 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
135.0	000.0680	0050.8	006.6	024.7	000.0115	0157.2	011.0	53.51	
136.0	000.0680	0049.3	006.5	024.0	000.0106	0156.1	010.9	53.19	
137.0	000.0680	0048.5	006.5	023.5	000.0100	0155.3	010.8	53.03	
138.0	000.0680	0048.6	006.5	023.3	000.0097	0155.0	010.7	53.07	
139.0	000.0680	0049.1	006.5	023.2	000.0096	0154.8	010.6	53.21	
140.0	000.0680	0049.4	006.5	023.0	000.0094	0154.6	010.5	53.30	
141.0	000.0680	0049.3	006.5	022.7	000.0091	0154.0	010.4	53.26	
142.0	000.0680	0048.9	006.5	022.2	000.0086	0153.4	010.3	53.15	
143.0	000.0680	0048.8	006.5	021.9	000.0083	0152.9	010.2	53.09	
144.0	000.0680	0049.0	006.5	021.6	000.0079	0152.5	010.1	53.08	
145.0	000.0680	0049.3	006.5	021.3	000.0077	0152.1	010.0	53.09	
146.0	000.0680	0049.8	006.6	021.1	000.0075	0151.8	009.9	53.15	
147.0	000.0680	0050.3	006.6	020.9	000.0072	0151.5	009.8	53.21	
148.0	000.0680	0050.8	006.6	020.7	000.0070	0151.1	009.7	53.27	
149.0	000.0680	0051.2	006.7	020.4	000.0068	0150.7	009.5	53.28	
150.0	000.0680	0051.6	006.7	020.1	000.0065	0150.3	009.4	53.25	
151.0	000.0680	0051.9	006.7	019.7	000.0064	0149.8	009.3	53.33	
152.0	000.0680	0052.1	006.7	019.3	000.0063	0149.2	009.2	53.42	
153.0	000.0680	0051.8	006.7	018.7	000.0062	0148.4	009.2	53.44	
154.0	000.0680	0051.2	006.7	018.0	000.0061	0147.2	009.1	53.38	
155.0	000.0680	0050.5	006.6	017.3	000.0060	0146.0	009.1	53.30	
156.0	000.0680	0050.0	006.6	016.5	000.0059	0145.0	009.0	53.25	
157.0	000.0680	0049.6	006.6	015.9	000.0058	0144.3	009.0	53.24	
158.0	000.0680	0049.5	006.5	015.3	000.0057	0143.8	008.9	53.25	
159.0	000.0680	0049.6	006.5	014.7	000.0056	0143.4	008.8	53.31	
160.0	000.0680	0049.8	006.6	014.2	000.0055	0143.1	008.8	53.37	
161.0	000.0680	0050.1	006.6	013.6	000.0054	0142.7	008.7	53.43	
162.0	000.0680	0050.1	006.6	013.0	000.0053	0142.2	008.6	53.46	
163.0	000.0680	0049.8	006.6	012.2	000.0052	0141.8	008.6	53.42	
164.0	000.0680	0049.3	006.5	011.4	000.0051	0141.6	008.6	53.35	
165.0	000.0680	0048.8	006.5	010.6	000.0050	0141.7	008.5	53.29	
166.0	000.0680	0048.2	006.5	009.8	000.0049	0141.9	008.5	53.21	
167.0	000.0680	0047.4	006.4	009.0	000.0046	0142.1	008.5	53.00	

Exhibit 7c

Contour Protection Studies Toward Select Allocation Concern(s)

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
168.0	000.0680	0046.8	006.4	008.2	000.0044	0142.3	008.5	52.82
169.0	000.0680	0046.7	006.4	007.5	000.0042	0142.4	008.5	52.69
170.0	000.0680	0046.7	006.4	006.8	000.0040	0142.4	008.5	52.57
171.0	000.0680	0046.7	006.4	006.1	000.0039	0142.4	008.4	52.43
172.0	000.0680	0046.7	006.4	005.3	000.0037	0142.3	008.4	52.27
173.0	000.0680	0046.6	006.3	004.6	000.0035	0142.3	008.4	52.08
174.0	000.0680	0046.4	006.3	003.8	000.0033	0142.2	008.4	51.87
175.0	000.0680	0046.9	006.4	003.1	000.0032	0142.1	008.3	51.74
176.0	000.0680	0047.8	006.4	002.4	000.0030	0141.9	008.3	51.67
177.0	000.0680	0049.6	006.5	001.7	000.0028	0141.8	008.1	51.69
178.0	000.0680	0051.8	006.7	000.9	000.0027	0142.5	008.0	51.82
179.0	000.0680	0054.8	006.9	000.1	000.0025	0144.3	007.8	52.09
180.0	000.0680	0056.9	007.0	359.2	000.0024	0146.3	007.6	52.33
181.0	000.0680	0059.0	007.2	358.3	000.0024	0148.5	007.5	52.65
182.0	000.0680	0061.4	007.3	357.2	000.0023	0151.2	007.4	52.95
183.0	000.0680	0064.1	007.4	356.1	000.0022	0154.5	007.2	53.34
184.0	000.0680	0066.2	007.6	354.9	000.0022	0158.1	007.1	53.67
185.0	000.0680	0068.0	007.7	353.7	000.0021	0161.8	007.1	53.86
186.0	000.0680	0068.8	007.7	352.6	000.0020	0165.1	007.0	53.93
187.0	000.0680	0069.5	007.7	351.4	000.0019	0167.3	007.0	53.89
188.0	000.0680	0070.3	007.8	350.3	000.0018	0168.5	007.0	53.77
189.0	000.0680	0071.1	007.8	349.1	000.0018	0168.8	007.0	53.73
190.0	000.0680	0071.7	007.9	348.0	000.0018	0168.9	007.1	53.68
191.0	000.0680	0071.3	007.9	347.0	000.0018	0168.9	007.1	53.51
192.0	000.0680	0070.3	007.8	346.2	000.0018	0169.0	007.2	53.25
193.0	000.0680	0068.7	007.7	345.6	000.0018	0169.0	007.4	52.92
194.0	000.0680	0066.8	007.6	345.1	000.0018	0169.0	007.5	52.56
195.0	000.0680	0064.9	007.5	344.6	000.0018	0168.9	007.7	52.19
196.0	000.0680	0063.2	007.4	344.2	000.0018	0168.8	007.8	51.88
197.0	000.0680	0061.8	007.3	343.7	000.0018	0168.6	008.0	51.60
198.0	000.0680	0060.7	007.3	343.2	000.0018	0168.5	008.1	51.35
199.0	000.0680	0059.9	007.2	342.6	000.0018	0168.3	008.2	51.12
200.0	000.0680	0059.5	007.2	342.0	000.0018	0168.0	008.3	50.92
201.0	000.0680	0059.5	007.2	341.4	000.0018	0167.5	008.4	50.74
202.0	000.0680	0059.8	007.2	340.6	000.0018	0166.6	008.5	50.55
203.0	000.0680	0060.1	007.2	339.9	000.0018	0165.5	008.5	50.40
204.0	000.0680	0061.8	007.3	338.9	000.0020	0164.0	008.5	50.77
205.0	000.0680	0066.1	007.5	337.1	000.0024	0162.0	008.5	51.43
206.0	000.0680	0072.1	007.9	334.8	000.0030	0159.8	008.4	52.50
207.0	000.0680	0076.5	008.1	332.8	000.0034	0158.9	008.3	53.17
208.0	000.0680	0075.9	008.1	332.4	000.0035	0158.9	008.5	53.02
209.0	000.0680	0071.2	007.8	333.4	000.0033	0159.1	008.7	52.19
210.0	000.0680	0065.9	007.5	334.5	000.0030	0159.7	009.0	51.33

Exhibit 7d

Contour Protection Studies Toward Select Allocation Concern(s)

FMCommander Single Allocation Study - 01-02-2024 - FCC NGDC 30 Sec
W225CS.P's Overlaps (In= 1.54 km, Out= 0.32 km)

W225CS.P CH 225 D DA
Lat= 39 57 44.00, Lng= 83 00 08.00
0.25 kW 167.5 m HAAT, 407.4 m COR
Prot.= 60 dBu, Intef.= 54 dBu

WEFC-LP CH 224 L1 BLL20151123CUL
Lat= 39 58 34.20, Lng= 83 14 23.60
0.1 kW 22.02454 m HAAT, 298 m COR
Prot.= 60 dBu, Intef.= 54 dBu

