

# Technical Report Supporting a Minor Modification of a Licensed FM Translator

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

*for*

*K217EL - Scio, OR  
(Facility ID: 93023)*

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*Non-Adjacent Channel Change per  
47 C.F.R. Section 74.1233(a)(1)(i)(A)(2)  
to  
CH207D(89.3 MHz) - Scio, OR*

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*as a Non-Commercial,  
Regular (non-fill-in) Translator  
for KCSH(FM) - Ellensburg, WA*

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May, 2023

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1(202)875-2986

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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 K217EI.L - Scio, OR (Facility ID: 93023). This filing requests a 47 C.F.R. Section 74.1233(a)(1)(i)(A)(2) non-adjacent channel change from CH217D (91.3 MHz) to CH207D (89.3 MHz) based upon a showing of reduced interference. Operation on the new frequency of CH207D (89.3 MHz) with a non-directional power of 0.100 kW ERP circular polarization (H&V) is requested. The FM Translator will operate from a COR of 254.5 meters AMSL at a new site location. This LMS Filing will continue to specify rebroadcast of Class A FM Primary Station KCSH(FM) - Ellensburg, WA (CH205A, 88.9 MHz); Facility ID No. 81756. The Translator will continue to provide service to the community of Scio, OR.

**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 outside of the NCE-FM Primary Station 60 dBμ contour. The Primary Station relationship has been plotted in **Exhibit 2**. The Translator will be fed via satellite. Regarding permission to retransmit Primary Station, KCSH(FM) - Ellensburg, WA; both KCSH(FM) and CH207D.P(K217EI.L) are under common control of Lifetalk Radio, Inc.; therefore, permission to rebroadcast is implied.

The proposed facility will be located on a 15.2 meter AGL tower which does not require Antenna Structure Registration. This tower has been previously authorized under co-located LPFM Construction Permit LMS-0000189684 for KPIK-LP(FM).C - Stayton, OR (Facility ID: 133093). Although LMS-0000189684 grants authority to construct a 20.7 m AGL structure; the applicant has been informed KPIK-LP(FM) will shortly be filing its own Construction Permit Modification Application reducing the overall tower height to 15.2 meters AGL. In support of this filing, a copy of USGS Topographic Aerial Photomapping of the existing tower site 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 believed required as this proposal will reduce, but 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. A general allocation study for this proposal is found in ***Exhibit 6***. There are three (3) 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-c)***. A copy of the manufacturer's antenna specifications has been included in ***Exhibit 8***.

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 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 believed required where the currently authorized new tower construction is not being substantially altered from its current height. In this instance, further compliance is not believed necessary where only an antenna and feed-line are being installed on a reduced-height tower as here. *(Per submitted and granted co-located LPFM Construction Permit LMS-0000189684 for KPIK-LP(FM).C - Stayton, OR (Facility ID: 133093); the KPIK-LP(FM) licensee previously certified full environmental compliance for a proposed new 20.7 m AGL structure. At this time, the KPIK-LP(FM) licensee has informed Lifetalk it will shortly be filing its own Construction Permit Modification Application reducing the overall tower height to 15.2 meters AGL. However, a reduction in height does not constitute a substantial change from the previous certifications made within, or grant thereof, of LPFM Construction Permit LMS-0000189684.)* 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  
May 24, 2023

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

# Exhibit 1

## Service Contour Study: Present vs Proposed Operations

*Proposed 60 dBμ F(50:50) Contour*

*Present 60 dBμ F(50:50) Contour*

**CH207D.P**  
Scio, OR  
Proposed Operation  
Facility ID: 93023  
Latitude: 44-45-32.40 N  
Longitude: 122-44-54.80 W  
ERP: 0.10 kW  
Channel: 207D (89.3 MHz)  
AMSL Height: 254.5 m  
Pattern: Omni

60 dBμ F(50:50) Contour  
Total Population: 16,700  
Total Area: 233.3 sq. km

**K217EI.L**  
Scio, OR  
BLFT20070410ADJ  
Facility ID: 93023  
Latitude: 44-40-59.40 N  
Longitude: 122-46-58.30 W  
ERP: 0.028 kW  
Channel: 217D (91.3 MHz)  
AMSL Height: 385.0 m  
Pattern: Directional

60 dBμ F(50:50) Contour  
Total Population: 3,880  
Total Area: 158.5 sq. km

Terrain  
35 1359 m

Scale 1:200,000

0 4 8 12 km

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**Exhibit 2**  
**Service Contour Study:**  
**Proposed vs Primary Operations**

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

**Primary 60 dBμ F(50:50) Contour**

**KCSH(FM).L**



**KCSH(FM).L**  
Ellensburg, WA  
BLED20011026AAA  
Facility ID: 81756  
Latitude: 47-10-01.40 N  
Longitude: 120-45-54.20 W  
ERP: 0.38 kW  
Channel: 205A (88.9 MHz)  
AMSL Height: 1013.0 m  
Pattern: Omni

**CH207D.P**  
Scio, OR  
Proposed Operation  
Facility ID: 93023  
Latitude: 44-45-32.40 N  
Longitude: 122-44-54.80 W  
ERP: 0.10 kW  
Channel: 207D (89.3 MHz)  
AMSL Height: 254.5 m  
Horiz. Pattern: Omni

**Proposed 60 dBμ F(50:50) Contour**

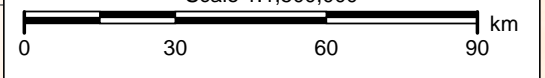


**CH207D.P**

**Asher Broadcast Consulting LLC**  
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Terrain  
-1 4378 m

Scale 1:1,500,000





# The National Map Advanced Viewer

## Exhibit 3 - Copy of USGS Topographic Aerial Photomap of Existing Site

#1:797.2242955899168 ft/242.99 m

Kreilich Reservoir

### Site Coordinates

(NGS NADCON)

Latitude

Longitude

NAD 27 datum values: -- -- --

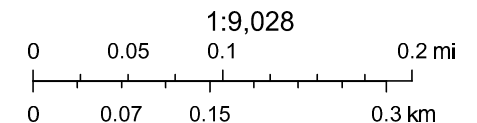
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NAD 83 datum values: 44-45-32.4 N

122-44-54.8 W

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5/18/2023, 7:11:37 AM



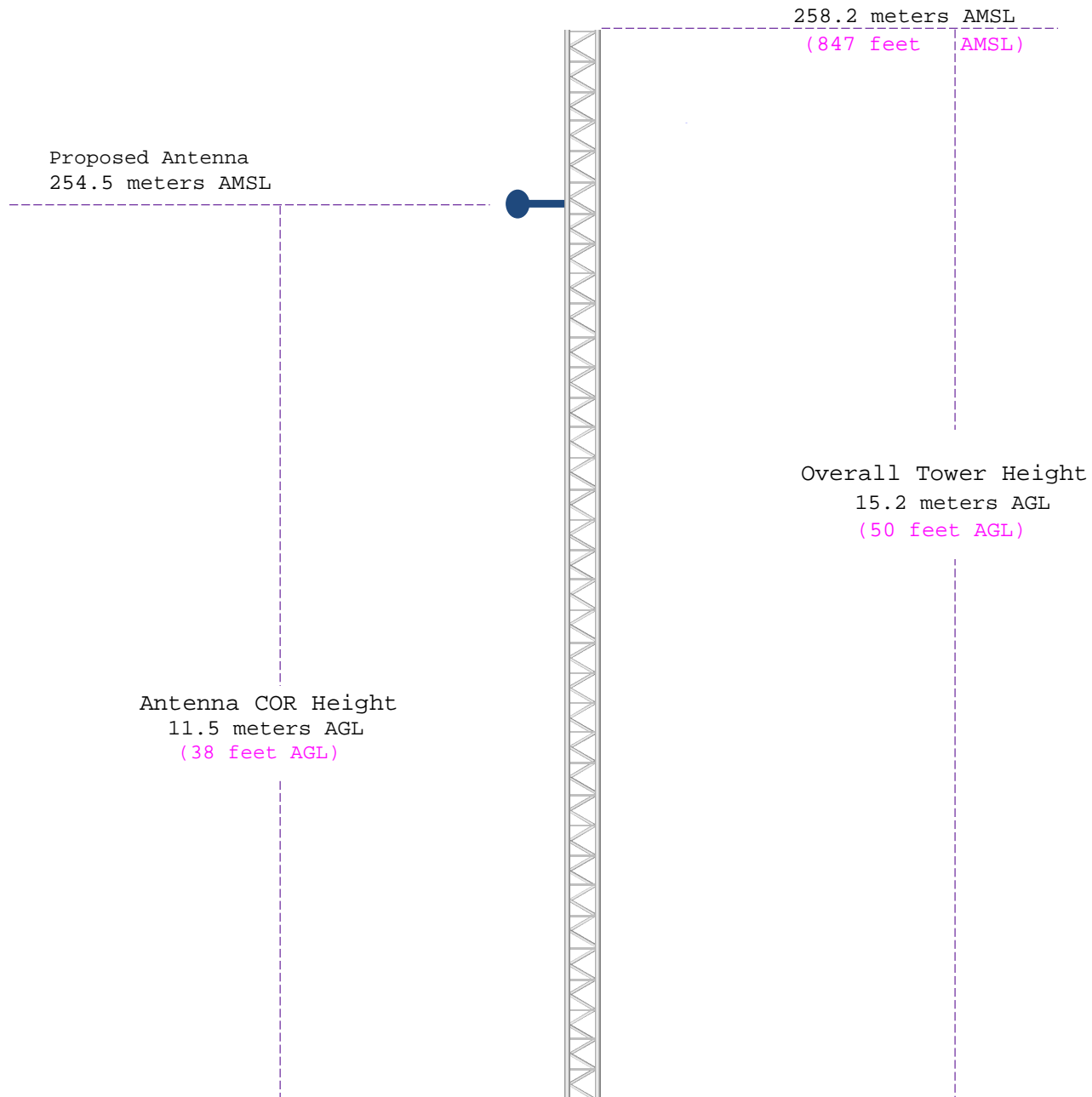
USGS The National Map: Orthoimagery and US Topo. Data refreshed December, 2022.

