

**Exhibit 13.1 - Copy of Existing  
Antenna Structure Registration****Registration Detail**

|             |          |             |             |
|-------------|----------|-------------|-------------|
| Reg Number  | 1056002  | Status      | Constructed |
| File Number | A0822634 | Constructed | 08/21/1998  |
| EMI         | No       | Dismantled  |             |
| NEPA        | No       |             |             |

**Antenna Structure**

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

**Location** (in NAD83 Coordinates)

|                    |                            |                            |                     |
|--------------------|----------------------------|----------------------------|---------------------|
| Lat/Long           | 47-06-07.0 N 122-36-10.0 W | Address                    | FORT LEWIS FLORA RD |
| City, State        | FORT LEWIS , WA            |                            |                     |
| Zip                | 98433                      | County                     | PIERCE              |
| Center of AM Array |                            | Position of Tower in Array |                     |

**Heights (meters)**

|  |   |
|--|---|
| Elevation of Site Above Mean Sea Level | Overall Height Above Ground (AGL)             |
| 80.0                                   | 47.0  |
| Overall Height Above Mean Sea Level    | Overall Height Above Ground w/o Appurtenances |
| 127.0                                  | 47.0  |

**Painting and Lighting Specifications**

FAA Chapters 3, 4, 5, 13  
 Paint and Light in Accordance with FAA Circular Number 70/7460-1J

**FAA Notification**

|           |                |                |            |
|-----------|----------------|----------------|------------|
| FAA Study | 98-ANM-0843-OE | FAA Issue Date | 09/11/1998 |
|-----------|----------------|----------------|------------|

**Owner & Contact Information**

|   |            |  |                           |
|---|------------|--|---------------------------|
| FRN                                     | 0022193262 | Owner Entity Type                              | Limited Liability Company |
| <b>Owner</b>                            |            | P: (425)383-8401                               |                           |
| T-Mobile West Tower LLC                 |            | F:   |                           |
| Attention To: FCC Regulatory Compliance |            | E: FCCRegulatoryComplianceContact@t-mobile.com |                           |
| 12920 S.E. 38th Street                  |            |  |                           |
| Bellevue , WA 98006                     |            |  |                           |

**Contact**

|                                    |  |
|------------------------------------|--|
| Attention To: Regulatory Departmen | P: (724)416-2000                         |
| 2000 Corporate Drive               | F:                                       |
| Canonsburg , PA 15317              | E: Regulatory.Department@CrownCastle.com |

**Last Action Status**

|         |              |          |            |
|---------|--------------|----------|------------|
| Status  | Constructed  | Received | 01/22/2013 |
| Purpose | Admin Update | Entered  | 01/22/2013 |
| Mode    | Interactive  |          |            |

**Related Applications**

|            |                              |
|------------|------------------------------|
| 01/22/2013 | A0822634 - Admin Update (AU) |
| 12/18/2012 | A0808131 - Change Owner (OC) |
| 06/29/2012 | A0778877 - Admin Update (AU) |

Related applications (11)

**Comments****Comments**

None

**History**

| Date       | Event   |
|------------|---|
| 01/23/2013 | Registration Printed                            |
| 01/22/2013 | ASR Application receipt email sent: Tower email |
| 01/22/2013 | ASR Application receipt email sent: Tower email |

All History (30)

**Automated Letters**

|            |                                    |
|------------|------------------------------------|
| 01/23/2013 | Authorization, Reference           |
| 12/19/2012 | Authorization, Reference           |
| 12/19/2012 | Ownership Change, Reference 737415 |

All letters (13)

## Exhibit 13.2

### Vertical Plan of Antenna System

The site is located on Fort Lewis Flora Road;  
the city of Fort Lewis, Pierce County, Washington.

Antenna Structure Registration No.

**1056002**

NAD 27 datum values:

NAD 83 datum values:

Latitude (D M S)

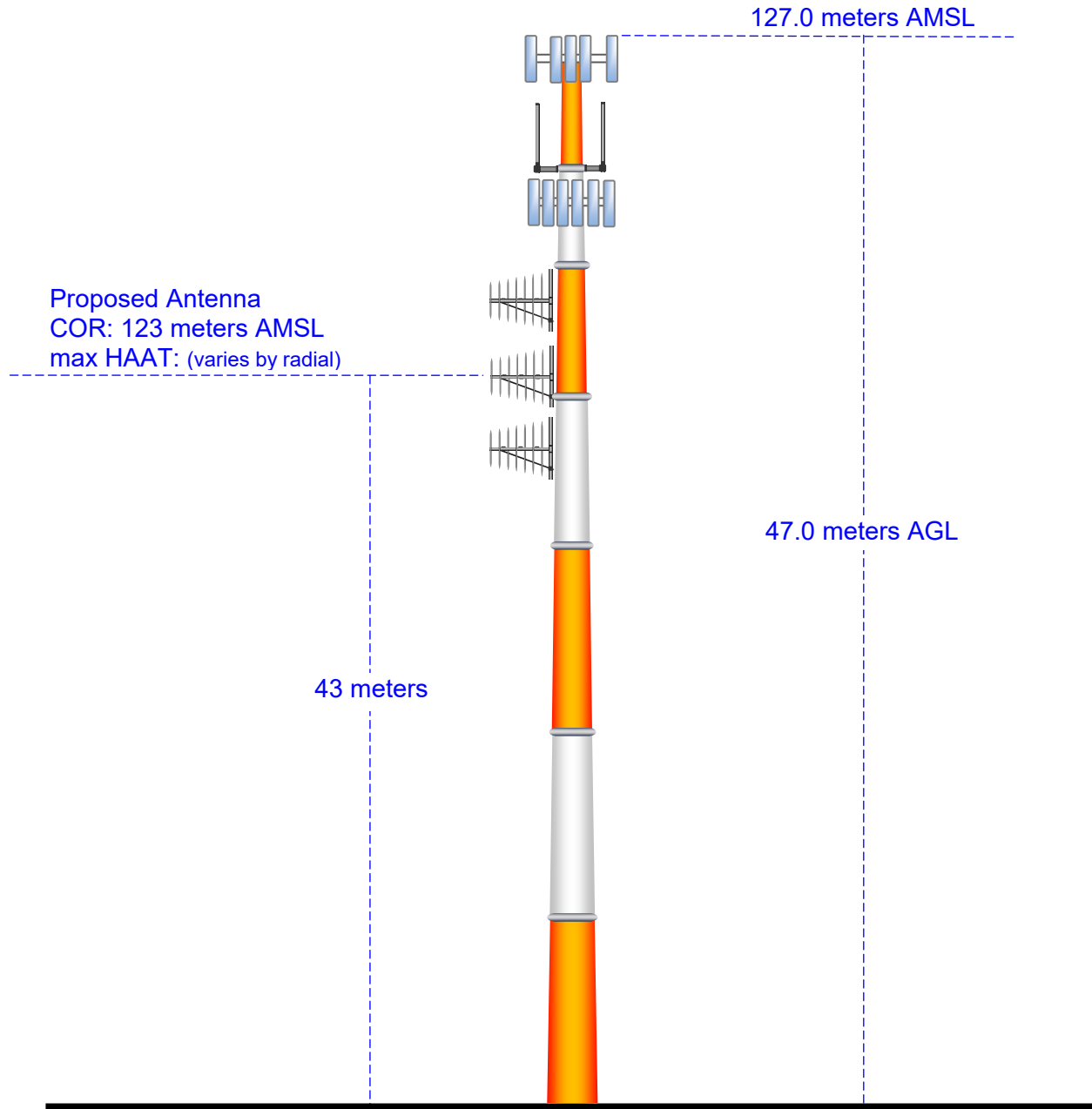
47 06 7.64940

47 06 7.00000

Longitude (D M S)

122 36 5.54275

122 36 10.0000



Ground Elevation = 80.0 m AMSL

Drawing is not to Scale

Terrain  
-1 223 m

NGDC 30 SEC Terrain Database  
U.S. Census 2010 PL Database

## Exhibit 13.3 Present vs. Proposed Service Contour Study

*Proposed 60 dBμ F(50:50) Contour*

*Present 60 dBμ F(50:50) Contour*

*Steilacoom*

*Lakewood*

**CH281D.P**  
**K253BW.L** +

*Dupont*

**CH281D.P**  
Union Mill, WA  
Proposed Operation  
Facility ID: 146771  
Latitude: 47-06-08 N  
Longitude: 122-36-06 W  
ERP: 0.25 kW  
Channel: 281D  
Frequency: 104.1 MHz  
AMSL Height: 123.0 m  
Horiz. Pattern: Directional

**60 dBμ Contour**  
Total Population: 45,924  
Coverage Area: 208 sq. km

**K253BW.L**  
Union Mill, WA  
BLFT20150608ABW  
Facility ID: 146771  
Latitude: 47-06-08 N  
Longitude: 122-36-06 W  
ERP: 0.13 kW  
Channel: 253D  
Frequency: 98.5 MHz  
AMSL Height: 121.0 m  
Horiz. Pattern: Omni

**60 dBμ Contour**  
Total Population: 39,913  
Total Area: 206 sq. km

Scale 1:115,000

0 2 4 6 km

KGHO-LP(FM).L  
Hoquiam, WA  
BLL20150316ACP  
Facility ID: 134721  
Latitude: 46-58-22 N  
Longitude: 123-51-10 W  
ERP: 0.10 kW  
Channel: 260L1  
Frequency: 99.9 MHz  
AMSL Height: 50.0 m  
Horiz. Pattern: Omni

K266BM.L  
Olympia, WA  
BLFT20130402ACL  
Facility ID: 150021  
Latitude: 46-58-24 N  
Longitude: 123-08-11 W  
ERP: 0.01 kW  
Channel: 266D  
Frequency: 101.1 MHz  
AMSL Height: 858.0 m  
Horiz. Pattern: Omni

CH281D.P  
Union Mill, WA  
Proposed Operation  
Facility ID: 146771  
Latitude: 47-06-08 N  
Longitude: 122-36-06 W  
ERP: 0.25 kW  
Channel: 281D  
Frequency: 104.1 MHz  
AMSL Height: 123.0 m  
Horiz. Pattern: Directional

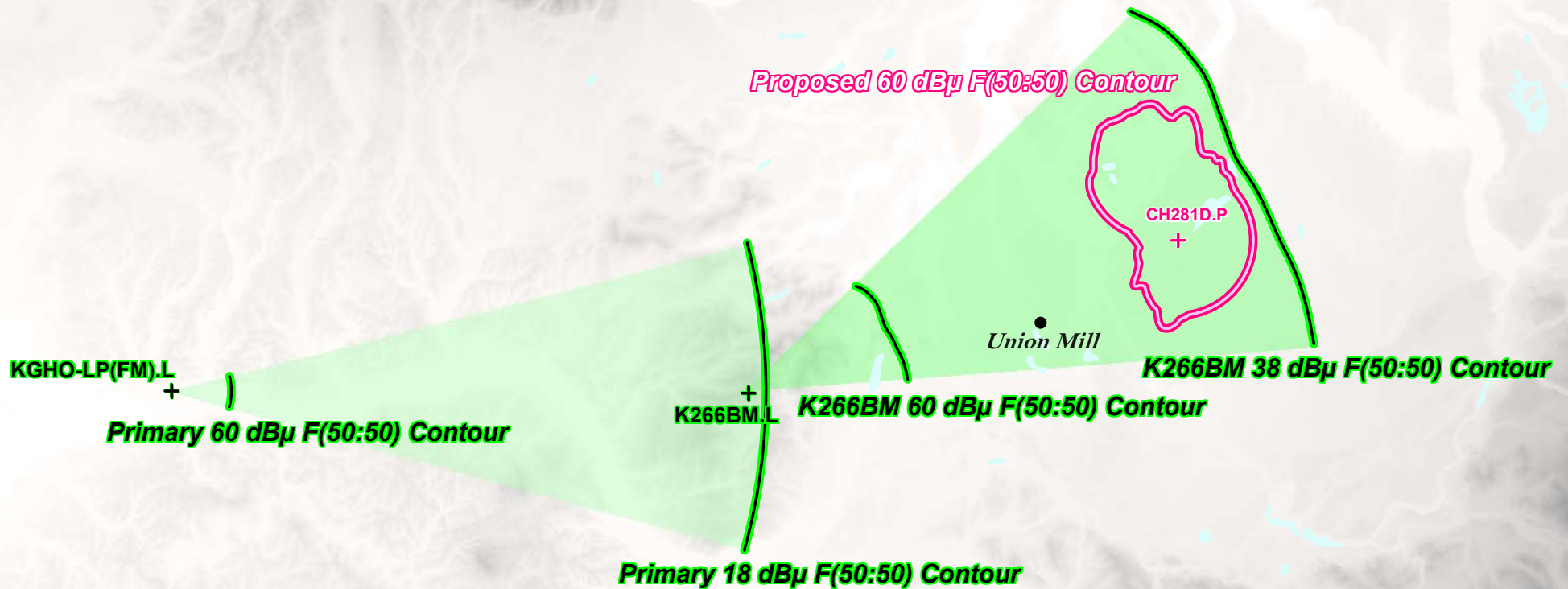
Terrain

-1

2201 m

NGDC 30 SEC Terrain Database  
U.S. Census 2010 PL Database

## Exhibit 13.4 Proposed vs. Primary Service Contour Study



Scale 1:575,000

0 8 16 24 km

# Exhibit 13.5

## Tabulation of Proposed Allocation

|  |         |  |                   |                           |                           |   |                   |                                    |                         |         |
|--|---------|--|-------------------|---------------------------|---------------------------|---|-------------------|------------------------------------|-------------------------|---------|
| REFERENCE<br>47 06 08.0 N.<br>122 36 06.0 W.   |         | CH# 281D - 104.1 MHz, Pwr= 0.25 kW DA, HAAT= 49.4 M, COR= 123 M<br>Average Protected F(50-50)= 9.21 km<br>Standard Directional |                   |                           |                           | DISPLAY DATES<br>DATA 01-26-16<br>SEARCH 01-27-16 |                   |                                    |                         |         |
| CH<br>CITY   | CALL    | TYPE<br>STATE  | ANT<br>AZI<br><-- | DIST<br>FILE #            | LAT<br>LNG                | PWR(kW)<br>HAAT(M)                                | INT(km)<br>COR(M) | PRO(km)<br>LICENSEE                | *IN*<br>(Overlap in km) | *OUT*   |
| 279C<br>Tacoma   | KHTP    | LIC DC<br>WA   | 46.4<br>226.9     | 65.02<br>BLH20080730AKI   | 47 30 14.0<br>121 58 29.0 | 68.000<br>707                                     | 12.6<br>940       | 92.9<br>Entercom License, LIc      | 45.2                    | -29.0*< |
| 281C<br>Bellingham   | KAFF    | LIC DCX<br>WA  | 354.3<br>174.1    | 176.36<br>BLH20091204ADR  | 48 40 49.6<br>122 50 26.3 | 60.000<br>701                                     | 192.0<br>739      | 89.9<br>Saga Broadcasting, LIc     | -27.7*<                 | 45.0    |
| 7/8/2009: Accepted on channel 281C by Industry Canada in 7/2/2009 letter as a specially negotiated, short-spaced allotment limited: to 34.17 kW ERP and 728.8 m HAAT or the equivalent towards channel 280A in Powell River, BC (Az. = 314.6 deg); to 39.45 kW ERP and 738.5 m HAAT or the equivalent towards channel 281A in Bralorne, BC (Az. = 0.4 deg); and to the proposed parameters, including directional antenna pattern, towards channel 282C(L3) in Vancouver, BC (Az. = 270 deg to 58 deg). See Construction Permit BPH-20070703AAY. |         |  |                   |                           |                           |   |                   |                                    |                         |         |
| 281D<br>Tacoma   | DK281AS | LIC _C_<br>WA  | 47.0<br>227.2     | 26.39<br>BLFT20070618ABD  | 47 15 50.0<br>122 20 45.0 | 0.092<br>96                                       | 30.2<br>167       | 9.1<br>Horizon Christian Fellowsh  | -11.0*<                 | -6.9<   |
| 281D<br>Olympia  | K281AD  | LIC CN<br>WA   | 253.5<br>73.3     | 19.28<br>BLFT19931228TD   | 47 03 10.0<br>122 50 45.0 | 0.050<br>59                                       | 21.2<br>105       | 6.3<br>Entercom License, LIc       | -5.9*<                  | 0.3     |
| Translator for KMTTFM, Tacoma, WA  |         |  |                   |                           |                           |   |                   |                                    |                         |         |
| 282C3<br>Chehalis  | KMNT    | LIC _CX<br>WA  | 209.8<br>29.5     | 70.02<br>BLH20050720AEZ   | 46 33 18.0<br>123 03 27.0 | 2.350<br>322                                      | 64.1<br>477       | 42.4<br>BiCoastal Media Licenses I | 0.0<                    | 19.2    |
| 281C1<br>Yakima  | KXDD    | LIC ZCX<br>WA  | 110.6<br>292.2    | 179.77<br>BLH20020305AAX  | 46 30 48.0<br>120 24 05.0 | 100.000<br>245                                    | 169.0<br>629      | 69.8<br>Ingstad Radio Washignton,  | 3.7                     | 86.2    |
| 283C2<br>Covington   | KLSW    | CP _CX<br>WA   | 37.1<br>217.4     | 61.58<br>BPED20150402AAS  | 47 32 35.0<br>122 06 25.0 | 6.700<br>400                                      | 4.8<br>525        | 54.0<br>Educational Media Foundati | 49.0                    | 6.4     |
| 283C2<br>Covington   | KLSW    | LIC DCX<br>WA  | 37.1<br>217.4     | 61.58<br>BMLED20150303AAL | 47 32 35.0<br>122 06 25.0 | 7.100<br>388                                      | 4.9<br>514        | 54.0<br>Educational Media Foundati | 48.9                    | 6.5     |
| 281D<br>Aberdeen   | K280GE  | CP _V_<br>WA   | 258.1<br>77.2     | 87.74<br>BPFT20151005ABT  | 46 56 00.0<br>123 43 57.0 | 0.250   | 48.6<br>203       | 14.4<br>Jodesha Broadcasting, Inc. | 35.3                    | 61.1    |
| 227C0<br>Seattle   | KUBE    | LIC _CY<br>WA  | 37.0<br>217.3     | 61.76<br>BLH20010206AAA   | 47 32 40.0<br>122 06 26.0 | 100.000<br>387                                    | 23.8<br>512       | 7.1<br>Citi casters Licenses, Inc. | 24.5R                   | 37.3M   |
| 281C2<br>Scappoose   | KFIS    | LIC NCY<br>OR  | 182.3<br>2.2      | 179.51<br>BLH20020306AAK  | 45 29 20.0<br>122 41 40.0 | 7.000<br>386                                      | 130.9<br>480      | 54.3<br>Caron Broadcasting, Inc.   | 40.6                    | 98.5    |
| 284C2<br>Hoquiam   | KDUX-FM | LIC _CX<br>WA  | 258.1<br>77.2     | 87.57<br>BLH20140506ACW   | 46 56 01.0<br>123 43 49.0 | 31.000<br>110                                     | 4.6<br>191        | 43.0<br>Alpha Media Licensee LIc   | 79.1                    | 44.4    |