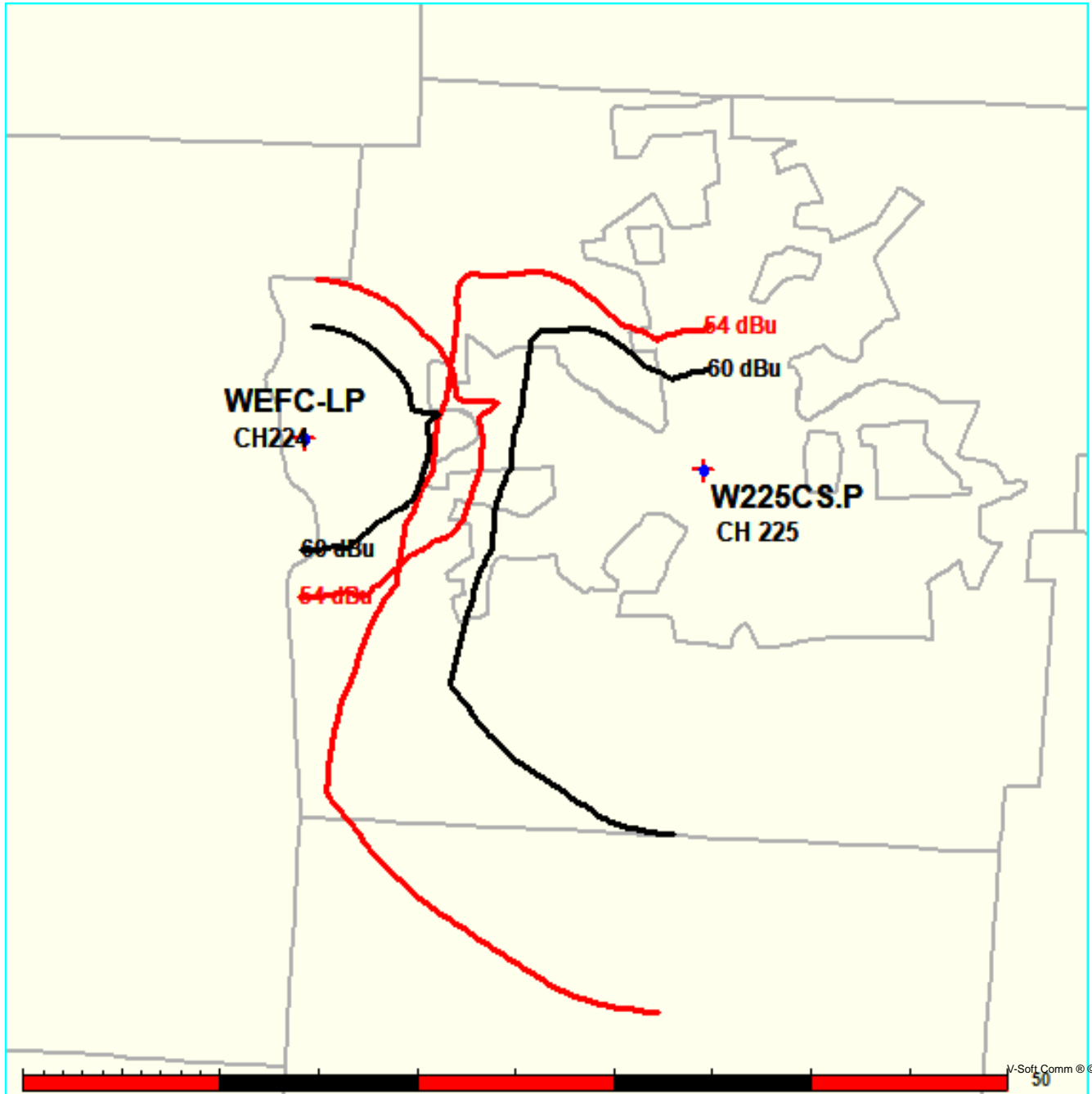


Exhibit 7d

Contour Protection Studies Toward Select Allocation Concern(s)

01-02-2024 Terrain Data: FCC NGDC 30 Sec FMOver Analysis

W225CS.P

WEFC-LP BLL20151123CUL

Channel = 225D
 Max ERP = 0.25 kW
 RCAMSL = 407.4 m
 N. Lat. 39 57 44.00
 W. Lng. 83 00 08.00
 Protected
 60 dBu

Channel = 224L1
 Max ERP = 0.1 kW
 RCAMSL = 298 m
 N. Lat. 39 58 34.20
 W. Lng. 83 14 23.60
 Interfering
 54 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
235.0	000.1806	0162.0	015.2	142.8	000.1000	0029.7	012.9	45.65	
236.0	000.1681	0161.6	014.9	141.4	000.1000	0029.7	012.7	46.00	
237.0	000.1560	0161.3	014.6	139.9	000.1000	0029.7	012.4	46.33	
238.0	000.1444	0160.9	014.3	138.3	000.1000	0029.6	012.2	46.64	
239.0	000.1332	0160.4	014.0	136.6	000.1000	0030.1	012.1	46.94	
240.0	000.1225	0159.9	013.7	134.9	000.1000	0030.8	011.9	47.35	
241.0	000.1156	0159.5	013.5	133.6	000.1000	0031.3	011.7	47.73	
242.0	000.1089	0159.1	013.3	132.2	000.1000	0031.7	011.6	48.09	
243.0	000.1024	0158.8	013.0	130.8	000.1000	0032.2	011.4	48.42	
244.0	000.0961	0158.4	012.8	129.4	000.1000	0032.6	011.3	48.71	
245.0	000.0900	0158.0	012.6	127.9	000.1000	0033.2	011.2	49.04	
246.0	000.0841	0157.6	012.4	126.4	000.1000	0034.5	011.1	49.48	
247.0	000.0784	0157.1	012.2	124.8	000.1000	0035.8	011.1	49.89	
248.0	000.0729	0156.5	011.9	123.1	000.1000	0036.5	011.0	50.15	
249.0	000.0676	0155.9	011.7	121.5	000.1000	0037.0	011.0	50.31	
250.0	000.0625	0155.3	011.4	119.9	000.1000	0037.5	011.0	50.43	
251.0	000.0613	0154.8	011.4	118.9	000.1000	0037.7	010.9	50.65	
252.0	000.0600	0154.3	011.3	117.9	000.1000	0037.9	010.8	50.85	
253.0	000.0588	0153.9	011.2	116.9	000.1000	0038.0	010.7	51.01	
254.0	000.0576	0153.6	011.1	115.9	000.1000	0038.0	010.6	51.15	
255.0	000.0564	0153.4	011.1	114.8	000.1000	0037.8	010.5	51.24	
256.0	000.0552	0153.2	011.0	113.8	000.1000	0037.6	010.5	51.32	
257.0	000.0541	0153.0	011.0	112.7	000.1000	0037.5	010.4	51.40	
258.0	000.0529	0152.9	010.9	111.7	000.1000	0037.4	010.3	51.48	
259.0	000.0518	0152.8	010.8	110.6	000.1000	0037.4	010.3	51.56	
260.0	000.0506	0152.7	010.8	109.5	000.1000	0037.3	010.2	51.62	
261.0	000.0488	0152.7	010.7	108.4	000.1000	0037.2	010.2	51.61	
262.0	000.0473	0152.7	010.6	107.2	000.1000	0037.2	010.2	51.63	
263.0	000.0456	0152.7	010.5	106.1	000.1000	0037.3	010.2	51.63	
264.0	000.0441	0152.8	010.4	104.9	000.1000	0037.4	010.2	51.64	

Exhibit 7d

Contour Protection Studies Toward Select Allocation Concern(s)

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
265.0	000.0424	0152.8	010.3	103.8	000.1000	0037.5	010.3	51.62
266.0	000.0410	0152.8	010.2	102.7	000.1000	0037.6	010.3	51.59
267.0	000.0396	0152.8	010.1	101.6	000.1000	0037.8	010.3	51.57
268.0	000.0380	0152.7	010.0	100.5	000.1000	0037.9	010.4	51.50
269.0	000.0365	0152.6	009.9	099.5	000.1000	0038.1	010.5	51.42
270.0	000.0352	0152.4	009.8	098.5	000.1000	0038.1	010.5	51.32
271.0	000.0352	0152.2	009.8	097.5	000.1000	0038.1	010.5	51.35
272.0	000.0352	0151.9	009.8	096.6	000.1000	0038.0	010.5	51.33
273.0	000.0352	0151.7	009.8	095.7	000.1000	0037.8	010.5	51.29
274.0	000.0352	0151.5	009.8	094.7	000.1000	0037.7	010.5	51.27
275.0	000.0352	0151.5	009.8	093.8	000.1000	0037.7	010.5	51.27
276.0	000.0352	0151.5	009.8	092.9	000.1000	0037.8	010.5	51.28
277.0	000.0352	0151.6	009.8	091.9	000.1000	0037.9	010.5	51.28
278.0	000.0352	0151.6	009.8	091.0	000.1000	0037.9	010.5	51.26
279.0	000.0352	0151.7	009.8	090.1	000.1000	0037.9	010.6	51.21
280.0	000.0352	0151.6	009.8	089.2	000.1000	0037.7	010.6	51.13
281.0	000.0352	0151.2	009.8	088.3	000.1000	0037.6	010.6	51.02
282.0	000.0352	0150.6	009.8	087.4	000.1000	0037.4	010.7	50.88
283.0	000.0352	0149.8	009.8	086.6	000.1000	0037.3	010.8	50.73
284.0	000.0352	0149.1	009.7	085.7	000.1000	0037.2	010.8	50.59
285.0	000.0352	0148.7	009.7	084.9	000.1000	0037.1	010.9	50.44
286.0	000.0352	0148.6	009.7	084.1	000.1000	0036.9	011.0	50.29
287.0	000.0352	0149.0	009.7	083.3	000.1000	0036.6	011.0	50.14
288.0	000.0352	0149.9	009.8	082.4	000.1000	0038.7	011.1	50.56
289.0	000.0352	0150.9	009.8	081.5	000.1000	0041.1	011.1	51.03
290.0	000.0352	0151.6	009.8	080.7	000.1000	0043.4	011.2	51.42
291.0	000.0355	0152.3	009.9	079.8	000.1000	0045.6	011.2	51.81
292.0	000.0361	0152.7	009.9	078.9	000.1000	0042.2	011.3	51.03
293.0	000.0365	0153.1	010.0	078.1	000.1000	0038.0	011.3	49.98
294.0	000.0371	0153.3	010.0	077.2	000.1000	0033.9	011.4	48.90
295.0	000.0374	0153.6	010.0	076.4	000.1000	0030.4	011.5	47.94
296.0	000.0380	0154.1	010.1	075.5	000.1000	0029.4	011.5	47.72
297.0	000.0386	0154.8	010.2	074.7	000.1000	0029.0	011.6	47.62
298.0	000.0390	0155.8	010.2	073.8	000.1000	0028.8	011.7	47.49
299.0	000.0396	0156.8	010.3	073.0	000.1000	0028.7	011.8	47.38
300.0	000.0400	0158.0	010.4	072.1	000.1000	0029.0	011.8	47.25
301.0	000.0400	0159.8	010.4	071.3	000.1000	0029.5	011.9	47.10
302.0	000.0400	0161.9	010.5	070.5	000.1000	0030.0	012.0	46.96
303.0	000.0400	0164.4	010.6	069.6	000.1000	0030.5	012.1	46.94
304.0	000.0400	0167.0	010.7	068.8	000.1000	0030.9	012.2	46.89
305.0	000.0400	0169.5	010.8	067.9	000.1000	0031.2	012.3	46.80
306.0	000.0400	0171.8	010.8	067.2	000.1000	0031.3	012.4	46.67
307.0	000.0400	0172.9	010.9	066.6	000.1000	0031.5	012.6	46.49

Exhibit 7d

Contour Protection Studies Toward Select Allocation Concern(s)

