

Technical Report Supporting a Form 349 Application for a New FM Translator Station

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

for

*CH295D.P - Harrisonburg, VA
CH295D (106.9 MHz)*

"New FM Translator Operation"

as a

*Commercial, Fill-In Translator
for Class D AM Station
WHBG(AM) - Harrisonburg, VA*

Table of Contents

Table of Contents

Explanation of Technical Report

Exhibit 1 - Service Contour Study: Present vs Proposed Operations

Exhibit 2 - Service Contour Study: Proposed vs Primary Operations

Exhibit 3 - Copy of Existing Antenna Structure Registration

Exhibit 4 - Vertical Plan of Antenna System

Exhibit 5 - HAAT Calculation & Miscellaneous Coordinate Information

Exhibit 6 - Tabulation of Proposed Allocation

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

Exhibit 8 - §74.1204(d) Second / Third Adjacent Given Interference Waiver Request

Exhibit 9 - Manufacturer's Directional Antenna Pattern Documentation

Supplemental Appendix(s):

RF Appendix 1 - Radio Frequency Radiation Compliance Showing

EXPLANATION OF PROPOSAL: This Form 349 Filing and accompanying technical report supports an Original Construction Permit Application for a new FM Translator facility for CH295D.P - Harrisonburg, VA. This FCC Form 349 Filing requests a new CH295D (106.9 MHz) operation with a power of 0.250 kW ERP (circular polarization). The FM Translator will operate from a COR of 561 meters AMSL. This Form 349 Filing will specify rebroadcast of Class D, AM Primary Station WHBG(AM) - Harrisonburg, VA (1360 kHz); Facility ID No. 72143. The Translator will be licensed to the community of Harrisonburg, VA.

FACILITY COMPLIANCE SHOWINGS: A map of the proposed 60 dB μ service contour has been included in *Exhibit 1*. The proposed 60 dB μ 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*.

The proposed facility will be located on the tower bearing Antenna Structure Registration Number 1018184. In support of this filing, a copy of the existing 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 NED 03 second terrain database for all allocation, contour and HAAT showings contained herein. A copy of the proposed HAAT calculation has been included in *Exhibit 5*.

ALLOCATION COMPLIANCE SHOWINGS: The proposed Translator remains in compliance with C.F.R. 47 Section 74.1204 toward all allocation protection concerns with the exception of W298BR - Harrisonburg, VA (CH298D). A general allocation study for this proposal is found in ***Exhibit 6***.

The applicant would like to note the existence of a C.F.R. 47 Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Request toward W298BR - Harrisonburg, VA (CH298D) as noted in ***Exhibit 8***. Both stations are co-located on the same tower, therefore the interference area will not leave the base of the tower. However out of an overabundance of caution, protection of a worst case 140 dBμ F(50:10) interference contour has been demonstrated through a downward radiation study. Full protection will be afforded the facility in question as this area will not reach the ground nor a seven meter artificial plane representing a standard two story home when taking into account the downward radiation characteristics of the antenna as supplied by the antenna manufacturer. A copy of the antenna manufacturer specifications has been included in ***Exhibit 9***. Sufficient filtering is, or will be, installed within both facility systems to address any intermodulation issues.

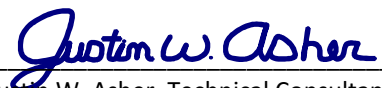
There are two additional facilities, existing or proposed, close enough to merit further study. Therefore, a supplemental contour protection study has been provided toward each facility as included in ***Exhibit(s) 7(a-b)***. It is believed sufficient clearance exists, precluding the need for additional contour protection showings.

Regarding protection of international concerns, the facility is, and will remain, more than 320 km from the common border between the United States and Canada or Mexico. As a result, no further international protection showings are believed required.

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 guidelines for 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 with 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 eighteen 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

June 14, 2017

Exhibit 1
Service Contour Study:
Present vs Proposed Operations

Proposed 60 dBμ F(50:50) Contour

CH295D.P



CH295D.P
Harrisonburg, VA
Proposed Operation
Facility ID: new
Latitude: 38-27-08 N
Longitude: 078-54-32 W
ERP: 0.25 kW
Channel: 295D (106.9 MHz)
AMSL Height: 561.0 m
Horiz. Pattern: Directional

60 dBμ F(50:50) Contour
Total Population: 86,593
Coverage Area: 624.3 sq. km

NED 03 SEC Terrain Database
US Census 2010 PL Database

Terrain
125 1310 m

Scale 1:225,000
0 4 8 12 km

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

V-Soft Communications LLC ©

Exhibit 2

Service Contour Study: Proposed vs Primary Operations

25 mile Radius from AM Site

Pendleton **Primary 2 mV/m Daytime Contour**

Proposed 60 dBμ F(50:50) Contour

**WHBG(AM)
CH295D.P**

WHBG 1360 kHz
Harrisonburg, Virginia
Station Class: D
Region 2 Class: B
Facility ID: 72143
File Number: BL-20041006AFE
38-27-04.0 N 78-54-29.0 W (NAD 27)
38-27-04.4 N 78-54-28.1 W (NAD 83)
Power: 5 kW, Non-Directional
Hours: Daytime
Pattern Type: Theoretical
Towers: 1 Augmentations: 0
Tower Elec Hght: 172.8 Deg; 105.81 m
RMS Theocal: 371.2 mV/meter (per kW)
or 830.03 mV/meter at 5 kW

CH295D.P
Harrisonburg, VA
Proposed Operation
Facility ID: new
Latitude: 38-27-08 N
Longitude: 078-54-32 W
ERP: 0.25 kW
Channel: 295D (106.9 MHz)
AMSL Height: 561.0 m
Horiz. Pattern: Directional

Terrain
13 1480 m

NED 03 SEC Terrain Database
US Census 2010 PL Database

Scale 1:475,000

0 10 20 30 km

V-Soft Communications LLC ©

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justinasher@consultant.com
1 (202) 875-2986

Exhibit 3

Copy of Existing Antenna Structure Registration

(public record copy)

Registration Detail

Reg Number	1018184	Status	Constructed
File Number	A1026432	Constructed	09/20/1985
EMI	No	Dismantled	
NEPA	No		

Antenna Structure

Structure Type TOWER - Free standing or Guyed Structure used for Commu

Location (in NAD83 Coordinates)

Lat/Long	38-27-08.0 N 078-54-31.0 W	Address	RT 33 W
City, State	HARRISONBURG , VA		
Zip	22801	County	ROCKINGHAM
Center of AM Array		Position of Tower in Array	

Heights (meters)

Elevation of Site Above Mean Sea Level	Overall Height Above Ground (AGL)
445.0	152.0
Overall Height Above Mean Sea Level	Overall Height Above Ground w/o Appurtenances
597.0	151.0

Painting and Lighting Specifications

FCC Paragraphs 1, 3, 4, 13, 21

FAA Notification

FAA Study	85-AEA-0299-OE	FAA Issue Date	
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Owner & Contact Information

FRN	0009269473	Owner Entity Type	Limited Liability Company
Assignor FRN	0003794302	Assignor ID	L00078067

Owner

Tidewater Communications, LLC
 73 Kercheval Avenue
 Grosse Pointe Farms , MI 48236

P: (313)886-7070
 F:
 E: FCCLICENSES@SAGACOM.COM

Contact

Atkins , Tom
 73 Kercheval Avenue
 Grosse Pointe Farms , MI 48236

P: (313)886-7070
 F:
 E: FCCLICENSES@SAGACOM.COM

Last Action Status

Status	Constructed	Received	05/06/2016
Purpose	Change Owner	Entered	05/06/2016
Mode	Interactive		

Related Applications

05/06/2016	A1026432 - Change Owner (OC)
03/22/2012	A0758135 - Admin Update (AU)
03/22/2012	A0758146 - Admin Update (AU)

Related applications (4)

Comments**Comments**

07/30/1997	CORRECTED FCC PARAGRAPHS FROM A1,H TO MATCH THE TOWER FILE RECORD ATTACHED TO 854 BASED ON OWNER'S CALL TO CONSUMER ASSISTANCE.
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History**Date****Event**

05/07/2016	Registration Printed
05/07/2016	Change of Ownership Letter Sent
05/06/2016	Change of Ownership Received

All History (10)