Terrain database is NGDC 30 SEC, R= 73.215 qualifying spacings or FCC minimum Spacings in KM, M= Margin in KM  
Contour distances are on direct line to and from reference station. Reference zone= West 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

Yellow Highlighted Text denotes the existence of a §74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Request toward KHTP(FM) - Tacoma, WA (CH279C) as noted in **Exhibit 13.7**. Protection has been based on the worst case calculated 111.4 dBµ F(50:10) Interference Contour, corresponding to the worst case 71.4 dBµ F(50:50) Protected Contour. Protection has been demonstrated through the attached downward radiation study. Full protection will be afforded the facility as the interference 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 also been included in **Exhibit 13.8**.

Green Text denotes a deleted former licensed Translator operation. This facility need not be protected.

Blue Highlighted Text denotes supplemental contour protection studies toward select facilities as included in **Exhibit(s) 13.6**.



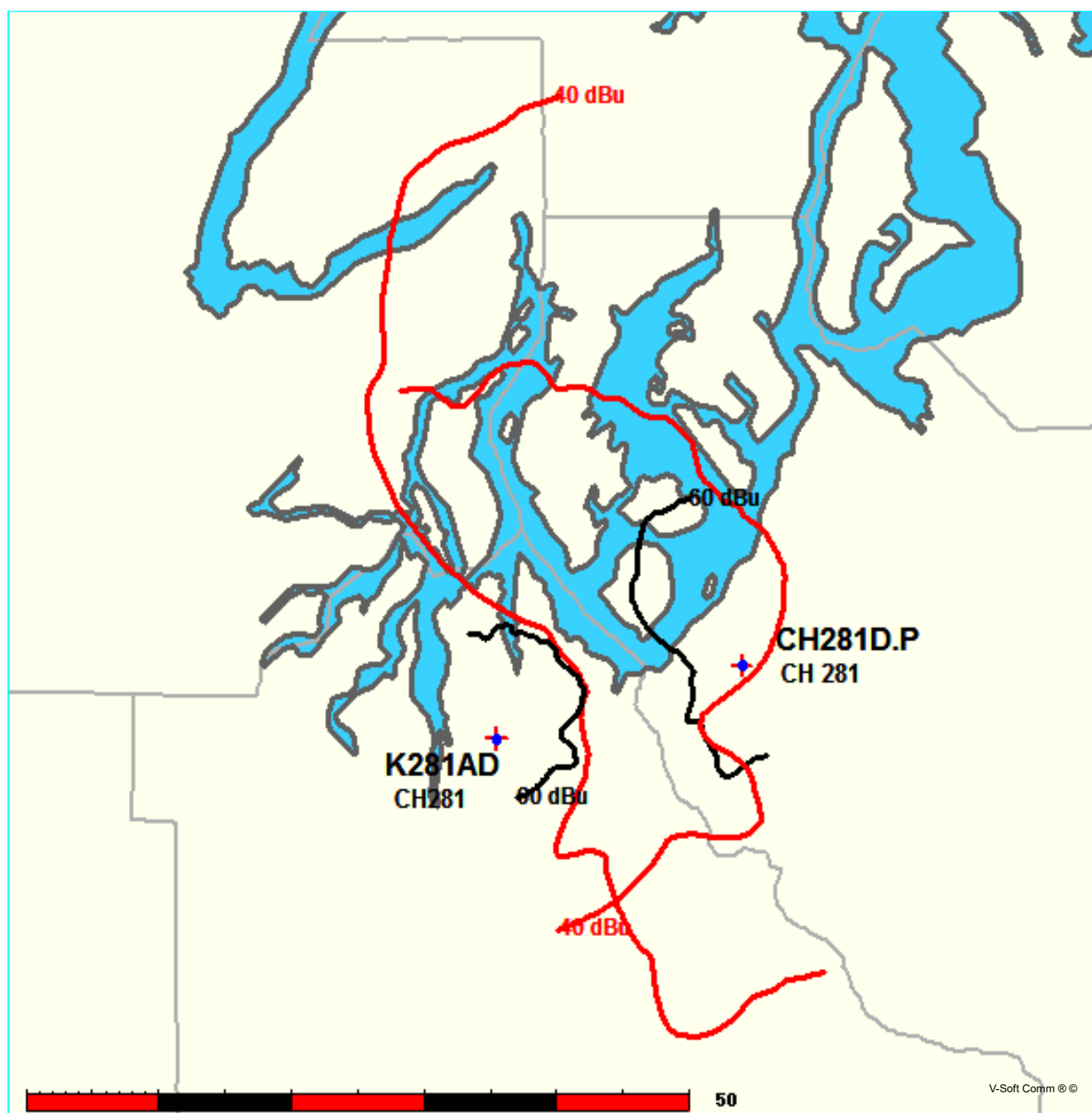
## Exhibit 13.6

### Contour Protection Studies Toward Select Station(s)

FMCommander Single Allocation Study - 01-27-2016 - NGDC 30 SEC  
CH281D.P's Overlaps (In= -5.92 km, Out= 0.26 km)

CH281D.P CH 281 D DA  
Lat= 47 06 08.0, Lng= 122 36 06.0  
0.25 kW 49.4 m HAAT, 123 m COR  
Prot.= 60 dBu, Intef.= 40 dBu

K281AD CH 281 D BLFT19931228TD  
Lat= 47 03 10.0, Lng= 122 50 45.0  
0.05 kW 59 m HAAT, 105 m COR  
Prot.= 60 dBu, Intef.= 40 dBu



# Exhibit 13.6

## Contour Protection Studies Toward Select Station(s)

01-27-2016

Terrain Data: NGDC 30 SEC

FMOver Analysis

CH281D.P

K281AD BLFT19931228TD

Channel = 281D  
Max ERP = 0.25 kW  
RCAMSL = 123 m  
N. Lat. 47 06 08.0  
W. Lng. 122 36 06.0  
Protected  
60 dBu

Channel = 281D  
Max ERP = 0.05 kW  
RCAMSL = 105 m  
N. Lat. 47 03 10.0  
W. Lng. 122 50 45.0  
Interfering  
40 dBu

| Azimuth<br>(degrees) | ERP<br>(kW) | HAAT<br>(m) | Dist<br>(km) | Azimuth<br>(degrees) | ERP<br>(kW) | HAAT<br>(m) | Dist<br>(km) | Actual<br>(dBu) | IX<br>(km) |
|----------------------|-------------|-------------|--------------|----------------------|-------------|-------------|--------------|-----------------|------------|
| 194.0                | 000.2304    | 0038.8      | 007.8        | 097.2                | 000.0500    | 0044.7      | 016.7        | 42.03*          | 2.39       |
| 195.0                | 000.2256    | 0036.4      | 007.6        | 096.1                | 000.0500    | 0043.2      | 016.6        | 41.78*          | 2.10       |
| 196.0                | 000.2209    | 0033.6      | 007.2        | 094.9                | 000.0500    | 0040.9      | 016.6        | 41.33*          | 1.56       |
| 197.0                | 000.2162    | 0030.9      | 006.9        | 093.8                | 000.0500    | 0038.6      | 016.5        | 40.85*          | 0.99       |
| 198.0                | 000.2116    | 0028.5      | 006.8        | 093.3                | 000.0500    | 0037.5      | 016.4        | 40.66*          | 0.78       |
| 199.0                | 000.2070    | 0026.5      | 006.8        | 093.1                | 000.0500    | 0037.0      | 016.3        | 40.64*          | 0.75       |
| 200.0                | 000.2025    | 0024.9      | 006.7        | 092.8                | 000.0500    | 0036.5      | 016.2        | 40.60*          | 0.70       |
| 201.0                | 000.1936    | 0023.8      | 006.7        | 092.5                | 000.0500    | 0035.8      | 016.1        | 40.48*          | 0.57       |
| 202.0                | 000.1849    | 0023.0      | 006.6        | 092.1                | 000.0500    | 0034.9      | 016.0        | 40.36*          | 0.42       |
| 203.0                | 000.1764    | 0022.5      | 006.5        | 091.6                | 000.0500    | 0034.2      | 016.0        | 40.23*          | 0.27       |
| 204.0                | 000.1681    | 0022.0      | 006.4        | 091.2                | 000.0500    | 0033.6      | 015.9        | 40.15*          | 0.18       |
| 205.0                | 000.1600    | 0021.2      | 006.3        | 090.8                | 000.0500    | 0033.3      | 015.8        | 40.14*          | 0.16       |
| 206.0                | 000.1521    | 0020.6      | 006.3        | 090.4                | 000.0500    | 0033.0      | 015.8        | 40.13*          | 0.15       |
| 207.0                | 000.1444    | 0020.9      | 006.2        | 090.0                | 000.0500    | 0032.7      | 015.7        | 40.11*          | 0.12       |
| 208.0                | 000.1369    | 0021.3      | 006.1        | 089.5                | 000.0500    | 0032.4      | 015.6        | 40.08*          | 0.10       |
| 209.0                | 000.1296    | 0021.3      | 006.0        | 089.0                | 000.0500    | 0032.1      | 015.6        | 40.05*          | 0.06       |
| 210.0                | 000.1225    | 0020.8      | 005.9        | 088.6                | 000.0500    | 0031.9      | 015.5        | 40.02*          | 0.02       |
| 211.0                | 000.1156    | 0020.4      | 005.8        | 088.1                | 000.0500    | 0031.6      | 015.5        | 39.99           |            |
| 212.0                | 000.1089    | 0021.1      | 005.8        | 087.7                | 000.0500    | 0031.3      | 015.5        | 39.95           |            |
| 213.0                | 000.1024    | 0023.0      | 005.7        | 087.2                | 000.0500    | 0031.2      | 015.4        | 39.94           |            |
| 214.0                | 000.0961    | 0025.4      | 005.6        | 086.7                | 000.0500    | 0031.1      | 015.4        | 39.94           |            |
| 215.0                | 000.0900    | 0027.8      | 005.5        | 086.2                | 000.0500    | 0031.1      | 015.4        | 39.97           |            |
| 216.0                | 000.0841    | 0029.7      | 005.4        | 085.7                | 000.0500    | 0031.2      | 015.4        | 40.01*          | 0.01       |
| 217.0                | 000.0784    | 0031.2      | 005.4        | 085.5                | 000.0500    | 0031.3      | 015.3        | 40.09*          | 0.10       |
| 218.0                | 000.0729    | 0032.7      | 005.4        | 085.3                | 000.0500    | 0031.4      | 015.2        | 40.18*          | 0.20       |
| 219.0                | 000.0676    | 0034.7      | 005.5        | 085.2                | 000.0500    | 0031.4      | 015.1        | 40.28*          | 0.32       |
| 220.0                | 000.0625    | 0036.9      | 005.5        | 085.1                | 000.0500    | 0031.4      | 015.0        | 40.35*          | 0.44       |
| 221.0                | 000.0576    | 0039.6      | 005.6        | 085.1                | 000.0500    | 0031.4      | 014.9        | 40.50*          | 0.57       |
| 222.0                | 000.0529    | 0043.3      | 005.8        | 085.2                | 000.0500    | 0031.4      | 014.7        | 40.69*          | 0.73       |
| 223.0                | 000.0484    | 0047.5      | 005.9        | 085.3                | 000.0500    | 0031.4      | 014.5        | 40.89*          | 0.90       |
| 224.0                | 000.0441    | 0050.8      | 006.0        | 085.2                | 000.0500    | 0031.4      | 014.4        | 41.05*          | 1.03       |
| 225.0                | 000.0400    | 0052.8      | 006.0        | 084.8                | 000.0500    | 0031.5      | 014.3        | 41.14*          | 1.12       |
| 226.0                | 000.0361    | 0053.7      | 005.9        | 084.2                | 000.0500    | 0031.7      | 014.3        | 41.19*          | 1.18       |
| 227.0                | 000.0324    | 0054.1      | 005.7        | 083.6                | 000.0500    | 0032.2      | 014.4        | 41.24*          | 1.26       |
| 228.0                | 000.0289    | 0054.1      | 005.6        | 082.9                | 000.0500    | 0033.1      | 014.4        | 41.38*          | 1.47       |
| 229.0                | 000.0256    | 0053.6      | 005.4        | 082.2                | 000.0500    | 0034.1      | 014.5        | 41.52*          | 1.67       |
| 230.0                | 000.0225    | 0052.9      | 005.2        | 081.5                | 000.0500    | 0035.2      | 014.7        | 41.64*          | 1.87       |
| 231.0                | 000.0210    | 0052.1      | 005.1        | 080.9                | 000.0500    | 0036.1      | 014.7        | 41.77*          | 2.06       |
| 232.0                | 000.0196    | 0051.2      | 004.9        | 080.4                | 000.0500    | 0037.0      | 014.8        | 41.90*          | 2.25       |