01-02-2024 Terrain Data: FCC NGDC 30 Sec FMOver Analysis

WEFC-LP BLL20151123CUL

W225CS.P

Channel = 224L1
Max ERP = 0.1 kW
RCAMSL = 298 m
N. Lat. 39 58 34.20
W. Lng. 83 14 23.60
Protected
60 dBu

Channel = 225D
Max ERP = 0.25 kW
RCAMSL = 407.4 m
N. Lat. 39 57 44.00
W. Lng. 83 00 08.00
Interfering
54 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
049.0	000.1000	0029.6	005.6	288.2	000.0352	0150.1	016.8	51.01	
050.0	000.1000	0030.0	005.6	288.1	000.0352	0150.0	016.7	51.07	
051.0	000.1000	0030.3	005.7	287.9	000.0352	0149.8	016.6	51.14	
052.0	000.1000	0030.6	005.7	287.8	000.0352	0149.7	016.6	51.22	
053.0	000.1000	0031.0	005.7	287.7	000.0352	0149.6	016.5	51.29	
054.0	000.1000	0031.3	005.7	287.6	000.0352	0149.5	016.4	51.36	
055.0	000.1000	0031.4	005.7	287.4	000.0352	0149.3	016.3	51.42	
056.0	000.1000	0031.4	005.7	287.2	000.0352	0149.2	016.2	51.48	
057.0	000.1000	0031.5	005.8	287.0	000.0352	0149.0	016.1	51.54	
058.0	000.1000	0031.5	005.8	286.7	000.0352	0148.9	016.0	51.59	
059.0	000.1000	0031.4	005.8	286.5	000.0352	0148.8	016.0	51.64	
060.0	000.1000	0031.4	005.8	286.2	000.0352	0148.7	015.9	51.70	
061.0	000.1000	0031.4	005.8	286.0	000.0352	0148.6	015.8	51.76	
062.0	000.1000	0031.5	005.8	285.7	000.0352	0148.6	015.7	51.82	
063.0	000.1000	0031.5	005.8	285.5	000.0352	0148.6	015.7	51.87	
064.0	000.1000	0031.5	005.8	285.2	000.0352	0148.6	015.6	51.93	
065.0	000.1000	0031.5	005.8	284.9	000.0352	0148.7	015.5	51.99	
066.0	000.1000	0031.5	005.8	284.6	000.0352	0148.7	015.5	52.05	
067.0	000.1000	0031.4	005.8	284.3	000.0352	0148.9	015.4	52.10	
068.0	000.1000	0031.1	005.7	284.0	000.0352	0149.1	015.4	52.15	
069.0	000.1000	0030.8	005.7	283.6	000.0352	0149.4	015.4	52.20	
070.0	000.1000	0030.3	005.7	283.2	000.0352	0149.7	015.3	52.24	
071.0	000.1000	0029.7	005.6	282.8	000.0352	0150.0	015.3	52.28	
072.0	000.1000	0029.1	005.6	282.5	000.0352	0150.2	015.2	52.34	
073.0	000.1000	0028.7	005.6	282.2	000.0352	0150.4	015.2	52.40	
074.0	000.1000	0028.8	005.6	281.9	000.0352	0150.6	015.2	52.45	
075.0	000.1000	0029.1	005.6	281.5	000.0352	0150.9	015.1	52.50	
076.0	000.1000	0029.7	005.6	281.2	000.0352	0151.1	015.1	52.55	
077.0	000.1000	0032.9	005.9	281.2	000.0352	0151.1	014.8	52.68	
078.0	000.1000	0037.7	006.3	281.5	000.0352	0150.9	014.4	53.13	
079.0	000.1000	0042.7	006.7	281.7	000.0352	0150.8	014.0	53.62	
080.0	000.1000	0045.3	006.9	281.5	000.0352	0150.9	013.8	53.92	
081.0	000.1000	0042.5	006.7	280.8	000.0352	0151.4	013.9	53.75	

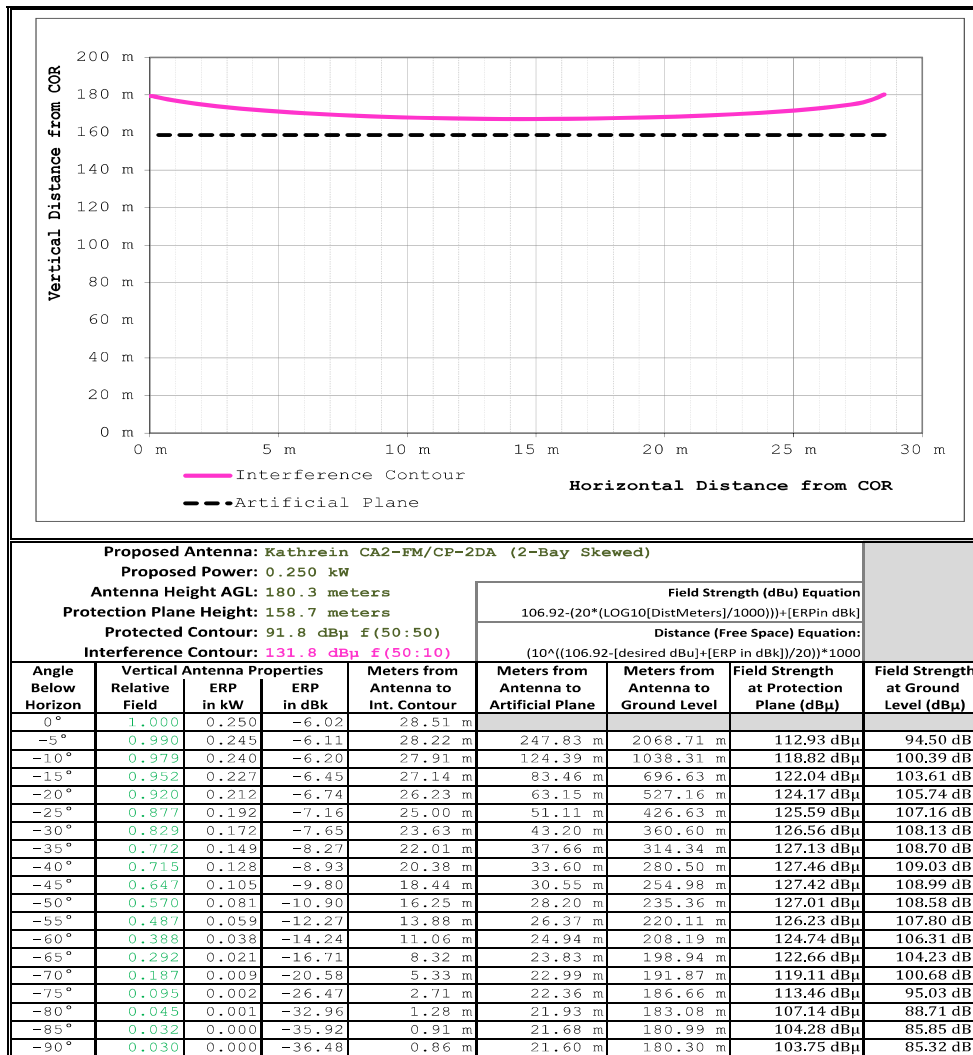
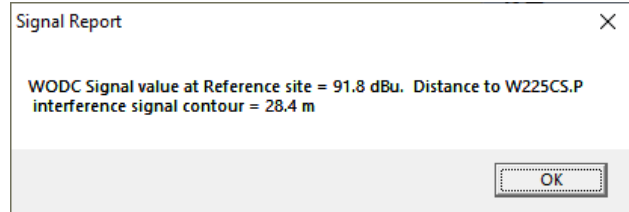
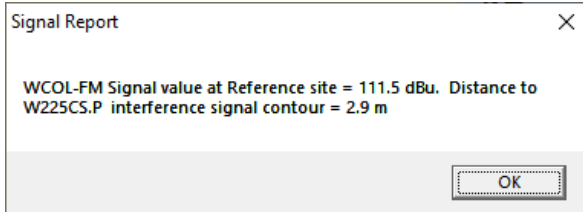
Exhibit 7d
Contour Protection Studies Toward Select Allocation Concern(s)