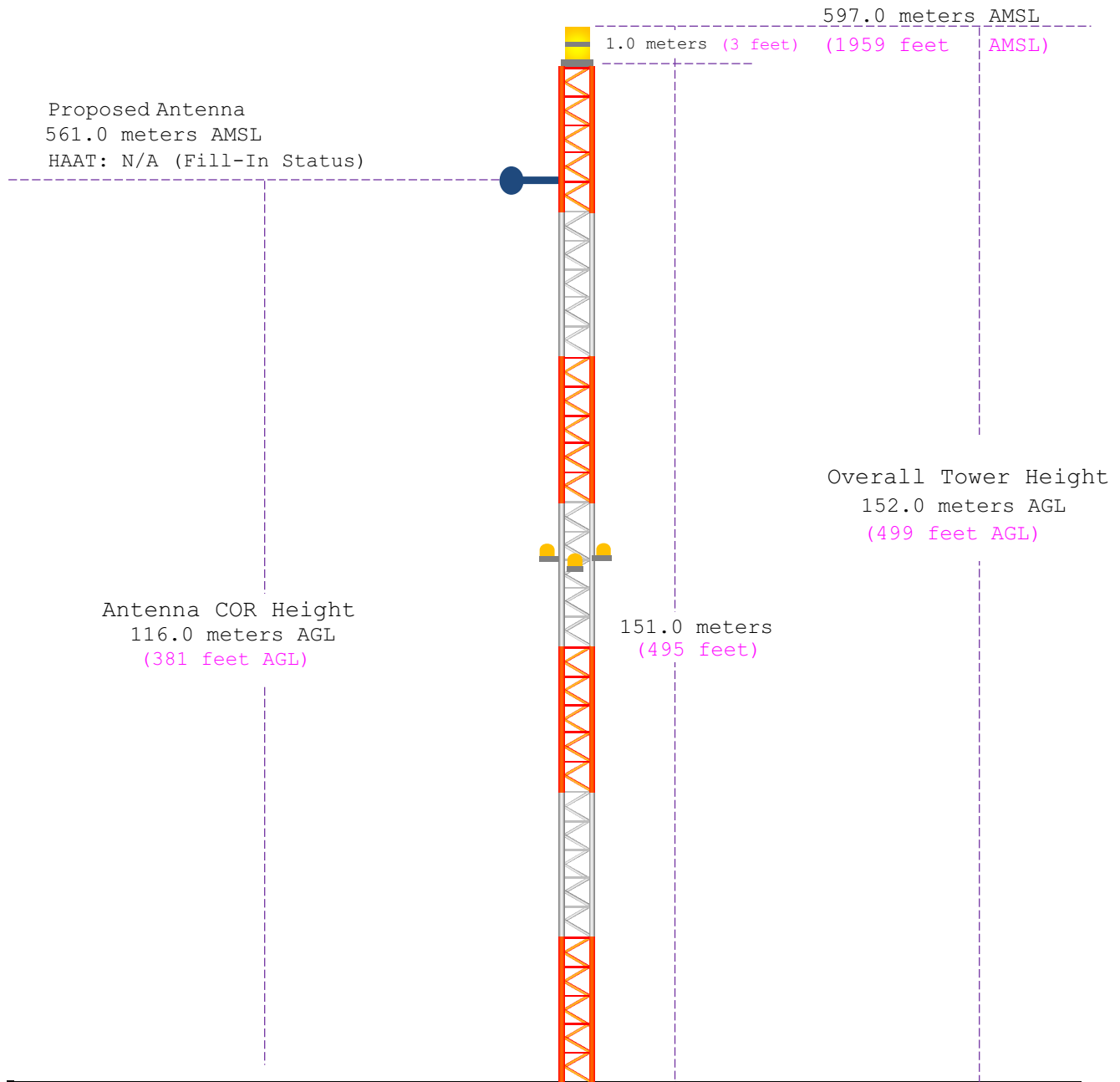
Automated Letters

05/07/2016	Authorization, Reference
05/07/2016	Ownership Change, Reference 912804
03/23/2012	Authorization, Reference

All letters (4)

Exhibit 4

Vertical Plan of Antenna System



Ground Elevation: 445.0 meters AMSL (1460 feet AMSL)		
Address: Route 33 West City: Harrisonburg County: Rockingham State: Virginia		
	Latitude (D M S)	Longitude (D M S)
NAD 27 datum values:	38 27 7.55235	78 54 31.89956
NAD 83 datum values:	38 27 8.00000	78 54 31.00000
Antenna Structure Registration 1018184	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 (1927):

N. Lat. = 382708.0 W. Lng. = 785432.0
 HAAT and Distance to Contour,
 FCC, FM 2-10 Mi, 51 pts Method - NED 03 SEC

Azi.	AV EL	HAAT	ERP kW	dBk	Field	60-F5
000	463.2	97.8	0.2500	-6.02	1.000	12.72
030	380.9	180.1	0.2500	-6.02	1.000	17.63
060	396.5	164.5	0.0506	-12.96	0.450	11.22
090	501.5	59.5	0.2025	-6.94	0.900	9.62
120	475.6	85.4	0.2500	-6.02	1.000	11.93
150	397.2	163.8	0.2500	-6.02	1.000	16.76
180	379.7	181.3	0.2500	-6.02	1.000	17.69
210	380.5	180.5	0.2500	-6.02	1.000	17.65
240	393.9	167.1	0.2500	-6.02	1.000	16.95
270	444.0	117.0	0.2500	-6.02	1.000	13.90
300	492.6	68.4	0.2500	-6.02	1.000	10.78
330	522.1	38.9	0.2500	-6.02	1.000	8.03

Ave El= 435.64 M HAAT= 125.36 M AMSL= 561.0

NAD 1983 to NAD 1927 Conversion:

	<u>Latitude</u>	<u>Longitude</u>
NAD 27 datum values:	38 27 7.55235	78 54 31.89956
NAD 83 datum values:	38 27 8.00000	78 54 31.00000

Various Coordinate Conversion Calculations (NAD 1983):

Position Type	Lat Lon
Degrees Lat Long	38.4522222°, -078.9086111°
Degrees Minutes	38°27.13333', -078°54.51667'
Degrees Minutes Seconds	38°27'08.0000", -078°54'31.0000"
UTM	17S 682494mE 4258063mN
UTM centimeter	17S 682494.34mE 4258063.68mN
MGRS	17SPC8249458063
Grid North	1.3°
GARS	203LS12
Maidenhead	FM08NK08XM28
GEOREF	GJMJ05482713

Exhibit 6

Tabulation of Proposed Allocation

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

Yellow Highlighted Text denotes the existence of a C.F.R. 47 Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Request toward W298BR - Harrisonburg, VA (CH298D) as noted in **Exhibit 8**. Both stations are co-located on the same tower, therefore the interference area will not leave the base of the tower. However out of an overabundance of caution, protection of a worst case 140 dBμ F(50:10) interference contour has been demonstrated through a downward radiation study. Full protection will be afforded the facility in question as this area will not reach the ground nor a seven meter artificial plane representing a standard two story home when taking into account the downward radiation characteristics of the antenna as supplied by the antenna manufacturer. A copy of the antenna manufacturer specifications has been included in **Exhibit 9**. Sufficient filtering is, or will be, installed within both facility systems to address any intermodulation issues.

REFERENCE CH# 295D - 106.9 MHz, Pwr= 0.25 kW DA, HAAT= 125.4 M, COR= 561 M 38 27 08.0 N. Average Protected F(50-50)= 14.37 km 78 54 32.0 W. Standard Directional											
DISPLAY DATES DATA 06-05-17 SEARCH 06-05-17											
CH CITY	CALL	TYPE STATE	ANT AZI <--	DIST FILE #	LAT LNG	PWR(kW) HAAT (M)	INT (km) COR (M)	PRO (km) LICENSEE	*IN* (Overlap in km)	*OUT*	
298D Harrisonburg	W298BR	LIC_C VA	0.0 0.0	0.00 BLFT20170111ABD	38 27 08.0 78 54 32.0	0.010	0.2 572	6.1 Positive Alternative Radio	-12.9*<	-7.2*<	
293D Harrisonburg	W293BQ	LIC_C VA	92.7 272.8	15.27 BLFT20130529AHL	38 26 44.0 78 44 01.0	0.010 566	0.2 993	13.2 Bible Broadcasting Network	6.5	1.0	
241B1 Broadway	WMQR	LIC_CN VA	343.9 163.9	12.90 BLH19900531KA	38 33 50.0 78 57 00.0	2.600 308	13.0 842	8.5 Tidewater Communications,	11.5R	1.4M	
296A Shenandoah	WHFV	LIC NCX VA	77.7 257.8	23.25 BLED20141031AAS	38 29 47.9 78 38 52.0	0.330 -65	10.9 393	7.6 Holy Family Communications	2.2	1.4	
295B Myersville	WWEG	LIC_CX MD	43.5 224.3	161.61 BLH20070518AAX	39 29 57.0 77 36 42.0	15.500 260	129.9 476	67.7 Manning Broadcasting Inc.	16.2	26.5	
294D Charlottesville	W294BY	LIC_C VA	144.4 324.7	64.15 BLFT20151124CZT	37 58 56.0 78 28 58.0	0.010	14.6 481	10.4 Positive Alternative Radio	32.9	28.9	
296A Hot Springs	WCHG	LIC_CX VA	238.7 58.2	89.38 BMLED20110527AAF	38 01 53.0 79 46 52.0	0.160 429	43.0 1076	27.7 Pocahontas Communications	29.6	36.7	
298A Charlottesville	WCHV-FM	LIC_CN VA	144.1 324.4	64.05 BLH19960112KD	37 59 05.0 78 28 49.0	0.210 338	1.0 506	23.0 Monticello Media LLC	46.4	40.0	
295A Bedford	WZZI	LIC NCX VA	207.0 26.6	140.95 BMLH20080904AAE	37 19 14.0 79 37 59.0	0.290 389	77.8 725	26.3 Wvjt, Llc	45.4	58.7	
296A Keyser	WCBC-FM	LIC NCX WV	1.9 182.0	119.34 BMLH20141022ABE	39 31 30.0 78 51 43.0	0.480 253	43.2 619	28.5 Prosperitas Broadcasting S	62.8	70.8	
296A Appomattox	WTTX-FM	LIC_CX VA	176.9 356.9	120.27 BMLED20060112AEE	37 22 19.0 78 50 06.0	1.700 130	37.3 341	24.8 Positive Alternative Radio	65.6	69.6	
294B Manassas	WJFK-FM	LIC DCX VA	71.7 252.7	153.64 BLH20141121AHM	38 52 28.0 77 13 25.0	20.000 223	71.5 312	60.9 Cbs Radio Inc. Of Washingt	71.4	69.9	

Terrain database is NED 03 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.
 < = Contour Overlap
 Reference station has protected zone issue: WV Quiet Zone- AM tower

Exhibit 7a

Contour Protection Studies Toward Select Allocation Concern(s)

Tidewater Communications, LLC

FMCommander Single Allocation Study - 06-05-2017 - NED 03 SEC

CH295D.P's Overlaps (In= 6.52 km, Out= 1.04 km)