# Exhibit 13.6

## Contour Protection Studies Toward Select Station(s)

| Azimuth<br>(degrees) | ERP<br>(kW) | HAAT<br>(m) | Dist<br>(km) | Azimuth<br>(degrees) | ERP<br>(kW) | HAAT<br>(m) | Dist<br>(km) | Actual<br>(dBu) | IX<br>(km) |
|----------------------|-------------|-------------|--------------|----------------------|-------------|-------------|--------------|-----------------|------------|
| 233.0                | 000.0182    | 0050.7      | 004.8        | 079.9                | 000.0500    | 0038.0      | 014.9        | 42.06*          | 2.47       |
| 234.0                | 000.0169    | 0050.4      | 004.7        | 079.4                | 000.0500    | 0038.9      | 014.9        | 42.20*          | 2.67       |
| 235.0                | 000.0156    | 0050.5      | 004.6        | 079.0                | 000.0500    | 0039.8      | 015.0        | 42.34*          | 2.85       |
| 236.0                | 000.0144    | 0050.9      | 004.5        | 078.6                | 000.0500    | 0040.6      | 015.0        | 42.63*          | 3.05       |
| 237.0                | 000.0132    | 0051.5      | 004.5        | 078.2                | 000.0500    | 0041.6      | 015.0        | 42.82*          | 3.27       |
| 238.0                | 000.0121    | 0052.1      | 004.4        | 077.8                | 000.0500    | 0042.6      | 015.1        | 43.02*          | 3.51       |
| 239.0                | 000.0110    | 0052.7      | 004.3        | 077.5                | 000.0500    | 0043.7      | 015.1        | 43.21*          | 3.74       |
| 240.0                | 000.0100    | 0053.4      | 004.3        | 077.1                | 000.0500    | 0044.7      | 015.2        | 43.39*          | 3.96       |
| 241.0                | 000.0095    | 0054.2      | 004.2        | 076.8                | 000.0500    | 0045.6      | 015.2        | 43.57*          | 4.17       |
| 242.0                | 000.0090    | 0055.2      | 004.2        | 076.5                | 000.0500    | 0046.3      | 015.2        | 43.74*          | 4.37       |
| 243.0                | 000.0086    | 0056.3      | 004.2        | 076.3                | 000.0500    | 0047.1      | 015.2        | 43.91*          | 4.57       |
| 244.0                | 000.0081    | 0057.6      | 004.2        | 076.0                | 000.0500    | 0047.9      | 015.2        | 44.07*          | 4.75       |
| 245.0                | 000.0077    | 0059.0      | 004.2        | 075.7                | 000.0500    | 0048.6      | 015.1        | 44.22*          | 4.93       |
| 246.0                | 000.0072    | 0060.3      | 004.2        | 075.4                | 000.0500    | 0049.4      | 015.2        | 44.36*          | 5.10       |
| 247.0                | 000.0068    | 0061.7      | 004.2        | 075.1                | 000.0500    | 0050.1      | 015.2        | 44.49*          | 5.26       |
| 248.0                | 000.0064    | 0063.1      | 004.1        | 074.9                | 000.0500    | 0050.8      | 015.2        | 44.61*          | 5.40       |
| 249.0                | 000.0060    | 0064.8      | 004.1        | 074.6                | 000.0500    | 0051.4      | 015.2        | 44.71*          | 5.53       |
| 250.0                | 000.0056    | 0066.5      | 004.1        | 074.3                | 000.0500    | 0051.9      | 015.2        | 44.80*          | 5.64       |
| 251.0                | 000.0053    | 0068.1      | 004.1        | 074.0                | 000.0500    | 0052.4      | 015.2        | 44.88*          | 5.74       |
| 252.0                | 000.0050    | 0069.5      | 004.1        | 073.8                | 000.0500    | 0052.9      | 015.2        | 44.95*          | 5.82       |
| 253.0                | 000.0048    | 0070.7      | 004.0        | 073.5                | 000.0500    | 0053.4      | 015.2        | 45.00*          | 5.89       |
| 254.0                | 000.0045    | 0071.8      | 004.0        | 073.2                | 000.0500    | 0053.8      | 015.3        | 45.05*          | 5.95       |
| 255.0                | 000.0042    | 0073.0      | 004.0        | 073.0                | 000.0500    | 0054.2      | 015.3        | 45.09*          | 6.00       |
| 256.0                | 000.0040    | 0073.9      | 003.9        | 072.7                | 000.0500    | 0054.6      | 015.4        | 45.12*          | 6.04       |
| 257.0                | 000.0037    | 0074.9      | 003.9        | 072.5                | 000.0500    | 0055.0      | 015.4        | 45.14*          | 6.08       |
| 258.0                | 000.0035    | 0075.8      | 003.9        | 072.2                | 000.0500    | 0055.3      | 015.4        | 45.16*          | 6.10       |
| 259.0                | 000.0032    | 0076.0      | 003.8        | 072.0                | 000.0500    | 0055.7      | 015.5        | 45.15*          | 6.10       |
| 260.0                | 000.0030    | 0076.2      | 003.7        | 071.8                | 000.0500    | 0056.0      | 015.6        | 45.13*          | 6.09       |
| 261.0                | 000.0031    | 0076.6      | 003.8        | 071.6                | 000.0500    | 0056.3      | 015.6        | 45.21*          | 6.17       |
| 262.0                | 000.0031    | 0076.9      | 003.8        | 071.3                | 000.0500    | 0056.7      | 015.6        | 45.28*          | 6.27       |
| 263.0                | 000.0032    | 0077.2      | 003.8        | 071.0                | 000.0500    | 0057.2      | 015.5        | 45.35*          | 6.36       |
| 264.0                | 000.0032    | 0077.6      | 003.8        | 070.8                | 000.0500    | 0057.7      | 015.5        | 45.43*          | 6.46       |
| 265.0                | 000.0033    | 0078.1      | 003.9        | 070.5                | 000.0500    | 0058.2      | 015.5        | 45.52*          | 6.57       |
| 266.0                | 000.0034    | 0078.9      | 003.9        | 070.2                | 000.0500    | 0058.8      | 015.5        | 45.63*          | 6.71       |
| 267.0                | 000.0034    | 0079.9      | 003.9        | 070.0                | 000.0500    | 0059.5      | 015.5        | 45.74*          | 6.85       |
| 268.0                | 000.0035    | 0081.0      | 004.0        | 069.7                | 000.0500    | 0060.2      | 015.5        | 45.85*          | 6.99       |
| 269.0                | 000.0035    | 0081.9      | 004.0        | 069.4                | 000.0500    | 0060.9      | 015.4        | 45.95*          | 7.11       |
| 270.0                | 000.0036    | 0083.9      | 004.1        | 069.0                | 000.0500    | 0061.6      | 015.4        | 46.07*          | 7.27       |
| 271.0                | 000.0037    | 0085.9      | 004.2        | 068.7                | 000.0500    | 0062.2      | 015.4        | 46.19*          | 7.42       |
| 272.0                | 000.0037    | 0088.0      | 004.2        | 068.3                | 000.0500    | 0062.9      | 015.3        | 46.30*          | 7.56       |
| 273.0                | 000.0038    | 0090.0      | 004.3        | 068.0                | 000.0500    | 0063.6      | 015.3        | 46.41*          | 7.70       |
| 274.0                | 000.0038    | 0092.8      | 004.4        | 067.6                | 000.0500    | 0064.3      | 015.3        | 46.54*          | 7.87       |
| 275.0                | 000.0039    | 0095.1      | 004.5        | 067.2                | 000.0500    | 0065.1      | 015.2        | 46.66*          | 8.04       |
| 276.0                | 000.0040    | 0097.5      | 004.5        | 066.8                | 000.0500    | 0065.9      | 015.2        | 46.78*          | 8.19       |
| 277.0                | 000.0040    | 0099.5      | 004.6        | 066.4                | 000.0500    | 0066.5      | 015.2        | 46.88*          | 8.32       |
| 278.0                | 000.0041    | 0101.2      | 004.7        | 066.0                | 000.0500    | 0067.1      | 015.2        | 46.96*          | 8.43       |
| 279.0                | 000.0042    | 0102.7      | 004.7        | 065.6                | 000.0500    | 0067.7      | 015.2        | 47.03*          | 8.53       |
| 280.0                | 000.0042    | 0104.1      | 004.8        | 065.3                | 000.0500    | 0068.2      | 015.2        | 47.09*          | 8.62       |
| 281.0                | 000.0054    | 0105.5      | 005.1        | 064.2                | 000.0500    | 0069.7      | 014.9        | 47.28*          | 9.10       |
| 282.0                | 000.0067    | 0106.4      | 005.5        | 063.1                | 000.0500    | 0070.8      | 014.7        | 47.64*          | 9.48       |
| 283.0                | 000.0082    | 0107.0      | 005.8        | 062.1                | 000.0500    | 0072.3      | 014.5        | 48.01*          | 9.90       |
| 284.0                | 000.0098    | 0107.6      | 006.0        | 061.1                | 000.0500    | 0074.0      | 014.4        | 48.38*          | 10.33      |
| 285.0                | 000.0116    | 0108.1      | 006.3        | 060.0                | 000.0500    | 0075.3      | 014.3        | 48.67*          | 10.67      |



## Exhibit 13.6

### Contour Protection Studies Toward Select Station(s)

| Azimuth<br>(degrees) | ERP<br>(kW) | HAAT<br>(m) | Dist<br>(km) | Azimuth<br>(degrees) | ERP<br>(kW) | HAAT<br>(m) | Dist<br>(km) | Actual<br>(dBu) | IX<br>(km) |
|----------------------|-------------|-------------|--------------|----------------------|-------------|-------------|--------------|-----------------|------------|
| 286.0                | 000.0135    | 0108.4      | 006.6        | 059.0                | 000.0500    | 0076.1      | 014.2        | 48.87*          | 10.89      |
| 287.0                | 000.0155    | 0108.8      | 006.8        | 058.0                | 000.0500    | 0076.3      | 014.1        | 48.98*          | 10.99      |
| 288.0                | 000.0177    | 0109.2      | 007.0        | 057.0                | 000.0500    | 0076.4      | 014.1        | 49.06*          | 11.06      |
| 289.0                | 000.0200    | 0109.7      | 007.2        | 055.9                | 000.0500    | 0076.6      | 014.0        | 49.14*          | 11.14      |
| 290.0                | 000.0225    | 0110.2      | 007.5        | 054.9                | 000.0500    | 0077.0      | 014.0        | 49.21*          | 11.23      |
| 291.0                | 000.0256    | 0110.5      | 007.7        | 053.7                | 000.0500    | 0077.5      | 014.0        | 49.30*          | 11.33      |
| 292.0                | 000.0289    | 0110.5      | 007.9        | 052.6                | 000.0500    | 0077.7      | 014.0        | 49.34*          | 11.38      |
| 293.0                | 000.0324    | 0110.4      | 008.2        | 051.5                | 000.0500    | 0077.3      | 014.0        | 49.29*          | 11.31      |
| 294.0                | 000.0361    | 0110.3      | 008.4        | 050.4                | 000.0500    | 0076.2      | 014.0        | 49.13*          | 11.10      |
| 295.0                | 000.0400    | 0110.0      | 008.6        | 049.4                | 000.0500    | 0075.2      | 014.0        | 48.97*          | 10.90      |
| 296.0                | 000.0441    | 0109.7      | 008.8        | 048.4                | 000.0500    | 0075.1      | 014.1        | 48.89*          | 10.82      |
| 297.0                | 000.0484    | 0109.3      | 009.0        | 047.4                | 000.0500    | 0075.6      | 014.2        | 48.84*          | 10.82      |
| 298.0                | 000.0529    | 0108.9      | 009.2        | 046.5                | 000.0500    | 0075.7      | 014.3        | 48.75*          | 10.76      |
| 299.0                | 000.0576    | 0108.6      | 009.4        | 045.6                | 000.0500    | 0075.2      | 014.4        | 48.57*          | 10.57      |
| 300.0                | 000.0625    | 0108.3      | 009.6        | 044.7                | 000.0500    | 0074.1      | 014.5        | 48.32*          | 10.28      |
| 301.0                | 000.0676    | 0107.6      | 009.7        | 044.0                | 000.0500    | 0073.3      | 014.6        | 48.07*          | 10.02      |
| 302.0                | 000.0729    | 0106.4      | 009.8        | 043.4                | 000.0500    | 0072.9      | 014.7        | 47.87*          | 9.82       |
| 303.0                | 000.0784    | 0105.1      | 010.0        | 042.8                | 000.0500    | 0073.0      | 014.9        | 47.70*          | 9.68       |
| 304.0                | 000.0841    | 0104.0      | 010.1        | 042.2                | 000.0500    | 0073.2      | 015.0        | 47.77*          | 9.56       |
| 305.0                | 000.0900    | 0102.7      | 010.2        | 041.7                | 000.0500    | 0073.5      | 015.2        | 47.66*          | 9.45       |
| 306.0                | 000.0961    | 0100.8      | 010.3        | 041.4                | 000.0500    | 0073.6      | 015.4        | 47.53*          | 9.30       |
| 307.0                | 000.1024    | 0098.3      | 010.3        | 041.2                | 000.0500    | 0073.7      | 015.5        | 47.38*          | 9.14       |
| 308.0                | 000.1089    | 0095.6      | 010.3        | 041.1                | 000.0500    | 0073.7      | 015.7        | 47.23*          | 8.97       |
| 309.0                | 000.1156    | 0093.6      | 010.4        | 040.9                | 000.0500    | 0073.7      | 015.9        | 47.07*          | 8.79       |
| 310.0                | 000.1225    | 0092.2      | 010.4        | 040.6                | 000.0500    | 0073.8      | 016.1        | 46.92*          | 8.62       |
| 311.0                | 000.1296    | 0091.9      | 010.6        | 040.2                | 000.0500    | 0073.8      | 016.3        | 46.77*          | 8.44       |
| 312.0                | 000.1369    | 0092.3      | 010.7        | 039.6                | 000.0500    | 0073.9      | 016.5        | 46.61*          | 8.26       |
| 313.0                | 000.1444    | 0093.1      | 010.9        | 039.0                | 000.0500    | 0074.0      | 016.6        | 46.45*          | 8.08       |

# Exhibit 13.6

## Contour Protection Studies Toward Select Station(s)

01-27-2016

Terrain Data: NGDC 30 SEC

FMOver Analysis

K281AD BLFT19931228TD

CH281D.P

Channel = 281D  
Max ERP = 0.05 kW  
RCAMSL = 105 m  
N. Lat. 47 03 10.0  
W. Lng. 122 50 45.0  
Protected  
60 dBu

Channel = 281D  
Max ERP = 0.25 kW  
RCAMSL = 123 m  
N. Lat. 47 06 08.0  
W. Lng. 122 36 06.0  
Interfering  
40 dBu

| Azimuth<br>(degrees) | ERP<br>(kW) | HAAT<br>(m) | Dist<br>(km) | Azimuth<br>(degrees) | ERP<br>(kW) | HAAT<br>(m) | Dist<br>(km) | Actual<br>(dBu) | IX<br>(km) |
|----------------------|-------------|-------------|--------------|----------------------|-------------|-------------|--------------|-----------------|------------|
| 013.0                | 000.0500    | 0086.4      | 008.0        | 278.0                | 000.0041    | 0101.2      | 016.8        | 38.20           |            |
| 014.0                | 000.0500    | 0086.7      | 008.0        | 278.0                | 000.0041    | 0101.2      | 016.7        | 38.32           |            |
| 015.0                | 000.0500    | 0086.9      | 008.0        | 278.0                | 000.0041    | 0101.2      | 016.5        | 38.43           |            |
| 016.0                | 000.0500    | 0085.9      | 008.0        | 277.7                | 000.0041    | 0100.7      | 016.4        | 38.48           |            |
| 017.0                | 000.0500    | 0084.8      | 007.9        | 277.5                | 000.0041    | 0100.3      | 016.3        | 38.54           |            |
| 018.0                | 000.0500    | 0085.1      | 008.0        | 277.4                | 000.0041    | 0100.2      | 016.2        | 38.64           |            |
| 019.0                | 000.0500    | 0085.9      | 008.0        | 277.5                | 000.0041    | 0100.3      | 016.0        | 38.77           |            |
| 020.0                | 000.0500    | 0086.5      | 008.0        | 277.5                | 000.0041    | 0100.3      | 015.9        | 38.90           |            |
| 021.0                | 000.0500    | 0086.6      | 008.0        | 277.4                | 000.0041    | 0100.1      | 015.7        | 38.99           |            |
| 022.0                | 000.0500    | 0085.7      | 008.0        | 277.1                | 000.0040    | 0099.6      | 015.6        | 39.03           |            |
| 023.0                | 000.0500    | 0084.6      | 007.9        | 276.7                | 000.0040    | 0099.0      | 015.5        | 39.06           |            |
| 024.0                | 000.0500    | 0084.1      | 007.9        | 276.5                | 000.0040    | 0098.6      | 015.4        | 39.11           |            |
| 025.0                | 000.0500    | 0084.4      | 007.9        | 276.4                | 000.0040    | 0098.4      | 015.2        | 39.20           |            |
| 026.0                | 000.0500    | 0085.2      | 008.0        | 276.4                | 000.0040    | 0098.3      | 015.1        | 39.32           |            |
| 027.0                | 000.0500    | 0086.4      | 008.0        | 276.4                | 000.0040    | 0098.4      | 014.9        | 39.33           |            |
| 028.0                | 000.0500    | 0087.6      | 008.1        | 276.4                | 000.0040    | 0098.5      | 014.8        | 39.50           |            |
| 029.0                | 000.0500    | 0087.8      | 008.1        | 276.3                | 000.0040    | 0098.1      | 014.6        | 39.61           |            |
| 030.0                | 000.0500    | 0087.2      | 008.1        | 275.9                | 000.0040    | 0097.3      | 014.5        | 39.65           |            |
| 031.0                | 000.0500    | 0086.4      | 008.0        | 275.5                | 000.0039    | 0096.4      | 014.4        | 39.66           |            |
| 032.0                | 000.0500    | 0085.7      | 008.0        | 275.2                | 000.0039    | 0095.5      | 014.3        | 39.68           |            |
| 033.0                | 000.0500    | 0084.9      | 007.9        | 274.8                | 000.0039    | 0094.5      | 014.2        | 39.69           |            |
| 034.0                | 000.0500    | 0083.5      | 007.9        | 274.2                | 000.0039    | 0093.3      | 014.1        | 39.65           |            |
| 035.0                | 000.0500    | 0081.1      | 007.8        | 273.5                | 000.0038    | 0091.5      | 014.1        | 39.48           |            |
| 036.0                | 000.0500    | 0078.3      | 007.6        | 272.7                | 000.0038    | 0089.4      | 014.0        | 39.27           |            |
| 037.0                | 000.0500    | 0076.0      | 007.5        | 272.0                | 000.0037    | 0088.1      | 014.0        | 39.14           |            |
| 038.0                | 000.0500    | 0074.6      | 007.4        | 271.5                | 000.0037    | 0086.9      | 013.9        | 39.06           |            |
| 039.0                | 000.0500    | 0074.0      | 007.4        | 271.1                | 000.0037    | 0086.1      | 013.8        | 39.06           |            |
| 040.0                | 000.0500    | 0073.9      | 007.4        | 270.7                | 000.0036    | 0085.4      | 013.7        | 39.08           |            |
| 041.0                | 000.0500    | 0073.7      | 007.4        | 270.4                | 000.0036    | 0084.6      | 013.6        | 39.10           |            |
| 042.0                | 000.0500    | 0073.3      | 007.4        | 269.9                | 000.0036    | 0083.8      | 013.6        | 39.09           |            |
| 043.0                | 000.0500    | 0072.9      | 007.3        | 269.5                | 000.0036    | 0082.9      | 013.5        | 39.07           |            |
| 044.0                | 000.0500    | 0073.3      | 007.4        | 269.2                | 000.0036    | 0082.2      | 013.4        | 39.12           |            |
| 045.0                | 000.0500    | 0074.5      | 007.4        | 268.9                | 000.0035    | 0081.9      | 013.2        | 39.24           |            |
| 046.0                | 000.0500    | 0075.5      | 007.5        | 268.7                | 000.0035    | 0081.5      | 013.1        | 39.36           |            |
| 047.0                | 000.0500    | 0075.7      | 007.5        | 268.3                | 000.0035    | 0081.2      | 013.0        | 39.43           |            |
| 048.0                | 000.0500    | 0075.2      | 007.4        | 267.8                | 000.0035    | 0080.8      | 013.0        | 39.44           |            |
| 049.0                | 000.0500    | 0075.1      | 007.4        | 267.3                | 000.0034    | 0080.3      | 012.9        | 39.46           |            |
| 050.0                | 000.0500    | 0075.7      | 007.5        | 266.9                | 000.0034    | 0079.9      | 012.8        | 39.53           |            |
| 051.0                | 000.0500    | 0076.9      | 007.5        | 266.6                | 000.0034    | 0079.5      | 012.7        | 39.65           |            |
| 052.0                | 000.0500    | 0077.6      | 007.6        | 266.2                | 000.0034    | 0079.1      | 012.5        | 39.73           |            |