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
082.0	000.1000	0039.8	006.4	280.0	000.0352	0151.6	014.1	53.55
083.0	000.1000	0037.1	006.2	279.4	000.0352	0151.7	014.3	53.35
084.0	000.1000	0036.9	006.2	278.9	000.0352	0151.7	014.3	53.36
085.0	000.1000	0037.1	006.2	278.5	000.0352	0151.6	014.2	53.41
086.0	000.1000	0037.3	006.2	278.1	000.0352	0151.6	014.2	53.45
087.0	000.1000	0037.4	006.2	277.7	000.0352	0151.6	014.1	53.48
088.0	000.1000	0037.5	006.3	277.2	000.0352	0151.6	014.1	53.52
089.0	000.1000	0037.7	006.3	276.8	000.0352	0151.5	014.1	53.55
090.0	000.1000	0037.8	006.3	276.4	000.0352	0151.5	014.1	53.58
091.0	000.1000	0037.9	006.3	275.9	000.0352	0151.5	014.0	53.60
092.0	000.1000	0037.9	006.3	275.5	000.0352	0151.5	014.0	53.60
093.0	000.1000	0037.8	006.3	275.0	000.0352	0151.5	014.0	53.60
094.0	000.1000	0037.7	006.3	274.6	000.0352	0151.5	014.0	53.60
095.0	000.1000	0037.7	006.3	274.1	000.0352	0151.5	014.0	53.60
096.0	000.1000	0037.9	006.3	273.7	000.0352	0151.6	014.0	53.62
097.0	000.1000	0038.1	006.3	273.2	000.0352	0151.6	014.0	53.63
098.0	000.1000	0038.1	006.3	272.8	000.0352	0151.7	014.0	53.63
099.0	000.1000	0038.1	006.3	272.3	000.0352	0151.8	014.0	53.63
100.0	000.1000	0038.0	006.3	271.9	000.0352	0152.0	014.1	53.60
101.0	000.1000	0037.9	006.3	271.5	000.0352	0152.1	014.1	53.57
102.0	000.1000	0037.7	006.3	271.0	000.0352	0152.1	014.1	53.54
103.0	000.1000	0037.6	006.3	270.6	000.0352	0152.2	014.2	53.51
104.0	000.1000	0037.5	006.2	270.2	000.0352	0152.3	014.2	53.48
105.0	000.1000	0037.4	006.2	269.8	000.0354	0152.4	014.2	53.47
106.0	000.1000	0037.3	006.2	269.4	000.0360	0152.5	014.3	53.50
107.0	000.1000	0037.2	006.2	269.0	000.0365	0152.6	014.3	53.52
108.0	000.1000	0037.2	006.2	268.6	000.0372	0152.7	014.3	53.56
109.0	000.1000	0037.2	006.2	268.1	000.0378	0152.7	014.4	53.60
110.0	000.1000	0037.3	006.2	267.7	000.0385	0152.7	014.4	53.63
111.0	000.1000	0037.4	006.2	267.3	000.0391	0152.8	014.4	53.66
112.0	000.1000	0037.4	006.2	266.9	000.0397	0152.8	014.5	53.68
113.0	000.1000	0037.5	006.3	266.5	000.0403	0152.8	014.5	53.69
114.0	000.1000	0037.7	006.3	266.1	000.0408	0152.8	014.6	53.71
115.0	000.1000	0037.8	006.3	265.7	000.0414	0152.8	014.6	53.72
116.0	000.1000	0038.0	006.3	265.3	000.0420	0152.8	014.7	53.73
117.0	000.1000	0038.0	006.3	265.0	000.0425	0152.8	014.7	53.72
118.0	000.1000	0037.9	006.3	264.6	000.0431	0152.8	014.8	53.71
119.0	000.1000	0037.7	006.3	264.3	000.0436	0152.8	014.9	53.67
120.0	000.1000	0037.5	006.2	264.0	000.0441	0152.8	014.9	53.64
121.0	000.1000	0037.2	006.2	263.7	000.0445	0152.8	015.0	53.73
122.0	000.1000	0036.9	006.2	263.4	000.0449	0152.8	015.1	53.69
123.0	000.1000	0036.6	006.2	263.2	000.0453	0152.8	015.2	53.65
124.0	000.1000	0036.2	006.1	263.0	000.0456	0152.7	015.3	53.61
125.0	000.1000	0035.6	006.1	262.8	000.0459	0152.7	015.4	53.54

Exhibit 8

47 C.F.R. Section 74.1204(d) Second / Third Adjacent Given Interference Waiver Request

The applicant would like to note the existence of a 47 C.F.R. Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Request toward WCOL-FM – Columbus, OH (CH222B) and WODC(FM) – Ashville, OH (CH227B) as noted in **Exhibit 8**. Protection of the worst case calculated 131.8 dBμ F(50:10) Interference Contour, corresponding to the worst case calculated 91.8 dBμ F(50:50) Protected Contour, has been demonstrated through a downward radiation study. Full protection will be afforded all concerns as this area will not reach the ground nor a 158.7 meter artificial plane representing the highest unoccupied floor of the building mounted operation when taking into account the downward radiation characteristics of the antenna as supplied by the antenna manufacturer. A copy of the manufacturer's antenna specifications has been included in **Exhibit 9**.

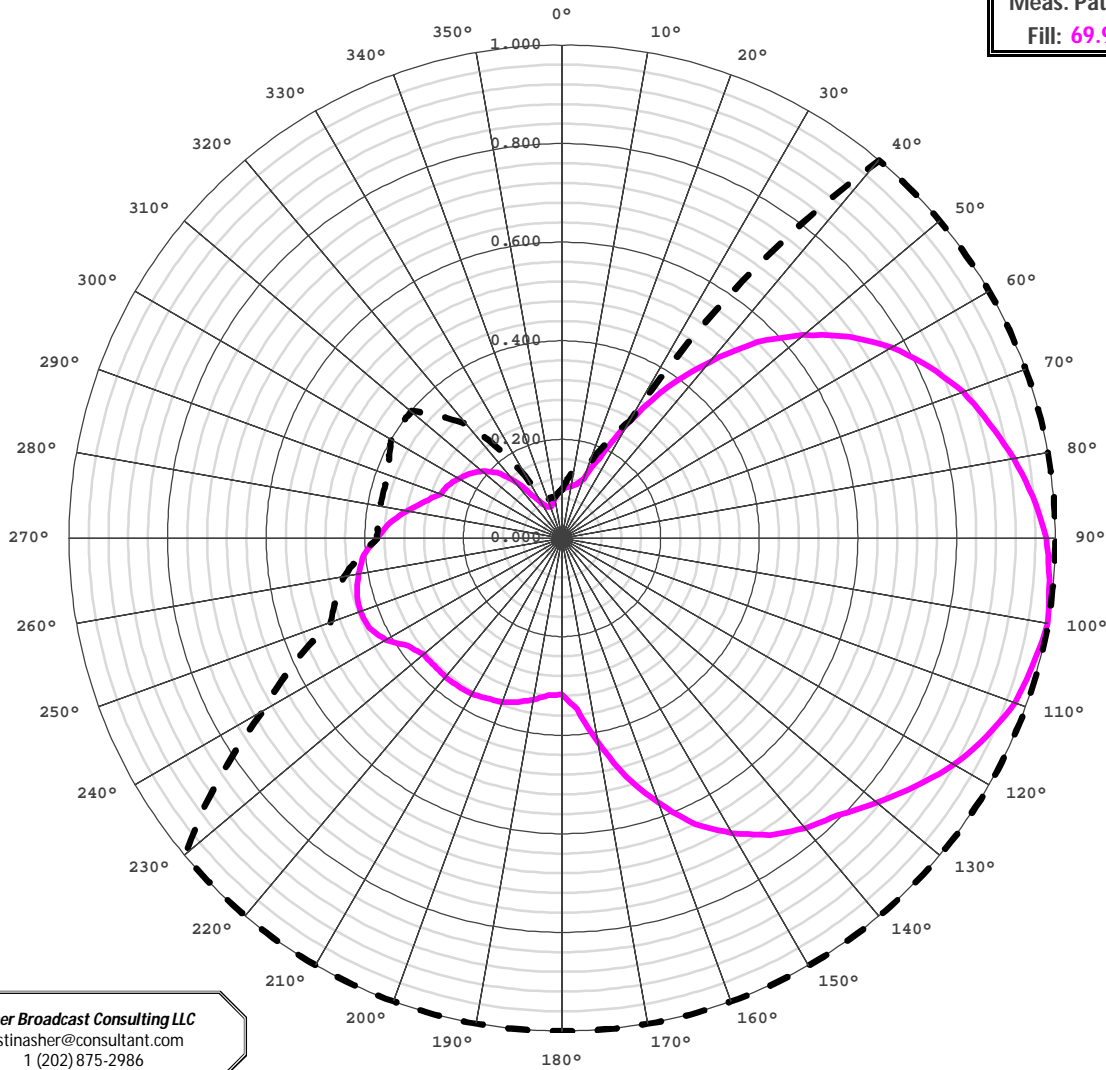


Manufacturer's	Make/Model	Orientation	Power
Element 1:	CA2-FM(CP)	100° True	90.0%
Element 2:	CA2-FM(CP)	210° True	10.0%
Element 3:			
Element 4:			

Composite Power: 100%

Exhibit 9 Manufacturer's Directional Antenna Pattern Data

Meas. Pattern
Fill: 69.9%



Azimuth ° True	FCC Pattern	Manufacturer's Pattern
0°	0.100	0.098
10°	0.140	0.107
20°	0.160	0.127
30°	0.275	0.270
40°	1.000	0.466
50°	1.000	0.640
60°	1.000	0.773
70°	1.000	0.866
80°	1.000	0.930
90°	1.000	0.982
100°	1.000	1.000
110°	1.000	0.978
120°	1.000	0.919
130°	1.000	0.834
140°	1.000	0.768
150°	1.000	0.691
160°	1.000	0.571
170°	1.000	0.420
180°	1.000	0.318
190°	1.000	0.333
200°	1.000	0.354
210°	1.000	0.366
220°	1.000	0.368
230°	1.000	0.367
240°	0.700	0.413
250°	0.500	0.436
260°	0.450	0.419
270°	0.375	0.375
280°	0.375	0.318
290°	0.375	0.262
300°	0.400	0.241
310°	0.400	0.210
320°	0.300	0.152
330°	0.130	0.079
340°	0.085	0.067
350°	0.085	0.083

Asher Broadcast Consulting LLC
justinasher@consultant.com
1 (202) 875-2986

Allocation (FCC) Pattern: ---
Manufacturer's Pattern: ———

Exhibit 9

Copy of Manufacturer's Directional Antenna Documentation

(Actual Antenna Pattern rotated to 100.0°T & 210°T) (public record copy)

CA2-FM/CP

FM Yagi Antenna

88—108 MHz Circularly polarized

KATHREIN

The KUSA CA2-FM/CP is a circularly polarized antenna, designed for professional FM transmit and receive applications.

Like all KUSA antennas, the CA2-FM/CP is made of the finest materials using state of the art electrical and mechanical designs resulting in superior performance and long service life.

The CA2-FM/CP may be used stand alone or in stacked arrays for higher gain, increased side-lobe suppression, or custom azimuth patterns.

Specifications

Frequency range	Any specified FM channel 88 to 108 MHz
-----------------	---

Gain	1 dBd
------	-------

Impedance	50 ohms
-----------	---------

VSWR	<1.5:1
------	--------

Polarization	Circular
--------------	----------

Front-to-back ratio	>11 dB
---------------------	--------

Maximum input power	250 watts
---------------------	-----------

Azimuth beamwidth	80 degrees (half-power)
-------------------	-------------------------

Elevation beamwidth	80 degrees (half-power)
---------------------	-------------------------

Connector	N female
-----------	----------

Weight	21 lb (9.5 kg)
--------	----------------

Dimensions	51 x 51 x 39 inches maximum (1295 x 1295 x 991 mm)
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Wind load at 100 mph (161 kph)	
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Front	34.6 lbf (154 N)
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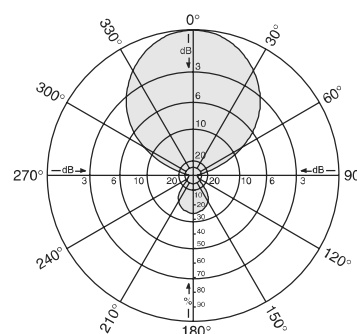
Wind survival rating*	120 mph (193 kph)
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Shipping dimensions	75 x 11 x 6 inches (1905 x 279 x 152 mm)
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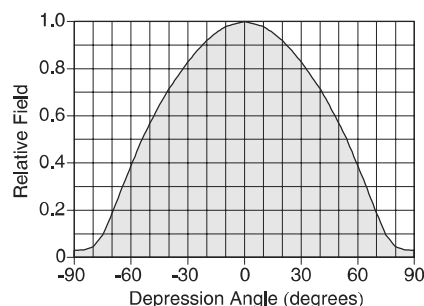
Shipping weight	24 lb (10.9 kg)
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Mounting	For masts of 2.375 inch (60 mm) OD.
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*Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.