CH295D.P CH 295 D DA

Lat= 38 27 08.0, Lng= 78 54 32.0

0.25 kW 125.4 m HAAT, 561 m COR

Prot.= 60 dBu, Intef.= 100 dBu

W293BQ CH 293 D BLFT20130529AHL

Lat= 38 26 44.0, Lng= 78 44 01.0

0.01 kW 566.3 m HAAT, 993 m COR

Prot.= 60 dBu, Intef.= 100 dBu

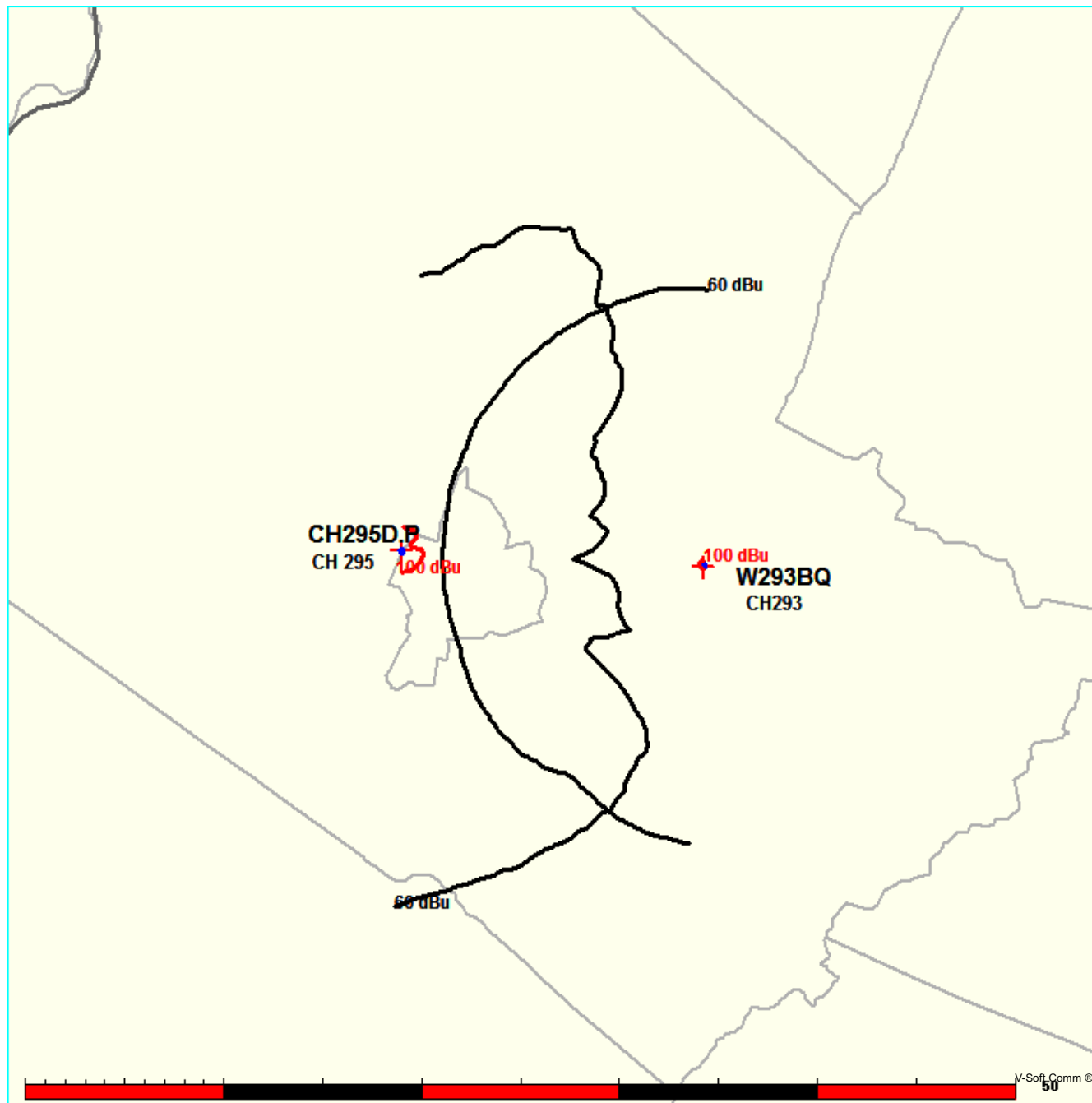


Exhibit 7a

Contour Protection Studies Toward Select Allocation Concern(s)

06-05-2017

Terrain Data: NED 03 SEC

FMOVer Analysis

W293BQ BLFT20130529AHL

CH295D.P

Channel = 293D

Max ERP = 0.01 kW

RCAMSL = 993 m

N. Lat. 38 26 44.0

W. Lng. 78 44 01.0

Protected

60 dBu

Channel = 295D

Max ERP = 0.25 kW

RCAMSL = 561 m

N. Lat. 38 27 08.0

W. Lng. 78 54 32.0

Interfering

100 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
228.0	000.0100	0557.1	013.2	150.1	000.2500	0164.0	011.0	67.22	
229.0	000.0100	0558.6	013.2	150.4	000.2500	0164.5	010.8	67.61	
230.0	000.0100	0562.2	013.2	150.9	000.2500	0163.6	010.6	67.92	
231.0	000.0100	0563.9	013.2	151.2	000.2500	0162.3	010.4	68.22	
232.0	000.0100	0563.9	013.2	151.5	000.2500	0161.6	010.1	68.58	
233.0	000.0100	0561.4	013.2	151.5	000.2500	0161.5	009.9	68.98	
234.0	000.0100	0565.2	013.3	152.0	000.2500	0161.5	009.7	69.38	
235.0	000.0100	0565.2	013.3	152.2	000.2500	0161.7	009.4	69.80	
236.0	000.0100	0561.3	013.2	152.0	000.2500	0161.5	009.2	70.23	
237.0	000.0100	0562.1	013.2	152.2	000.2500	0161.7	009.0	70.67	
238.0	000.0100	0564.7	013.3	152.6	000.2500	0161.8	008.8	71.11	
239.0	000.0100	0565.8	013.3	152.8	000.2500	0161.7	008.5	71.55	
240.0	000.0100	0565.0	013.3	152.8	000.2500	0161.7	008.3	72.00	
241.0	000.0100	0564.1	013.2	152.8	000.2500	0161.7	008.1	72.46	
242.0	000.0100	0563.7	013.2	152.8	000.2500	0161.7	007.8	72.94	
243.0	000.0100	0562.3	013.2	152.7	000.2500	0161.7	007.6	73.45	
244.0	000.0100	0558.2	013.2	152.3	000.2500	0161.7	007.4	73.97	
245.0	000.0100	0554.5	013.1	151.8	000.2500	0161.3	007.1	74.49	
246.0	000.0100	0553.6	013.1	151.6	000.2500	0161.4	006.9	75.06	
247.0	000.0100	0553.4	013.1	151.4	000.2500	0161.7	006.7	75.66	
248.0	000.0100	0551.3	013.1	151.0	000.2500	0163.3	006.5	76.32	
249.0	000.0100	0551.0	013.1	150.7	000.2500	0164.1	006.2	76.97	
250.0	000.0100	0548.7	013.1	150.1	000.2500	0164.0	006.0	77.57	
251.0	000.0100	0544.6	013.0	149.2	000.2500	0163.7	005.8	78.16	
252.0	000.0100	0546.1	013.0	148.9	000.2500	0163.8	005.6	78.81	
253.0	000.0100	0544.9	013.0	148.2	000.2500	0162.1	005.4	79.37	
254.0	000.0100	0545.8	013.0	147.6	000.2500	0162.5	005.1	80.05	
255.0	000.0100	0546.4	013.0	147.0	000.2500	0162.2	004.9	80.70	
256.0	000.0100	0549.3	013.1	146.5	000.2500	0162.9	004.7	81.42	
257.0	000.0100	0551.0	013.1	145.7	000.2500	0162.9	004.5	82.13	
258.0	000.0100	0551.0	013.1	144.6	000.2500	0162.6	004.3	82.82	
259.0	000.0100	0552.0	013.1	143.4	000.2500	0161.5	004.0	83.53	
260.0	000.0100	0551.5	013.1	141.9	000.2500	0160.8	003.8	84.23	

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)
261.0	000.0100	0552.2	013.1	140.3	000.2500	0162.0	003.6	85.04
262.0	000.0100	0555.0	013.1	138.8	000.2500	0160.6	003.4	85.82
263.0	000.0100	0555.2	013.1	136.6	000.2500	0158.3	003.2	86.50
264.0	000.0100	0557.3	013.2	134.4	000.2500	0153.0	003.0	87.14
265.0	000.0100	0559.2	013.2	131.8	000.2500	0149.5	002.9	87.89
266.0	000.0100	0561.2	013.2	128.7	000.2500	0149.4	002.7	88.79
267.0	000.0100	0559.9	013.2	124.7	000.2500	0128.7	002.5	88.78
268.0	000.0100	0559.5	013.2	120.2	000.2500	0088.2	002.4	87.48
269.0	000.0100	0558.3	013.2	115.2	000.2500	0064.6	002.3	86.28
270.0	000.0100	0559.4	013.2	109.9	000.2500	0086.7	002.2	88.81
271.0	000.0100	0560.2	013.2	104.2	000.2500	0075.3	002.1	88.55
272.0	000.0100	0560.2	013.2	098.0	000.2401	0069.8	002.1	88.27
273.0	000.0100	0561.3	013.2	091.7	000.2101	0052.0	002.1	86.04
274.0	000.0100	0561.3	013.2	085.3	000.1188	0093.7	002.1	86.89
275.0	000.0100	0561.2	013.2	079.2	000.0506	0128.2	002.1	84.25
276.0	000.0100	0560.6	013.2	073.5	000.0506	0151.4	002.2	84.42
277.0	000.0100	0559.9	013.2	068.4	000.0506	0151.9	002.3	83.83
278.0	000.0100	0560.2	013.2	063.6	000.0506	0150.0	002.4	83.11
279.0	000.0100	0560.8	013.2	059.3	000.0580	0163.8	002.6	83.43
280.0	000.0100	0561.4	013.2	055.5	000.1068	0160.4	002.7	85.22
281.0	000.0100	0563.2	013.2	051.9	000.1656	0148.4	002.9	85.94
282.0	000.0100	0564.1	013.2	048.9	000.2074	0137.8	003.0	85.66
283.0	000.0100	0565.1	013.3	046.3	000.2195	0138.2	003.2	85.10
284.0	000.0100	0567.0	013.3	043.8	000.2311	0147.7	003.4	84.99
285.0	000.0100	0569.8	013.3	041.5	000.2423	0149.6	003.6	84.52
286.0	000.0100	0571.9	013.3	039.6	000.2500	0149.2	003.8	83.86
287.0	000.0100	0572.6	013.4	038.2	000.2500	0148.0	004.0	83.01
288.0	000.0100	0572.0	013.3	037.2	000.2500	0157.3	004.2	82.67
289.0	000.0100	0571.3	013.3	036.3	000.2500	0165.2	004.5	82.27
290.0	000.0100	0572.4	013.4	035.3	000.2500	0173.1	004.7	81.90
291.0	000.0100	0572.1	013.3	034.7	000.2500	0174.9	004.9	81.28
292.0	000.0100	0571.9	013.3	034.1	000.2500	0175.1	005.1	80.61
293.0	000.0100	0571.0	013.3	033.7	000.2500	0174.4	005.4	79.91
294.0	000.0100	0571.9	013.3	033.2	000.2500	0174.6	005.6	79.26
295.0	000.0100	0572.2	013.4	032.8	000.2500	0175.5	005.8	78.65
296.0	000.0100	0573.0	013.4	032.4	000.2500	0176.6	006.1	78.05
297.0	000.0100	0573.5	013.4	032.1	000.2500	0177.2	006.3	77.46
298.0	000.0100	0578.2	013.4	031.4	000.2500	0176.5	006.5	76.83
299.0	000.0100	0581.9	013.5	030.9	000.2500	0175.7	006.7	76.21
300.0	000.0100	0582.6	013.5	030.8	000.2500	0175.7	007.0	75.63
301.0	000.0100	0583.6	013.5	030.7	000.2500	0175.9	007.2	75.07
302.0	000.0100	0584.7	013.5	030.6	000.2500	0176.2	007.4	74.54
303.0	000.0100	0584.3	013.5	030.7	000.2500	0175.9	007.7	74.00
304.0	000.0100	0583.9	013.5	030.8	000.2500	0175.7	007.9	73.50