## Exhibit 13.6

### Contour Protection Studies Toward Select Station(s)

| Azimuth<br>(degrees) | ERP<br>(kW) | HAAT<br>(m) | Dist<br>(km) | Azimuth<br>(degrees) | ERP<br>(kW) | HAAT<br>(m) | Dist<br>(km) | Actual<br>(dBu) | IX<br>(km) |
|----------------------|-------------|-------------|--------------|----------------------|-------------|-------------|--------------|-----------------|------------|
| 053.0                | 000.0500    | 0077.7      | 007.6        | 265.7                | 000.0033    | 0078.6      | 012.5        | 39.75           |            |
| 054.0                | 000.0500    | 0077.4      | 007.6        | 265.2                | 000.0033    | 0078.2      | 012.4        | 39.75           |            |
| 055.0                | 000.0500    | 0077.0      | 007.5        | 264.6                | 000.0033    | 0077.9      | 012.4        | 39.75           |            |
| 056.0                | 000.0500    | 0076.6      | 007.5        | 264.0                | 000.0032    | 0077.6      | 012.3        | 39.73           |            |
| 057.0                | 000.0500    | 0076.4      | 007.5        | 263.4                | 000.0032    | 0077.3      | 012.3        | 39.73           |            |
| 058.0                | 000.0500    | 0076.3      | 007.5        | 262.9                | 000.0032    | 0077.2      | 012.2        | 39.75           |            |
| 059.0                | 000.0500    | 0076.1      | 007.5        | 262.3                | 000.0032    | 0077.0      | 012.2        | 39.76           |            |
| 060.0                | 000.0500    | 0075.4      | 007.5        | 261.7                | 000.0031    | 0076.7      | 012.2        | 39.71           |            |
| 061.0                | 000.0500    | 0074.1      | 007.4        | 261.0                | 000.0031    | 0076.6      | 012.2        | 39.62           |            |
| 062.0                | 000.0500    | 0072.5      | 007.3        | 260.3                | 000.0030    | 0076.3      | 012.2        | 39.49           |            |
| 063.0                | 000.0500    | 0070.9      | 007.2        | 259.6                | 000.0031    | 0076.1      | 012.2        | 39.50           |            |
| 064.0                | 000.0500    | 0069.9      | 007.2        | 259.0                | 000.0033    | 0076.0      | 012.3        | 39.66           |            |
| 065.0                | 000.0500    | 0068.6      | 007.1        | 258.4                | 000.0034    | 0075.9      | 012.3        | 39.79           |            |
| 066.0                | 000.0500    | 0067.2      | 007.0        | 257.7                | 000.0035    | 0075.5      | 012.3        | 39.87           |            |
| 067.0                | 000.0500    | 0065.5      | 007.0        | 257.1                | 000.0037    | 0075.0      | 012.4        | 39.90           |            |
| 068.0                | 000.0500    | 0063.5      | 006.9        | 256.5                | 000.0039    | 0074.4      | 012.5        | 39.90           |            |
| 069.0                | 000.0500    | 0061.6      | 006.8        | 255.9                | 000.0040    | 0073.8      | 012.5        | 39.88           |            |
| 070.0                | 000.0500    | 0059.4      | 006.7        | 255.3                | 000.0041    | 0073.3      | 012.6        | 39.83           |            |
| 071.0                | 000.0500    | 0057.2      | 006.5        | 254.7                | 000.0043    | 0072.7      | 012.8        | 39.75           |            |
| 072.0                | 000.0500    | 0055.7      | 006.4        | 254.2                | 000.0044    | 0072.1      | 012.8        | 39.70           |            |
| 073.0                | 000.0500    | 0054.1      | 006.4        | 253.7                | 000.0046    | 0071.5      | 012.9        | 39.65           |            |
| 074.0                | 000.0500    | 0052.5      | 006.3        | 253.2                | 000.0047    | 0070.9      | 013.0        | 39.57           |            |
| 075.0                | 000.0500    | 0050.4      | 006.1        | 252.8                | 000.0048    | 0070.4      | 013.2        | 39.44           |            |
| 076.0                | 000.0500    | 0047.8      | 006.0        | 252.3                | 000.0049    | 0069.9      | 013.3        | 39.25           |            |
| 077.0                | 000.0500    | 0045.1      | 005.8        | 252.0                | 000.0051    | 0069.5      | 013.5        | 39.04           |            |
| 078.0                | 000.0500    | 0042.2      | 005.6        | 251.6                | 000.0051    | 0069.0      | 013.7        | 38.80           |            |
| 079.0                | 000.0500    | 0039.7      | 005.4        | 251.3                | 000.0052    | 0068.6      | 013.9        | 38.59           |            |
| 080.0                | 000.0500    | 0037.8      | 005.3        | 251.0                | 000.0053    | 0068.1      | 014.0        | 38.41           |            |
| 081.0                | 000.0500    | 0036.0      | 005.2        | 250.8                | 000.0054    | 0067.7      | 014.2        | 38.24           |            |
| 082.0                | 000.0500    | 0034.4      | 005.0        | 250.5                | 000.0055    | 0067.3      | 014.3        | 38.09           |            |
| 083.0                | 000.0500    | 0033.0      | 004.9        | 250.2                | 000.0056    | 0066.9      | 014.4        | 37.95           |            |
| 084.0                | 000.0500    | 0031.9      | 004.9        | 250.0                | 000.0056    | 0066.5      | 014.5        | 37.84           |            |
| 085.0                | 000.0500    | 0031.4      | 004.8        | 249.7                | 000.0057    | 0066.0      | 014.6        | 37.80           |            |
| 086.0                | 000.0500    | 0031.2      | 004.8        | 249.4                | 000.0058    | 0065.5      | 014.6        | 37.77           |            |
| 087.0                | 000.0500    | 0031.1      | 004.8        | 249.1                | 000.0060    | 0065.0      | 014.7        | 37.76           |            |
| 088.0                | 000.0500    | 0031.5      | 004.8        | 248.8                | 000.0061    | 0064.4      | 014.7        | 37.79           |            |
| 089.0                | 000.0500    | 0032.1      | 004.9        | 248.4                | 000.0062    | 0063.8      | 014.7        | 37.83           |            |
| 090.0                | 000.0500    | 0032.7      | 004.9        | 248.0                | 000.0064    | 0063.1      | 014.6        | 37.87           |            |
| 091.0                | 000.0500    | 0033.4      | 005.0        | 247.6                | 000.0066    | 0062.6      | 014.6        | 37.91           |            |
| 092.0                | 000.0500    | 0034.8      | 005.1        | 247.1                | 000.0068    | 0061.9      | 014.6        | 38.03           |            |
| 093.0                | 000.0500    | 0036.9      | 005.2        | 246.6                | 000.0070    | 0061.0      | 014.5        | 38.20           |            |
| 094.0                | 000.0500    | 0039.0      | 005.4        | 246.0                | 000.0072    | 0060.2      | 014.4        | 38.36           |            |
| 095.0                | 000.0500    | 0041.0      | 005.5        | 245.3                | 000.0075    | 0059.4      | 014.3        | 38.50           |            |
| 096.0                | 000.0500    | 0043.0      | 005.7        | 244.7                | 000.0078    | 0058.6      | 014.2        | 38.62           |            |
| 097.0                | 000.0500    | 0044.5      | 005.8        | 244.2                | 000.0080    | 0057.8      | 014.2        | 38.70           |            |
| 098.0                | 000.0500    | 0045.4      | 005.8        | 243.7                | 000.0082    | 0057.2      | 014.2        | 38.70           |            |
| 099.0                | 000.0500    | 0046.2      | 005.9        | 243.2                | 000.0084    | 0056.6      | 014.2        | 38.70           |            |
| 100.0                | 000.0500    | 0046.7      | 005.9        | 242.8                | 000.0086    | 0056.1      | 014.3        | 38.67           |            |
| 101.0                | 000.0500    | 0047.2      | 005.9        | 242.4                | 000.0088    | 0055.6      | 014.3        | 38.65           |            |
| 102.0                | 000.0500    | 0047.8      | 006.0        | 242.0                | 000.0090    | 0055.2      | 014.3        | 38.63           |            |
| 103.0                | 000.0500    | 0048.7      | 006.0        | 241.6                | 000.0092    | 0054.7      | 014.4        | 38.62           |            |
| 104.0                | 000.0500    | 0049.6      | 006.1        | 241.1                | 000.0095    | 0054.3      | 014.4        | 38.63           |            |
| 105.0                | 000.0500    | 0050.6      | 006.1        | 240.6                | 000.0097    | 0053.9      | 014.4        | 38.63           |            |

Exhibit 13.6

Contour Protection Studies Toward Select Station(s)

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| Azimuth<br>(degrees) | ERP<br>(kW) | HAAT<br>(m) | Dist<br>(km) | Azimuth<br>(degrees) | ERP<br>(kW) | HAAT<br>(m) | Dist<br>(km) | Actual<br>(dBu) | IX<br>(km) |
|----------------------|-------------|-------------|--------------|----------------------|-------------|-------------|--------------|-----------------|------------|
| 106.0                | 000.0500    | 0051.5      | 006.2        | 240.1                | 000.0099    | 0053.5      | 014.5        | 38.63           |            |
| 107.0                | 000.0500    | 0052.0      | 006.2        | 239.8                | 000.0102    | 0053.2      | 014.5        | 38.65           |            |
| 108.0                | 000.0500    | 0052.0      | 006.2        | 239.5                | 000.0105    | 0053.0      | 014.6        | 38.63           |            |
| 109.0                | 000.0500    | 0051.3      | 006.2        | 239.3                | 000.0107    | 0052.9      | 014.7        | 38.55           |            |
| 110.0                | 000.0500    | 0050.0      | 006.1        | 239.3                | 000.0107    | 0052.9      | 014.8        | 38.40           |            |
| 111.0                | 000.0500    | 0048.3      | 006.0        | 239.4                | 000.0106    | 0053.0      | 015.0        | 38.20           |            |
| 112.0                | 000.0500    | 0046.3      | 005.9        | 239.5                | 000.0105    | 0053.0      | 015.2        | 38.26           |            |
| 113.0                | 000.0500    | 0043.6      | 005.7        | 239.8                | 000.0102    | 0053.2      | 015.3        | 38.00           |            |
| 114.0                | 000.0500    | 0040.5      | 005.5        | 240.3                | 000.0099    | 0053.6      | 015.5        | 37.74           |            |
| 115.0                | 000.0500    | 0037.2      | 005.3        | 240.7                | 000.0096    | 0054.0      | 015.8        | 37.52           |            |
| 116.0                | 000.0500    | 0034.6      | 005.1        | 241.1                | 000.0094    | 0054.3      | 015.9        | 37.32           |            |
| 117.0                | 000.0500    | 0032.8      | 004.9        | 241.3                | 000.0093    | 0054.5      | 016.1        | 37.17           |            |
| 118.0                | 000.0500    | 0031.8      | 004.8        | 241.4                | 000.0093    | 0054.6      | 016.2        | 37.07           |            |
| 119.0                | 000.0500    | 0030.9      | 004.8        | 241.4                | 000.0093    | 0054.6      | 016.3        | 36.97           |            |
| 120.0                | 000.0500    | 0029.5      | 004.7        | 241.5                | 000.0093    | 0054.6      | 016.4        | 36.88           |            |
| 121.0                | 000.0500    | 0027.5      | 004.7        | 241.3                | 000.0093    | 0054.5      | 016.5        | 36.83           |            |
| 122.0                | 000.0500    | 0025.2      | 004.7        | 241.2                | 000.0094    | 0054.4      | 016.6        | 36.77           |            |
| 123.0                | 000.0500    | 0023.0      | 004.7        | 241.1                | 000.0095    | 0054.3      | 016.6        | 36.72           |            |
| 124.0                | 000.0500    | 0020.6      | 004.7        | 240.9                | 000.0095    | 0054.2      | 016.7        | 36.67           |            |
| 125.0                | 000.0500    | 0018.3      | 004.7        | 240.8                | 000.0096    | 0054.1      | 016.8        | 36.62           |            |
| 126.0                | 000.0500    | 0016.4      | 004.7        | 240.7                | 000.0097    | 0054.0      | 016.9        | 36.56           |            |
| 127.0                | 000.0500    | 0015.5      | 004.7        | 240.6                | 000.0097    | 0053.9      | 016.9        | 36.51           |            |
| 128.0                | 000.0500    | 0015.6      | 004.7        | 240.5                | 000.0098    | 0053.8      | 017.0        | 36.45           |            |
| 129.0                | 000.0500    | 0016.4      | 004.7        | 240.4                | 000.0098    | 0053.7      | 017.1        | 36.39           |            |
| 130.0                | 000.0500    | 0017.7      | 004.7        | 240.3                | 000.0099    | 0053.6      | 017.2        | 36.33           |            |
| 131.0                | 000.0500    | 0019.3      | 004.7        | 240.2                | 000.0099    | 0053.5      | 017.2        | 36.27           |            |
| 132.0                | 000.0500    | 0020.1      | 004.7        | 240.1                | 000.0100    | 0053.5      | 017.3        | 36.21           |            |

# **Exhibit 13.7** **§74.1204(d) 2nd/3rd Adjacent Channel** **Given Interference Waiver Request with** **KHTP(AM) - Tacoma, WA**

**CH281D.P**  
 Union Mill, WA  
 Proposed Operation  
 Facility ID: 146771  
 Latitude: 47-06-08 N  
 Longitude: 122-36-06 W  
 ERP: 0.25 kW  
 Channel: 281D  
 Frequency: 104.1 MHz  
 AMSL Height: 123.0 m  
 Horiz. Pattern: Directional

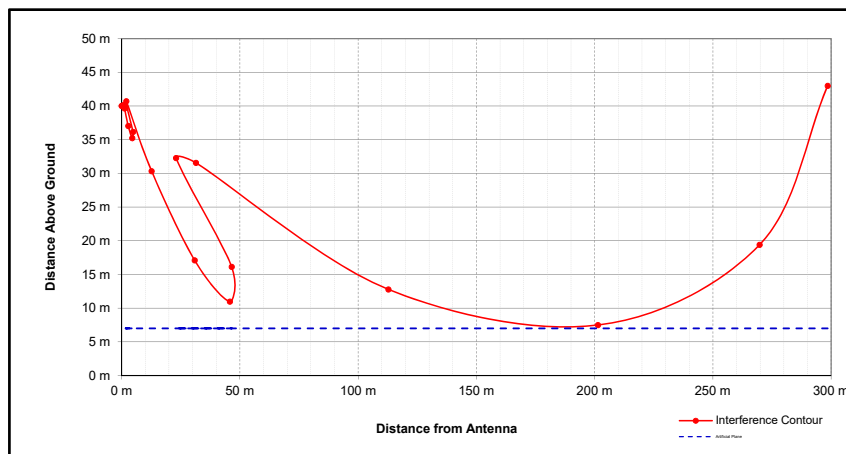
**KHTP(FM)**  
 Tacoma, WA  
 BLH20080730AKI  
 Facility ID: 18513  
 Latitude: 47-30-14 N  
 Longitude: 121-58-29 W  
 ERP: 68.00 kW  
 Channel: 279C  
 Frequency: 103.7 MHz  
 AMSL Height: 940.0 m  
 Horiz. Pattern: Directional

**+ KHTP(FM)**

NGDC 30 SEC Terrain Database  
 U.S. Census 2010 PL Database

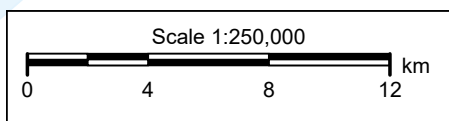
Terrain  
 -1 1844 m

The Interference Contour corresponding to the KHTP(FM) - Tacoma, WA (CH279C) Protected Contour at the proposed Translator site has been calculated to be no less than the 111.4 dBμ F(50:10) Interference Contour corresponding to the worst case KHTP(FM) 71.4 dBμ F(50:50) Protected Contour. This represents the proposed interference contour which falls wholly within the 40:1 dBu ratio. As seen on the map and associated vertical protection study, full protection will be afforded KHTP(FM) as the calculated interference area will not reach the ground nor a seven meter artificial plane representing a standard two story building when taking into account the downward radiation characteristics of the antenna as supplied by the antenna manufacturer. A copy of the antenna manufacturer's vertical radiation pattern has been included in *Exhibit 13.8*.