Azimuth pattern



Elevation pattern

10813b subject to alteration



All specifications are subject to change without notice.
The latest specifications are available at www.kathreinusa.com

CA2-FM/CP Page 1 of 2

Kathrein USA Greenway Plaza II, 2400 Lakeside Blvd., Suite 650, Richardson TX 75082
Phone: 214.238.8800 Fax: 214.238.8801 Email: info@kathrein.com

Exhibit 9

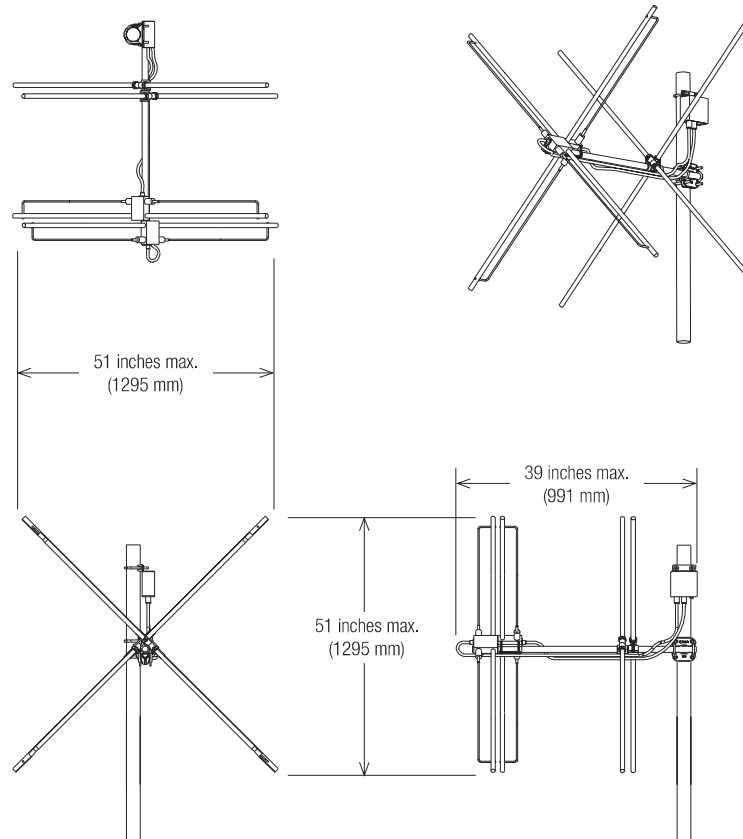
Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 100.0°T & 210°T) (public record copy)

CA2-FM/CP

FM Yagi Antenna

88—108 MHz Circularly polarized

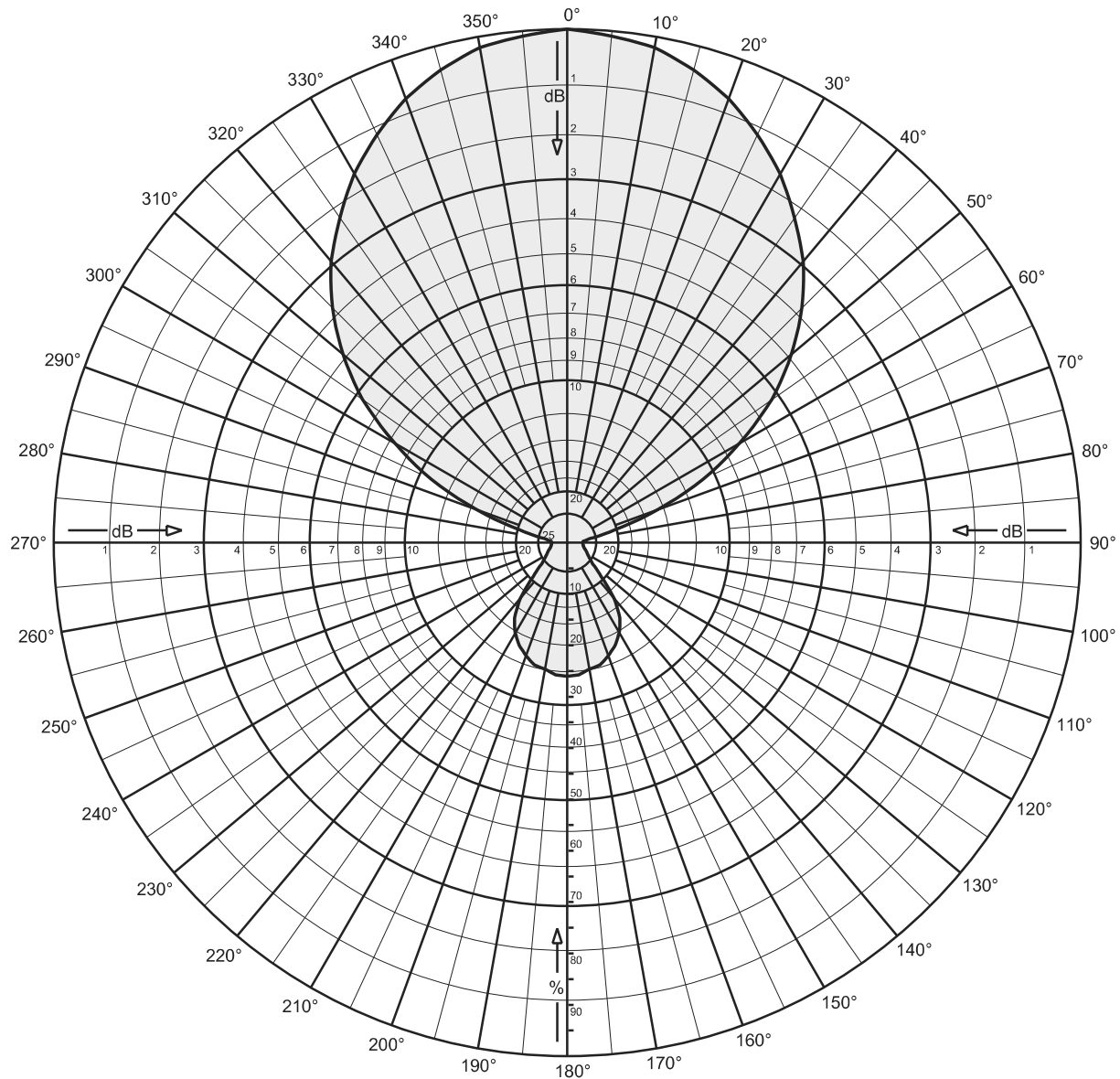
KATHREIN



10813b subject to alteration

Exhibit 9

Copy of Manufacturer's Directional Antenna Documentation
(Actual Antenna Pattern rotated to **100.0°T** & **210°T**) (public record copy)



CA2-FM/CP

98 MHz

Maximum gain: 1.0 dBd

Circular polarization

Horizontal plane pattern

KATHREIN
USA

Exhibit 9

Copy of Manufacturer's Directional Antenna Documentation

(Actual Antenna Pattern rotated to 100.0°T & 210°T) (public record copy)

CA2-FM/CP
98 MHz
Maximum gain: 1 dBd
Circular polarization
Horizontal plane pattern