USGS  
2021 USGS



# Exhibit 4

## Vertical Plan of Antenna System and Support Tower



Ground Elevation: 243.0 meters AMSL (797 feet AMSL)		
Address: 40656 Huntley Rd		
City: Stayton	Laitude (D M S)	Longitude (D M S)
County: Marion	---	---
State: Oregon	Lat/Long: 44-45-32.4 N 122-44-54.8 W	(NAD 1927) (NAD 1983)
Antenna Structure Registration Not Required	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. = 444532.4    W. Lng. = 1224454.8  
 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	220.1	34.4	0.1000	-10.00	1.000	5.99
030	344.1	-89.6	0.1000	-10.00	1.000	5.64
060	366.7	-112.2	0.1000	-10.00	1.000	5.64
090	324.5	-70.0	0.1000	-10.00	1.000	5.64
120	305.9	-51.4	0.1000	-10.00	1.000	5.64
150	324.6	-70.1	0.1000	-10.00	1.000	5.64
180	225.0	29.5	0.1000	-10.00	1.000	5.64
210	131.4	123.1	0.1000	-10.00	1.000	11.37
240	128.0	126.5	0.1000	-10.00	1.000	11.51
270	119.3	135.2	0.1000	-10.00	1.000	11.89
300	122.9	131.6	0.1000	-10.00	1.000	11.74
330	147.7	106.8	0.1000	-10.00	1.000	10.65

Ave El= 230.02 M    HAAT= 24.48 M    AMSL= 254.5

#### **NAD 1983 to NAD 1927 Conversion:**

#### **Various Coordinate Conversion Calculations (NAD 1983):**

Position Type	Lat Lon
<b>Degrees Lat Long</b>	44.7590000°, -122.7485556°
<b>Degrees Minutes</b>	44°45.54000', -122°44.91333'
<b>Degrees Minutes Seconds</b>	44°45'32.4000", -122°44'54.8000"
<b>UTM</b>	10T 519900mE 4956209mN
<b>UTM centimeter</b>	10T 519900.57mE 4956209.66mN
<b>MGRS</b>	10TEQ1990056209
<b>Grid North</b>	0.2°
<b>GARS</b>	115MF27
<b>Maidenhead</b>	CN84PS02ED18
<b>GEOREF</b>	DJNQ15084554
<b>Plus Code</b>	84PVQ752+JH
<b>Plus Code Extended</b>	84PVQ752+JH42542
<b>what3words</b>	perfecting.chat.dividers

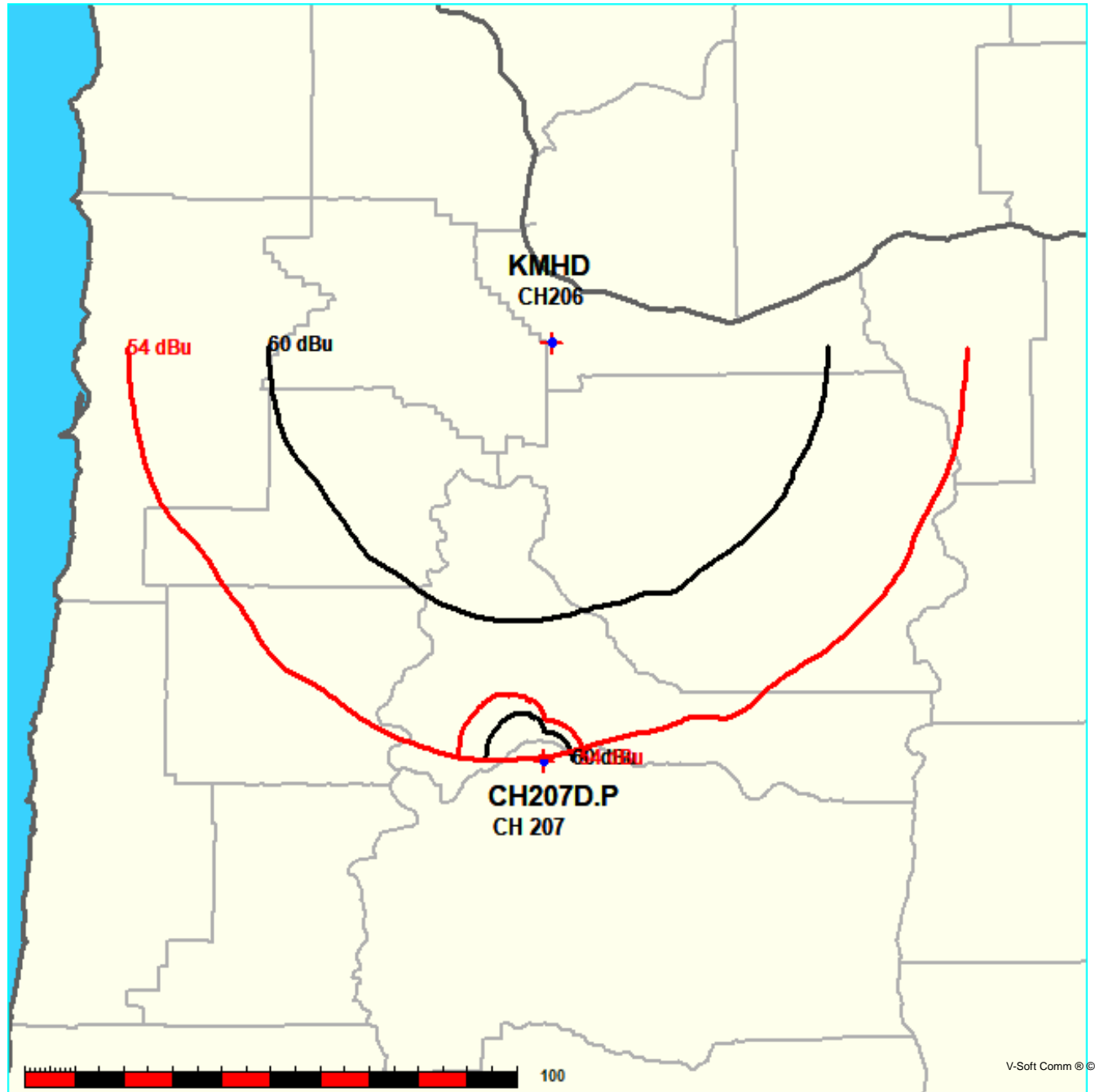


***Exhibit 7a***  
***Contour Protection Studies Toward Select Allocation Concern(s)***

FMCommander Single Allocation Study - 05-23-2023 - FCC NGDC 30 Sec  
CH207D.P's Overlaps (In= -9.23 km, Out= 15.94 km)

CH207D.P CH 207 D  
Lat= 44 45 32.40, Lng= 122 44 54.80  
0.1 kW 24.5 m HAAT, 254.5 m COR  
Prot.= 60 dBu, Intef.= 54 dBu

KMHD CH 206 C1 BLED20050603ABW  
Lat= 45 30 57.40, Lng= 122 44 03.40  
7.9 kW 437 m HAAT, 528 m COR  
Prot.= 60 dBu, Intef.= 54 dBu



# ***Exhibit 7a***

## **Contour Protection Studies Toward Select Allocation Concern(s)**

05-23-2023      Terrain Data: FCC NGDC 30 Sec      FMOver Analysis

CH207D.P

KMHD    BLED20050603ABW

Channel = 207D  
 Max ERP = 0.1 kW  
 RCAMSL = 254.5 m  
 N. Lat. 44 45 32.40  
 W. Lng. 122 44 54.80  
 Protected  
 60 dBu

Channel = 206C1  
 Max ERP = 7.9 kW  
 RCAMSL = 528 m  
 N. Lat. 45 30 57.40  
 W. Lng. 122 44 03.40  
 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	000.1000	0121.3	011.3	186.2	007.9000	0445.9	075.8	56.87*	8.82
322.0	000.1000	0120.7	011.3	186.1	007.9000	0445.6	075.7	56.90*	8.91
323.0	000.1000	0119.8	011.2	186.0	007.9000	0445.2	075.6	56.93*	8.98
324.0	000.1000	0118.9	011.2	185.9	007.9000	0444.9	075.5	56.95*	9.05
325.0	000.1000	0117.8	011.1	185.7	007.9000	0444.5	075.4	56.97*	9.11
326.0	000.1000	0116.3	011.1	185.6	007.9000	0444.1	075.3	56.99*	9.15
327.0	000.1000	0114.1	011.0	185.4	007.9000	0443.7	075.3	56.99*	9.16
328.0	000.1000	0111.7	010.9	185.2	007.9000	0443.4	075.3	56.99*	9.16
329.0	000.1000	0109.2	010.8	185.1	007.9000	0443.0	075.2	56.99*	9.15
330.0	000.1000	0106.8	010.6	184.9	007.9000	0442.6	075.2	56.98*	9.13
331.0	000.1000	0104.7	010.5	184.8	007.9000	0442.3	075.2	56.98*	9.12
332.0	000.1000	0103.0	010.5	184.6	007.9000	0442.0	075.2	56.98*	9.13
333.0	000.1000	0101.9	010.4	184.5	007.9000	0441.7	075.1	56.99*	9.15
334.0	000.1000	0101.3	010.4	184.3	007.9000	0441.5	075.0	57.01*	9.20
335.0	000.1000	0100.5	010.3	184.2	007.9000	0441.2	075.0	57.02*	9.23
336.0	000.1000	0098.7	010.3	184.1	007.9000	0440.9	075.0	57.01*	9.21
337.0	000.1000	0096.0	010.1	183.9	007.9000	0440.6	075.0	56.99*	9.15
338.0	000.1000	0093.2	010.0	183.7	007.9000	0440.3	075.1	56.97*	9.06
339.0	000.1000	0091.1	009.9	183.6	007.9000	0439.9	075.1	56.95*	9.00
340.0	000.1000	0089.7	009.8	183.4	007.9000	0439.6	075.1	56.94*	8.98
341.0	000.1000	0088.7	009.7	183.3	007.9000	0439.3	075.1	56.94*	8.96
342.0	000.1000	0087.4	009.7	183.1	007.9000	0438.9	075.1	56.93*	8.93
343.0	000.1000	0083.4	009.4	183.0	007.9000	0438.5	075.2	56.87*	8.74
344.0	000.1000	0076.9	009.1	182.7	007.9000	0438.0	075.5	56.75*	8.39
345.0	000.1000	0070.4	008.7	182.5	007.9000	0437.5	075.9	56.63*	8.02
346.0	000.1000	0070.3	008.7	182.4	007.9000	0437.3	075.8	56.63*	8.03
347.0	000.1000	0071.4	008.7	182.3	007.9000	0437.1	075.7	56.66*	8.12
348.0	000.1000	0070.4	008.7	182.2	007.9000	0436.8	075.7	56.65*	8.07
349.0	000.1000	0068.9	008.6	182.1	007.9000	0436.5	075.8	56.62*	7.99
350.0	000.1000	0067.3	008.5	182.0	007.9000	0436.2	075.9	56.59*	7.90
351.0	000.1000	0064.7	008.3	181.8	007.9000	0435.9	076.0	56.54*	7.73