**KHTP(FM) - 71.4 dBμ F(50:50) Contour**

**CH281D.P**



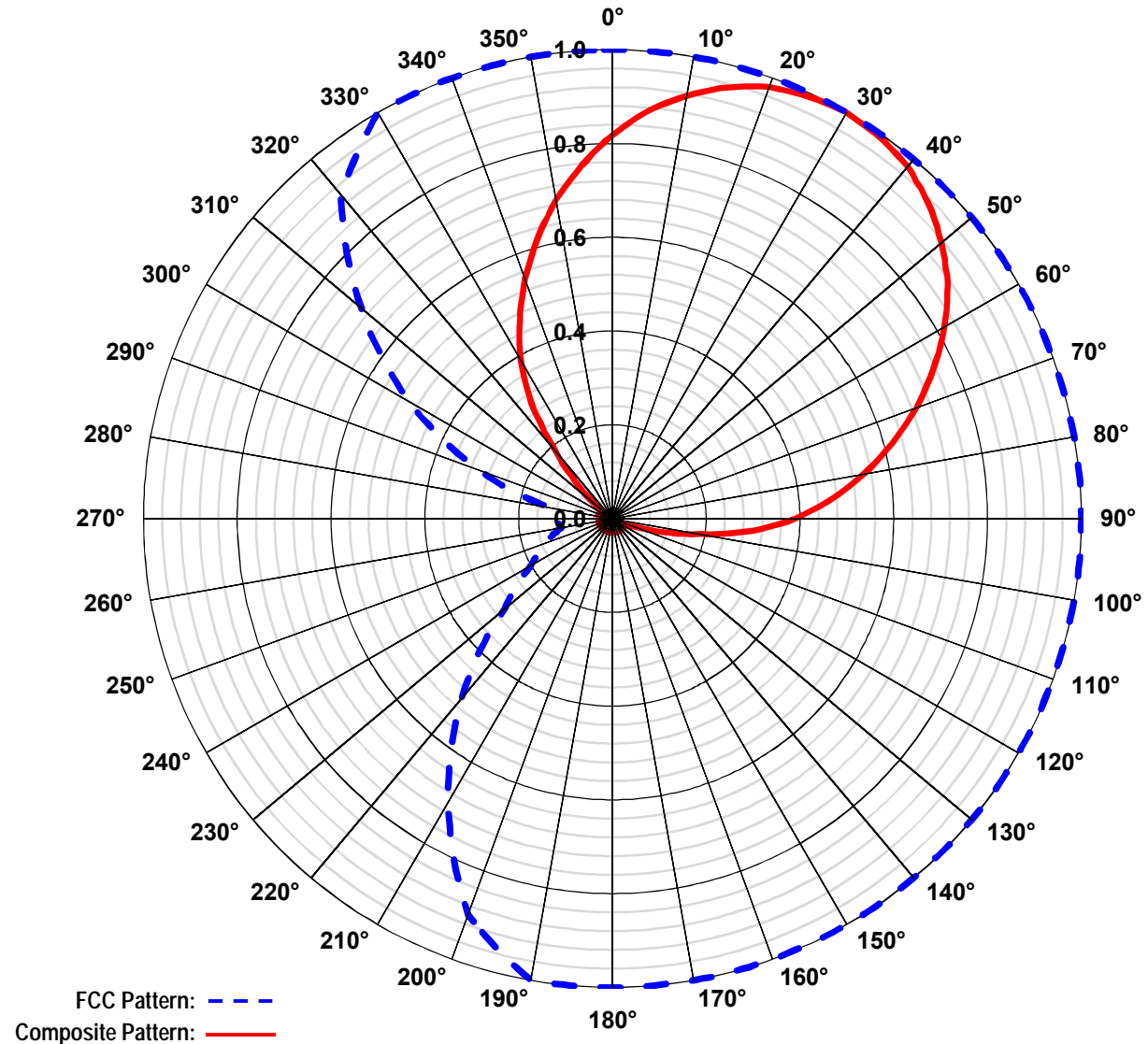
| Proposed Antenna: CL-FM 3-Bay (0.87 Spaced)<br>Proposed Power: 0.25 kW<br>Antenna Height AGL: 43 meters<br>Interference Contour: 111.4 dBμ f(50:10)<br>Artificial Ground Plane Height: 7 meters<br>Distance (Free Space) Equation: $= (10^{((106.92 - \text{desired dBu}) + (\text{ERP in dBk}) / 20)) * 1000}$<br>Field Strength (dBu) Equation: $= 106.92 - (20 * (\text{LOG10}(\text{DistMeters} / 1000))) + (\text{ERP in dBk})$ |          |       |        |                 |                  |                  |                 |                |  |
|--|----------|-------|--------|-----------------|------------------|------------------|-----------------|----------------|--|
| Depression   | Antenna  | ERP   | ERP    | Distance        | Distance         | Field Strength   | Distance        | Field Strength |  |
| Angle  | Relative | in kW | in dBk | to Interference | from Ant. to     | in dBu @         | from Ant.       | in dBu @       |  |
| Below  | Field    |       |        | Contour         | Artificial Plane | Artificial Plane | to Ground Level | Ground Level   |  |
| Horizon  |          |       |        |                 |                  |                  |                 |                |  |
| 0°   | 1.000    | 0.250 | -6.02  | 298.52 m        | infinite         | ---              | ---             | ---            |  |
| -5°  | 0.907    | 0.206 | -6.87  | 270.76 m        | 413.05 m         | 107.73 dBu       | 493.37 m        | 106.19 dBu     |  |
| -10°   | 0.885    | 0.117 | -9.31  | 204.48 m        | 207.32 m         | 111.28 dBu       | 247.63 m        | 109.74 dBu     |  |
| -15°   | 0.391    | 0.038 | -14.18 | 116.72 m        | 139.09 m         | 109.88 dBu       | 166.14 m        | 108.33 dBu     |  |
| -20°   | 0.112    | 0.003 | -25.04 | 33.43 m         | 105.26 m         | 101.44 dBu       | 125.72 m        | 99.90 dBu      |  |
| -25°   | 0.085    | 0.002 | -27.43 | 25.37 m         | 85.18 m          | 100.88 dBu       | 101.75 m        | 99.34 dBu      |  |
| -30°   | 0.180    | 0.008 | -20.92 | 53.73 m         | 72.00 m          | 108.86 dBu       | 86.00 m         | 107.31 dBu     |  |
| -35°   | 0.187    | 0.009 | -20.58 | 55.82 m         | 62.76 m          | 110.38 dBu       | 74.97 m         | 108.84 dBu     |  |
| -40°   | 0.135    | 0.005 | -23.41 | 40.30 m         | 56.01 m          | 108.54 dBu       | 66.90 m         | 107.00 dBu     |  |
| -45°   | 0.060    | 0.001 | -30.46 | 17.91 m         | 50.91 m          | 102.33 dBu       | 60.81 m         | 100.78 dBu     |  |
| -50°   | 0.010    | 0.000 | -46.02 | 2.99 m          | 46.99 m          | 87.46 dBu        | 56.13 m         | 85.92 dBu      |  |
| -55°   | 0.028    | 0.000 | -37.08 | 8.36 m          | 43.95 m          | 96.98 dBu        | 52.49 m         | 95.44 dBu      |  |
| -60°   | 0.030    | 0.000 | -36.48 | 8.96 m          | 41.57 m          | 98.07 dBu        | 49.65 m         | 96.52 dBu      |  |
| -65°   | 0.022    | 0.000 | -39.17 | 6.57 m          | 39.72 m          | 95.77 dBu        | 47.45 m         | 94.22 dBu      |  |
| -70°   | 0.012    | 0.000 | -44.44 | 3.58 m          | 38.31 m          | 90.82 dBu        | 45.76 m         | 89.27 dBu      |  |
| -75°   | 0.010    | 0.000 | -46.02 | 2.99 m          | 37.27 m          | 89.47 dBu        | 44.52 m         | 87.93 dBu      |  |
| -80°   | 0.010    | 0.000 | -46.02 | 2.99 m          | 36.56 m          | 89.64 dBu        | 43.66 m         | 88.10 dBu      |  |
| -85°   | 0.010    | 0.000 | -46.02 | 2.99 m          | 36.14 m          | 89.74 dBu        | 43.16 m         | 88.20 dBu      |  |
| -90°   | 0.010    | 0.000 | -46.02 | 2.99 m          | 36.00 m          | 89.77 dBu        | 43.00 m         | 88.23 dBu      |  |

# Exhibit 13.8

## Copy of Manufacturer's Directional Antenna Pattern Data

| Azimuth<br>° True | FCC<br>Pattern | Composite<br>Pattern |
|-------------------|----------------|----------------------|
| 0°                | 1.000          | 0.817                |
| 10°               | 1.000          | 0.916                |
| 20°               | 1.000          | 0.980                |
| 30°               | 1.000          | 1.000                |
| 40°               | 1.000          | 0.980                |
| 50°               | 1.000          | 0.916                |
| 60°               | 1.000          | 0.817                |
| 70°               | 1.000          | 0.690                |
| 80°               | 1.000          | 0.544                |
| 90°               | 1.000          | 0.390                |
| 100°              | 1.000          | 0.190                |
| 110°              | 1.000          | 0.050                |
| 120°              | 1.000          | 0.030                |
| 130°              | 1.000          | 0.030                |
| 140°              | 1.000          | 0.030                |
| 150°              | 1.000          | 0.030                |
| 160°              | 1.000          | 0.030                |
| 170°              | 1.000          | 0.030                |
| 180°              | 1.000          | 0.030                |
| 190°              | 1.000          | 0.030                |
| 200°              | 0.900          | 0.030                |
| 210°              | 0.700          | 0.030                |
| 220°              | 0.500          | 0.030                |
| 230°              | 0.300          | 0.030                |
| 240°              | 0.200          | 0.030                |
| 250°              | 0.150          | 0.030                |
| 260°              | 0.110          | 0.030                |
| 270°              | 0.120          | 0.030                |
| 280°              | 0.130          | 0.030                |
| 290°              | 0.300          | 0.030                |
| 300°              | 0.500          | 0.030                |
| 310°              | 0.700          | 0.050                |
| 320°              | 0.900          | 0.190                |
| 330°              | 1.000          | 0.390                |
| 340°              | 1.000          | 0.544                |
| 350°              | 1.000          | 0.690                |

|              | Antenna 1            | Antenna 2 | Antenna 3 | Antenna 4 |           |
|--------------|----------------------|-----------|-----------|-----------|-----------|
| Model:       | CI-FM(Vertical Only) |           |           |           | Composite |
| Orientation: | 030° True            |           |           |           | Power     |
| Power:       | 100.0%               |           |           |           | 100%      |



# Exhibit 13.8 - Copy of Manufacturer's Directional Antenna Pattern Data



## CL-FM FM LOG-PERIODIC ANTENNA 7 dBd gain 88–108 MHz

The Kathrein Scala Division CL-FM is a ruggedly built log-periodic antenna, designed for professional FM transmit and receive applications.

Like all Kathrein Scala Division antennas, the CL-FM is made of the finest materials using state of the art electrical and mechanical designs, resulting in superior performance and long service life.

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

### Specifications:

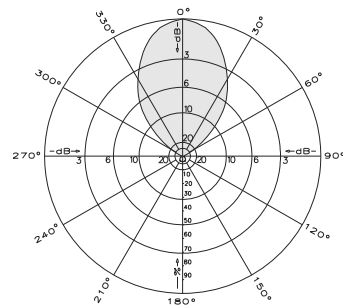
|                            |  |
|----------------------------|--|
| Frequency range            | 88–108 MHz (broadband)   |
| Gain                       | 7 dBd  |
| Impedance                  | 50 or 75 ohms  |
| VSWR                       | < 1.5:1  |
| Polarization               | Horizontal or vertical   |
| Front-to-back ratio        | >25 dB   |
| Maximum input power        | 250 watts, type "N" 75 ohm connector<br>500 watts, type "N" 50 ohm connector |
| Azimuth pattern            | 52 degrees (half-power)<br>horizontal polarization                           |
| Elevation pattern          | 78 degrees (half-power)<br>horizontal polarization                           |
| Connector                  | Female 50Ω or 75Ω N  |
| Weight                     | 45 lb (20.4 kg)  |
| Dimensions                 | 104 x 67.9 inches<br>(2642 x 1724 mm)  |
| Equivalent flat plate area |  |
| <b>CL-FM/HCM</b>           | 5.31 ft <sup>2</sup> (0.494 m <sup>2</sup> )                                 |
| <b>CL-FM/HRM</b>           | 5.86 ft <sup>2</sup> (0.544 m <sup>2</sup> )                                 |
| <b>CL-FM/VRM</b>           | 5.86 ft <sup>2</sup> (0.544 m <sup>2</sup> )                                 |
| Wind survival rating*      | 120 mph (200 kph)  |
| Shipping dimensions        | 116 x 14.5 x 6 inches<br>(2946 x 369 x 153 mm)                               |
| Shipping weight            | 56 lb (25.4 kg)  |
| Mounting                   | For masts of 2.375 inches<br>(60 mm) OD.                                     |
| <b>CL-FM/HCM</b>           | Horizontal polarization center-mount   |
| <b>CL-FM/HRM</b>           | Horizontal polarization rear-mount   |
| <b>CL-FM/VRM</b>           | Vertical polarization rear-mount   |

See reverse for order information.

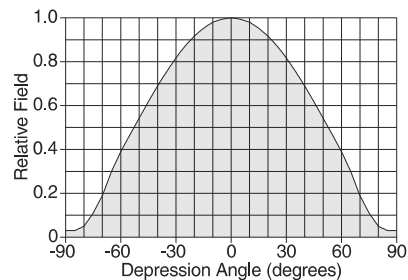
\* Mechanical design is based on environmental conditions as stipulated in EIA-222-F (June 1996) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.



10492-D



Azimuth pattern (E-plane)



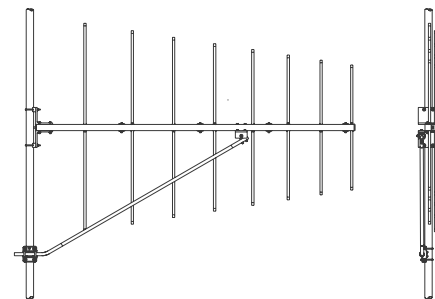
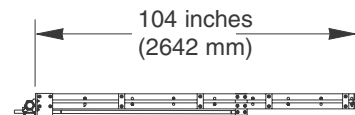
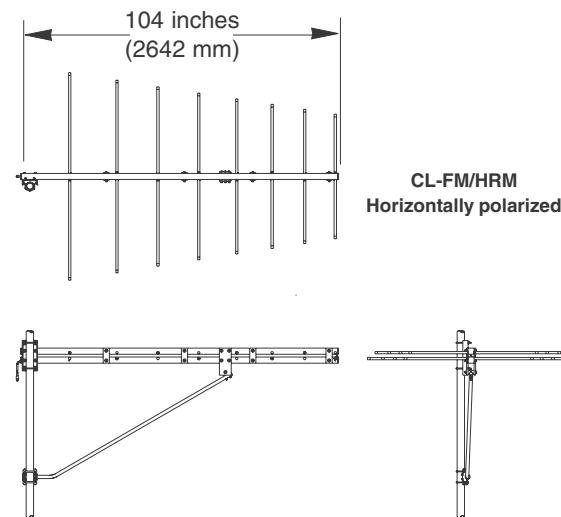
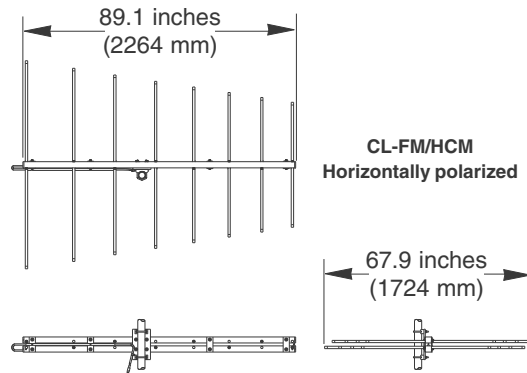
Elevation pattern (H-plane)



# Exhibit 13.8 - Copy of Manufacturer's Directional Antenna Pattern Data



## CL-FM FM LOG-PERIODIC ANTENNA 7 dBd gain 88–108 MHz



### CL-FM/VRM Vertically polarized

Vertically polarized antennas require lateral stabilization (not supplied) to prevent the antenna from turning on the mounting pipe.