CA2-FM/CP
FM Yagi Antenna
88—108 MHz Circularly polarized

KATHREIN

Angle	Rel.Field	Rel.dB	dBd	PwrMult	Angle	Rel.Field	Rel.dB	dBd	PwrMult
0	1.000	0.00	1.00	1.26	42	0.688	-3.25	-2.25	0.60
1	0.998	-0.02	0.98	1.25	43	0.674	-3.43	-2.43	0.57
2	0.996	-0.03	0.97	1.25	44	0.660	-3.60	-2.60	0.55
3	0.994	-0.05	0.95	1.24	45	0.647	-3.79	-2.79	0.53
4	0.992	-0.07	0.93	1.24	46	0.631	-3.99	-2.99	0.50
5	0.990	-0.09	0.91	1.23	47	0.616	-4.21	-3.21	0.48
6	0.988	-0.11	0.89	1.23	48	0.601	-4.43	-3.43	0.45
7	0.986	-0.13	0.87	1.22	49	0.585	-4.65	-3.65	0.43
8	0.984	-0.14	0.86	1.22	50	0.570	-4.88	-3.88	0.41
9	0.981	-0.16	0.84	1.21	51	0.553	-5.14	-4.14	0.39
10	0.979	-0.18	0.82	1.21	52	0.537	-5.41	-4.41	0.36
11	0.974	-0.23	0.77	1.19	53	0.520	-5.68	-4.68	0.34
12	0.969	-0.28	0.72	1.18	54	0.503	-5.96	-4.96	0.32
13	0.963	-0.33	0.67	1.17	55	0.487	-6.26	-5.26	0.30
14	0.958	-0.37	0.63	1.16	56	0.467	-6.61	-5.61	0.27
15	0.952	-0.42	0.58	1.14	57	0.447	-6.99	-5.99	0.25
16	0.946	-0.48	0.52	1.13	58	0.428	-7.38	-6.38	0.23
17	0.939	-0.54	0.46	1.11	59	0.408	-7.79	-6.79	0.21
18	0.933	-0.60	0.40	1.10	60	0.388	-8.22	-7.22	0.19
19	0.927	-0.66	0.34	1.08	61	0.369	-8.66	-7.66	0.17
20	0.920	-0.72	0.28	1.07	62	0.350	-9.13	-8.13	0.15
21	0.911	-0.81	0.19	1.04	63	0.330	-9.62	-8.62	0.14
22	0.903	-0.89	0.11	1.03	64	0.311	-10.14	-9.14	0.12
23	0.894	-0.97	0.03	1.01	65	0.292	-10.70	-9.70	0.11
24	0.885	-1.06	-0.06	0.99	66	0.271	-11.35	-10.35	0.09
25	0.877	-1.14	-0.14	0.97	67	0.250	-12.05	-11.05	0.08
26	0.867	-1.24	-0.24	0.95	68	0.229	-12.82	-11.82	0.07
27	0.858	-1.33	-0.33	0.93	69	0.208	-13.65	-12.65	0.05
28	0.848	-1.43	-0.43	0.91	70	0.187	-14.58	-13.58	0.04
29	0.839	-1.53	-0.53	0.89	71	0.168	-15.48	-14.48	0.04
30	0.829	-1.63	-0.63	0.86	72	0.150	-16.48	-15.48	0.03
31	0.818	-1.75	-0.75	0.84	73	0.132	-17.61	-16.61	0.02
32	0.806	-1.87	-0.87	0.82	74	0.113	-18.91	-17.91	0.02
33	0.795	-2.00	-1.00	0.79	75	0.095	-20.45	-19.45	0.01
34	0.783	-2.12	-1.12	0.77	76	0.085	-21.41	-20.41	0.01
35	0.772	-2.25	-1.25	0.75	77	0.075	-22.50	-21.50	0.01
36	0.760	-2.38	-1.38	0.73	78	0.065	-23.74	-22.74	0.01
37	0.749	-2.51	-1.51	0.71	79	0.055	-25.19	-24.19	0.00
38	0.738	-2.64	-1.64	0.69	80	0.045	-26.94	-25.94	0.00
39	0.726	-2.78	-1.78	0.66	81	0.042	-27.47	-26.47	0.00
40	0.715	-2.91	-1.91	0.64	82	0.040	-28.03	-27.03	0.00
41	0.701	-3.08	-2.08	0.62	83	0.037	-28.64	-27.64	0.00

Exhibit 9

Copy of Manufacturer's Directional Antenna Documentation

(Actual Antenna Pattern rotated to 100.0°T & 210°T) (public record copy)

Angle	Rel.Field	Rel.dB	dBd	PwrMult	Angle	Rel.Field	Rel.dB	dBd	PwrMult
84	0.034	-29.29	-28.29	0.00	134	0.088	-21.14	-20.14	0.01
85	0.032	-29.99	-28.99	0.00	135	0.093	-20.60	-19.60	0.01
86	0.031	-30.08	-29.08	0.00	136	0.103	-19.74	-18.74	0.01
87	0.031	-30.17	-29.17	0.00	137	0.113	-18.96	-17.96	0.02
88	0.031	-30.27	-29.27	0.00	138	0.122	-18.25	-17.25	0.02
89	0.030	-30.36	-29.36	0.00	139	0.132	-17.59	-16.59	0.02
90	0.030	-30.46	-29.46	0.00	140	0.142	-16.97	-15.97	0.03
91	0.030	-30.41	-29.41	0.00	141	0.149	-16.53	-15.53	0.03
92	0.030	-30.36	-29.36	0.00	142	0.157	-16.10	-15.10	0.03
93	0.030	-30.31	-29.31	0.00	143	0.164	-15.69	-14.69	0.03
94	0.031	-30.27	-29.27	0.00	144	0.172	-15.31	-14.31	0.04
95	0.031	-30.22	-29.22	0.00	145	0.179	-14.93	-13.93	0.04
96	0.031	-30.17	-29.17	0.00	146	0.184	-14.71	-13.71	0.04
97	0.031	-30.13	-29.13	0.00	147	0.188	-14.49	-13.49	0.04
98	0.031	-30.08	-29.08	0.00	148	0.193	-14.28	-13.28	0.05
99	0.032	-30.03	-29.03	0.00	149	0.198	-14.07	-13.07	0.05
100	0.032	-29.99	-28.99	0.00	150	0.202	-13.87	-12.87	0.05
101	0.032	-29.90	-28.90	0.00	151	0.206	-13.72	-12.72	0.05
102	0.032	-29.81	-28.81	0.00	152	0.210	-13.56	-12.56	0.06
103	0.033	-29.72	-28.72	0.00	153	0.213	-13.41	-12.41	0.06
104	0.033	-29.63	-28.63	0.00	154	0.217	-13.26	-12.26	0.06
105	0.033	-29.54	-28.54	0.00	155	0.221	-13.12	-12.12	0.06
106	0.034	-29.37	-28.37	0.00	156	0.223	-13.01	-12.01	0.06
107	0.035	-29.20	-28.20	0.00	157	0.226	-12.91	-11.91	0.06
108	0.035	-29.04	-28.04	0.00	158	0.229	-12.81	-11.81	0.07
109	0.036	-28.87	-27.87	0.00	159	0.231	-12.71	-11.71	0.07
110	0.037	-28.71	-27.71	0.00	160	0.234	-12.61	-11.61	0.07
111	0.038	-28.48	-27.48	0.00	161	0.237	-12.52	-11.52	0.07
112	0.039	-28.25	-27.25	0.00	162	0.239	-12.43	-11.43	0.07
113	0.040	-28.03	-27.03	0.00	163	0.242	-12.34	-11.34	0.07
114	0.041	-27.82	-26.82	0.00	164	0.244	-12.25	-11.25	0.07
115	0.042	-27.60	-26.60	0.00	165	0.247	-12.16	-11.16	0.08
116	0.043	-27.43	-26.43	0.00	166	0.247	-12.13	-11.13	0.08
117	0.043	-27.26	-26.26	0.00	167	0.248	-12.11	-11.11	0.08
118	0.044	-27.10	-26.10	0.00	168	0.249	-12.09	-11.09	0.08
119	0.045	-26.94	-25.94	0.00	169	0.249	-12.06	-11.06	0.08
120	0.046	-26.78	-25.78	0.00	170	0.250	-12.04	-11.04	0.08
121	0.047	-26.50	-25.50	0.00	171	0.252	-11.98	-10.98	0.08
122	0.049	-26.23	-25.23	0.00	172	0.253	-11.93	-10.93	0.08
123	0.050	-25.96	-24.96	0.00	173	0.255	-11.87	-10.87	0.08
124	0.052	-25.71	-24.71	0.00	174	0.257	-11.81	-10.81	0.08
125	0.053	-25.46	-24.46	0.00	175	0.258	-11.76	-10.76	0.08
126	0.056	-25.09	-24.09	0.00	176	0.259	-11.75	-10.75	0.08
127	0.058	-24.73	-23.73	0.00	177	0.259	-11.73	-10.73	0.08
128	0.060	-24.39	-23.39	0.00	178	0.259	-11.72	-10.72	0.08
129	0.063	-24.06	-23.06	0.00	179	0.260	-11.71	-10.71	0.08
130	0.065	-23.74	-22.74	0.01	180	0.260	-11.70	-10.70	0.09
131	0.071	-23.02	-22.02	0.01	181	0.260	-11.71	-10.71	0.08
132	0.076	-22.35	-21.35	0.01	182	0.259	-11.72	-10.72	0.08
133	0.082	-21.72	-20.72	0.01	183	0.259	-11.73	-10.73	0.08

Exhibit 9

Copy of Manufacturer's Directional Antenna Documentation

(Actual Antenna Pattern rotated to 100.0°T & 210°T) (public record copy)

Angle	Rel.Field	Rel.dB	dBd	PwrMult	Angle	Rel.Field	Rel.dB	dBd	PwrMult
184	0.259	-11.75	-10.75	0.08	234	0.056	-25.09	-24.09	0.00
185	0.258	-11.76	-10.76	0.08	235	0.053	-25.46	-24.46	0.00
186	0.257	-11.81	-10.81	0.08	236	0.052	-25.71	-24.71	0.00
187	0.255	-11.87	-10.87	0.08	237	0.050	-25.96	-24.96	0.00
188	0.253	-11.93	-10.93	0.08	238	0.049	-26.23	-25.23	0.00
189	0.252	-11.98	-10.98	0.08	239	0.047	-26.50	-25.50	0.00
190	0.250	-12.04	-11.04	0.08	240	0.046	-26.78	-25.78	0.00
191	0.249	-12.06	-11.06	0.08	241	0.045	-26.94	-25.94	0.00
192	0.249	-12.09	-11.09	0.08	242	0.044	-27.10	-26.10	0.00
193	0.248	-12.11	-11.11	0.08	243	0.043	-27.26	-26.26	0.00
194	0.247	-12.13	-11.13	0.08	244	0.043	-27.43	-26.43	0.00
195	0.247	-12.16	-11.16	0.08	245	0.042	-27.60	-26.60	0.00
196	0.244	-12.25	-11.25	0.07	246	0.041	-27.82	-26.82	0.00
197	0.242	-12.34	-11.34	0.07	247	0.040	-28.03	-27.03	0.00
198	0.239	-12.43	-11.43	0.07	248	0.039	-28.25	-27.25	0.00
199	0.237	-12.52	-11.52	0.07	249	0.038	-28.48	-27.48	0.00
200	0.234	-12.61	-11.61	0.07	250	0.037	-28.71	-27.71	0.00
201	0.231	-12.71	-11.71	0.07	251	0.036	-28.87	-27.87	0.00
202	0.229	-12.81	-11.81	0.07	252	0.035	-29.04	-28.04	0.00
203	0.226	-12.91	-11.91	0.06	253	0.035	-29.20	-28.20	0.00
204	0.223	-13.01	-12.01	0.06	254	0.034	-29.37	-28.37	0.00
205	0.221	-13.12	-12.12	0.06	255	0.033	-29.54	-28.54	0.00
206	0.217	-13.26	-12.26	0.06	256	0.033	-29.63	-28.63	0.00
207	0.213	-13.41	-12.41	0.06	257	0.033	-29.72	-28.72	0.00
208	0.210	-13.56	-12.56	0.06	258	0.032	-29.81	-28.81	0.00
209	0.206	-13.72	-12.72	0.05	259	0.032	-29.90	-28.90	0.00
210	0.202	-13.87	-12.87	0.05	260	0.032	-29.99	-28.99	0.00
211	0.198	-14.07	-13.07	0.05	261	0.032	-30.03	-29.03	0.00
212	0.193	-14.28	-13.28	0.05	262	0.031	-30.08	-29.08	0.00
213	0.188	-14.49	-13.49	0.04	263	0.031	-30.13	-29.13	0.00
214	0.184	-14.71	-13.71	0.04	264	0.031	-30.17	-29.17	0.00
215	0.179	-14.93	-13.93	0.04	265	0.031	-30.22	-29.22	0.00
216	0.172	-15.31	-14.31	0.04	266	0.031	-30.27	-29.27	0.00
217	0.164	-15.69	-14.69	0.03	267	0.030	-30.31	-29.31	0.00
218	0.157	-16.10	-15.10	0.03	268	0.030	-30.36	-29.36	0.00
219	0.149	-16.53	-15.53	0.03	269	0.030	-30.41	-29.41	0.00
220	0.142	-16.97	-15.97	0.03	270	0.030	-30.46	-29.46	0.00
221	0.132	-17.59	-16.59	0.02	271	0.030	-30.36	-29.36	0.00
222	0.122	-18.25	-17.25	0.02	272	0.031	-30.27	-29.27	0.00
223	0.113	-18.96	-17.96	0.02	273	0.031	-30.17	-29.17	0.00
224	0.103	-19.74	-18.74	0.01	274	0.031	-30.08	-29.08	0.00
225	0.093	-20.60	-19.60	0.01	275	0.032	-29.99	-28.99	0.00
226	0.088	-21.14	-20.14	0.01	276	0.034	-29.29	-28.29	0.00
227	0.082	-21.72	-20.72	0.01	277	0.037	-28.64	-27.64	0.00
228	0.076	-22.35	-21.35	0.01	278	0.040	-28.03	-27.03	0.00
229	0.071	-23.02	-22.02	0.01	279	0.042	-27.47	-26.47	0.00
230	0.065	-23.74	-22.74	0.01	280	0.045	-26.94	-25.94	0.00
231	0.063	-24.06	-23.06	0.00	281	0.055	-25.19	-24.19	0.00
232	0.060	-24.39	-23.39	0.00	282	0.065	-23.74	-22.74	0.01
233	0.058	-24.73	-23.73	0.00	283	0.075	-22.50	-21.50	0.01