Exhibit 7b

Contour Protection Studies Toward Select Allocation Concern(s)

Tidewater Communications, Llc

FMCommander Single Allocation Study - 06-05-2017 - NED 03 SEC
CH295D.P's Overlaps (In= 2.23 km, Out= 1.41 km)

CH295D.P CH 295 D DA
Lat= 38 27 08.0, Lng= 78 54 32.0
0.25 kW 125.4 m HAAT, 561 m COR
Prot.= 60 dBu, Intef.= 54 dBu

WHFV CH 296 A 73.215 N BLED20141031AAS
Lat= 38 29 47.9, Lng= 78 38 52.0
0.33 kW -64.9 m HAAT, 393.2 m COR
Prot.= 60 dBu, Intef.= 54 dBu

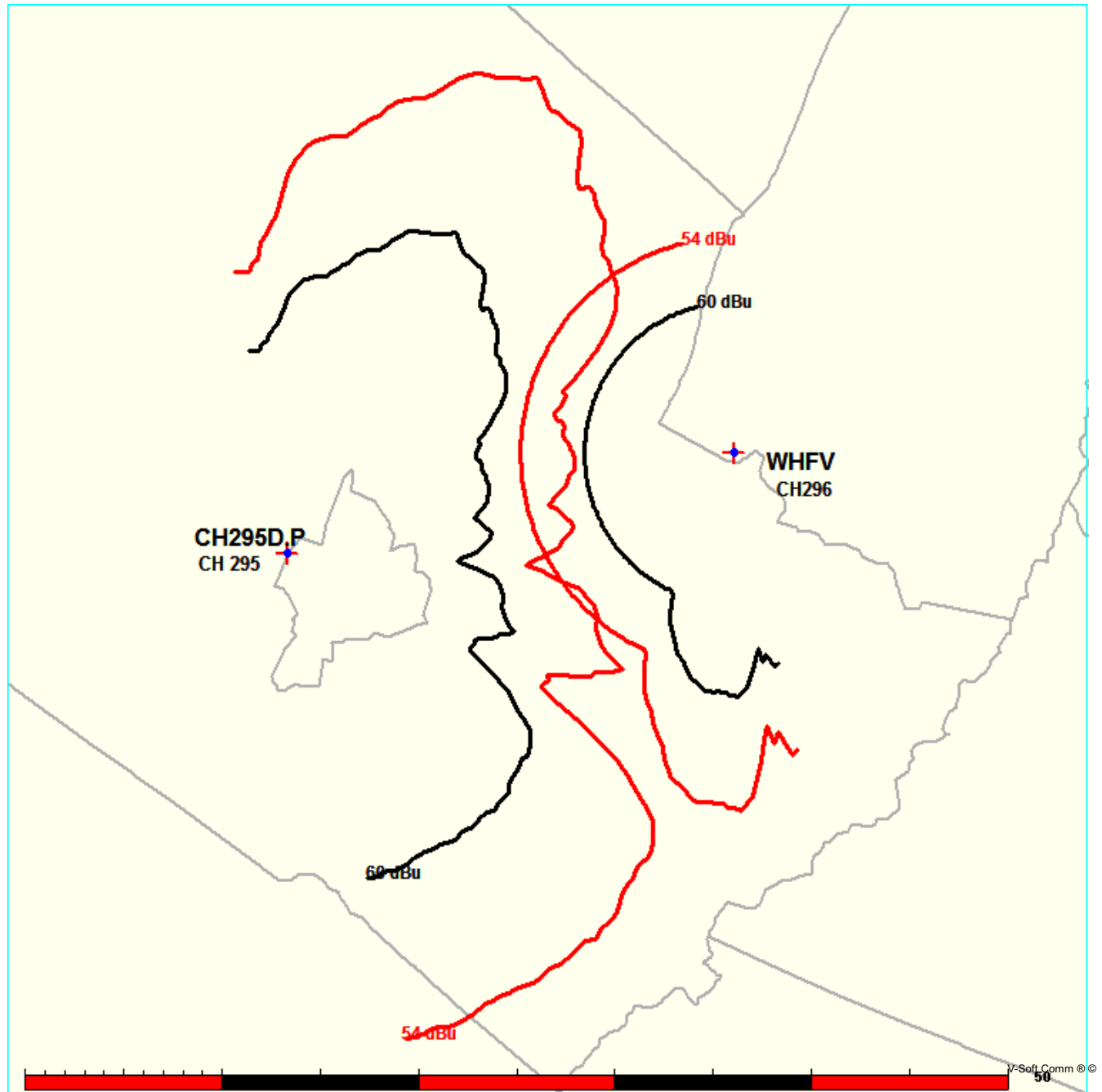


Exhibit 7b

Contour Protection Studies Toward Select Allocation Concern(s)

06-05-2017 Terrain Data: NED 03 SEC FMOver Analysis

WHFV BLED20141031AAS

CH295D.P

Channel = 296A
 Max ERP = 0.33 kW
 RCAMSL = 393.2 m
 N. Lat. 38 29 47.9
 W. Lng. 78 38 52.0
 Protected
 60 dBu

Channel = 295D
 Max ERP = 0.25 kW
 RCAMSL = 561 m
 N. Lat. 38 27 08.0
 W. Lng. 78 54 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)
213.0	000.3300	-0022.3	007.6	094.4	000.2226	0052.7	018.7	48.42	
214.0	000.3300	-0032.1	007.6	094.2	000.2217	0051.9	018.5	48.37	
215.0	000.3300	-0041.9	007.6	094.0	000.2207	0052.3	018.4	48.53	
216.0	000.3300	-0054.9	007.6	093.7	000.2197	0052.9	018.3	48.70	
217.0	000.3300	-0072.8	007.6	093.5	000.2186	0052.8	018.2	48.75	
218.0	000.3300	-0093.7	007.6	093.3	000.2175	0049.9	018.1	48.31	
219.0	000.3300	-0122.0	007.6	093.0	000.2164	0047.5	018.0	47.91	
220.0	000.3300	-0165.2	007.6	092.8	000.2152	0046.5	017.9	47.77	
221.0	000.3300	-0209.9	007.6	092.5	000.2140	0046.5	017.8	47.83	
222.0	000.3300	-0236.0	007.6	092.3	000.2128	0048.2	017.7	48.23	
223.0	000.3300	-0225.5	007.6	092.0	000.2115	0050.5	017.6	48.74	
224.0	000.3300	-0218.5	007.6	091.7	000.2102	0051.9	017.5	49.05	
225.0	000.3300	-0225.6	007.6	091.4	000.2088	0053.5	017.4	49.38	
226.0	000.3300	-0254.4	007.6	091.1	000.2074	0054.8	017.3	49.66	
227.0	000.3300	-0281.3	007.6	090.8	000.2060	0056.3	017.2	49.96	
228.0	000.3300	-0266.6	007.6	090.4	000.2045	0057.6	017.1	50.20	
229.0	000.3300	-0245.1	007.6	090.1	000.2030	0058.9	017.0	50.43	
230.0	000.3300	-0230.3	007.6	089.8	000.1980	0061.0	016.9	50.66	
231.0	000.3300	-0229.8	007.6	089.4	000.1911	0064.1	016.8	50.97	
232.0	000.3300	-0232.8	007.6	089.1	000.1841	0066.8	016.7	51.20	
233.0	000.3300	-0237.6	007.6	088.7	000.1771	0068.5	016.7	51.29	
234.0	000.3300	-0237.6	007.6	088.3	000.1701	0071.1	016.6	51.49	
235.0	000.3300	-0235.5	007.6	087.9	000.1631	0073.1	016.5	51.60	
236.0	000.3300	-0231.8	007.6	087.6	000.1561	0075.2	016.4	51.72	
237.0	000.3300	-0233.2	007.6	087.2	000.1491	0078.6	016.4	51.95	
238.0	000.3300	-0235.8	007.6	086.8	000.1422	0082.6	016.3	52.23	
239.0	000.3300	-0233.9	007.6	086.3	000.1353	0086.1	016.2	52.43	
240.0	000.3300	-0233.8	007.6	085.9	000.1284	0088.9	016.2	52.54	
241.0	000.3300	-0234.2	007.6	085.5	000.1217	0091.9	016.1	52.66	
242.0	000.3300	-0233.1	007.6	085.1	000.1150	0095.6	016.1	52.80	
243.0	000.3300	-0227.9	007.6	084.6	000.1084	0098.5	016.0	52.86	
244.0	000.3300	-0220.6	007.6	084.2	000.1019	0100.8	016.0	52.84	
245.0	000.3300	-0215.9	007.6	083.7	000.0956	0102.7	015.9	52.76	