# ***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)
352.0	000.1000	0061.5	008.1	181.7	007.9000	0435.6	076.2	56.47* 7.52
353.0	000.1000	0058.5	007.9	181.6	007.9000	0435.3	076.4	56.40* 7.32
354.0	000.1000	0056.0	007.7	181.4	007.9000	0435.0	076.5	56.34* 7.13
355.0	000.1000	0052.8	007.5	181.3	007.9000	0434.8	076.7	56.26* 6.88
356.0	000.1000	0049.4	007.2	181.2	007.9000	0434.5	077.0	56.17* 6.62
357.0	000.1000	0045.9	006.9	181.1	007.9000	0434.3	077.3	56.08* 6.32
358.0	000.1000	0042.7	006.7	181.0	007.9000	0434.0	077.5	55.99* 6.06
359.0	000.1000	0039.4	006.4	180.9	007.9000	0433.8	077.8	55.90* 5.77
000.0	000.1000	0034.4	006.0	180.8	007.9000	0433.6	078.2	55.76* 5.35
001.0	000.1000	0029.2	005.6	180.7	007.9000	0433.5	078.5	55.64* 4.98
002.0	000.1000	0024.6	005.6	180.7	007.9000	0433.3	078.5	55.63* 4.96
003.0	000.1000	0020.7	005.6	180.6	007.9000	0433.1	078.5	55.63* 4.94
004.0	000.1000	0017.6	005.6	180.5	007.9000	0433.0	078.5	55.62* 4.92
005.0	000.1000	0015.1	005.6	180.5	007.9000	0432.8	078.5	55.61* 4.90
006.0	000.1000	0016.0	005.6	180.4	007.9000	0432.6	078.6	55.60* 4.88
007.0	000.1000	0016.1	005.6	180.3	007.9000	0432.5	078.6	55.60* 4.85
008.0	000.1000	0011.7	005.6	180.2	007.9000	0432.3	078.6	55.59* 4.83
009.0	000.1000	0005.8	005.6	180.2	007.9000	0432.2	078.6	55.58* 4.80
010.0	000.1000	-0000.8	005.6	180.1	007.9000	0432.0	078.6	55.57* 4.76
011.0	000.1000	-0008.2	005.6	180.0	007.9000	0431.8	078.6	55.56* 4.73
012.0	000.1000	-0015.9	005.6	180.0	007.9000	0431.6	078.6	55.54* 4.69
013.0	000.1000	-0021.9	005.6	179.9	007.9000	0431.4	078.7	55.53* 4.65
014.0	000.1000	-0027.8	005.6	179.8	007.9000	0431.1	078.7	55.52* 4.60
015.0	000.1000	-0034.9	005.6	179.8	007.9000	0430.9	078.7	55.50* 4.56
016.0	000.1000	-0041.1	005.6	179.7	007.9000	0430.7	078.7	55.49* 4.51
017.0	000.1000	-0045.2	005.6	179.6	007.9000	0430.5	078.8	55.47* 4.47
018.0	000.1000	-0049.1	005.6	179.6	007.9000	0430.3	078.8	55.46* 4.42
019.0	000.1000	-0053.6	005.6	179.5	007.9000	0430.1	078.8	55.44* 4.37
020.0	000.1000	-0057.4	005.6	179.4	007.9000	0429.9	078.9	55.42* 4.31
021.0	000.1000	-0061.2	005.6	179.4	007.9000	0429.7	078.9	55.40* 4.26
022.0	000.1000	-0062.9	005.6	179.3	007.9000	0429.5	078.9	55.39* 4.20
023.0	000.1000	-0062.4	005.6	179.2	007.9000	0429.3	079.0	55.37* 4.15
024.0	000.1000	-0063.4	005.6	179.2	007.9000	0429.1	079.0	55.35* 4.09
025.0	000.1000	-0067.9	005.6	179.1	007.9000	0428.9	079.1	55.33* 4.03
026.0	000.1000	-0072.0	005.6	179.0	007.9000	0428.7	079.1	55.31* 3.97
027.0	000.1000	-0075.0	005.6	179.0	007.9000	0428.5	079.1	55.29* 3.90
028.0	000.1000	-0078.9	005.6	178.9	007.9000	0428.3	079.2	55.27* 3.84
029.0	000.1000	-0084.4	005.6	178.8	007.9000	0428.2	079.2	55.25* 3.77
030.0	000.1000	-0089.6	005.6	178.8	007.9000	0428.0	079.3	55.22* 3.71
031.0	000.1000	-0094.1	005.6	178.7	007.9000	0427.8	079.3	55.20* 3.64
032.0	000.1000	-0098.1	005.6	178.7	007.9000	0427.6	079.4	55.18* 3.57
033.0	000.1000	-0100.9	005.6	178.6	007.9000	0427.4	079.5	55.16* 3.50
034.0	000.1000	-0101.9	005.6	178.5	007.9000	0427.3	079.5	55.13* 3.42
035.0	000.1000	-0101.8	005.6	178.5	007.9000	0427.1	079.6	55.11* 3.35
036.0	000.1000	-0101.3	005.6	178.4	007.9000	0426.9	079.6	55.08* 3.27

# ***Exhibit 7a***

## ***Contour Protection Studies Toward Select Allocation Concern(s)***

05-23-2023      Terrain Data: FCC NGDC 30 Sec      FMOver Analysis

KMHD    BLED20050603ABW

CH207D.P

Channel = 206C1  
 Max ERP = 7.9 kW  
 RCAMSL = 528 m  
 N. Lat. 45 30 57.40  
 W. Lng. 122 44 03.40  
 Protected  
     60 dBu

Channel = 207D  
 Max ERP = 0.1 kW  
 RCAMSL = 254.5 m  
 N. Lat. 44 45 32.40  
 W. Lng. 122 44 54.80  
 Interfering  
     54 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
136.0	007.9000	0438.3	056.1	042.5	000.1000	-0127.1	059.4	23.93	
137.0	007.9000	0437.1	056.1	042.4	000.1000	-0126.8	058.4	24.14	
138.0	007.9000	0436.0	056.0	042.2	000.1000	-0126.4	057.4	24.34	
139.0	007.9000	0434.1	055.9	042.0	000.1000	-0125.8	056.5	24.54	
140.0	007.9000	0431.4	055.8	041.7	000.1000	-0125.1	055.5	24.74	
141.0	007.9000	0428.8	055.6	041.4	000.1000	-0124.2	054.6	24.94	
142.0	007.9000	0426.4	055.5	041.1	000.1000	-0123.1	053.7	25.15	
143.0	007.9000	0424.7	055.4	040.8	000.1000	-0121.9	052.7	25.35	
144.0	007.9000	0423.8	055.3	040.5	000.1000	-0120.6	051.8	25.55	
145.0	007.9000	0423.6	055.3	040.2	000.1000	-0119.3	050.9	25.75	
146.0	007.9000	0423.8	055.3	039.9	000.1000	-0117.8	049.9	25.95	
147.0	007.9000	0424.9	055.4	039.7	000.1000	-0116.3	049.0	26.16	
148.0	007.9000	0427.1	055.5	039.5	000.1000	-0114.9	048.0	26.37	
149.0	007.9000	0430.3	055.7	039.3	000.1000	-0113.9	047.1	26.59	
150.0	007.9000	0433.7	055.9	039.1	000.1000	-0112.7	046.1	26.82	
151.0	007.9000	0436.9	056.1	038.8	000.1000	-0111.1	045.1	27.06	
152.0	007.9000	0439.0	056.2	038.5	000.1000	-0108.9	044.2	27.31	
153.0	007.9000	0439.5	056.2	038.0	000.1000	-0106.1	043.3	27.56	
154.0	007.9000	0438.2	056.1	037.3	000.1000	-0103.0	042.4	27.80	
155.0	007.9000	0434.3	055.9	036.5	000.1000	-0101.3	041.6	28.03	
156.0	007.9000	0426.6	055.5	035.3	000.1000	-0101.7	041.0	28.22	
157.0	007.9000	0417.4	055.0	034.0	000.1000	-0101.9	040.5	28.39	
158.0	007.9000	0409.8	054.6	032.7	000.1000	-0100.2	039.9	28.56	
159.0	007.9000	0405.9	054.3	031.6	000.1000	-0096.8	039.3	28.77	
160.0	007.9000	0404.8	054.3	030.7	000.1000	-0092.9	038.6	29.00	
161.0	007.9000	0405.2	054.3	029.8	000.1000	-0088.7	037.8	29.24	
162.0	007.9000	0406.9	054.4	028.9	000.1000	-0084.1	037.1	29.51	
163.0	007.9000	0408.7	054.5	028.0	000.1000	-0079.1	036.3	29.77	
164.0	007.9000	0409.2	054.5	027.0	000.1000	-0074.9	035.6	30.01	

## 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)
165.0	007.9000	0408.2	054.5	025.8	000.1000	-0071.2	035.0	30.23
166.0	007.9000	0406.9	054.4	024.5	000.1000	-0065.3	034.5	30.43
167.0	007.9000	0405.1	054.3	023.1	000.1000	-0062.3	034.0	30.61
168.0	007.9000	0404.1	054.2	021.7	000.1000	-0062.8	033.5	30.80
169.0	007.9000	0403.9	054.2	020.4	000.1000	-0058.8	033.0	30.99
170.0	007.9000	0405.6	054.3	019.0	000.1000	-0053.6	032.4	31.20
171.0	007.9000	0407.5	054.4	017.6	000.1000	-0047.5	031.9	31.41
172.0	007.9000	0408.8	054.5	016.1	000.1000	-0041.6	031.4	31.60
173.0	007.9000	0410.6	054.6	014.6	000.1000	-0031.6	031.0	31.80
174.0	007.9000	0413.6	054.8	013.0	000.1000	-0021.8	030.5	32.02
175.0	007.9000	0416.4	054.9	011.3	000.1000	-0011.0	030.0	32.23
176.0	007.9000	0419.5	055.1	009.7	000.1000	0001.7	029.6	32.44
177.0	007.9000	0422.7	055.3	007.9	000.1000	0012.3	029.2	32.63
178.0	007.9000	0425.6	055.4	006.1	000.1000	0016.1	028.9	32.80
179.0	007.9000	0428.6	055.6	004.2	000.1000	0016.8	028.6	32.95
180.0	007.9000	0431.7	055.8	002.3	000.1000	0023.6	028.4	33.07
181.0	007.9000	0434.0	055.9	000.3	000.1000	0032.9	028.3	33.82
182.0	007.9000	0436.3	056.0	358.3	000.1000	0041.7	028.2	35.82
183.0	007.9000	0438.6	056.2	356.3	000.1000	0048.3	028.1	37.13
184.0	007.9000	0440.9	056.3	354.3	000.1000	0055.1	028.2	38.29
185.0	007.9000	0442.8	056.4	352.3	000.1000	0060.6	028.2	39.03
186.0	007.9000	0445.3	056.5	350.3	000.1000	0066.7	028.3	39.74
187.0	007.9000	0448.1	056.7	348.3	000.1000	0070.0	028.5	40.06
188.0	007.9000	0450.9	056.8	346.3	000.1000	0070.6	028.7	40.02
189.0	007.9000	0453.2	057.0	344.4	000.1000	0074.0	028.9	40.26
190.0	007.9000	0454.8	057.1	342.6	000.1000	0085.8	029.3	41.40
191.0	007.9000	0455.8	057.1	340.8	000.1000	0088.9	029.7	41.49
192.0	007.9000	0456.6	057.2	339.1	000.1000	0090.9	030.2	41.42
193.0	007.9000	0457.2	057.2	337.5	000.1000	0094.5	030.7	41.49
194.0	007.9000	0457.5	057.2	336.0	000.1000	0098.6	031.3	41.58
195.0	007.9000	0457.6	057.2	334.6	000.1000	0100.9	032.0	41.48
196.0	007.9000	0457.4	057.2	333.3	000.1000	0101.6	032.6	41.23
197.0	007.9000	0456.8	057.2	332.1	000.1000	0102.8	033.3	40.99
198.0	007.9000	0455.8	057.1	331.0	000.1000	0104.7	034.1	40.79
199.0	007.9000	0455.2	057.1	329.9	000.1000	0107.0	034.9	40.63
200.0	007.9000	0455.4	057.1	328.9	000.1000	0109.5	035.6	40.47
201.0	007.9000	0455.9	057.1	327.9	000.1000	0112.0	036.4	40.31
202.0	007.9000	0456.3	057.2	326.9	000.1000	0114.3	037.2	40.11
203.0	007.9000	0456.2	057.1	326.1	000.1000	0116.1	038.0	39.86
204.0	007.9000	0455.3	057.1	325.4	000.1000	0117.3	038.9	39.55
205.0	007.9000	0453.7	057.0	324.7	000.1000	0118.1	039.8	39.20
206.0	007.9000	0452.0	056.9	324.2	000.1000	0118.7	040.7	38.83
207.0	007.9000	0450.4	056.8	323.7	000.1000	0119.2	041.6	38.46
208.0	007.9000	0448.5	056.7	323.2	000.1000	0119.6	042.6	38.09
209.0	007.9000	0446.2	056.6	322.8	000.1000	0120.0	043.5	37.71