Exhibit 9
Copy of Manufacturer's Directional Antenna Documentation
(Actual Antenna Pattern rotated to 100.0°T & 210°T) (public record copy)

Angle	Rel.Field	Rel.dB	dBd	PwrMult	Angle	Rel.Field	Rel.dB	dBd	PwrMult
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
284	0.085	-21.41	-20.41	0.01	334	0.867	-1.24	-0.24	0.95
285	0.095	-20.45	-19.45	0.01	335	0.877	-1.14	-0.14	0.97
286	0.113	-18.91	-17.91	0.02	336	0.885	-1.06	-0.06	0.99
287	0.132	-17.61	-16.61	0.02	337	0.894	-0.97	0.03	1.01
288	0.150	-16.48	-15.48	0.03	338	0.903	-0.89	0.11	1.03
289	0.168	-15.48	-14.48	0.04	339	0.911	-0.81	0.19	1.04
290	0.187	-14.58	-13.58	0.04	340	0.920	-0.72	0.28	1.07
291	0.208	-13.65	-12.65	0.05	341	0.927	-0.66	0.34	1.08
292	0.229	-12.82	-11.82	0.07	342	0.933	-0.60	0.40	1.10
293	0.250	-12.05	-11.05	0.08	343	0.939	-0.54	0.46	1.11
294	0.271	-11.35	-10.35	0.09	344	0.946	-0.48	0.52	1.13
295	0.292	-10.70	-9.70	0.11	345	0.952	-0.42	0.58	1.14
296	0.311	-10.14	-9.14	0.12	346	0.958	-0.37	0.63	1.16
297	0.330	-9.62	-8.62	0.14	347	0.963	-0.33	0.67	1.17
298	0.350	-9.13	-8.13	0.15	348	0.969	-0.28	0.72	1.18
299	0.369	-8.66	-7.66	0.17	349	0.974	-0.23	0.77	1.19
300	0.388	-8.22	-7.22	0.19	350	0.979	-0.18	0.82	1.21
301	0.408	-7.79	-6.79	0.21	351	0.981	-0.16	0.84	1.21
302	0.428	-7.38	-6.38	0.23	352	0.984	-0.14	0.86	1.22
303	0.447	-6.99	-5.99	0.25	353	0.986	-0.13	0.87	1.22
304	0.467	-6.61	-5.61	0.27	354	0.988	-0.11	0.89	1.23
305	0.487	-6.26	-5.26	0.30	355	0.990	-0.09	0.91	1.23
306	0.503	-5.96	-4.96	0.32	356	0.992	-0.07	0.93	1.24
307	0.520	-5.68	-4.68	0.34	357	0.994	-0.05	0.95	1.24
308	0.537	-5.41	-4.41	0.36	358	0.996	-0.03	0.97	1.25
309	0.553	-5.14	-4.14	0.39	359	0.998	-0.02	0.98	1.25
310	0.570	-4.88	-3.88	0.41					
311	0.585	-4.65	-3.65	0.43					
312	0.601	-4.43	-3.43	0.45					
313	0.616	-4.21	-3.21	0.48					
314	0.631	-3.99	-2.99	0.50					
315	0.647	-3.79	-2.79	0.53					
316	0.660	-3.60	-2.60	0.55					
317	0.674	-3.43	-2.43	0.57					
318	0.688	-3.25	-2.25	0.60					
319	0.701	-3.08	-2.08	0.62					
320	0.715	-2.91	-1.91	0.64					
321	0.726	-2.78	-1.78	0.66					
322	0.738	-2.64	-1.64	0.69					
323	0.749	-2.51	-1.51	0.71					
324	0.760	-2.38	-1.38	0.73					
325	0.772	-2.25	-1.25	0.75					
326	0.783	-2.12	-1.12	0.77					
327	0.795	-2.00	-1.00	0.79					
328	0.806	-1.87	-0.87	0.82					
329	0.818	-1.75	-0.75	0.84					
330	0.829	-1.63	-0.63	0.86					
331	0.839	-1.53	-0.53	0.89					
332	0.848	-1.43	-0.43	0.91					
333	0.858	-1.33	-0.33	0.93					

Exhibit 9

Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 100.0°T & 210°T) (public record copy)

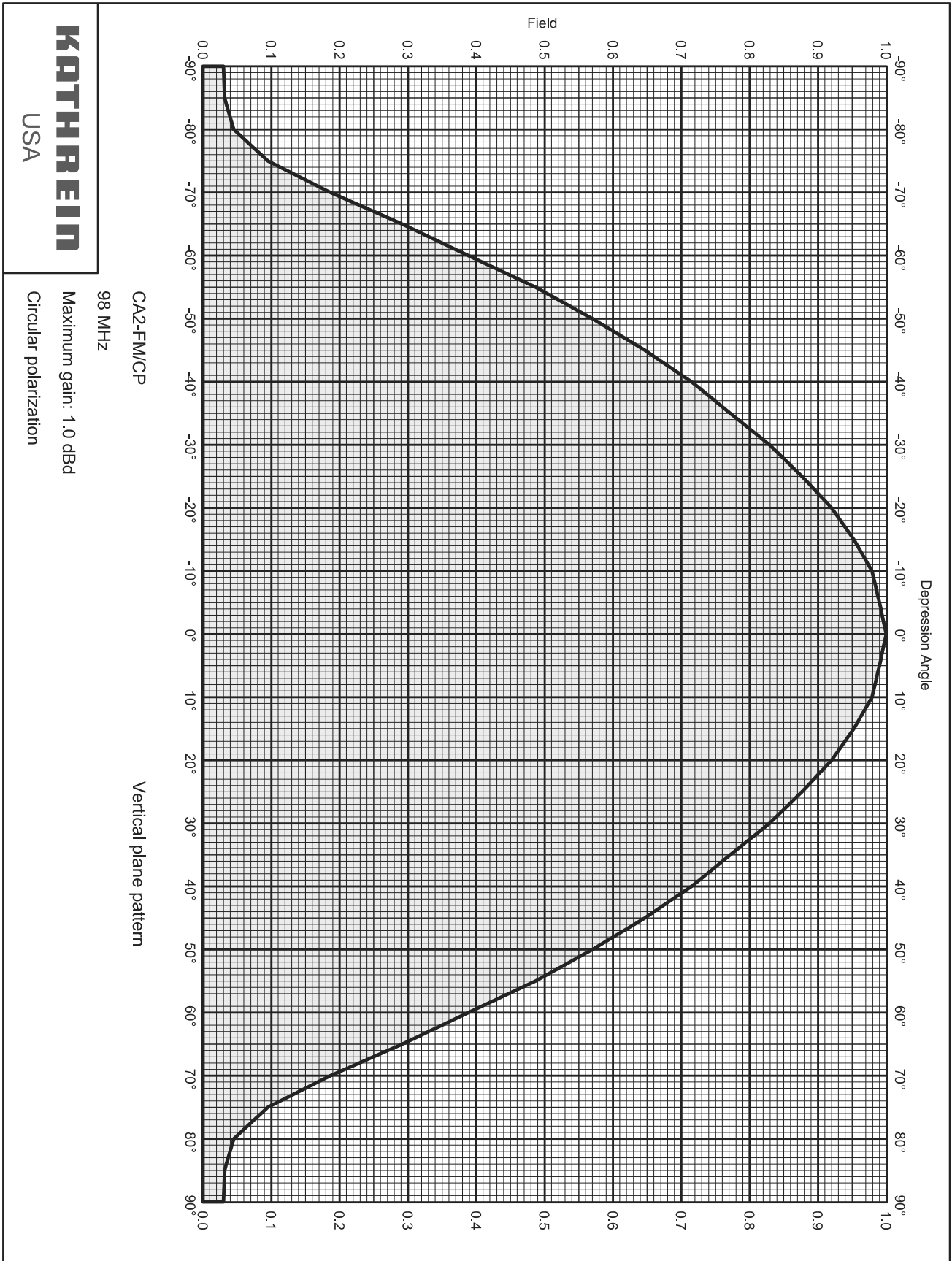


Exhibit 9

Copy of Manufacturer's Directional Antenna Documentation

(Actual Antenna Pattern rotated to 100.0°T & 210°T) (public record copy)