Exhibit 7b

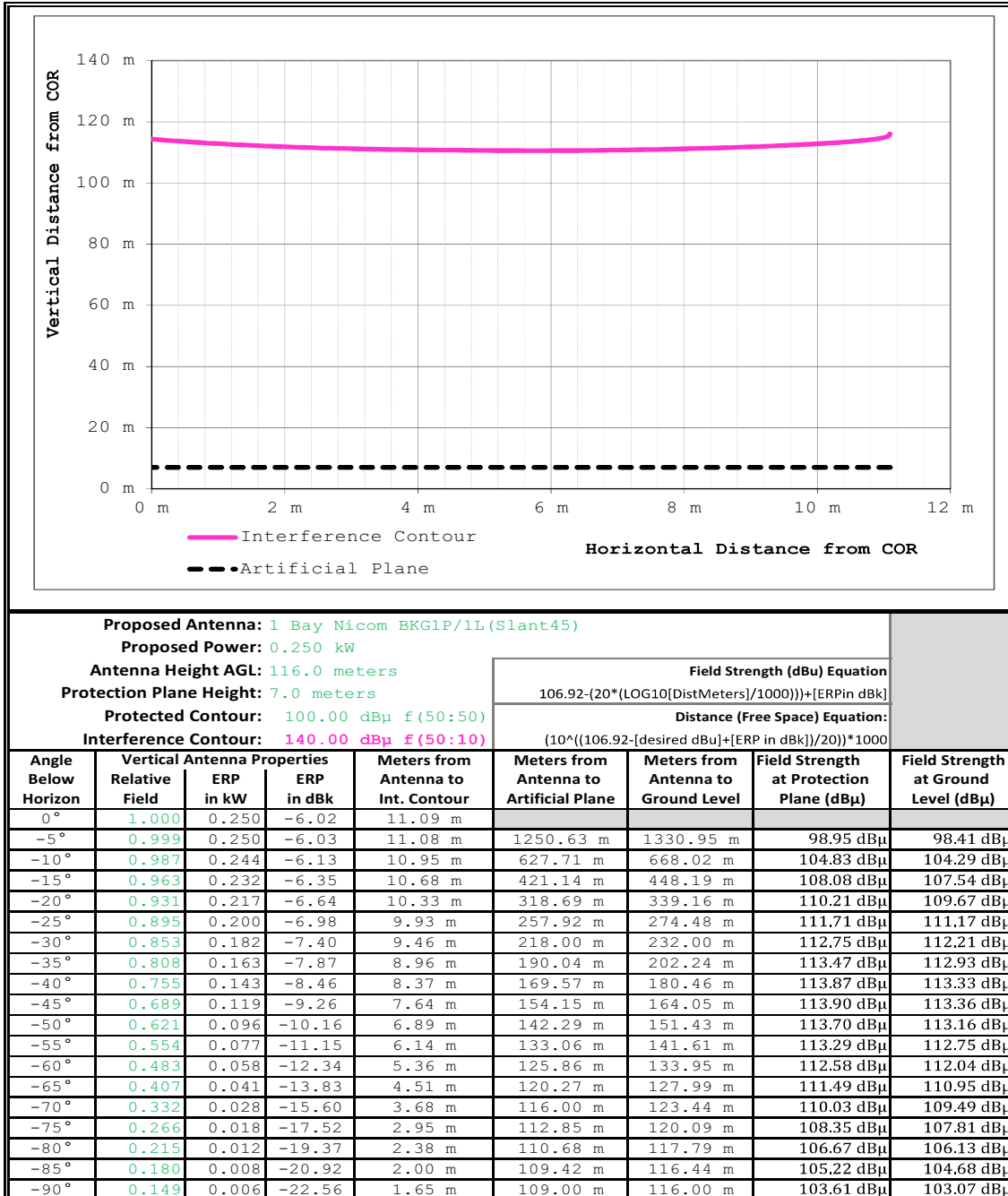
Contour Protection Studies Toward Select Allocation Concern(s)

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
246.0	000.3300	-0206.5	007.6	083.3	000.0894	0103.1	015.9	52.55
247.0	000.3300	-0196.7	007.6	082.8	000.0833	0105.1	015.9	52.44
248.0	000.3300	-0189.1	007.6	082.4	000.0774	0108.0	015.8	52.39
249.0	000.3300	-0181.0	007.6	081.9	000.0716	0111.6	015.8	52.37
250.0	000.3300	-0172.5	007.6	081.4	000.0661	0114.4	015.8	52.25
251.0	000.3300	-0164.4	007.6	081.0	000.0607	0118.7	015.7	52.22
252.0	000.3300	-0153.0	007.6	080.5	000.0555	0121.9	015.7	52.06
253.0	000.3300	-0143.0	007.6	080.0	000.0506	0124.0	015.7	51.82
254.0	000.3300	-0135.4	007.6	079.5	000.0506	0126.4	015.7	51.99
255.0	000.3300	-0127.9	007.6	079.0	000.0506	0128.9	015.7	52.17
256.0	000.3300	-0121.1	007.6	078.5	000.0506	0131.3	015.7	52.34
257.0	000.3300	-0116.6	007.6	078.1	000.0506	0135.0	015.7	52.58
258.0	000.3300	-0108.8	007.6	077.6	000.0506	0137.5	015.7	52.75
259.0	000.3300	-0105.4	007.6	077.1	000.0506	0140.4	015.7	52.94
260.0	000.3300	-0101.7	007.6	076.6	000.0506	0142.1	015.7	53.05
261.0	000.3300	-0098.8	007.6	076.1	000.0506	0144.0	015.7	53.17
262.0	000.3300	-0097.3	007.6	075.6	000.0506	0145.5	015.7	53.25
263.0	000.3300	-0094.7	007.6	075.2	000.0506	0146.8	015.7	53.32
264.0	000.3300	-0090.2	007.6	074.7	000.0506	0148.6	015.7	53.42
265.0	000.3300	-0085.7	007.6	074.2	000.0506	0149.9	015.7	53.49
266.0	000.3300	-0080.3	007.6	073.7	000.0506	0151.0	015.8	53.54
267.0	000.3300	-0076.1	007.6	073.3	000.0506	0151.6	015.8	53.55
268.0	000.3300	-0071.9	007.6	072.8	000.0506	0151.9	015.8	53.54
269.0	000.3300	-0070.8	007.6	072.3	000.0506	0152.1	015.9	53.52
270.0	000.3300	-0071.8	007.6	071.9	000.0506	0152.7	015.9	53.53
271.0	000.3300	-0073.6	007.6	071.4	000.0506	0153.1	015.9	53.52
272.0	000.3300	-0074.9	007.6	071.0	000.0506	0152.4	016.0	53.43
273.0	000.3300	-0075.5	007.6	070.5	000.0506	0151.6	016.0	53.34
274.0	000.3300	-0077.2	007.6	070.1	000.0506	0152.0	016.1	53.32
275.0	000.3300	-0076.0	007.6	069.7	000.0506	0152.5	016.1	53.31
276.0	000.3300	-0073.1	007.6	069.2	000.0506	0153.1	016.2	53.30
277.0	000.3300	-0069.7	007.6	068.8	000.0506	0152.7	016.3	53.23
278.0	000.3300	-0067.9	007.6	068.4	000.0506	0152.1	016.3	53.13
279.0	000.3300	-0068.4	007.6	068.0	000.0506	0150.8	016.4	52.99
280.0	000.3300	-0066.7	007.6	067.6	000.0506	0150.2	016.5	52.90
281.0	000.3300	-0062.4	007.6	067.2	000.0506	0150.9	016.5	52.88
282.0	000.3300	-0058.7	007.6	066.9	000.0506	0151.8	016.6	52.88
283.0	000.3300	-0056.4	007.6	066.5	000.0506	0152.4	016.7	52.85
284.0	000.3300	-0057.3	007.6	066.1	000.0506	0153.3	016.8	52.84
285.0	000.3300	-0057.2	007.6	065.8	000.0506	0154.0	016.9	52.82
286.0	000.3300	-0054.1	007.6	065.4	000.0506	0154.0	016.9	52.75
287.0	000.3300	-0052.6	007.6	065.1	000.0506	0154.3	017.0	52.69
288.0	000.3300	-0050.8	007.6	064.8	000.0506	0153.8	017.1	52.59
289.0	000.3300	-0047.9	007.6	064.4	000.0506	0152.9	017.2	52.46
290.0	000.3300	-0047.1	007.6	064.1	000.0506	0151.3	017.3	52.28
291.0	000.3300	-0046.3	007.6	063.8	000.0506	0150.0	017.4	52.12