#### Order Information:

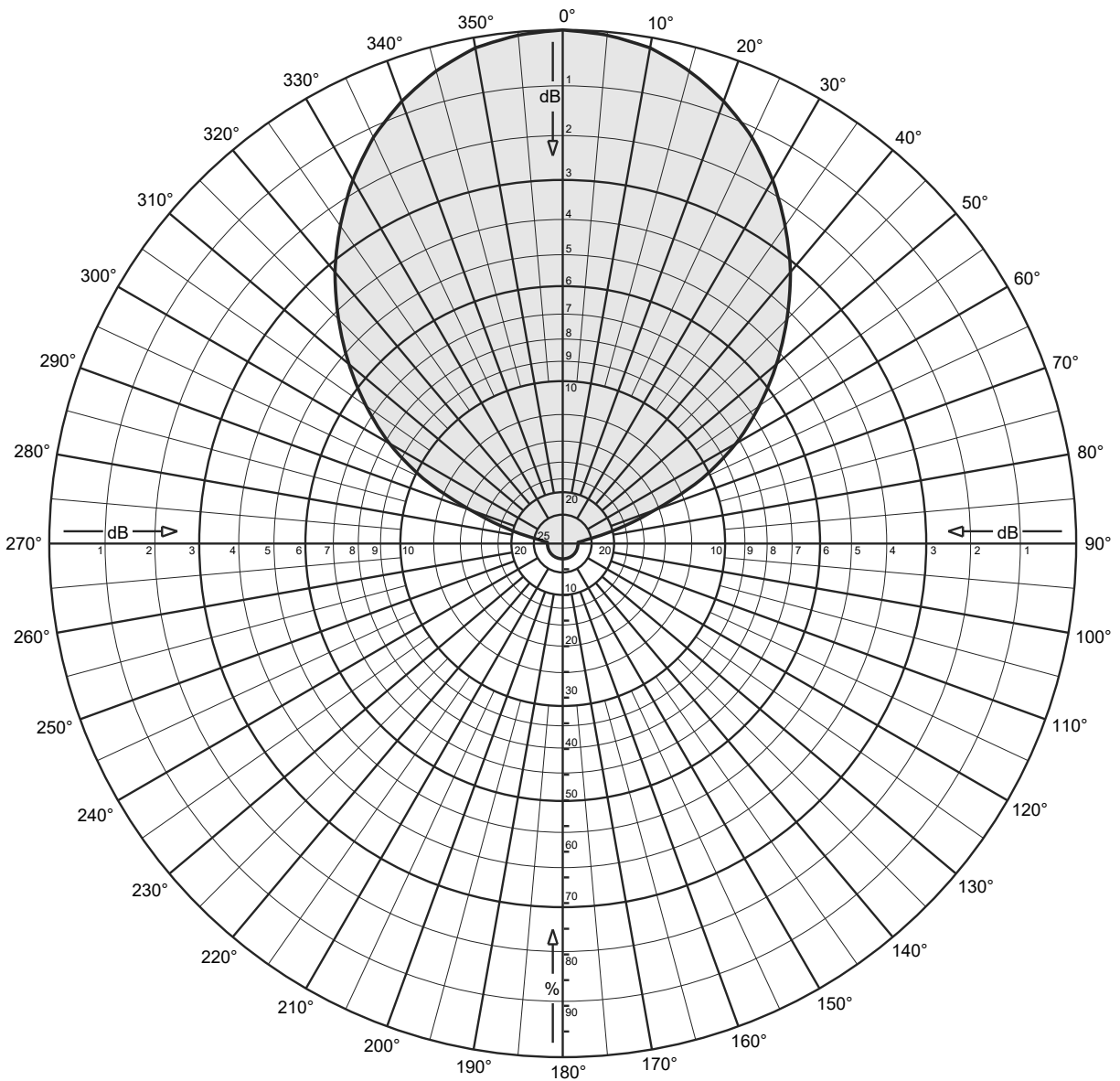
| Model         | Description  |
|---------------|--|
| CL-FM/HCM/50N | Antenna with 50Ω N connector<br>Horizontal polarization center-mount |
| CL-FM/HCM/75N | Antenna with 75Ω N connector<br>Horizontal polarization center-mount |
| CL-FM/HRM/50N | Antenna with 50Ω N connector<br>Horizontal polarization rear-mount   |

#### Order Information:

| Model         | Description  |
|---------------|--|
| CL-FM/HRM/75N | Antenna with 75Ω N connector<br>Horizontal polarization rear-mount |
| CL-FM/VRM/50N | Antenna with 50Ω N connector<br>Vertical polarization rear-mount   |
| CL-FM/VRM/75N | Antenna with 75Ω N connector<br>Vertical polarization rear-mount   |

All specifications are subject to change without notice

## Exhibit 13.8 - Copy of Manufacturer's Directional Antenna Pattern Data



CL-FM Log-periodic

FM

Maximum gain: 7.0 dBd

Vertical polarization

Horizontal radiation pattern

0 degree electrical downtilt



# Exhibit 13.8 - Copy of Manufacturer's Directional Antenna Pattern Data



CL-FM Log-periodic  
FM

Maximum gain: 7.0 dBd  
Vertical polarization

Horizontal radiation pattern  
0 degree electrical downtilt

| Angle | Field | Rel.dB | dBd  | PwrMult | Angle | Field | Rel.dB | dBd    | PwrMult |
|-------|-------|--------|------|---------|-------|-------|--------|--------|---------|
| 0     | 1.000 | 0.00   | 7.00 | 5.01    | 45    | 0.618 | -4.19  | 2.81   | 1.91    |
| 1     | 0.998 | -0.01  | 6.99 | 5.00    | 46    | 0.602 | -4.40  | 2.60   | 1.82    |
| 2     | 0.997 | -0.02  | 6.98 | 4.99    | 47    | 0.588 | -4.61  | 2.39   | 1.73    |
| 3     | 0.996 | -0.03  | 6.97 | 4.97    | 48    | 0.573 | -4.84  | 2.16   | 1.65    |
| 4     | 0.995 | -0.04  | 6.96 | 4.96    | 49    | 0.558 | -5.06  | 1.94   | 1.56    |
| 5     | 0.993 | -0.06  | 6.94 | 4.95    | 50    | 0.544 | -5.30  | 1.70   | 1.48    |
| 6     | 0.991 | -0.08  | 6.92 | 4.92    | 51    | 0.528 | -5.54  | 1.46   | 1.40    |
| 7     | 0.988 | -0.10  | 6.90 | 4.89    | 52    | 0.513 | -5.80  | 1.20   | 1.32    |
| 8     | 0.985 | -0.13  | 6.87 | 4.87    | 53    | 0.498 | -6.06  | 0.94   | 1.24    |
| 9     | 0.982 | -0.15  | 6.85 | 4.84    | 54    | 0.483 | -6.33  | 0.67   | 1.17    |
| 10    | 0.980 | -0.18  | 6.82 | 4.81    | 55    | 0.467 | -6.60  | 0.40   | 1.10    |
| 11    | 0.975 | -0.22  | 6.78 | 4.76    | 56    | 0.452 | -6.90  | 0.10   | 1.02    |
| 12    | 0.969 | -0.27  | 6.73 | 4.71    | 57    | 0.436 | -7.20  | -0.20  | 0.95    |
| 13    | 0.964 | -0.32  | 6.68 | 4.65    | 58    | 0.421 | -7.51  | -0.51  | 0.89    |
| 14    | 0.958 | -0.37  | 6.63 | 4.60    | 59    | 0.405 | -7.84  | -0.84  | 0.82    |
| 15    | 0.952 | -0.42  | 6.58 | 4.55    | 60    | 0.390 | -8.18  | -1.18  | 0.76    |
| 16    | 0.946 | -0.49  | 6.51 | 4.48    | 61    | 0.372 | -8.59  | -1.59  | 0.69    |
| 17    | 0.938 | -0.56  | 6.44 | 4.41    | 62    | 0.354 | -9.02  | -2.02  | 0.63    |
| 18    | 0.931 | -0.62  | 6.38 | 4.34    | 63    | 0.336 | -9.47  | -2.47  | 0.57    |
| 19    | 0.923 | -0.69  | 6.31 | 4.27    | 64    | 0.318 | -9.95  | -2.95  | 0.51    |
| 20    | 0.916 | -0.76  | 6.24 | 4.21    | 65    | 0.300 | -10.46 | -3.46  | 0.45    |
| 21    | 0.908 | -0.84  | 6.16 | 4.13    | 66    | 0.278 | -11.12 | -4.12  | 0.39    |
| 22    | 0.899 | -0.92  | 6.08 | 4.05    | 67    | 0.256 | -11.84 | -4.84  | 0.33    |
| 23    | 0.890 | -1.01  | 5.99 | 3.97    | 68    | 0.234 | -12.62 | -5.62  | 0.27    |
| 24    | 0.882 | -1.10  | 5.90 | 3.89    | 69    | 0.212 | -13.47 | -6.47  | 0.23    |
| 25    | 0.873 | -1.18  | 5.82 | 3.82    | 70    | 0.190 | -14.42 | -7.42  | 0.18    |
| 26    | 0.862 | -1.29  | 5.71 | 3.72    | 71    | 0.174 | -15.19 | -8.19  | 0.15    |
| 27    | 0.851 | -1.41  | 5.59 | 3.63    | 72    | 0.158 | -16.03 | -9.03  | 0.13    |
| 28    | 0.840 | -1.52  | 5.48 | 3.53    | 73    | 0.142 | -16.95 | -9.95  | 0.10    |
| 29    | 0.829 | -1.63  | 5.37 | 3.44    | 74    | 0.126 | -17.99 | -10.99 | 0.08    |
| 30    | 0.817 | -1.75  | 5.25 | 3.35    | 75    | 0.110 | -19.17 | -12.17 | 0.06    |
| 31    | 0.806 | -1.88  | 5.12 | 3.25    | 76    | 0.098 | -20.18 | -13.18 | 0.05    |
| 32    | 0.793 | -2.02  | 4.98 | 3.15    | 77    | 0.086 | -21.31 | -14.31 | 0.04    |
| 33    | 0.781 | -2.15  | 4.85 | 3.05    | 78    | 0.074 | -22.62 | -15.62 | 0.03    |
| 34    | 0.767 | -2.30  | 4.70 | 2.95    | 79    | 0.062 | -24.15 | -17.15 | 0.02    |
| 35    | 0.756 | -2.44  | 4.56 | 2.86    | 80    | 0.050 | -26.02 | -19.02 | 0.01    |
| 36    | 0.742 | -2.59  | 4.41 | 2.76    | 81    | 0.046 | -26.74 | -19.74 | 0.01    |
| 37    | 0.729 | -2.74  | 4.26 | 2.67    | 82    | 0.042 | -27.54 | -20.54 | 0.01    |
| 38    | 0.716 | -2.90  | 4.10 | 2.57    | 83    | 0.038 | -28.40 | -21.40 | 0.01    |
| 39    | 0.704 | -3.05  | 3.95 | 2.48    | 84    | 0.034 | -29.37 | -22.37 | 0.01    |
| 40    | 0.690 | -3.22  | 3.78 | 2.39    | 85    | 0.030 | -30.46 | -23.46 | 0.00    |
| 41    | 0.675 | -3.41  | 3.59 | 2.29    | 86    | 0.030 | -30.46 | -23.46 | 0.00    |
| 42    | 0.661 | -3.60  | 3.40 | 2.19    | 87    | 0.030 | -30.46 | -23.46 | 0.00    |
| 43    | 0.646 | -3.79  | 3.21 | 2.09    | 88    | 0.030 | -30.46 | -23.46 | 0.00    |
| 44    | 0.632 | -3.99  | 3.01 | 2.00    | 89    | 0.030 | -30.46 | -23.46 | 0.00    |

# Exhibit 13.8 - Copy of Manufacturer's Directional Antenna Pattern Data



CL-FM Log-periodic

FM

Maximum gain: 7.0 dBd

Vertical polarization

Horizontal radiation pattern

0 degree electrical downtilt

| Angle | Field | Rel.dB | dBd    | PwrMult | Angle | Field | Rel.dB | dBd    | PwrMult |
|-------|-------|--------|--------|---------|-------|-------|--------|--------|---------|
| 90    | 0.030 | -30.46 | -23.46 | 0.00    | 135   | 0.030 | -30.46 | -23.46 | 0.00    |
| 91    | 0.030 | -30.46 | -23.46 | 0.00    | 136   | 0.030 | -30.46 | -23.46 | 0.00    |
| 92    | 0.030 | -30.46 | -23.46 | 0.00    | 137   | 0.030 | -30.46 | -23.46 | 0.00    |
| 93    | 0.030 | -30.46 | -23.46 | 0.00    | 138   | 0.030 | -30.46 | -23.46 | 0.00    |
| 94    | 0.030 | -30.46 | -23.46 | 0.00    | 139   | 0.030 | -30.46 | -23.46 | 0.00    |
| 95    | 0.030 | -30.46 | -23.46 | 0.00    | 140   | 0.030 | -30.46 | -23.46 | 0.00    |
| 96    | 0.030 | -30.46 | -23.46 | 0.00    | 141   | 0.030 | -30.46 | -23.46 | 0.00    |
| 97    | 0.030 | -30.46 | -23.46 | 0.00    | 142   | 0.030 | -30.46 | -23.46 | 0.00    |
| 98    | 0.030 | -30.46 | -23.46 | 0.00    | 143   | 0.030 | -30.46 | -23.46 | 0.00    |
| 99    | 0.030 | -30.46 | -23.46 | 0.00    | 144   | 0.030 | -30.46 | -23.46 | 0.00    |
| 100   | 0.030 | -30.46 | -23.46 | 0.00    | 145   | 0.030 | -30.46 | -23.46 | 0.00    |
| 101   | 0.030 | -30.46 | -23.46 | 0.00    | 146   | 0.030 | -30.46 | -23.46 | 0.00    |
| 102   | 0.030 | -30.46 | -23.46 | 0.00    | 147   | 0.030 | -30.46 | -23.46 | 0.00    |
| 103   | 0.030 | -30.46 | -23.46 | 0.00    | 148   | 0.030 | -30.46 | -23.46 | 0.00    |
| 104   | 0.030 | -30.46 | -23.46 | 0.00    | 149   | 0.030 | -30.46 | -23.46 | 0.00    |
| 105   | 0.030 | -30.46 | -23.46 | 0.00    | 150   | 0.030 | -30.46 | -23.46 | 0.00    |
| 106   | 0.030 | -30.46 | -23.46 | 0.00    | 151   | 0.030 | -30.46 | -23.46 | 0.00    |
| 107   | 0.030 | -30.46 | -23.46 | 0.00    | 152   | 0.030 | -30.46 | -23.46 | 0.00    |
| 108   | 0.030 | -30.46 | -23.46 | 0.00    | 153   | 0.030 | -30.46 | -23.46 | 0.00    |
| 109   | 0.030 | -30.46 | -23.46 | 0.00    | 154   | 0.030 | -30.46 | -23.46 | 0.00    |
| 110   | 0.030 | -30.46 | -23.46 | 0.00    | 155   | 0.030 | -30.46 | -23.46 | 0.00    |
| 111   | 0.030 | -30.46 | -23.46 | 0.00    | 156   | 0.030 | -30.46 | -23.46 | 0.00    |
| 112   | 0.030 | -30.46 | -23.46 | 0.00    | 157   | 0.030 | -30.46 | -23.46 | 0.00    |
| 113   | 0.030 | -30.46 | -23.46 | 0.00    | 158   | 0.030 | -30.46 | -23.46 | 0.00    |
| 114   | 0.030 | -30.46 | -23.46 | 0.00    | 159   | 0.030 | -30.46 | -23.46 | 0.00    |
| 115   | 0.030 | -30.46 | -23.46 | 0.00    | 160   | 0.030 | -30.46 | -23.46 | 0.00    |
| 116   | 0.030 | -30.46 | -23.46 | 0.00    | 161   | 0.030 | -30.46 | -23.46 | 0.00    |
| 117   | 0.030 | -30.46 | -23.46 | 0.00    | 162   | 0.030 | -30.46 | -23.46 | 0.00    |
| 118   | 0.030 | -30.46 | -23.46 | 0.00    | 163   | 0.030 | -30.46 | -23.46 | 0.00    |
| 119   | 0.030 | -30.46 | -23.46 | 0.00    | 164   | 0.030 | -30.46 | -23.46 | 0.00    |
| 120   | 0.030 | -30.46 | -23.46 | 0.00    | 165   | 0.030 | -30.46 | -23.46 | 0.00    |
| 121   | 0.030 | -30.46 | -23.46 | 0.00    | 166   | 0.030 | -30.46 | -23.46 | 0.00    |
| 122   | 0.030 | -30.46 | -23.46 | 0.00    | 167   | 0.030 | -30.46 | -23.46 | 0.00    |
| 123   | 0.030 | -30.46 | -23.46 | 0.00    | 168   | 0.030 | -30.46 | -23.46 | 0.00    |
| 124   | 0.030 | -30.46 | -23.46 | 0.00    | 169   | 0.030 | -30.46 | -23.46 | 0.00    |
| 125   | 0.030 | -30.46 | -23.46 | 0.00    | 170   | 0.030 | -30.46 | -23.46 | 0.00    |
| 126   | 0.030 | -30.46 | -23.46 | 0.00    | 171   | 0.030 | -30.46 | -23.46 | 0.00    |
| 127   | 0.030 | -30.46 | -23.46 | 0.00    | 172   | 0.030 | -30.46 | -23.46 | 0.00    |
| 128   | 0.030 | -30.46 | -23.46 | 0.00    | 173   | 0.030 | -30.46 | -23.46 | 0.00    |
| 129   | 0.030 | -30.46 | -23.46 | 0.00    | 174   | 0.030 | -30.46 | -23.46 | 0.00    |
| 130   | 0.030 | -30.46 | -23.46 | 0.00    | 175   | 0.030 | -30.46 | -23.46 | 0.00    |
| 131   | 0.030 | -30.46 | -23.46 | 0.00    | 176   | 0.030 | -30.46 | -23.46 | 0.00    |
| 132   | 0.030 | -30.46 | -23.46 | 0.00    | 177   | 0.030 | -30.46 | -23.46 | 0.00    |
| 133   | 0.030 | -30.46 | -23.46 | 0.00    | 178   | 0.030 | -30.46 | -23.46 | 0.00    |
| 134   | 0.030 | -30.46 | -23.46 | 0.00    | 179   | 0.030 | -30.46 | -23.46 | 0.00    |