## ***Exhibit 7b***

### **Contour Protection Studies Toward Select Allocation Concern(s)**

FMCommander Single Allocation Study - 05-23-2023 - FCC NGDC 30 Sec

CH207D.P's Overlaps 39.33 Req km, 0.06 Mar km)

CH207D.P CH 207 D

Lat= 44 45 32.40, Lng= 122 44 54.80

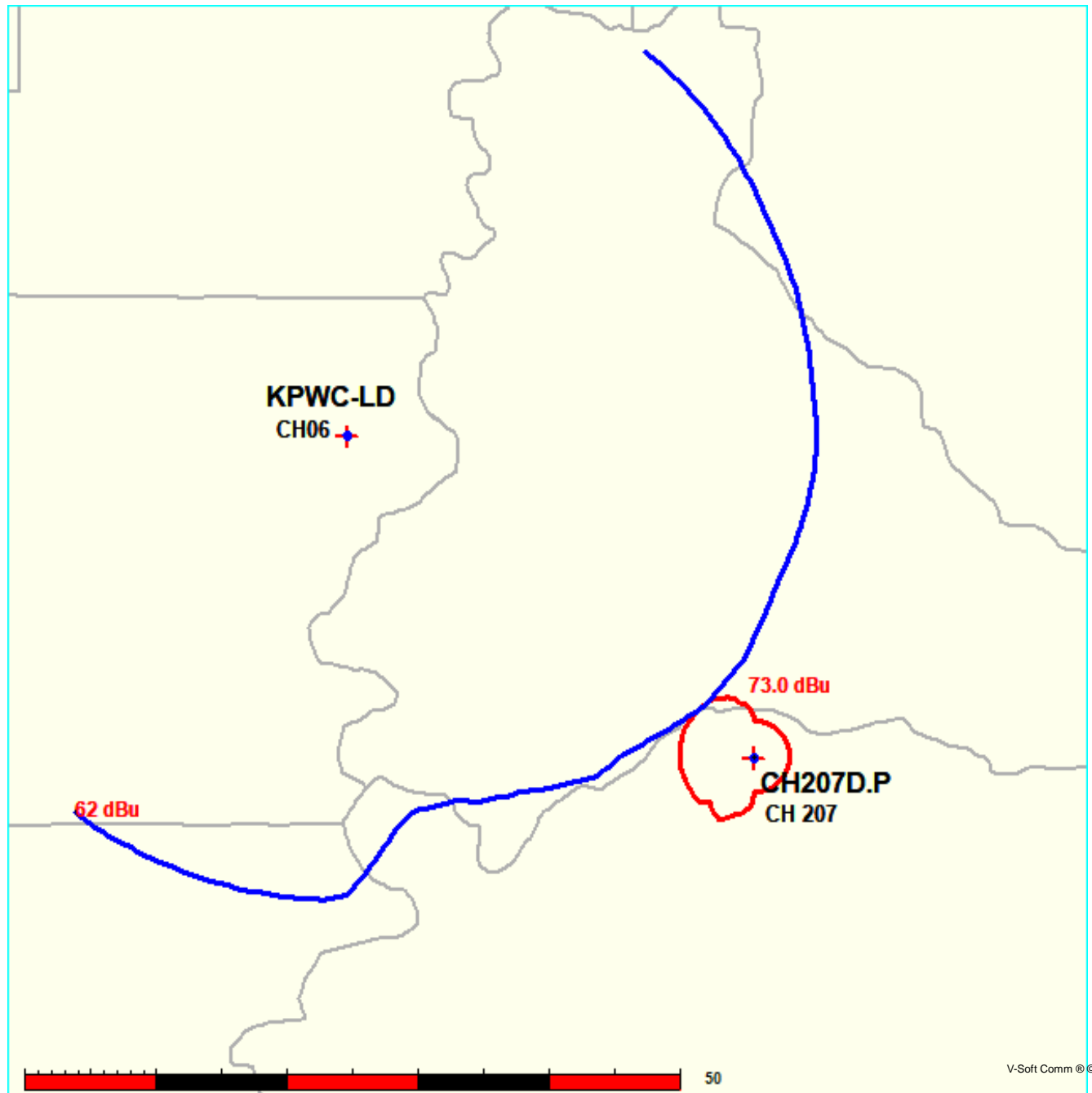
0.1 kW 24.5 m HAAT, 254.5 m COR

Intef. = 73.0 dBu Prot. = 62 dBu

KPWC-LD CH 06 -- 0000157489

Lat= 44 58 37.40, Lng= 123 08 33.31

3.0 kW 0 m HAAT, 346 m COR



## Exhibit 7b

### Contour Protection Studies Toward Select Allocation Concern(s)

05-23-2023

Terrain Data: FCC NGDC 30 Sec

FMOver Analysis

KPWC-LD 0000157489

CH207D.P

Channel = 06 --

Max ERP = 3 kW

RCAMSL = 346 m

N. Lat. 44 58 37.40

W. Lng. 123 08 33.31

Protected

62 dBu

Channel = 207D

Max ERP = 0.1 kW

RCAMSL = 254.5 m

N. Lat. 44 45 32.40

W. Lng. 122 44 54.80

Interfering

73 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
086.0	003.0000	0292.1	035.7	009.9	000.1000	-0000.4	027.0	33.86	
087.0	003.0000	0292.5	035.8	010.3	000.1000	-0002.9	026.4	34.23	
088.0	003.0000	0292.6	035.8	010.6	000.1000	-0005.2	025.8	34.62	
089.0	003.0000	0292.6	035.8	010.9	000.1000	-0007.4	025.2	35.02	
090.0	003.0000	0292.7	035.8	011.2	000.1000	-0009.7	024.6	35.43	
091.0	003.0000	0292.7	035.8	011.5	000.1000	-0011.9	024.0	35.85	
092.0	003.0000	0292.9	035.8	011.7	000.1000	-0014.0	023.4	36.29	
093.0	003.0000	0292.8	035.8	012.0	000.1000	-0015.7	022.8	36.73	
094.0	003.0000	0292.3	035.7	012.1	000.1000	-0016.7	022.1	37.19	
095.0	003.0000	0291.5	035.7	012.2	000.1000	-0017.4	021.5	37.66	
096.0	003.0000	0290.4	035.6	012.2	000.1000	-0017.5	020.9	38.15	
097.0	003.0000	0289.0	035.6	012.2	000.1000	-0017.2	020.3	38.64	
098.0	003.0000	0287.6	035.5	012.1	000.1000	-0016.6	019.6	39.13	
099.0	003.0000	0286.3	035.4	012.0	000.1000	-0015.8	019.0	39.63	
100.0	003.0000	0285.2	035.3	011.9	000.1000	-0015.1	018.4	40.14	
101.0	003.0000	0284.2	035.3	011.7	000.1000	-0014.0	017.8	40.65	
102.0	003.0000	0283.1	035.2	011.5	000.1000	-0012.3	017.2	41.16	
103.0	003.0000	0281.8	035.1	011.2	000.1000	-0009.8	016.6	41.68	
104.0	003.0000	0280.3	035.1	010.8	000.1000	-0006.7	016.0	42.20	
105.0	003.0000	0278.8	035.0	010.3	000.1000	-0003.2	015.4	42.71	
106.0	003.0000	0277.3	034.9	009.8	000.1000	0000.8	014.8	43.29	
107.0	003.0000	0276.0	034.8	009.1	000.1000	0004.9	014.2	44.00	
108.0	003.0000	0274.7	034.7	008.5	000.1000	0009.0	013.6	44.76	
109.0	003.0000	0273.5	034.7	007.7	000.1000	0013.4	013.0	45.55	
110.0	003.0000	0272.7	034.6	006.9	000.1000	0016.3	012.4	46.38	
111.0	003.0000	0272.2	034.6	006.0	000.1000	0016.0	011.8	47.25	
112.0	003.0000	0271.8	034.6	005.1	000.1000	0015.1	011.3	48.16	
113.0	003.0000	0271.7	034.6	004.1	000.1000	0017.3	010.7	49.10	
114.0	003.0000	0271.8	034.6	003.0	000.1000	0020.9	010.1	50.07	
115.0	003.0000	0272.0	034.6	001.7	000.1000	0025.7	009.6	51.06	
116.0	003.0000	0272.4	034.6	000.2	000.1000	0033.2	009.0	52.86	