Exhibit 8

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

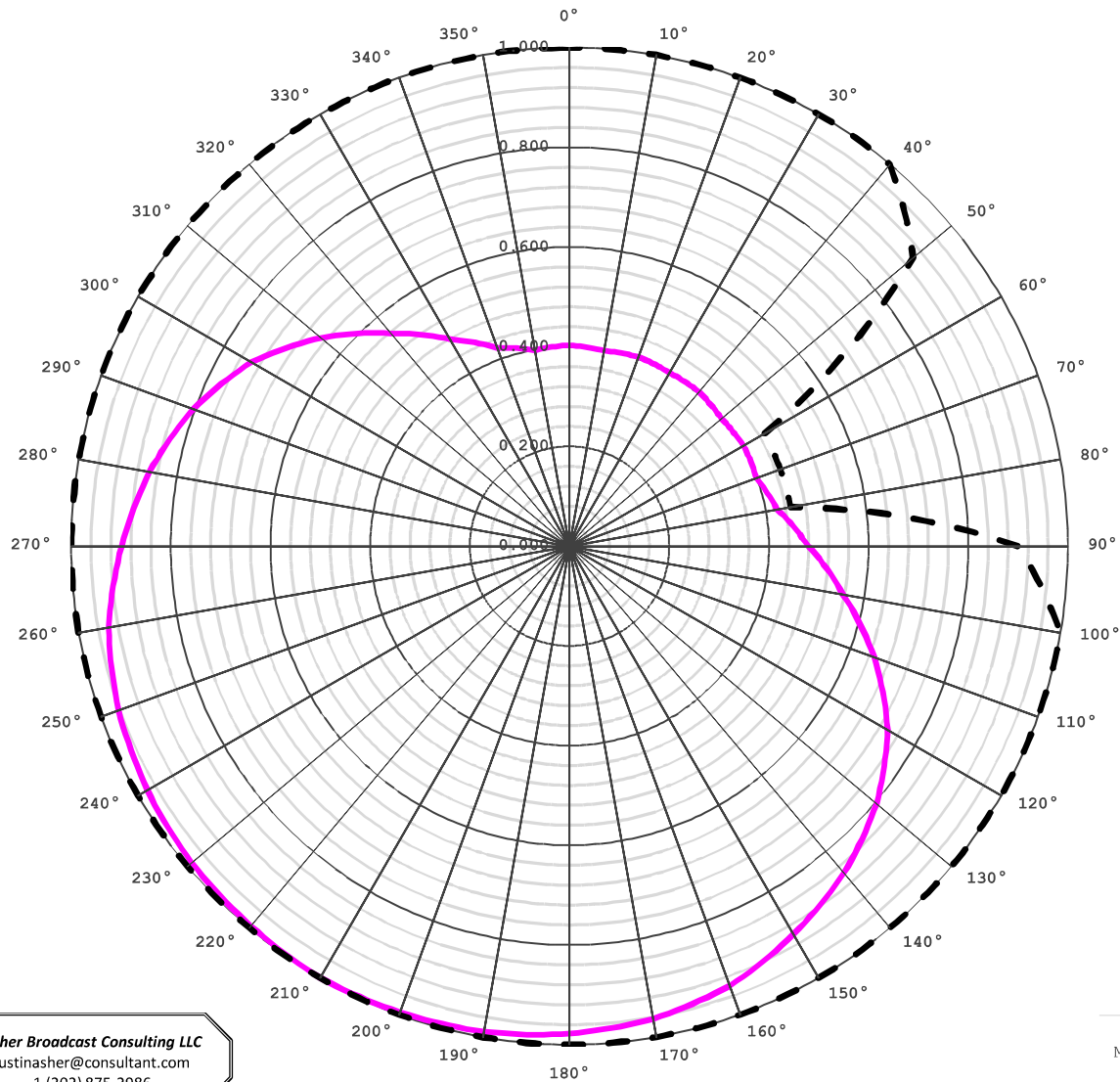
Yellow Highlighted Text denotes the existence of a C.F.R. 47 Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Request toward W298BR - Harrisonburg, VA (CH298D) as noted in **Exhibit 8**. Both stations are co-located on the same tower, therefore the interference area will not leave the base of the tower. However out of an overabundance of caution, protection of a worst case 140 dBμ F(50:10) interference contour has been demonstrated through a downward radiation study. Full protection will be afforded the facility in question as this area will not reach the ground nor a seven meter artificial plane representing a standard two story home when taking into account the downward radiation characteristics of the antenna as supplied by the antenna manufacturer. A copy of the antenna manufacturer specifications has been included in **Exhibit 9**. Sufficient filtering is, or will be, installed within both facility systems to address any intermodulation issues.



Manufacturer's	Make/Model	Orientation	Power
Element 1:	BKG1P(Slant45)	210° True	100.0%
Element 2:			
Element 3:			
Element 4:			

Composite Power: 100%

Exhibit 9 - Copy of Manufacturer's Directional Antenna Pattern Data



Azimuth ° True	FCC Pattern	Manufacturer's Pattern
0°	1.000	0.403
10°	1.000	0.398
20°	1.000	0.404
30°	1.000	0.401
40°	1.000	0.404
50°	0.900	0.398
60°	0.450	0.403
70°	0.450	0.399
80°	0.450	0.423
90°	0.900	0.479
100°	1.000	0.557
110°	1.000	0.650
120°	1.000	0.737
130°	1.000	0.804
140°	1.000	0.856
150°	1.000	0.899
160°	1.000	0.939
170°	1.000	0.963
180°	1.000	0.978
190°	1.000	0.989
200°	1.000	0.995
210°	1.000	1.000
220°	1.000	0.995
230°	1.000	0.989
240°	1.000	0.978
250°	1.000	0.963
260°	1.000	0.939
270°	1.000	0.899
280°	1.000	0.856
290°	1.000	0.804
300°	1.000	0.737
310°	1.000	0.650
320°	1.000	0.557
330°	1.000	0.479
340°	1.000	0.423
350°	1.000	0.399

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

FCC Pattern: ---
Manufacturer's Pattern: ———

Exhibit 9

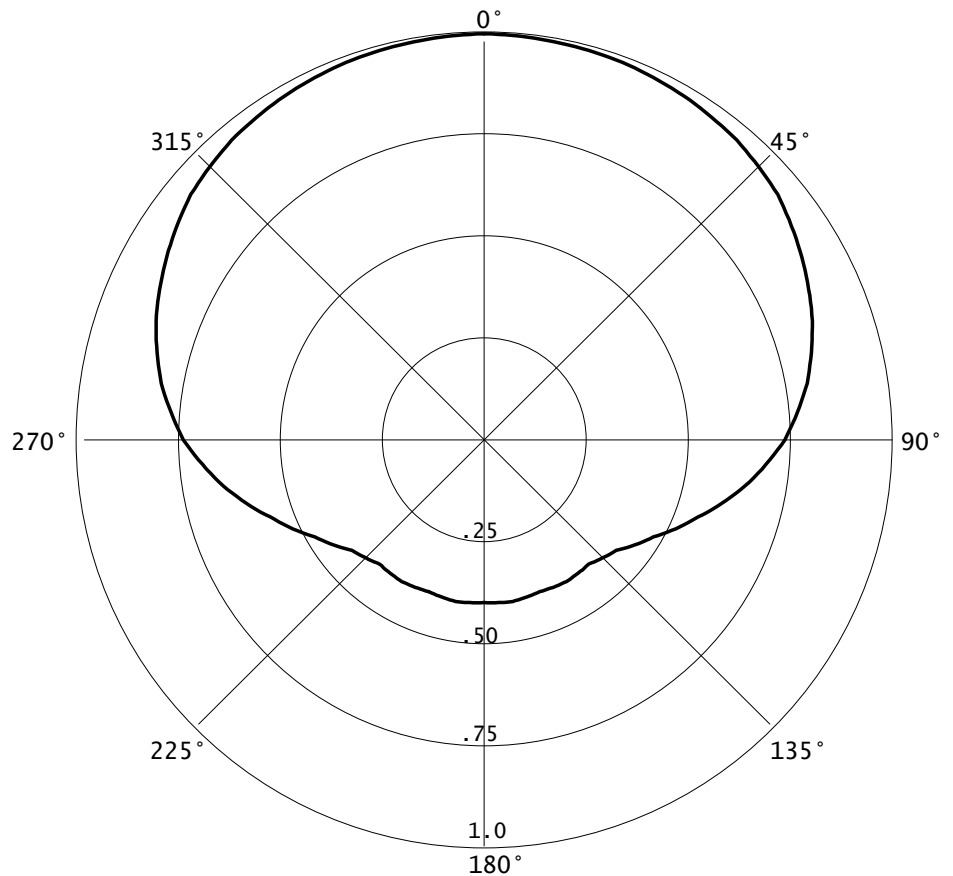
Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 210.0°T) (public record copy)

BKG1/P-1DA(Slant45) COMPOSITE PATTERN

RMS(V)= .739

Graph is Relative Field

Azi	Field	dBk
000	1.000	-10.000
010	0.995	-10.044
020	0.989	-10.096
030	0.978	-10.193
040	0.963	-10.327
050	0.939	-10.547
060	0.899	-10.925
070	0.856	-11.351
080	0.804	-11.895
090	0.737	-12.651
100	0.650	-13.742
110	0.557	-15.083
120	0.479	-16.393
130	0.423	-17.473
140	0.399	-17.981
150	0.403	-17.894
160	0.398	-18.002
170	0.404	-17.872
180	0.401	-17.937
190	0.404	-17.872
200	0.398	-18.002
210	0.403	-17.894
220	0.399	-17.981
230	0.423	-17.473
240	0.479	-16.393
250	0.557	-15.083
260	0.650	-13.742
270	0.737	-12.651
280	0.804	-11.895
290	0.856	-11.351
300	0.899	-10.925
310	0.939	-10.547
320	0.963	-10.327
330	0.978	-10.193
340	0.989	-10.096
350	0.995	-10.044



The directional antenna pattern will be produced by means of a Nicom Dipole BKG1/P broadcast element mounted at a 45° (degree) slant orientation to achieve horizontal and vertical polarization. The BKG1/P-1DA(Slant45) Directional Pattern is therefore a maximum composite pattern of the current horizontal and vertical broadcast patterns as notified by Nicom USA, Inc.

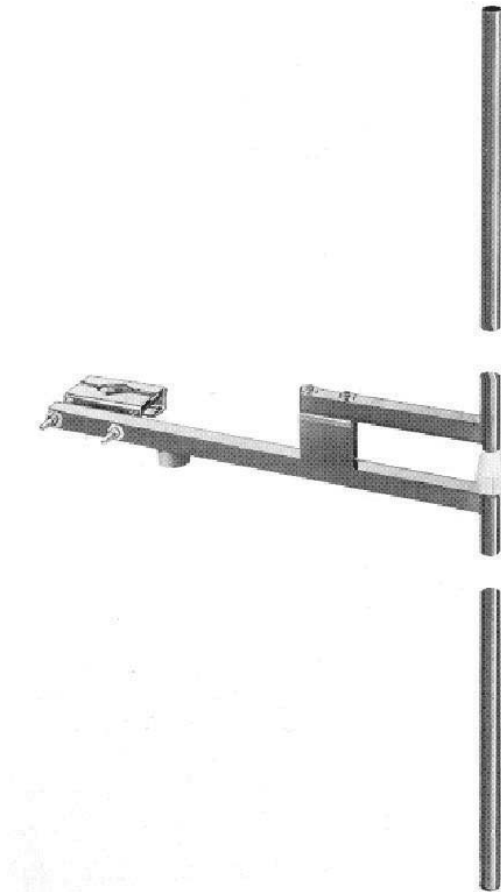
The maximum antenna gain for a single BKG1/P-1DA(Slant45) element will be -3.0 dBd or the common horizontal or vertical maximum antenna gain of 0.0 dBd adjusted by 3 dBd for dual broadcast in the Horizontal and Vertical planes (-3.0 dBd = 0.0 dBd - 3.0 dBd). The maximum gain for multiple bay options of the Nicom BKG1/P-1DA(Slant45) antenna would therefore also be adjusted by -3 dBd to account for operation in the horizontal and vertical planes.