# Exhibit 13.8 - Copy of Manufacturer's Directional Antenna Pattern Data



CL-FM Log-periodic

FM

Maximum gain: 7.0 dBd

Vertical polarization

Horizontal radiation pattern

0 degree electrical downtilt

| Angle | Field | Rel.dB | dBd    | PwrMult | Angle | Field | Rel.dB | dBd    | PwrMult |
|-------|-------|--------|--------|---------|-------|-------|--------|--------|---------|
| 180   | 0.030 | -30.46 | -23.46 | 0.00    | 225   | 0.030 | -30.46 | -23.46 | 0.00    |
| 181   | 0.030 | -30.46 | -23.46 | 0.00    | 226   | 0.030 | -30.46 | -23.46 | 0.00    |
| 182   | 0.030 | -30.46 | -23.46 | 0.00    | 227   | 0.030 | -30.46 | -23.46 | 0.00    |
| 183   | 0.030 | -30.46 | -23.46 | 0.00    | 228   | 0.030 | -30.46 | -23.46 | 0.00    |
| 184   | 0.030 | -30.46 | -23.46 | 0.00    | 229   | 0.030 | -30.46 | -23.46 | 0.00    |
| 185   | 0.030 | -30.46 | -23.46 | 0.00    | 230   | 0.030 | -30.46 | -23.46 | 0.00    |
| 186   | 0.030 | -30.46 | -23.46 | 0.00    | 231   | 0.030 | -30.46 | -23.46 | 0.00    |
| 187   | 0.030 | -30.46 | -23.46 | 0.00    | 232   | 0.030 | -30.46 | -23.46 | 0.00    |
| 188   | 0.030 | -30.46 | -23.46 | 0.00    | 233   | 0.030 | -30.46 | -23.46 | 0.00    |
| 189   | 0.030 | -30.46 | -23.46 | 0.00    | 234   | 0.030 | -30.46 | -23.46 | 0.00    |
| 190   | 0.030 | -30.46 | -23.46 | 0.00    | 235   | 0.030 | -30.46 | -23.46 | 0.00    |
| 191   | 0.030 | -30.46 | -23.46 | 0.00    | 236   | 0.030 | -30.46 | -23.46 | 0.00    |
| 192   | 0.030 | -30.46 | -23.46 | 0.00    | 237   | 0.030 | -30.46 | -23.46 | 0.00    |
| 193   | 0.030 | -30.46 | -23.46 | 0.00    | 238   | 0.030 | -30.46 | -23.46 | 0.00    |
| 194   | 0.030 | -30.46 | -23.46 | 0.00    | 239   | 0.030 | -30.46 | -23.46 | 0.00    |
| 195   | 0.030 | -30.46 | -23.46 | 0.00    | 240   | 0.030 | -30.46 | -23.46 | 0.00    |
| 196   | 0.030 | -30.46 | -23.46 | 0.00    | 241   | 0.030 | -30.46 | -23.46 | 0.00    |
| 197   | 0.030 | -30.46 | -23.46 | 0.00    | 242   | 0.030 | -30.46 | -23.46 | 0.00    |
| 198   | 0.030 | -30.46 | -23.46 | 0.00    | 243   | 0.030 | -30.46 | -23.46 | 0.00    |
| 199   | 0.030 | -30.46 | -23.46 | 0.00    | 244   | 0.030 | -30.46 | -23.46 | 0.00    |
| 200   | 0.030 | -30.46 | -23.46 | 0.00    | 245   | 0.030 | -30.46 | -23.46 | 0.00    |
| 201   | 0.030 | -30.46 | -23.46 | 0.00    | 246   | 0.030 | -30.46 | -23.46 | 0.00    |
| 202   | 0.030 | -30.46 | -23.46 | 0.00    | 247   | 0.030 | -30.46 | -23.46 | 0.00    |
| 203   | 0.030 | -30.46 | -23.46 | 0.00    | 248   | 0.030 | -30.46 | -23.46 | 0.00    |
| 204   | 0.030 | -30.46 | -23.46 | 0.00    | 249   | 0.030 | -30.46 | -23.46 | 0.00    |
| 205   | 0.030 | -30.46 | -23.46 | 0.00    | 250   | 0.030 | -30.46 | -23.46 | 0.00    |
| 206   | 0.030 | -30.46 | -23.46 | 0.00    | 251   | 0.030 | -30.46 | -23.46 | 0.00    |
| 207   | 0.030 | -30.46 | -23.46 | 0.00    | 252   | 0.030 | -30.46 | -23.46 | 0.00    |
| 208   | 0.030 | -30.46 | -23.46 | 0.00    | 253   | 0.030 | -30.46 | -23.46 | 0.00    |
| 209   | 0.030 | -30.46 | -23.46 | 0.00    | 254   | 0.030 | -30.46 | -23.46 | 0.00    |
| 210   | 0.030 | -30.46 | -23.46 | 0.00    | 255   | 0.030 | -30.46 | -23.46 | 0.00    |
| 211   | 0.030 | -30.46 | -23.46 | 0.00    | 256   | 0.030 | -30.46 | -23.46 | 0.00    |
| 212   | 0.030 | -30.46 | -23.46 | 0.00    | 257   | 0.030 | -30.46 | -23.46 | 0.00    |
| 213   | 0.030 | -30.46 | -23.46 | 0.00    | 258   | 0.030 | -30.46 | -23.46 | 0.00    |
| 214   | 0.030 | -30.46 | -23.46 | 0.00    | 259   | 0.030 | -30.46 | -23.46 | 0.00    |
| 215   | 0.030 | -30.46 | -23.46 | 0.00    | 260   | 0.030 | -30.46 | -23.46 | 0.00    |
| 216   | 0.030 | -30.46 | -23.46 | 0.00    | 261   | 0.030 | -30.46 | -23.46 | 0.00    |
| 217   | 0.030 | -30.46 | -23.46 | 0.00    | 262   | 0.030 | -30.46 | -23.46 | 0.00    |
| 218   | 0.030 | -30.46 | -23.46 | 0.00    | 263   | 0.030 | -30.46 | -23.46 | 0.00    |
| 219   | 0.030 | -30.46 | -23.46 | 0.00    | 264   | 0.030 | -30.46 | -23.46 | 0.00    |
| 220   | 0.030 | -30.46 | -23.46 | 0.00    | 265   | 0.030 | -30.46 | -23.46 | 0.00    |
| 221   | 0.030 | -30.46 | -23.46 | 0.00    | 266   | 0.030 | -30.46 | -23.46 | 0.00    |
| 222   | 0.030 | -30.46 | -23.46 | 0.00    | 267   | 0.030 | -30.46 | -23.46 | 0.00    |
| 223   | 0.030 | -30.46 | -23.46 | 0.00    | 268   | 0.030 | -30.46 | -23.46 | 0.00    |
| 224   | 0.030 | -30.46 | -23.46 | 0.00    | 269   | 0.030 | -30.46 | -23.46 | 0.00    |

# Exhibit 13.8 - Copy of Manufacturer's Directional Antenna Pattern Data



CL-FM Log-periodic

FM

Maximum gain: 7.0 dBd

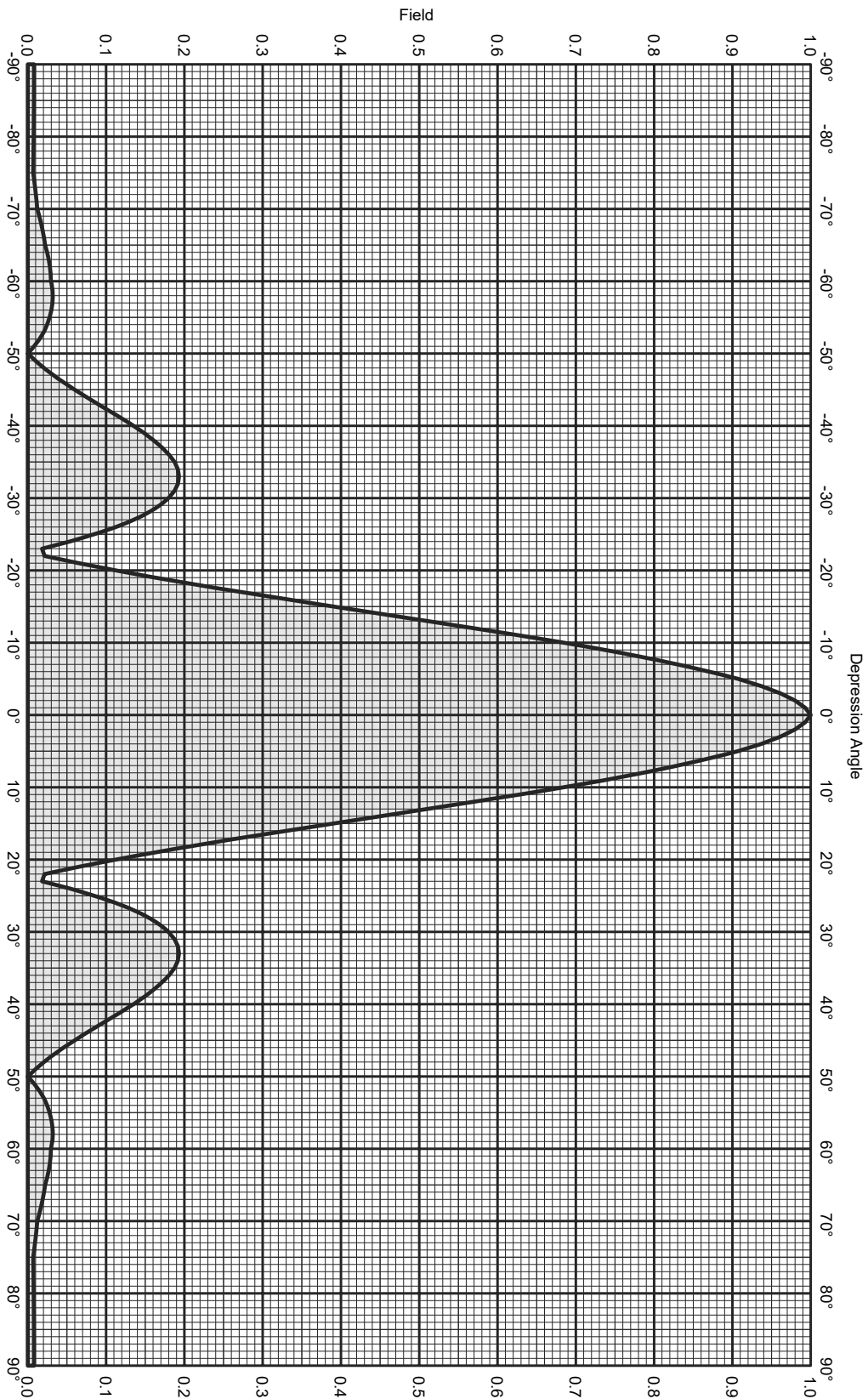
Vertical polarization

Horizontal radiation pattern

0 degree electrical downtilt

| Angle | Field | Rel.dB | dBd    | PwrMult | Angle | Field | Rel.dB | dBd  | PwrMult |
|-------|-------|--------|--------|---------|-------|-------|--------|------|---------|
| 270   | 0.030 | -30.46 | -23.46 | 0.00    | 315   | 0.618 | -4.19  | 2.81 | 1.91    |
| 271   | 0.030 | -30.46 | -23.46 | 0.00    | 316   | 0.632 | -3.99  | 3.01 | 2.00    |
| 272   | 0.030 | -30.46 | -23.46 | 0.00    | 317   | 0.646 | -3.79  | 3.21 | 2.09    |
| 273   | 0.030 | -30.46 | -23.46 | 0.00    | 318   | 0.661 | -3.60  | 3.40 | 2.19    |
| 274   | 0.030 | -30.46 | -23.46 | 0.00    | 319   | 0.675 | -3.41  | 3.59 | 2.29    |
| 275   | 0.030 | -30.46 | -23.46 | 0.00    | 320   | 0.690 | -3.22  | 3.78 | 2.39    |
| 276   | 0.034 | -29.37 | -22.37 | 0.01    | 321   | 0.704 | -3.05  | 3.95 | 2.48    |
| 277   | 0.038 | -28.40 | -21.40 | 0.01    | 322   | 0.716 | -2.90  | 4.10 | 2.57    |
| 278   | 0.042 | -27.54 | -20.54 | 0.01    | 323   | 0.729 | -2.74  | 4.26 | 2.67    |
| 279   | 0.046 | -26.74 | -19.74 | 0.01    | 324   | 0.742 | -2.59  | 4.41 | 2.76    |
| 280   | 0.050 | -26.02 | -19.02 | 0.01    | 325   | 0.756 | -2.44  | 4.56 | 2.86    |
| 281   | 0.062 | -24.15 | -17.15 | 0.02    | 326   | 0.767 | -2.30  | 4.70 | 2.95    |
| 282   | 0.074 | -22.62 | -15.62 | 0.03    | 327   | 0.781 | -2.15  | 4.85 | 3.05    |
| 283   | 0.086 | -21.31 | -14.31 | 0.04    | 328   | 0.793 | -2.02  | 4.98 | 3.15    |
| 284   | 0.098 | -20.18 | -13.18 | 0.05    | 329   | 0.806 | -1.88  | 5.12 | 3.25    |
| 285   | 0.110 | -19.17 | -12.17 | 0.06    | 330   | 0.817 | -1.75  | 5.25 | 3.35    |
| 286   | 0.126 | -17.99 | -10.99 | 0.08    | 331   | 0.829 | -1.63  | 5.37 | 3.44    |
| 287   | 0.142 | -16.95 | -9.95  | 0.10    | 332   | 0.840 | -1.52  | 5.48 | 3.53    |
| 288   | 0.158 | -16.03 | -9.03  | 0.13    | 333   | 0.851 | -1.41  | 5.59 | 3.63    |
| 289   | 0.174 | -15.19 | -8.19  | 0.15    | 334   | 0.862 | -1.29  | 5.71 | 3.72    |
| 290   | 0.190 | -14.42 | -7.42  | 0.18    | 335   | 0.873 | -1.18  | 5.82 | 3.82    |
| 291   | 0.212 | -13.47 | -6.47  | 0.23    | 336   | 0.882 | -1.10  | 5.90 | 3.89    |
| 292   | 0.234 | -12.62 | -5.62  | 0.27    | 337   | 0.890 | -1.01  | 5.99 | 3.97    |
| 293   | 0.256 | -11.84 | -4.84  | 0.33    | 338   | 0.899 | -0.92  | 6.08 | 4.05    |
| 294   | 0.278 | -11.12 | -4.12  | 0.39    | 339   | 0.908 | -0.84  | 6.16 | 4.13    |
| 295   | 0.300 | -10.46 | -3.46  | 0.45    | 340   | 0.916 | -0.76  | 6.24 | 4.21    |
| 296   | 0.318 | -9.95  | -2.95  | 0.51    | 341   | 0.923 | -0.69  | 6.31 | 4.27    |
| 297   | 0.336 | -9.47  | -2.47  | 0.57    | 342   | 0.931 | -0.62  | 6.38 | 4.34    |
| 298   | 0.354 | -9.02  | -2.02  | 0.63    | 343   | 0.938 | -0.56  | 6.44 | 4.41    |
| 299   | 0.372 | -8.59  | -1.59  | 0.69    | 344   | 0.946 | -0.49  | 6.51 | 4.48    |
| 300   | 0.390 | -8.18  | -1.18  | 0.76    | 345   | 0.952 | -0.42  | 6.58 | 4.55    |
| 301   | 0.405 | -7.84  | -0.84  | 0.82    | 346   | 0.958 | -0.37  | 6.63 | 4.60    |
| 302   | 0.421 | -7.51  | -0.51  | 0.89    | 347   | 0.964 | -0.32  | 6.68 | 4.65    |
| 303   | 0.436 | -7.20  | -0.20  | 0.95    | 348   | 0.969 | -0.27  | 6.73 | 4.71    |
| 304   | 0.452 | -6.90  | 0.10   | 1.02    | 349   | 0.975 | -0.22  | 6.78 | 4.76    |
| 305   | 0.467 | -6.60  | 0.40   | 1.10    | 350   | 0.980 | -0.18  | 6.82 | 4.81    |
| 306   | 0.483 | -6.33  | 0.67   | 1.17    | 351   | 0.982 | -0.15  | 6.85 | 4.84    |
| 307   | 0.498 | -6.06  | 0.94   | 1.24    | 352   | 0.985 | -0.13  | 6.87 | 4.87    |
| 308   | 0.513 | -5.80  | 1.20   | 1.32    | 353   | 0.988 | -0.10  | 6.90 | 4.89    |
| 309   | 0.528 | -5.54  | 1.46   | 1.40    | 354   | 0.991 | -0.08  | 6.92 | 4.92    |
| 310   | 0.544 | -5.30  | 1.70   | 1.48    | 355   | 0.993 | -0.06  | 6.94 | 4.95    |
| 311   | 0.558 | -5.06  | 1.94   | 1.56    | 356   | 0.995 | -0.04  | 6.96 | 4.96    |
| 312   | 0.573 | -4.84  | 2.16   | 1.65    | 357   | 0.996 | -0.03  | 6.97 | 4.97    |
| 313   | 0.588 | -4.61  | 2.39   | 1.73    | 358   | 0.997 | -0.02  | 6.98 | 4.99    |
| 314   | 0.602 | -4.40  | 2.60   | 1.82    | 359   | 0.998 | -0.01  | 6.99 | 5.00    |