## ***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)
117.0	003.0000	0272.8	034.6	358.6	000.1000	0041.0	008.5	55.68
118.0	003.0000	0272.9	034.6	356.5	000.1000	0047.7	007.9	58.08
119.0	003.0000	0272.6	034.6	353.8	000.1000	0056.4	007.4	60.64
120.0	003.0000	0271.6	034.6	350.6	000.1000	0066.0	007.0	62.99
121.0	003.0000	0270.4	034.5	346.7	000.1000	0071.1	006.6	64.68
122.0	003.0000	0269.1	034.4	342.3	000.1000	0086.7	006.2	67.50
123.0	003.0000	0267.9	034.3	337.4	000.1000	0095.0	005.9	69.25
124.0	003.0000	0266.6	034.3	331.9	000.1000	0103.1	005.7	70.74
125.0	003.0000	0265.1	034.2	326.0	000.1000	0116.3	005.5	72.27
126.0	003.0000	0263.3	034.1	319.7	000.1000	0121.8	005.5	72.84
127.0	003.0000	0261.2	033.9	313.4	000.1000	0125.6	005.5	72.97
128.0	003.0000	0258.7	033.8	307.2	000.1000	0128.1	005.6	72.76
129.0	003.0000	0256.0	033.6	301.4	000.1000	0130.5	005.8	72.28
130.0	003.0000	0253.0	033.4	296.3	000.1000	0134.0	006.1	71.63
131.0	003.0000	0249.6	033.2	291.7	000.1000	0137.5	006.5	70.83
132.0	003.0000	0246.5	033.0	287.8	000.1000	0138.5	006.9	69.83
133.0	003.0000	0243.5	032.8	284.3	000.1000	0138.1	007.3	68.72
134.0	003.0000	0241.1	032.7	281.2	000.1000	0137.0	007.7	67.64
135.0	003.0000	0238.8	032.5	278.5	000.1000	0136.3	008.2	66.65
136.0	003.0000	0236.7	032.4	276.1	000.1000	0136.3	008.7	65.72
137.0	003.0000	0234.4	032.2	274.0	000.1000	0136.4	009.1	64.77
138.0	003.0000	0232.4	032.1	272.2	000.1000	0136.1	009.6	63.82
139.0	003.0000	0231.0	032.0	270.4	000.1000	0135.3	010.1	62.92
140.0	003.0000	0230.8	032.0	268.5	000.1000	0135.4	010.6	62.16
141.0	003.0000	0231.1	032.0	266.7	000.1000	0135.6	011.0	61.44
142.0	003.0000	0231.1	032.0	265.1	000.1000	0135.9	011.5	60.72
143.0	003.0000	0230.5	032.0	263.8	000.1000	0135.8	012.0	59.95
144.0	003.0000	0229.0	031.8	263.0	000.1000	0135.7	012.5	59.15
145.0	003.0000	0226.5	031.7	262.5	000.1000	0135.6	013.1	58.35
146.0	003.0000	0223.2	031.4	262.4	000.1000	0135.6	013.7	57.56
147.0	003.0000	0220.5	031.2	262.1	000.1000	0135.6	014.2	56.85
148.0	003.0000	0218.5	031.1	261.8	000.1000	0135.6	014.8	56.21
149.0	003.0000	0216.9	031.0	261.4	000.1000	0135.5	015.3	55.83
150.0	003.0000	0214.4	030.8	261.3	000.1000	0135.5	015.9	55.35
151.0	003.0000	0211.2	030.5	261.5	000.1000	0135.5	016.5	54.87
152.0	003.0000	0207.9	030.3	261.6	000.1000	0135.5	017.1	54.39
153.0	003.0000	0205.2	030.1	261.7	000.1000	0135.5	017.6	53.92
154.0	003.0000	0203.6	030.0	261.5	000.1000	0135.5	018.2	53.48
155.0	003.0000	0202.4	029.9	261.3	000.1000	0135.5	018.7	53.05
156.0	003.0000	0201.2	029.8	261.2	000.1000	0135.5	019.2	52.63
157.0	003.0000	0199.8	029.7	261.1	000.1000	0135.4	019.8	52.21
158.0	003.0000	0198.3	029.6	261.1	000.1000	0135.4	020.3	51.79
159.0	003.0000	0197.3	029.5	261.0	000.1000	0135.4	020.8	51.38
160.0	003.0000	0196.1	029.4	260.9	000.1000	0135.4	021.3	50.97
161.0	003.0000	0193.6	029.2	261.1	000.1000	0135.5	021.9	50.56
162.0	003.0000	0190.3	029.0	261.5	000.1000	0135.5	022.4	50.16

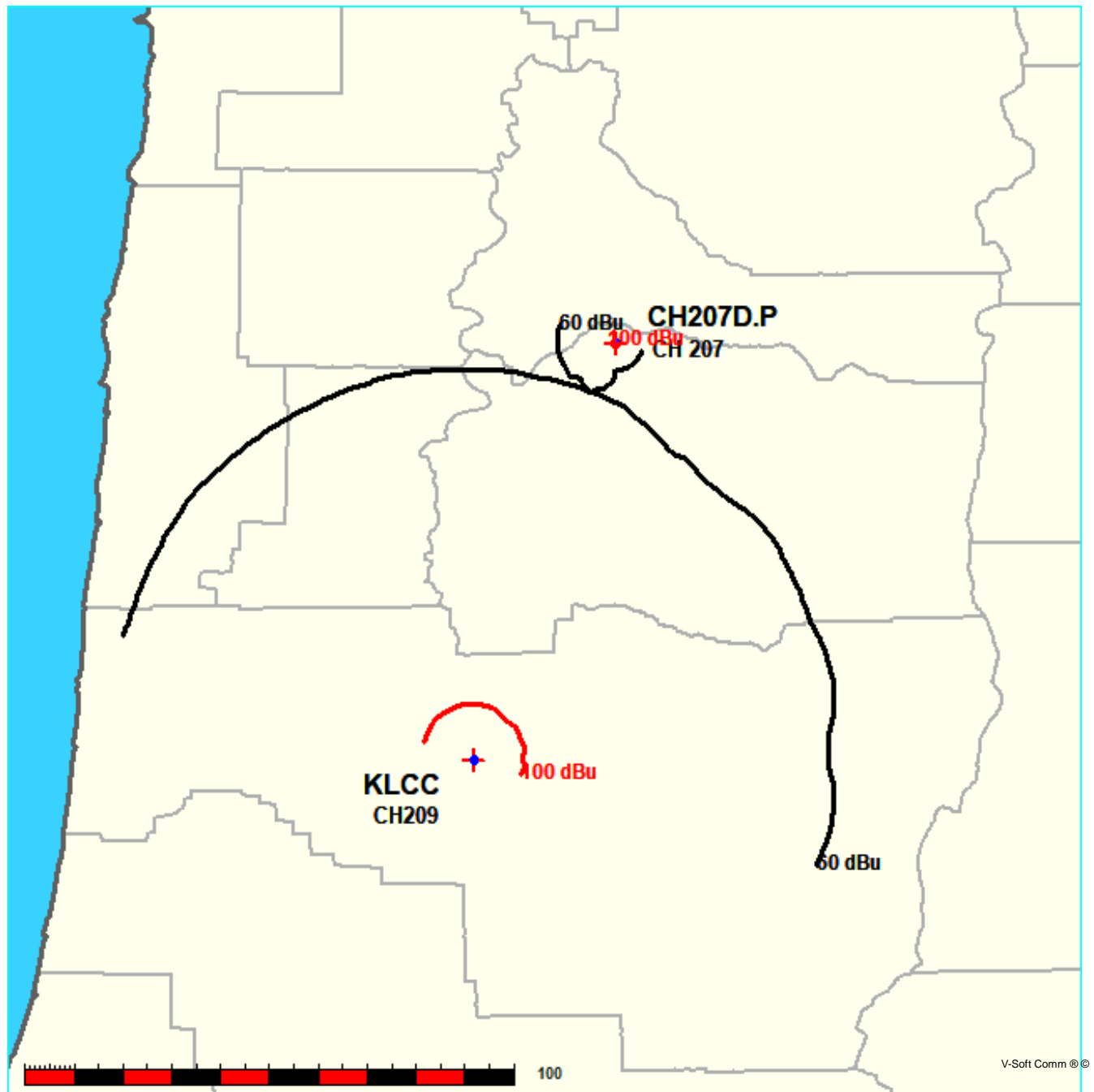
## Exhibit 7c

### Contour Protection Studies Toward Select Allocation Concern(s)

FMCommander Single Allocation Study - 05-23-2023 - FCC NGDC 30 Sec  
CH207D.P's Overlaps (In= 66.97 km, Out= 10.46 km)

CH207D.P CH 207 D  
Lat= 44 45 32.40, Lng= 122 44 54.80  
0.1 kW 24.5 m HAAT, 254.5 m COR  
Prot.= 60 dBu, Intef.= 100 dBu

KLCC CH 209 C0 BLED19900313KB  
Lat= 44 00 04.40, Lng= 123 06 52.30  
81.0 kW 354 m HAAT, 546 m COR  
Prot.= 60 dBu, Intef.= 100 dBu



# ***Exhibit 7c***

## **Contour Protection Studies Toward Select Allocation Concern(s)**

05-23-2023

Terrain Data: FCC NGDC 30 Sec

FMOver Analysis

CH207D.P

KLCC BLED19900313KB

Channel = 207D  
 Max ERP = 0.1 kW  
 RCAMSL = 254.5 m  
 N. Lat. 44 45 32.40  
 W. Lng. 122 44 54.80  
 Protected  
 60 dBu