The antenna proposed in this application will be mounted in accordance with specific instructions provided by the antenna manufacturer. The directional antenna will be mounted on the tower which is of uniform cross section. No other antennas of any type are or will be mounted on the same tower level as the directional antenna.

No antenna is or will be mounted within any vertical or horizontal distance specified by the antenna manufacturer as being necessary for proper operation of the directional antenna. In addition, the antenna will be assembled under the supervision of a qualified engineer and installed pursuant to the manufacturer's instructions and manufacturer specified antenna orientation.

Exhibit 9

Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 210.0°T) (public record copy)



NICOM
BKG1/P
Low Power
Broadband
FM Dipole
Dipolo de FM
Banda Ancha

This antenna can be easily installed because of its lightness. Electrically grounded it gives excellent protection against lightning. Combined in arrays of more elements this dipole offers high gain over a wide angle.

Esta antena puede ser facilmente armada debido a su ligereza. Es conectada por tierra lo cual ofrece óptima protección contra relámpagos. Combinada de arrays de varios elementos este dipolo puede ofrecer buena ganancia a través de un amplio ángulo.

TECHNICAL SPECIFICATIONS

Antenna type	dipole	Front-to-back ratio	7 dB
Frequency range	87.5 - 108 MHz	Lightning protection	all parts grounded
Bandwidth	20 MHz	Max wind velocity	119 mph (190 km/h)
Impedance	50 Ohms	Wind load	39.6 Lbs (18 kg)
Connectors	N type	Wind surface	1.2 ft ² (0.11 m ²)
Power rating	500 Watts max.	Materials (external)	anti-corrosive aluminum
VSWR	< 1.3	Mounting	from 2" to 4"
Polarization	vertical	Weight	8.8 Lbs (4 kg)
Gain	0 dBd (unity gain)	Dimensions	55"×33"×2" (1400×850×60 mm)
H plane	194 degrees	Packing	59"×36"×4" (1500×900×100 mm)
V plane	78 degrees		

Radiation Patterns (at mid-band)

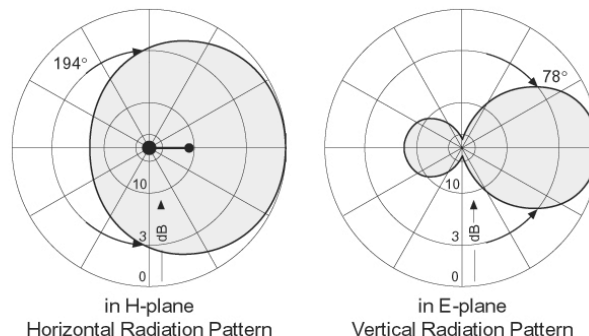


Exhibit 9

Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 210.0°T) (public record copy)

TX station: BKG1/P

Site name:

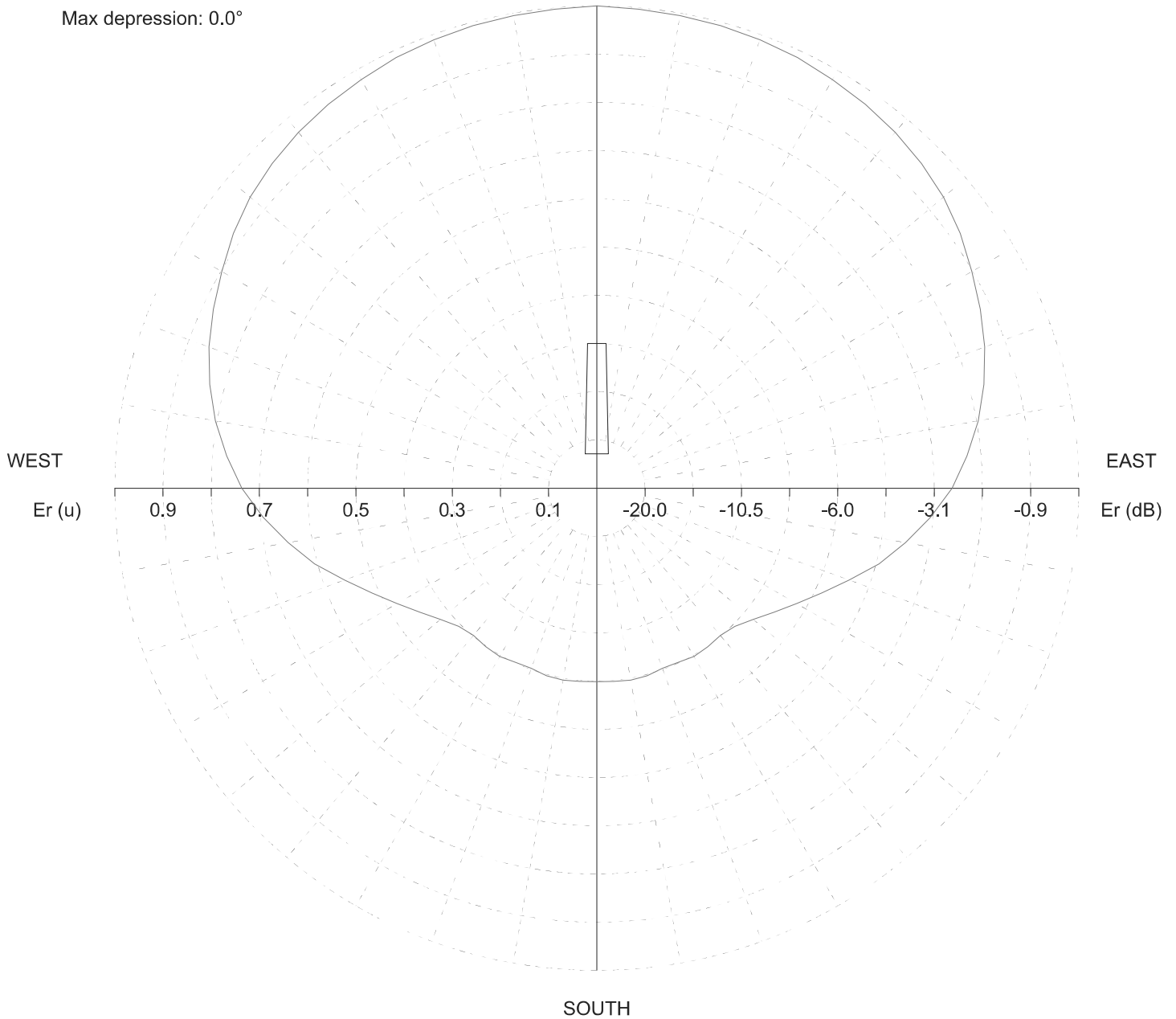
Frequency: 100.00 MHz

Horizontal diagram of Maxima

NORTH

Max azimuth: 0°

Max depression: 0.0°



—— 0.0° depres. (Total antenna), Gain (dBd): 0.00 ERP T.max (KW): 1.

ERP E.max (KW): 0.776

Exhibit 9

Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 210.0°T) (public record copy)

TX station: BKG1/P

Site name:

Frequency: 100.00 MHz

Horizontal diagram of Maxima

Az (°)	Dep (°)	Er (%)	ERP (W)	Az (°)	Dep (°)	Er (%)	ERP (W)	Az (°)	Dep (°)	Er (%)	ERP (W)
0.0	0.0	100.0	776.2	120.0	0.0	47.9	178.0	240.0	0.0	47.9	178.0
5.0	0.0	99.7	772.1	125.0	0.0	44.8	156.0	245.0	0.0	51.5	205.9
10.0	0.0	99.5	768.1	130.0	0.0	42.3	139.1	250.0	0.0	55.7	240.8
15.0	0.0	99.3	765.7	135.0	0.0	40.5	127.4	255.0	0.0	60.6	285.0
20.0	0.0	98.9	759.7	140.0	0.0	39.9	123.3	260.0	0.0	65.0	328.3
25.0	0.0	98.5	753.4	145.0	0.0	40.1	125.1	265.0	0.0	69.5	374.7
30.0	0.0	97.8	743.2	150.0	0.0	40.3	126.0	270.0	0.0	73.7	421.3
35.0	0.0	97.2	733.2	155.0	0.0	39.9	123.5	275.0	0.0	77.1	461.6
40.0	0.0	96.3	720.1	160.0	0.0	39.8	122.8	280.0	0.0	80.4	501.4
45.0	0.0	95.2	703.9	165.0	0.0	40.3	126.1	285.0	0.0	83.2	536.8
50.0	0.0	93.9	684.4	170.0	0.0	40.4	126.9	290.0	0.0	85.6	569.2
55.0	0.0	92.1	658.3	175.0	0.0	40.3	125.8	295.0	0.0	87.8	598.3
60.0	0.0	89.9	627.1	180.0	0.0	40.1	125.0	300.0	0.0	89.9	627.1
65.0	0.0	87.8	598.3	185.0	0.0	40.3	125.8	305.0	0.0	92.1	658.3
70.0	0.0	85.6	569.2	190.0	0.0	40.4	126.9	310.0	0.0	93.9	684.4
75.0	0.0	83.2	536.8	195.0	0.0	40.3	126.1	315.0	0.0	95.2	703.9
80.0	0.0	80.4	501.4	200.0	0.0	39.8	122.8	320.0	0.0	96.3	720.1
85.0	0.0	77.1	461.6	205.0	0.0	39.9	123.5	325.0	0.0	97.2	733.2
90.0	0.0	73.7	421.3	210.0	0.0	40.3	126.0	330.0	0.0	97.8	743.2
95.0	0.0	69.5	374.7	215.0	0.0	40.1	125.1	335.0	0.0	98.5	753.4
100.0	0.0	65.0	328.3	220.0	0.0	39.9	123.3	340.0	0.0	98.9	759.7
105.0	0.0	60.6	285.0	225.0	0.0	40.5	127.4	345.0	0.0	99.3	765.7
110.0	0.0	55.7	240.8	230.0	0.0	42.3	139.1	350.0	0.0	99.5	768.1
115.0	0.0	51.5	205.9	235.0	0.0	44.8	156.0	355.0	0.0	99.7	772.1