# Exhibit 13.8 - Copy of Manufacturer's Directional Antenna Pattern Data



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Three CL-FM/VRM Log-periodic Antennas  
 Vertical Polarization  
 Vertical stacked 0.87 wavelength  
 Gain: 10.9 dBd  
 Vertical plane Pattern



# Exhibit 13.8 - Copy of Manufacturer's Directional Antenna Pattern Data



Three CL-FM/VRM Log-periodic Antennas

Vertical plane Pattern

Vertical Polarization

Vertical stacked 0.87 wavelength

Gain: 10.9 dBd

| Angle | Field | Rel.dB | dBd    | PwrMult | Angle | Field | Rel.dB | dBd    | PwrMult |
|-------|-------|--------|--------|---------|-------|-------|--------|--------|---------|
| -90   | 0.010 | -40.00 | -29.10 | 0.00    | -45   | 0.060 | -24.46 | -13.56 | 0.04    |
| -89   | 0.010 | -40.00 | -29.10 | 0.00    | -44   | 0.075 | -22.55 | -11.65 | 0.07    |
| -88   | 0.010 | -40.00 | -29.10 | 0.00    | -43   | 0.090 | -20.95 | -10.05 | 0.10    |
| -87   | 0.010 | -40.00 | -29.10 | 0.00    | -42   | 0.105 | -19.57 | -8.67  | 0.14    |
| -86   | 0.010 | -40.00 | -29.10 | 0.00    | -41   | 0.120 | -18.39 | -7.49  | 0.18    |
| -85   | 0.010 | -40.00 | -29.10 | 0.00    | -40   | 0.135 | -17.38 | -6.48  | 0.22    |
| -84   | 0.010 | -40.00 | -29.10 | 0.00    | -39   | 0.148 | -16.57 | -5.67  | 0.27    |
| -83   | 0.010 | -40.00 | -29.10 | 0.00    | -38   | 0.161 | -15.89 | -4.99  | 0.32    |
| -82   | 0.010 | -40.00 | -29.10 | 0.00    | -37   | 0.171 | -15.32 | -4.42  | 0.36    |
| -81   | 0.010 | -40.00 | -29.10 | 0.00    | -36   | 0.180 | -14.87 | -3.97  | 0.40    |
| -80   | 0.010 | -40.00 | -29.10 | 0.00    | -35   | 0.187 | -14.54 | -3.64  | 0.43    |
| -79   | 0.010 | -40.00 | -29.10 | 0.00    | -34   | 0.192 | -14.35 | -3.45  | 0.45    |
| -78   | 0.010 | -40.00 | -29.10 | 0.00    | -33   | 0.193 | -14.28 | -3.38  | 0.46    |
| -77   | 0.010 | -40.00 | -29.10 | 0.00    | -32   | 0.192 | -14.34 | -3.44  | 0.45    |
| -76   | 0.010 | -40.00 | -29.10 | 0.00    | -31   | 0.187 | -14.54 | -3.64  | 0.43    |
| -75   | 0.010 | -40.00 | -29.10 | 0.00    | -30   | 0.180 | -14.91 | -4.01  | 0.40    |
| -74   | 0.010 | -40.00 | -29.10 | 0.00    | -29   | 0.169 | -15.46 | -4.56  | 0.35    |
| -73   | 0.010 | -40.00 | -29.10 | 0.00    | -28   | 0.154 | -16.25 | -5.35  | 0.29    |
| -72   | 0.010 | -39.73 | -28.83 | 0.00    | -27   | 0.135 | -17.38 | -6.48  | 0.22    |
| -71   | 0.011 | -38.95 | -28.05 | 0.00    | -26   | 0.112 | -19.00 | -8.10  | 0.16    |
| -70   | 0.012 | -38.31 | -27.41 | 0.00    | -25   | 0.085 | -21.39 | -10.49 | 0.09    |
| -69   | 0.015 | -36.66 | -25.76 | 0.00    | -24   | 0.054 | -25.39 | -14.49 | 0.04    |
| -68   | 0.017 | -35.41 | -24.51 | 0.00    | -23   | 0.018 | -34.81 | -23.91 | 0.00    |
| -67   | 0.019 | -34.43 | -23.53 | 0.00    | -22   | 0.021 | -33.36 | -22.46 | 0.01    |
| -66   | 0.021 | -33.67 | -22.77 | 0.01    | -21   | 0.065 | -23.73 | -12.83 | 0.05    |
| -65   | 0.022 | -33.08 | -22.18 | 0.01    | -20   | 0.112 | -18.98 | -8.08  | 0.16    |
| -64   | 0.025 | -32.14 | -21.24 | 0.01    | -19   | 0.163 | -15.76 | -4.86  | 0.33    |
| -63   | 0.027 | -31.46 | -20.56 | 0.01    | -18   | 0.216 | -13.29 | -2.39  | 0.58    |
| -62   | 0.028 | -30.99 | -20.09 | 0.01    | -17   | 0.273 | -11.29 | -0.39  | 0.91    |
| -61   | 0.029 | -30.70 | -19.80 | 0.01    | -16   | 0.331 | -9.61  | 1.29   | 1.35    |
| -60   | 0.030 | -30.59 | -19.69 | 0.01    | -15   | 0.391 | -8.16  | 2.74   | 1.88    |
| -59   | 0.031 | -30.11 | -19.21 | 0.01    | -14   | 0.450 | -6.93  | 3.97   | 2.50    |
| -58   | 0.032 | -29.93 | -19.03 | 0.01    | -13   | 0.510 | -5.85  | 5.05   | 3.20    |
| -57   | 0.032 | -30.03 | -19.13 | 0.01    | -12   | 0.570 | -4.89  | 6.01   | 3.99    |
| -56   | 0.030 | -30.43 | -19.53 | 0.01    | -11   | 0.628 | -4.04  | 6.86   | 4.86    |
| -55   | 0.028 | -31.17 | -20.27 | 0.01    | -10   | 0.685 | -3.28  | 7.62   | 5.78    |
| -54   | 0.025 | -32.11 | -21.21 | 0.01    | -9    | 0.737 | -2.65  | 8.25   | 6.68    |
| -53   | 0.021 | -33.73 | -22.83 | 0.01    | -8    | 0.785 | -2.10  | 8.80   | 7.58    |
| -52   | 0.015 | -36.49 | -25.59 | 0.00    | -7    | 0.830 | -1.62  | 9.28   | 8.48    |
| -51   | 0.010 | -40.00 | -29.10 | 0.00    | -6    | 0.871 | -1.20  | 9.70   | 9.33    |
| -50   | 0.010 | -40.00 | -29.10 | 0.00    | -5    | 0.907 | -0.85  | 10.05  | 10.13   |
| -49   | 0.010 | -40.00 | -29.10 | 0.00    | -4    | 0.937 | -0.57  | 10.33  | 10.80   |
| -48   | 0.021 | -33.70 | -22.80 | 0.01    | -3    | 0.961 | -0.34  | 10.56  | 11.37   |
| -47   | 0.033 | -29.70 | -18.80 | 0.01    | -2    | 0.980 | -0.18  | 10.72  | 11.82   |
| -46   | 0.046 | -26.77 | -15.87 | 0.03    | -1    | 0.993 | -0.06  | 10.84  | 12.13   |
|       |       |        |        |         | 0     | 1.000 | 0.00   | 10.90  | 12.30   |

# Exhibit 13.8 - Copy of Manufacturer's Directional Antenna Pattern Data



Three CL-FM/VRM Log-periodic Antennas

Vertical plane Pattern

Vertical Polarization

Vertical stacked 0.87 wavelength

Gain: 10.9 dBd

| Angle | Field | Rel.dB | dBd    | PwrMult | Angle | Field | Rel.dB | dBd    | PwrMult |
|-------|-------|--------|--------|---------|-------|-------|--------|--------|---------|
| 0     | 1.000 | 0.00   | 10.90  | 12.30   | 45    | 0.060 | -24.46 | -13.56 | 0.04    |
| 1     | 0.993 | -0.06  | 10.84  | 12.13   | 46    | 0.046 | -26.77 | -15.87 | 0.03    |
| 2     | 0.980 | -0.18  | 10.72  | 11.82   | 47    | 0.033 | -29.70 | -18.80 | 0.01    |
| 3     | 0.961 | -0.34  | 10.56  | 11.37   | 48    | 0.021 | -33.70 | -22.80 | 0.01    |
| 4     | 0.937 | -0.57  | 10.33  | 10.80   | 49    | 0.010 | -40.00 | -29.10 | 0.00    |
| 5     | 0.907 | -0.85  | 10.05  | 10.13   | 50    | 0.010 | -40.00 | -29.10 | 0.00    |
| 6     | 0.871 | -1.20  | 9.70   | 9.33    | 51    | 0.010 | -40.00 | -29.10 | 0.00    |
| 7     | 0.830 | -1.62  | 9.28   | 8.48    | 52    | 0.015 | -36.49 | -25.59 | 0.00    |
| 8     | 0.785 | -2.10  | 8.80   | 7.59    | 53    | 0.021 | -33.73 | -22.83 | 0.01    |
| 9     | 0.737 | -2.65  | 8.25   | 6.68    | 54    | 0.025 | -32.11 | -21.21 | 0.01    |
| 10    | 0.685 | -3.28  | 7.62   | 5.78    | 55    | 0.028 | -31.17 | -20.27 | 0.01    |
| 11    | 0.628 | -4.04  | 6.86   | 4.86    | 56    | 0.030 | -30.43 | -19.53 | 0.01    |
| 12    | 0.570 | -4.89  | 6.01   | 3.99    | 57    | 0.032 | -30.03 | -19.13 | 0.01    |
| 13    | 0.510 | -5.84  | 5.06   | 3.20    | 58    | 0.032 | -29.93 | -19.03 | 0.01    |
| 14    | 0.450 | -6.93  | 3.97   | 2.50    | 59    | 0.031 | -30.11 | -19.21 | 0.01    |
| 15    | 0.391 | -8.16  | 2.74   | 1.88    | 60    | 0.030 | -30.59 | -19.69 | 0.01    |
| 16    | 0.331 | -9.61  | 1.29   | 1.35    | 61    | 0.029 | -30.70 | -19.80 | 0.01    |
| 17    | 0.273 | -11.29 | -0.39  | 0.91    | 62    | 0.028 | -30.99 | -20.09 | 0.01    |
| 18    | 0.216 | -13.29 | -2.39  | 0.58    | 63    | 0.027 | -31.46 | -20.56 | 0.01    |
| 19    | 0.163 | -15.76 | -4.86  | 0.33    | 64    | 0.025 | -32.14 | -21.24 | 0.01    |
| 20    | 0.112 | -18.98 | -8.08  | 0.16    | 65    | 0.022 | -33.08 | -22.18 | 0.01    |
| 21    | 0.065 | -23.73 | -12.83 | 0.05    | 66    | 0.021 | -33.67 | -22.77 | 0.01    |
| 22    | 0.021 | -33.36 | -22.46 | 0.01    | 67    | 0.019 | -34.43 | -23.53 | 0.00    |
| 23    | 0.018 | -34.82 | -23.92 | 0.00    | 68    | 0.017 | -35.41 | -24.51 | 0.00    |
| 24    | 0.054 | -25.40 | -14.50 | 0.04    | 69    | 0.015 | -36.66 | -25.76 | 0.00    |
| 25    | 0.085 | -21.40 | -10.50 | 0.09    | 70    | 0.012 | -38.31 | -27.41 | 0.00    |
| 26    | 0.112 | -19.00 | -8.10  | 0.16    | 71    | 0.011 | -38.95 | -28.05 | 0.00    |
| 27    | 0.135 | -17.38 | -6.48  | 0.22    | 72    | 0.010 | -39.73 | -28.83 | 0.00    |
| 28    | 0.154 | -16.26 | -5.36  | 0.29    | 73    | 0.010 | -40.00 | -29.10 | 0.00    |
| 29    | 0.169 | -15.46 | -4.56  | 0.35    | 74    | 0.010 | -40.00 | -29.10 | 0.00    |
| 30    | 0.180 | -14.91 | -4.01  | 0.40    | 75    | 0.010 | -40.00 | -29.10 | 0.00    |
| 31    | 0.187 | -14.54 | -3.64  | 0.43    | 76    | 0.010 | -40.00 | -29.10 | 0.00    |
| 32    | 0.192 | -14.34 | -3.44  | 0.45    | 77    | 0.010 | -40.00 | -29.10 | 0.00    |
| 33    | 0.193 | -14.28 | -3.38  | 0.46    | 78    | 0.010 | -40.00 | -29.10 | 0.00    |
| 34    | 0.192 | -14.35 | -3.45  | 0.45    | 79    | 0.010 | -40.00 | -29.10 | 0.00    |
| 35    | 0.187 | -14.54 | -3.64  | 0.43    | 80    | 0.010 | -40.00 | -29.10 | 0.00    |
| 36    | 0.180 | -14.87 | -3.97  | 0.40    | 81    | 0.010 | -40.00 | -29.10 | 0.00    |
| 37    | 0.171 | -15.32 | -4.42  | 0.36    | 82    | 0.010 | -40.00 | -29.10 | 0.00    |
| 38    | 0.161 | -15.89 | -4.99  | 0.32    | 83    | 0.010 | -40.00 | -29.10 | 0.00    |
| 39    | 0.148 | -16.57 | -5.67  | 0.27    | 84    | 0.010 | -40.00 | -29.10 | 0.00    |
| 40    | 0.135 | -17.38 | -6.48  | 0.22    | 85    | 0.010 | -40.00 | -29.10 | 0.00    |
| 41    | 0.120 | -18.39 | -7.49  | 0.18    | 86    | 0.010 | -40.00 | -29.10 | 0.00    |
| 42    | 0.105 | -19.57 | -8.67  | 0.14    | 87    | 0.010 | -40.00 | -29.10 | 0.00    |
| 43    | 0.090 | -20.95 | -10.05 | 0.10    | 88    | 0.010 | -40.00 | -29.10 | 0.00    |
| 44    | 0.075 | -22.55 | -11.65 | 0.07    | 89    | 0.010 | -40.00 | -29.10 | 0.00    |
|       |       |        |        |         | 90    | 0.010 | -40.00 | -29.10 | 0.00    |