Channel = 209C0  
 Max ERP = 81 kW  
 RCAMSL = 546 m  
 N. Lat. 44 00 04.40  
 W. Lng. 123 06 52.30  
 Interfering  
 100 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
157.0	000.1000	-0048.9	005.6	021.5	081.0000	0402.6	085.0	62.63	
158.0	000.1000	-0047.8	005.6	021.4	081.0000	0402.6	085.0	62.65	
159.0	000.1000	-0045.2	005.6	021.4	081.0000	0402.7	084.9	62.68	
160.0	000.1000	-0040.9	005.6	021.3	081.0000	0402.8	084.8	62.70	
161.0	000.1000	-0035.2	005.6	021.3	081.0000	0402.9	084.8	62.73	
162.0	000.1000	-0028.3	005.6	021.2	081.0000	0402.9	084.7	62.75	
163.0	000.1000	-0021.3	005.6	021.2	081.0000	0403.0	084.6	62.77	
164.0	000.1000	-0015.8	005.6	021.1	081.0000	0403.1	084.6	62.80	
165.0	000.1000	-0012.5	005.6	021.1	081.0000	0403.1	084.5	62.82	
166.0	000.1000	-0008.3	005.6	021.0	081.0000	0403.2	084.5	62.84	
167.0	000.1000	-0005.4	005.6	021.0	081.0000	0403.3	084.4	62.86	
168.0	000.1000	-0004.1	005.6	020.9	081.0000	0403.3	084.4	62.88	
169.0	000.1000	-0004.6	005.6	020.8	081.0000	0403.4	084.3	62.90	
170.0	000.1000	-0003.3	005.6	020.8	081.0000	0403.5	084.3	62.92	
171.0	000.1000	-0002.9	005.6	020.7	081.0000	0403.5	084.2	62.94	
172.0	000.1000	-0004.2	005.6	020.7	081.0000	0403.6	084.2	62.96	
173.0	000.1000	-0005.5	005.6	020.6	081.0000	0403.6	084.1	62.97	
174.0	000.1000	-0005.7	005.6	020.5	081.0000	0403.7	084.1	62.99	
175.0	000.1000	-0001.5	005.6	020.5	081.0000	0403.7	084.0	63.01	
176.0	000.1000	0003.7	005.6	020.4	081.0000	0403.8	084.0	63.02	
177.0	000.1000	0010.1	005.6	020.4	081.0000	0403.8	083.9	63.04	
178.0	000.1000	0016.9	005.6	020.3	081.0000	0403.9	083.9	63.05	
179.0	000.1000	0023.4	005.6	020.2	081.0000	0403.9	083.9	63.07	
180.0	000.1000	0029.5	005.6	020.2	081.0000	0404.0	083.8	63.08	
181.0	000.1000	0035.4	006.1	020.2	081.0000	0404.0	083.4	63.23	
182.0	000.1000	0042.5	006.7	020.3	081.0000	0403.9	082.8	63.43	
183.0	000.1000	0050.2	007.3	020.3	081.0000	0403.9	082.2	63.63	
184.0	000.1000	0056.7	007.8	020.3	081.0000	0403.9	081.7	63.81	
185.0	000.1000	0061.9	008.1	020.3	081.0000	0403.9	081.3	63.94	
186.0	000.1000	0064.6	008.3	020.3	081.0000	0403.9	081.1	64.01	
187.0	000.1000	0065.7	008.4	020.2	081.0000	0404.0	081.0	64.05	
188.0	000.1000	0066.1	008.4	020.1	081.0000	0404.1	080.9	64.07	
189.0	000.1000	0067.6	008.5	020.0	081.0000	0404.2	080.8	64.11	

## ***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)
190.0	000.1000	0071.4	008.7	019.9	081.0000	0404.3	080.5	64.21
191.0	000.1000	0075.8	009.0	019.8	081.0000	0404.4	080.2	64.31
192.0	000.1000	0079.8	009.2	019.7	081.0000	0404.4	080.0	64.40
193.0	000.1000	0082.9	009.4	019.6	081.0000	0404.5	079.8	64.46
194.0	000.1000	0084.8	009.5	019.5	081.0000	0404.6	079.6	64.51
195.0	000.1000	0086.1	009.6	019.4	081.0000	0404.7	079.6	64.54
196.0	000.1000	0086.8	009.6	019.3	081.0000	0404.9	079.5	64.56
197.0	000.1000	0087.5	009.7	019.2	081.0000	0405.0	079.5	64.58
198.0	000.1000	0088.6	009.7	019.1	081.0000	0405.1	079.4	64.61
199.0	000.1000	0090.5	009.8	018.9	081.0000	0405.2	079.3	64.65
200.0	000.1000	0093.0	010.0	018.8	081.0000	0405.3	079.2	64.69
201.0	000.1000	0095.9	010.1	018.7	081.0000	0405.4	079.0	64.74
202.0	000.1000	0098.7	010.3	018.5	081.0000	0405.5	078.9	64.79
203.0	000.1000	0101.9	010.4	018.4	081.0000	0405.6	078.7	64.84
204.0	000.1000	0105.6	010.6	018.3	081.0000	0405.7	078.6	64.90
205.0	000.1000	0109.7	010.8	018.1	081.0000	0405.8	078.4	64.96
206.0	000.1000	0113.8	011.0	018.0	081.0000	0405.9	078.3	65.02
207.0	000.1000	0117.6	011.1	017.8	081.0000	0406.0	078.1	65.07
208.0	000.1000	0120.7	011.3	017.6	081.0000	0406.2	078.0	65.11
209.0	000.1000	0122.7	011.3	017.5	081.0000	0406.3	078.0	65.13
210.0	000.1000	0123.1	011.4	017.3	081.0000	0406.4	078.0	65.12
211.0	000.1000	0122.2	011.3	017.2	081.0000	0406.5	078.1	65.10
212.0	000.1000	0120.3	011.2	017.1	081.0000	0406.6	078.2	65.06
213.0	000.1000	0118.4	011.2	017.0	081.0000	0406.7	078.3	65.02
214.0	000.1000	0116.5	011.1	016.8	081.0000	0406.8	078.5	64.98
215.0	000.1000	0115.0	011.0	016.7	081.0000	0406.9	078.6	64.94
216.0	000.1000	0113.6	011.0	016.6	081.0000	0407.1	078.7	64.90
217.0	000.1000	0112.5	010.9	016.5	081.0000	0407.2	078.8	64.87
218.0	000.1000	0111.2	010.8	016.4	081.0000	0407.3	078.9	64.83
219.0	000.1000	0109.6	010.8	016.3	081.0000	0407.5	079.1	64.79
220.0	000.1000	0107.5	010.7	016.2	081.0000	0407.6	079.2	64.74
221.0	000.1000	0105.0	010.6	016.1	081.0000	0407.7	079.4	64.68
222.0	000.1000	0102.3	010.4	016.0	081.0000	0407.8	079.6	64.62
223.0	000.1000	0099.6	010.3	015.9	081.0000	0407.8	079.8	64.55
224.0	000.1000	0097.7	010.2	015.8	081.0000	0407.9	080.0	64.50
225.0	000.1000	0097.6	010.2	015.7	081.0000	0408.1	080.1	64.48
226.0	000.1000	0099.4	010.3	015.6	081.0000	0408.2	080.1	64.48
227.0	000.1000	0102.2	010.4	015.4	081.0000	0408.4	080.1	64.49
228.0	000.1000	0105.8	010.6	015.3	081.0000	0408.6	080.0	64.51
229.0	000.1000	0109.9	010.8	015.1	081.0000	0408.8	079.9	64.54
230.0	000.1000	0114.3	011.0	014.9	081.0000	0409.0	079.9	64.56
231.0	000.1000	0118.5	011.2	014.7	081.0000	0409.1	079.9	64.58
232.0	000.1000	0122.0	011.3	014.5	081.0000	0409.2	079.9	64.58
233.0	000.1000	0124.5	011.4	014.3	081.0000	0409.3	079.9	64.57
234.0	000.1000	0126.1	011.5	014.2	081.0000	0409.4	080.0	64.55

# ***Exhibit 7c***

## **Contour Protection Studies Toward Select Allocation Concern(s)**

05-23-2023      Terrain Data: FCC NGDC 30 Sec      FMOver Analysis

KLCC    BLED19900313KB

CH207D.P

Channel = 209C0  
 Max ERP = 81 kW  
 RCAMSL = 546 m  
 N. Lat. 44 00 04.40  
 W. Lng. 123 06 52.30  
 Protected  
     60   dBu

Channel = 207D  
 Max ERP = 0.1 kW  
 RCAMSL = 254.5 m  
 N. Lat. 44 45 32.40  
 W. Lng. 122 44 54.80  
 Interfering  
     100   dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
334.0	081.0000	0415.0	078.7	258.2	000.1000	0134.0	064.8	30.41	
335.0	081.0000	0415.4	078.7	258.5	000.1000	0134.2	063.5	30.86	
336.0	081.0000	0415.9	078.8	258.8	000.1000	0134.5	062.2	31.32	
337.0	081.0000	0416.4	078.8	259.1	000.1000	0134.7	060.8	31.81	
338.0	081.0000	0416.9	078.8	259.4	000.1000	0134.9	059.5	32.30	
339.0	081.0000	0417.4	078.9	259.7	000.1000	0135.1	058.1	32.81	
340.0	081.0000	0417.9	078.9	260.0	000.1000	0135.2	056.8	33.32	
341.0	081.0000	0418.4	079.0	260.2	000.1000	0135.3	055.4	33.83	
342.0	081.0000	0418.9	079.0	260.5	000.1000	0135.3	054.1	34.36	
343.0	081.0000	0419.4	079.0	260.7	000.1000	0135.4	052.7	34.89	
344.0	081.0000	0419.8	079.1	260.9	000.1000	0135.4	051.4	35.42	
345.0	081.0000	0420.2	079.1	261.1	000.1000	0135.5	050.0	35.96	
346.0	081.0000	0420.6	079.1	261.3	000.1000	0135.5	048.6	36.49	
347.0	081.0000	0420.9	079.1	261.5	000.1000	0135.5	047.2	37.03	
348.0	081.0000	0421.2	079.2	261.6	000.1000	0135.5	045.9	37.59	
349.0	081.0000	0421.2	079.2	261.7	000.1000	0135.6	044.5	38.16	
350.0	081.0000	0420.9	079.1	261.7	000.1000	0135.6	043.1	38.75	
351.0	081.0000	0420.4	079.1	261.7	000.1000	0135.6	041.7	39.35	
352.0	081.0000	0420.0	079.1	261.7	000.1000	0135.5	040.3	39.96	
353.0	081.0000	0419.5	079.0	261.6	000.1000	0135.5	039.0	40.59	
354.0	081.0000	0419.1	079.0	261.5	000.1000	0135.5	037.6	41.23	
355.0	081.0000	0418.3	078.9	261.3	000.1000	0135.5	036.2	41.88	
356.0	081.0000	0417.6	078.9	261.0	000.1000	0135.4	034.9	42.54	
357.0	081.0000	0417.0	078.8	260.7	000.1000	0135.4	033.5	43.21	
358.0	081.0000	0416.8	078.8	260.3	000.1000	0135.3	032.1	43.88	
359.0	081.0000	0416.6	078.8	259.9	000.1000	0135.2	030.8	44.60	
000.0	081.0000	0416.5	078.8	259.5	000.1000	0135.0	029.4	45.35	
001.0	081.0000	0416.3	078.8	258.9	000.1000	0134.5	028.1	46.15	
002.0	081.0000	0416.1	078.8	258.2	000.1000	0134.0	026.7	46.97	
003.0	081.0000	0415.9	078.8	257.4	000.1000	0133.4	025.4	47.83	
004.0	081.0000	0415.2	078.7	256.3	000.1000	0132.6	024.1	48.71	
005.0	081.0000	0414.4	078.7	255.1	000.1000	0131.8	022.8	49.59	
006.0	081.0000	0413.6	078.6	253.7	000.1000	0131.2	021.6	50.50	