CA2-FM/CP
98 MHz
Maximum gain: 1 dBd
Circular polarization
Vertical plane pattern

CA2-FM/CP
FM Yagi Antenna
88—108 MHz Circularly polarized

KATHREIN

Angle	Rel.Field	Rel.dB	dBd	PwrMult	Angle	Rel.Field	Rel.dB	dBd	PwrMult
----	-----	-----	-----	-----	----	-----	-----	-----	-----
-90	0.030	-30.46	-29.46	0.00	-49	0.585	-4.65	-3.65	0.43
-89	0.030	-30.36	-29.36	0.00	-48	0.601	-4.43	-3.43	0.45
-88	0.031	-30.27	-29.27	0.00	-47	0.616	-4.21	-3.21	0.48
-87	0.031	-30.17	-29.17	0.00	-46	0.631	-3.99	-2.99	0.50
-86	0.031	-30.08	-29.08	0.00	-45	0.647	-3.79	-2.79	0.53
-85	0.032	-29.99	-28.99	0.00	-44	0.660	-3.60	-2.60	0.55
-84	0.034	-29.29	-28.29	0.00	-43	0.674	-3.43	-2.43	0.57
-83	0.037	-28.64	-27.64	0.00	-42	0.688	-3.25	-2.25	0.60
-82	0.040	-28.03	-27.03	0.00	-41	0.701	-3.08	-2.08	0.62
-81	0.042	-27.47	-26.47	0.00	-40	0.715	-2.91	-1.91	0.64
-80	0.045	-26.94	-25.94	0.00	-39	0.726	-2.78	-1.78	0.66
-79	0.055	-25.19	-24.19	0.00	-38	0.738	-2.64	-1.64	0.69
-78	0.065	-23.74	-22.74	0.01	-37	0.749	-2.51	-1.51	0.71
-77	0.075	-22.50	-21.50	0.01	-36	0.760	-2.38	-1.38	0.73
-76	0.085	-21.41	-20.41	0.01	-35	0.772	-2.25	-1.25	0.75
-75	0.095	-20.45	-19.45	0.01	-34	0.783	-2.12	-1.12	0.77
-74	0.113	-18.91	-17.91	0.02	-33	0.795	-2.00	-1.00	0.79
-73	0.132	-17.61	-16.61	0.02	-32	0.806	-1.87	-0.87	0.82
-72	0.150	-16.48	-15.48	0.03	-31	0.818	-1.75	-0.75	0.84
-71	0.168	-15.48	-14.48	0.04	-30	0.829	-1.63	-0.63	0.86
-70	0.187	-14.58	-13.58	0.04	-29	0.839	-1.53	-0.53	0.89
-69	0.208	-13.65	-12.65	0.05	-28	0.848	-1.43	-0.43	0.91
-68	0.229	-12.82	-11.82	0.07	-27	0.858	-1.33	-0.33	0.93
-67	0.250	-12.05	-11.05	0.08	-26	0.867	-1.24	-0.24	0.95
-66	0.271	-11.35	-10.35	0.09	-25	0.877	-1.14	-0.14	0.97
-65	0.292	-10.70	-9.70	0.11	-24	0.885	-1.06	-0.06	0.99
-64	0.311	-10.14	-9.14	0.12	-23	0.894	-0.97	0.03	1.01
-63	0.330	-9.62	-8.62	0.14	-22	0.903	-0.89	0.11	1.03
-62	0.350	-9.13	-8.13	0.15	-21	0.911	-0.81	0.19	1.04
-61	0.369	-8.66	-7.66	0.17	-20	0.920	-0.72	0.28	1.07
-60	0.388	-8.22	-7.22	0.19	-19	0.927	-0.66	0.34	1.08
-59	0.408	-7.79	-6.79	0.21	-18	0.933	-0.60	0.40	1.10
-58	0.428	-7.38	-6.38	0.23	-17	0.939	-0.54	0.46	1.11
-57	0.447	-6.99	-5.99	0.25	-16	0.946	-0.48	0.52	1.13
-56	0.467	-6.61	-5.61	0.27	-15	0.952	-0.42	0.58	1.14
-55	0.487	-6.26	-5.26	0.30	-14	0.958	-0.37	0.63	1.16
-54	0.503	-5.96	-4.96	0.32	-13	0.963	-0.33	0.67	1.17
-53	0.520	-5.68	-4.68	0.34	-12	0.969	-0.28	0.72	1.18
-52	0.537	-5.41	-4.41	0.36	-11	0.974	-0.23	0.77	1.19
-51	0.553	-5.14	-4.14	0.39	-10	0.979	-0.18	0.82	1.21
-50	0.570	-4.88	-3.88	0.41	-9	0.981	-0.16	0.84	1.21

Exhibit 9

Copy of Manufacturer's Directional Antenna Documentation

(Actual Antenna Pattern rotated to 100.0°T & 210°T) (public record copy)

Angle	Rel.Field	Rel.dB	dBd	PwrMult	Angle	Rel.Field	Rel.dB	dBd	PwrMult
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-8	0.984	-0.14	0.86	1.22	43	0.674	-3.43	-2.43	0.57
-7	0.986	-0.13	0.87	1.22	44	0.660	-3.60	-2.60	0.55
-6	0.988	-0.11	0.89	1.23	45	0.647	-3.79	-2.79	0.53
-5	0.990	-0.09	0.91	1.23	46	0.631	-3.99	-2.99	0.50
-4	0.992	-0.07	0.93	1.24	47	0.616	-4.21	-3.21	0.48
-3	0.994	-0.05	0.95	1.24	48	0.601	-4.43	-3.43	0.45
-2	0.996	-0.03	0.97	1.25	49	0.585	-4.65	-3.65	0.43
-1	0.998	-0.02	0.98	1.25	50	0.570	-4.88	-3.88	0.41
0	1.000	0.00	1.00	1.26	51	0.553	-5.14	-4.14	0.39
1	0.998	-0.02	0.98	1.25	52	0.537	-5.41	-4.41	0.36
2	0.996	-0.03	0.97	1.25	53	0.520	-5.68	-4.68	0.34
3	0.994	-0.05	0.95	1.24	54	0.503	-5.96	-4.96	0.32
4	0.992	-0.07	0.93	1.24	55	0.487	-6.26	-5.26	0.30
5	0.990	-0.09	0.91	1.23	56	0.467	-6.61	-5.61	0.27
6	0.988	-0.11	0.89	1.23	57	0.447	-6.99	-5.99	0.25
7	0.986	-0.13	0.87	1.22	58	0.428	-7.38	-6.38	0.23
8	0.984	-0.14	0.86	1.22	59	0.408	-7.79	-6.79	0.21
9	0.981	-0.16	0.84	1.21	60	0.388	-8.22	-7.22	0.19
10	0.979	-0.18	0.82	1.21	61	0.369	-8.66	-7.66	0.17
11	0.974	-0.23	0.77	1.19	62	0.350	-9.13	-8.13	0.15
12	0.969	-0.28	0.72	1.18	63	0.330	-9.62	-8.62	0.14
13	0.963	-0.33	0.67	1.17	64	0.311	-10.14	-9.14	0.12
14	0.958	-0.37	0.63	1.16	65	0.292	-10.70	-9.70	0.11
15	0.952	-0.42	0.58	1.14	66	0.271	-11.35	-10.35	0.09
16	0.946	-0.48	0.52	1.13	67	0.250	-12.05	-11.05	0.08
17	0.939	-0.54	0.46	1.11	68	0.229	-12.82	-11.82	0.07
18	0.933	-0.60	0.40	1.10	69	0.208	-13.65	-12.65	0.05
19	0.927	-0.66	0.34	1.08	70	0.187	-14.58	-13.58	0.04
20	0.920	-0.72	0.28	1.07	71	0.168	-15.48	-14.48	0.04
21	0.911	-0.81	0.19	1.04	72	0.150	-16.48	-15.48	0.03
22	0.903	-0.89	0.11	1.03	73	0.132	-17.61	-16.61	0.02
23	0.894	-0.97	0.03	1.01	74	0.113	-18.91	-17.91	0.02
24	0.885	-1.06	-0.06	0.99	75	0.095	-20.45	-19.45	0.01
25	0.877	-1.14	-0.14	0.97	76	0.085	-21.41	-20.41	0.01
26	0.867	-1.24	-0.24	0.95	77	0.075	-22.50	-21.50	0.01
27	0.858	-1.33	-0.33	0.93	78	0.065	-23.74	-22.74	0.01
28	0.848	-1.43	-0.43	0.91	79	0.055	-25.19	-24.19	0.00
29	0.839	-1.53	-0.53	0.89	80	0.045	-26.94	-25.94	0.00
30	0.829	-1.63	-0.63	0.86	81	0.042	-27.47	-26.47	0.00
31	0.818	-1.75	-0.75	0.84	82	0.040	-28.03	-27.03	0.00
32	0.806	-1.87	-0.87	0.82	83	0.037	-28.64	-27.64	0.00
33	0.795	-2.00	-1.00	0.79	84	0.034	-29.29	-28.29	0.00
34	0.783	-2.12	-1.12	0.77	85	0.032	-29.99	-28.99	0.00
35	0.772	-2.25	-1.25	0.75	86	0.031	-30.08	-29.08	0.00
36	0.760	-2.38	-1.38	0.73	87	0.031	-30.17	-29.17	0.00
37	0.749	-2.51	-1.51	0.71	88	0.031	-30.27	-29.27	0.00
38	0.738	-2.64	-1.64	0.69	89	0.030	-30.36	-29.36	0.00
39	0.726	-2.78	-1.78	0.66	90	0.030	-30.46	-29.46	0.00
40	0.715	-2.91	-1.91	0.64					
41	0.701	-3.08	-2.08	0.62					
42	0.688	-3.25	-2.25	0.60					