Exhibit 9

Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 210.0°T) (public record copy)

TX station: BKG1/P

Site name:

Frequency: 100.00 MHz

Vertical diagram

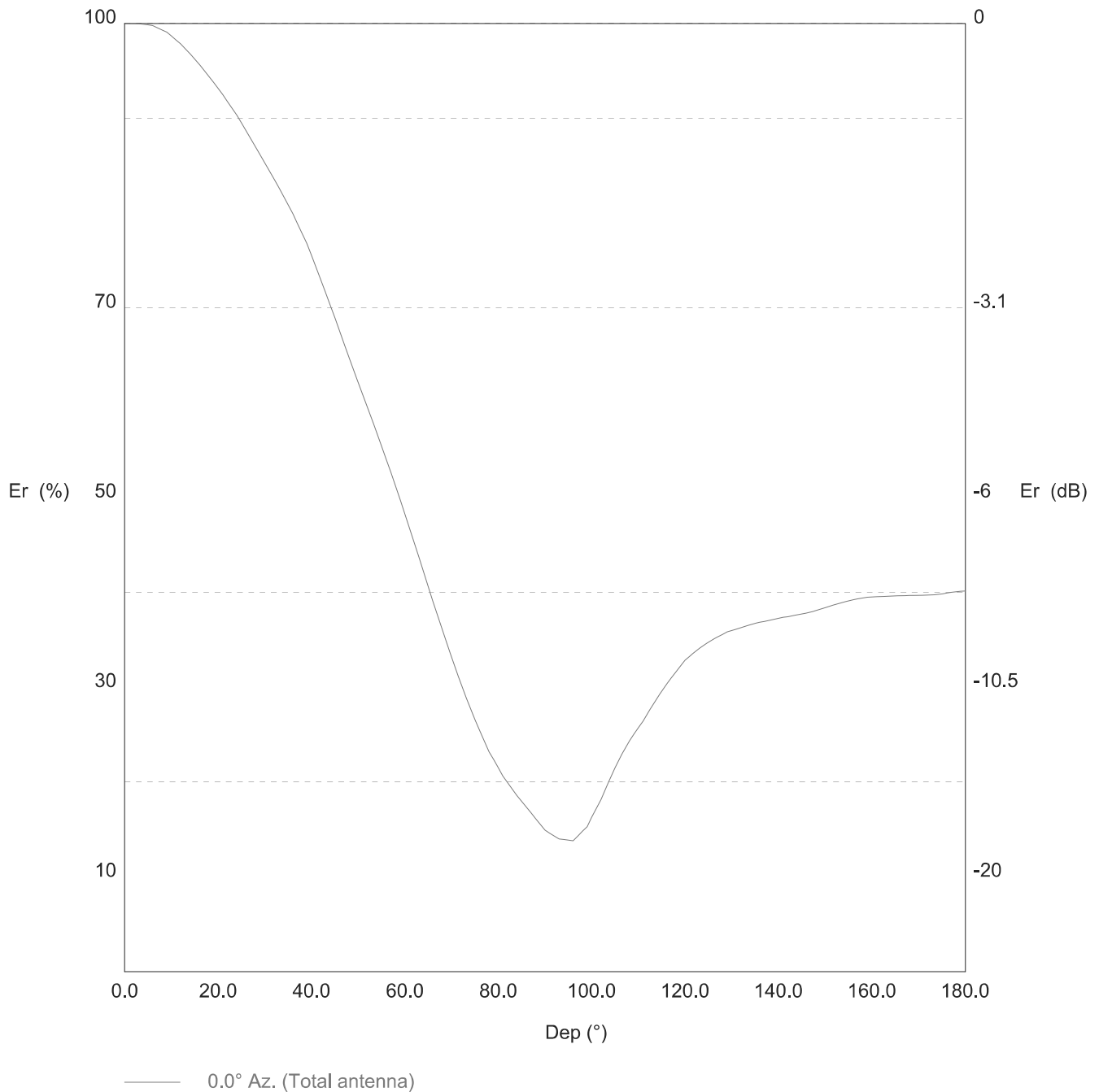


Exhibit 9

Copy of Manufacturer's Directional Antenna Documentation (Actual Antenna Pattern rotated to 210.0°T) (public record copy)

TX station: BKG1/P

Site name:

Frequency: 100.00 MHz

Vertical diagram at an azimuth of 0° degrees

Dep (°)	Er (%)	ERP (W)	Dep (°)	Er (%)	ERP (W)	Dep (°)	Er (%)	ERP (W)
0.0	100.0	776.2	60.0	48.3	180.9	120.0	32.8	83.6
1.0	100.0	776.1	61.0	46.8	169.7	121.0	33.2	85.8
2.0	100.0	775.9	62.0	45.2	158.9	122.0	33.7	88.0
3.0	100.0	775.7	63.0	43.7	148.5	123.0	34.1	90.2
4.0	99.9	774.8	64.0	42.2	138.1	124.0	34.4	91.9
5.0	99.8	773.8	65.0	40.6	128.0	125.0	34.7	93.6
6.0	99.8	772.9	66.0	39.1	118.4	126.0	35.0	95.3
7.0	99.5	769.2	67.0	37.6	109.6	127.0	35.3	96.8
8.0	99.3	765.6	68.0	36.1	101.1	128.0	35.6	98.2
9.0	99.1	762.0	69.0	34.6	92.9	129.0	35.8	99.6
10.0	98.7	755.7	70.0	33.2	85.4	130.0	36.0	100.4
11.0	98.3	749.5	71.0	31.7	78.1	131.0	36.1	101.3
12.0	97.9	743.2	72.0	30.3	71.2	132.0	36.3	102.1
13.0	97.3	735.2	73.0	29.0	65.4	133.0	36.4	103.0
14.0	96.8	727.2	74.0	27.8	59.9	134.0	36.6	103.8
15.0	96.3	719.2	75.0	26.5	54.6	135.0	36.7	104.7
16.0	95.7	710.3	76.0	25.4	50.1	136.0	36.8	105.3
17.0	95.1	701.4	77.0	24.3	45.8	137.0	36.9	105.9
18.0	94.5	692.6	78.0	23.2	41.7	138.0	37.0	106.5
19.0	93.8	683.0	79.0	22.3	38.7	139.0	37.1	107.1
20.0	93.1	673.5	80.0	21.5	35.8	140.0	37.2	107.7
21.0	92.5	664.1	81.0	20.6	33.1	141.0	37.3	108.2
22.0	91.8	653.7	82.0	19.9	30.9	142.0	37.4	108.8
23.0	91.0	643.4	83.0	19.2	28.8	143.0	37.5	109.3
24.0	90.3	633.1	84.0	18.6	26.7	144.0	37.6	109.8
25.0	89.5	621.6	85.0	17.9	25.0	145.0	37.7	110.4
26.0	88.7	610.3	86.0	17.3	23.4	146.0	37.8	111.0
27.0	87.8	599.0	87.0	16.7	21.8	147.0	37.9	111.6
28.0	87.0	587.3	88.0	16.1	20.2	148.0	38.1	112.5
29.0	86.1	575.7	89.0	15.5	18.7	149.0	38.2	113.4
30.0	85.3	564.3	90.0	14.9	17.3	150.0	38.4	114.2
31.0	84.4	552.9	91.0	14.6	16.5	151.0	38.5	115.2
32.0	83.5	541.7	92.0	14.3	15.8	152.0	38.7	116.1
33.0	82.7	530.6	93.0	14.0	15.2	153.0	38.8	117.1
34.0	81.7	518.8	94.0	13.9	15.0	154.0	39.0	117.9
35.0	80.8	507.1	95.0	13.9	14.9	155.0	39.1	118.6
36.0	79.9	495.6	96.0	13.8	14.8	156.0	39.2	119.4
37.0	78.9	482.9	97.0	14.3	15.9	157.0	39.3	119.9
38.0	77.8	470.4	98.0	14.8	17.0	158.0	39.4	120.4
39.0	76.8	458.0	99.0	15.3	18.1	159.0	39.5	120.9
40.0	75.5	442.7	100.0	16.2	20.5	160.0	39.5	121.1
41.0	74.2	427.7	101.0	17.2	23.0	161.0	39.5	121.3
42.0	72.9	412.9	102.0	18.1	25.5	162.0	39.5	121.4
43.0	71.6	398.0	103.0	19.3	28.8	163.0	39.6	121.6
44.0	70.3	383.3	104.0	20.4	32.3	164.0	39.6	121.7
45.0	68.9	368.9	105.0	21.5	35.9	165.0	39.6	121.9
46.0	67.5	354.2	106.0	22.4	39.1	166.0	39.6	122.0
47.0	66.2	339.7	107.0	23.4	42.4	167.0	39.6	122.0
48.0	64.8	325.5	108.0	24.3	45.8	168.0	39.7	122.1
49.0	63.4	312.3	109.0	25.0	48.5	169.0	39.7	122.1
50.0	62.1	299.4	110.0	25.7	51.3	170.0	39.7	122.2
51.0	60.8	286.8	111.0	26.4	54.2	171.0	39.7	122.2
52.0	59.5	274.4	112.0	27.2	57.6	172.0	39.7	122.4
53.0	58.1	262.3	113.0	28.1	61.1	173.0	39.7	122.5
54.0	56.8	250.4	114.0	28.9	64.6	174.0	39.8	122.7
55.0	55.4	238.3	115.0	29.6	67.9	175.0	39.8	123.2
56.0	54.0	226.6	116.0	30.3	71.1	176.0	39.9	123.7
57.0	52.6	215.1	117.0	31.0	74.4	177.0	40.0	124.2
58.0	51.2	203.3	118.0	31.6	77.5	178.0	40.0	124.5
59.0	49.7	191.9	119.0	32.2	80.5	179.0	40.1	124.7