***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)
007.0	081.0000	0412.5	078.5	252.0	000.1000	0130.9	020.4	51.43
008.0	081.0000	0411.3	078.4	249.9	000.1000	0130.4	019.2	52.34
009.0	081.0000	0410.4	078.4	247.7	000.1000	0128.8	018.0	53.17
010.0	081.0000	0409.7	078.3	245.0	000.1000	0126.6	016.9	53.94
011.0	081.0000	0409.3	078.3	242.1	000.1000	0126.1	015.8	54.79
012.0	081.0000	0409.4	078.3	238.7	000.1000	0126.8	014.8	55.62
013.0	081.0000	0409.6	078.3	234.8	000.1000	0126.7	013.8	56.74
014.0	081.0000	0409.5	078.3	230.3	000.1000	0115.4	013.0	57.07
015.0	081.0000	0408.8	078.2	224.9	000.1000	0097.6	012.3	56.62
016.0	081.0000	0407.8	078.2	218.9	000.1000	0109.8	011.8	58.42
017.0	081.0000	0406.7	078.1	212.4	000.1000	0119.5	011.4	59.71
018.0	081.0000	0405.9	078.0	205.6	000.1000	0112.1	011.2	59.50
019.0	081.0000	0405.1	078.0	198.6	000.1000	0089.6	011.2	57.63
020.0	081.0000	0404.2	077.9	191.7	000.1000	0078.7	011.3	56.25
021.0	081.0000	0403.2	077.8	185.2	000.1000	0062.5	011.7	53.80
022.0	081.0000	0401.6	077.7	179.3	000.1000	0025.0	012.3	46.58
023.0	081.0000	0399.1	077.5	174.1	000.1000	-0005.3	013.0	45.48
024.0	081.0000	0396.0	077.3	169.7	000.1000	-0003.8	013.9	44.28
025.0	081.0000	0391.8	077.0	166.2	000.1000	-0007.6	015.0	43.01
026.0	081.0000	0386.3	076.6	163.5	000.1000	-0018.5	016.2	42.00
027.0	081.0000	0381.9	076.3	161.0	000.1000	-0035.4	017.3	41.02
028.0	081.0000	0379.1	076.1	158.6	000.1000	-0046.4	018.5	40.09
029.0	081.0000	0375.7	075.8	156.7	000.1000	-0049.1	019.7	39.13
030.0	081.0000	0370.0	075.4	155.4	000.1000	-0049.6	021.0	38.10
031.0	081.0000	0362.8	074.9	154.6	000.1000	-0050.6	022.3	37.05
032.0	081.0000	0356.4	074.4	153.9	000.1000	-0052.1	023.7	36.07
033.0	081.0000	0353.5	074.2	152.7	000.1000	-0055.5	024.9	35.22
034.0	081.0000	0354.4	074.3	151.2	000.1000	-0062.6	026.0	34.50
035.0	081.0000	0356.6	074.4	149.7	000.1000	-0071.7	027.1	33.81
036.0	081.0000	0357.2	074.5	148.5	000.1000	-0075.0	028.3	33.14
037.0	081.0000	0356.1	074.4	147.8	000.1000	-0075.5	029.5	32.48
038.0	081.0000	0352.4	074.1	147.4	000.1000	-0075.5	030.8	31.85
039.0	081.0000	0348.9	073.9	147.1	000.1000	-0075.6	032.2	31.30
040.0	081.0000	0347.0	073.7	146.7	000.1000	-0076.2	033.4	30.82
041.0	081.0000	0346.8	073.7	146.1	000.1000	-0077.1	034.7	30.36
042.0	081.0000	0347.4	073.7	145.5	000.1000	-0078.5	035.9	29.91
043.0	081.0000	0348.3	073.8	145.0	000.1000	-0080.3	037.1	29.47
044.0	081.0000	0349.2	073.9	144.5	000.1000	-0082.0	038.4	29.05
045.0	081.0000	0350.9	074.0	144.0	000.1000	-0084.5	039.7	28.64
046.0	081.0000	0354.5	074.3	143.4	000.1000	-0089.1	040.9	28.25
047.0	081.0000	0359.4	074.6	142.7	000.1000	-0096.0	042.1	27.88
048.0	081.0000	0364.8	075.0	142.1	000.1000	-0104.6	043.4	27.52
049.0	081.0000	0369.5	075.4	141.5	000.1000	-0112.4	044.7	27.17
050.0	081.0000	0372.8	075.6	141.2	000.1000	-0117.7	046.0	26.83

# Exhibit 8

## Copy of Manufacturer's Directional Antenna Documentation (public record copy)



(619) 671 - 9500

PRODUCTS

BUNDLES

CONTACT US

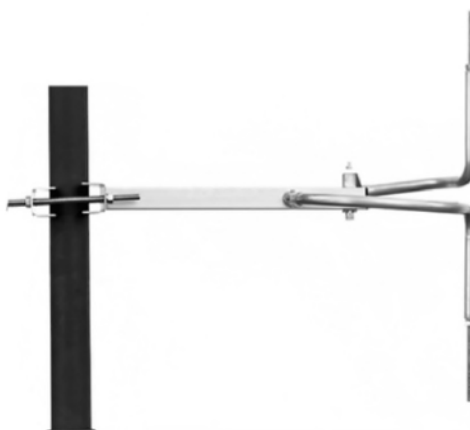
THERMOLOGGER

### TECHNICAL SPECIFICATIONS

Antenna Type: circular polarization dipole  
Front-to-Back Ratio: 3 dB  
Frequency Range: 87.5 - 108 MHz  
Polarization vertical and horizontal  
Gain -3 dBd (referred to half-wave dipole)  
Bandwidth: 500 KHz max  
VSWR: 1.1:1 tuned in factory  
H Plane: omni-directional  $\pm 1.5$  dB (with a 4" mast) Packing 16"x16"x39" (406x406x991mm)  
V Plane: omni-directional  $\pm 3$  dB (with a 4" mast)  
Impedance: 50 Ohms  
Connector: N type female / 7/16DIN Female  
Power Rating: 800 Watts max  
Wind Load: 8 Lbs (3.6 kg)  
Wind Velocity: 119 mph (190 km/h)  
Wind Surface: 0.3 ft<sup>2</sup> (0.04 m<sup>2</sup>)  
Lightning Protection: all parts grounded  
Material: (external) stainless steel  
Mounting: from 2" to 4" diameter pole  
Weight 7.7 Lbs (3.5 kg)  
Average Dimensions: 15"x15"x38" (381x381x965mm) depending on tuned frequency

### ANTENNAS > BKG88

**Overview:** Low Power Narrowband FMCircularly Polarized Antenna.  
Narrow Band 88-108 Mhz  
Low windload and lightweight  
Great coverage and easy installation



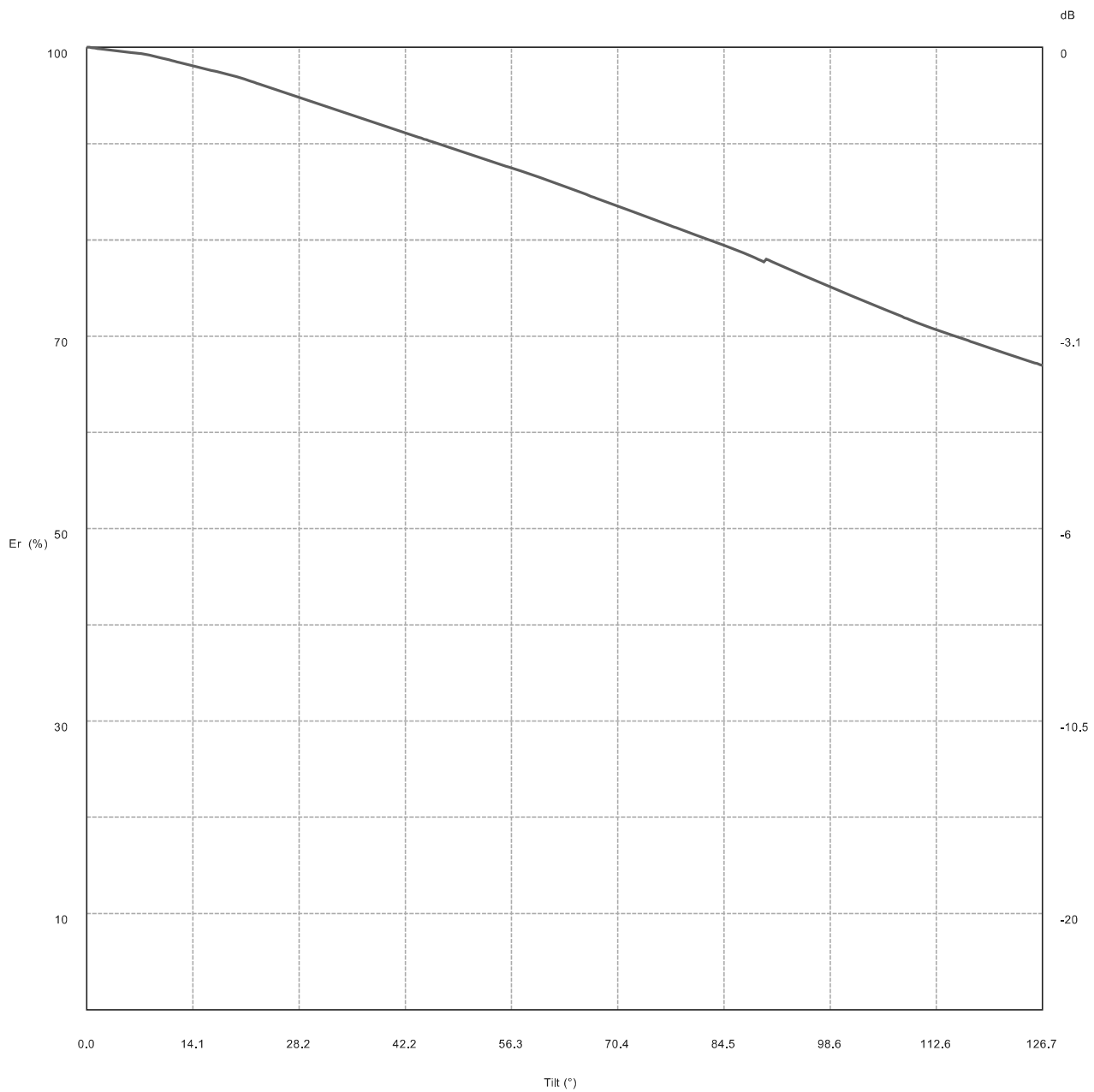
### OPTIONAL RADOME



Note: Please contact us for specific bay system wavelength studies.

**Exhibit 8**  
**Copy of Manufacturer's Directional Antenna Documentation**  
**(public record copy)**

**Vertical diagram at an azimuth of 0.0°**



# Exhibit 8

## Copy of Manufacturer's Directional Antenna Documentation

(public record copy)

**Vertical diagram at an azimuth of 0.0°**

Dep (°)	Er (%)	ERP (W)	Dep (°)	Er (%)	ERP (W)	Dep (°)	Er (%)	ERP (W)
0.0	100.0	0.5	21.1	96.7	0.4	42.2	91.1	0.4
0.4	100.0	0.5	21.5	96.6	0.4	42.6	91.0	0.4
0.7	100.0	0.5	21.8	96.5	0.4	42.9	90.9	0.4
1.1	99.9	0.5	22.2	96.4	0.4	43.3	90.8	0.4
1.4	99.9	0.5	22.5	96.3	0.4	43.6	90.8	0.4
1.8	99.9	0.5	22.9	96.2	0.4	44.0	90.7	0.4
2.1	99.8	0.5	23.2	96.1	0.4	44.4	90.6	0.4
2.5	99.8	0.5	23.6	96.0	0.4	44.7	90.5	0.4
2.8	99.8	0.5	23.9	95.9	0.4	45.1	90.4	0.4
3.2	99.7	0.5	24.3	95.8	0.4	45.4	90.3	0.4
3.5	99.7	0.5	24.6	95.7	0.4	45.8	90.2	0.4
3.9	99.7	0.5	25.0	95.6	0.4	46.1	90.1	0.4
4.2	99.6	0.5	25.3	95.5	0.4	46.5	90.0	0.4
4.6	99.6	0.5	25.7	95.5	0.4	46.8	89.9	0.4
4.9	99.6	0.5	26.0	95.4	0.4	47.2	89.8	0.4
5.3	99.5	0.5	26.4	95.3	0.4	47.5	89.8	0.4
5.6	99.5	0.5	26.8	95.2	0.4	47.9	89.7	0.4
6.0	99.5	0.5	27.1	95.1	0.4	48.2	89.6	0.4
6.3	99.4	0.5	27.5	95.0	0.4	48.6	89.5	0.4
6.7	99.4	0.5	27.8	94.9	0.4	48.9	89.4	0.4
7.0	99.4	0.5	28.2	94.8	0.4	49.3	89.3	0.4
7.4	99.3	0.5	28.5	94.7	0.4	49.6	89.2	0.4
7.7	99.3	0.5	28.9	94.6	0.4	50.0	89.1	0.4
8.1	99.2	0.5	29.2	94.5	0.4	50.3	89.0	0.4
8.4	99.2	0.5	29.6	94.4	0.4	50.7	88.9	0.4
8.8	99.1	0.5	29.9	94.3	0.4	51.0	88.8	0.4
9.2	99.0	0.5	30.3	94.3	0.4	51.4	88.7	0.4
9.5	99.0	0.5	30.6	94.2	0.4	51.7	88.7	0.4
9.9	98.9	0.5	31.0	94.1	0.4	52.1	88.6	0.4
10.2	98.8	0.4	31.3	94.0	0.4	52.4	88.5	0.4
10.6	98.8	0.4	31.7	93.9	0.4	52.8	88.4	0.4
10.9	98.7	0.4	32.0	93.8	0.4	53.2	88.3	0.4
11.3	98.6	0.4	32.4	93.7	0.4	53.5	88.2	0.4
11.6	98.6	0.4	32.7	93.6	0.4	53.9	88.1	0.4
12.0	98.5	0.4	33.1	93.5	0.4	54.2	88.0	0.4
12.3	98.4	0.4	33.4	93.4	0.4	54.6	87.9	0.4
12.7	98.4	0.4	33.8	93.3	0.4	54.9	87.8	0.4
13.0	98.3	0.4	34.1	93.2	0.4	55.3	87.7	0.4
13.4	98.2	0.4	34.5	93.1	0.4	55.6	87.7	0.4
13.7	98.2	0.4	34.8	93.1	0.4	56.0	87.6	0.4
14.1	98.1	0.4	35.2	93.0	0.4	56.3	87.5	0.4
14.4	98.0	0.4	35.6	92.9	0.4	56.7	87.4	0.4
14.8	98.0	0.4	35.9	92.8	0.4	57.0	87.3	0.4
15.1	97.9	0.4	36.3	92.7	0.4	57.4	87.2	0.3
15.5	97.8	0.4	36.6	92.6	0.4	57.7	87.1	0.3
15.8	97.7	0.4	37.0	92.5	0.4	58.1	87.0	0.3
16.2	97.7	0.4	37.3	92.4	0.4	58.4	86.9	0.3
16.5	97.6	0.4	37.7	92.3	0.4	58.8	86.8	0.3
16.9	97.5	0.4	38.0	92.2	0.4	59.1	86.7	0.3
17.2	97.5	0.4	38.4	92.1	0.4	59.5	86.6	0.3
17.6	97.4	0.4	38.7	92.0	0.4	59.8	86.6	0.3
18.0	97.3	0.4	39.1	91.9	0.4	60.2	86.5	0.3
18.3	97.3	0.4	39.4	91.9	0.4	60.5	86.4	0.3
18.7	97.2	0.4	39.8	91.8	0.4	60.9	86.3	0.3
19.0	97.1	0.4	40.1	91.7	0.4	61.2	86.2	0.3
19.4	97.1	0.4	40.5	91.6	0.4	61.6	86.1	0.3
19.7	97.0	0.4	40.8	91.5	0.4	62.0	86.0	0.3
20.1	96.9	0.4	41.2	91.4	0.4	62.3	85.8	0.3
20.4	96.8	0.4	41.5	91.3	0.4	62.7	85.7	0.3
20.8	96.7	0.4	41.9	91.2	0.4	63.0	85.6	0.3

# *Exhibit 8*

## *Copy of Manufacturer's Directional Antenna Documentation*

*(public record copy)*

**Vertical diagram at an azimuth of 0.0°**

Dep (°)	Er (%)	ERP (W)	Dep (°)	Er (%)	ERP (W)	Dep (°)	Er (%)	ERP (W)
63.4	85.5	0.3	84.5	79.4	0.3	105.6	72.8	0.2
63.7	85.4	0.3	84.8	79.3	0.3	106.0	72.7	0.2
64.1	85.3	0.3	85.2	79.2	0.3	106.3	72.6	0.2
64.4	85.2	0.3	85.5	79.1	0.3	106.7	72.5	0.2
64.8	85.1	0.3	85.9	79.0	0.3	107.0	72.4	0.2
65.1	85.0	0.3	86.2	78.9	0.3	107.4	72.3	0.2
65.5	84.9	0.3	86.6	78.8	0.3	107.7	72.2	0.2
65.8	84.8	0.3	86.9	78.7	0.3	108.1	72.0	0.2
66.2	84.7	0.3	87.3	78.6	0.3	108.4	71.9	0.2
66.5	84.6	0.3	87.6	78.5	0.3	108.8	71.8	0.2
66.9	84.5	0.3	88.0	78.3	0.3	109.1	71.7	0.2
67.2	84.4	0.3	88.4	78.2	0.3	109.5	71.6	0.2
67.6	84.3	0.3	88.7	78.1	0.3	109.8	71.5	0.2
67.9	84.2	0.3	89.1	78.0	0.3	110.2	71.4	0.2
68.3	84.1	0.3	89.4	77.9	0.3	110.5	71.3	0.2
68.6	84.0	0.3	89.8	77.7	0.3	110.9	71.2	0.2
69.0	83.9	0.3	90.1	78.0	0.3	111.2	71.1	0.2
69.3	83.8	0.3	90.5	77.9	0.3	111.6	71.0	0.2
69.7	83.7	0.3	90.8	77.7	0.3	111.9	70.9	0.2
70.0	83.6	0.3	91.2	77.6	0.3	112.3	70.8	0.2
70.4	83.5	0.3	91.5	77.5	0.3	112.6	70.7	0.2
70.8	83.4	0.3	91.9	77.4	0.3	113.0	70.6	0.2
71.1	83.3	0.3	92.2	77.3	0.3	113.3	70.5	0.2
71.5	83.2	0.3	92.6	77.1	0.3	113.7	70.4	0.2
71.8	83.1	0.3	92.9	77.0	0.3	114.0	70.3	0.2
72.2	83.0	0.3	93.3	76.9	0.3	114.4	70.2	0.2
72.5	82.9	0.3	93.6	76.8	0.3	114.8	70.1	0.2
72.9	82.8	0.3	94.0	76.7	0.3	115.1	70.0	0.2
73.2	82.7	0.3	94.3	76.5	0.3	115.5	69.9	0.2
73.6	82.6	0.3	94.7	76.4	0.3	115.8	69.8	0.2
73.9	82.5	0.3	95.0	76.3	0.3	116.2	69.7	0.2
74.3	82.4	0.3	95.4	76.2	0.3	116.5	69.6	0.2
74.6	82.3	0.3	95.7	76.1	0.3	116.9	69.5	0.2
75.0	82.2	0.3	96.1	76.0	0.3	117.2	69.4	0.2
75.3	82.1	0.3	96.4	75.8	0.3	117.6	69.3	0.2
75.7	82.0	0.3	96.8	75.7	0.3	117.9	69.2	0.2
76.0	81.9	0.3	97.2	75.6	0.3	118.3	69.2	0.2
76.4	81.8	0.3	97.5	75.5	0.3	118.6	69.1	0.2
76.7	81.7	0.3	97.9	75.4	0.3	119.0	69.0	0.2
77.1	81.6	0.3	98.2	75.2	0.3	119.3	68.9	0.2
77.4	81.5	0.3	98.6	75.1	0.3	119.7	68.8	0.2
77.8	81.4	0.3	98.9	75.0	0.3	120.0	68.7	0.2
78.1	81.3	0.3	99.3	74.9	0.3	120.4	68.6	0.2
78.5	81.2	0.3	99.6	74.8	0.3	120.7	68.5	0.2
78.8	81.1	0.3	100.0	74.7	0.3	121.1	68.4	0.2
79.2	81.0	0.3	100.3	74.5	0.3	121.4	68.3	0.2
79.6	80.9	0.3	100.7	74.4	0.3	121.8	68.2	0.2
79.9	80.8	0.3	101.0	74.3	0.3	122.1	68.1	0.2
80.3	80.7	0.3	101.4	74.2	0.3	122.5	68.0	0.2
80.6	80.5	0.3	101.7	74.1	0.3	122.8	68.0	0.2
81.0	80.4	0.3	102.1	74.0	0.3	123.2	67.9	0.2
81.3	80.3	0.3	102.4	73.9	0.3	123.6	67.8	0.2
81.7	80.2	0.3	102.8	73.7	0.3	123.9	67.7	0.2
82.0	80.1	0.3	103.1	73.6	0.2	124.3	67.6	0.2
82.4	80.0	0.3	103.5	73.5	0.2	124.6	67.5	0.2
82.7	79.9	0.3	103.8	73.4	0.2	125.0	67.4	0.2
83.1	79.8	0.3	104.2	73.3	0.2	125.3	67.3	0.2
83.4	79.7	0.3	104.5	73.2	0.2	125.7	67.2	0.2
83.8	79.6	0.3	104.9	73.1	0.2	126.0	67.1	0.2
84.1	79.5	0.3	105.2	72.9	0.2	126.4	67.1	0.2