

STEPHEN S. LOCKWOOD, PE, PMP

THOMAS M. ECKELS, PE  
THOMAS S. GORTON, PE

JAMES B. HATFIELD, PE  
BENJAMIN F. DAWSON III, PE  
ERIK C. SWANSON, PE, PMP  
DAVID J. PINION, PE  
STEPHEN PUMPLE, M.Eng, MBA, PMP  
CONSULTANTS

HATFIELD & DAWSON  
CONSULTING ELECTRICAL ENGINEERS  
9500 GREENWOOD AVE. N.  
SEATTLE, WASHINGTON 98103

TELEPHONE (206) 783-9151  
FACSIMILE (206) 789-9834  
E-MAIL hatdaw@hatdaw.com

MAURY L. HATFIELD, PE  
(1942-2009)  
PAUL W. LEONARD, PE  
(1925-2011)

**FM Translator K229DI  
Channel 229D at Corvallis, OR  
To Rebroadcast KEJO(AM) 1240 kHz Corvallis, OR  
March 2022**

**Allocation Study**

The attached spacing study shows the spacing between the proposed translator site and the location of cochannel and adjacent channel stations and proposals. This study was made with the Commission's Class A spacing requirements, and individual situations were examined to determine the lack of prohibited contour overlap per the requirements of §74.1204 of the Rules. The attached allocation study maps demonstrate compliance with the Commission's Rules for protection of FM broadcast stations and FM translators as outlined in §74.1204.

The attached spacing study demonstrates compliance with §73.207 of the Commission's Rules regarding spacing restrictions to stations which are 53 or 54 channels removed from the proposed operation.

***KKNU 227C0 Springfield-Eugene***

The proposed translator transmitter site is located within the 60 dBu protected contour of second-adjacent channel station KKNU 227C0 Springfield-Eugene. The following calculation, performed using the *Living Way* methodology, demonstrates interference protection to that station.

| Protected Station | Distance & Bearing to Proposal | Station ERP and HAAT on that azimuth | Station Field Strength at Proposal | Corresponding Translator Interfering Contour | Distance to Translator Interfering Contour |
|-------------------|--------------------------------|--------------------------------------|------------------------------------|--|--|
| KKNU 227C0        | 66.48 km<br>352 deg True       | 100 kW<br>460 meters                 | 67.1 dBu<br>F(50,50)               | 107.1 dBu                                    | 339 meters<br>Free Space                   |

The 107.1 dBu contour from the proposed facility would extend 339 meters from the antenna per a Free Space calculation. However, taking into account the elevation pattern of the Nicom BKG77-3(0.9) antenna, the attached calculations demonstrate that the 107.1 dBu contour will not reach ground level in the vicinity of the tower except out to a distance of 75 meters from the tower. There is no population within this contour. (In the aerial view on the following page, the only structures within this radius are the transmitter building, and a temporarily parked trailer in the southwest quadrant.) Therefore, the proposed facility is believed to satisfy the requirements of §74.1204(d) with respect to KGNU.



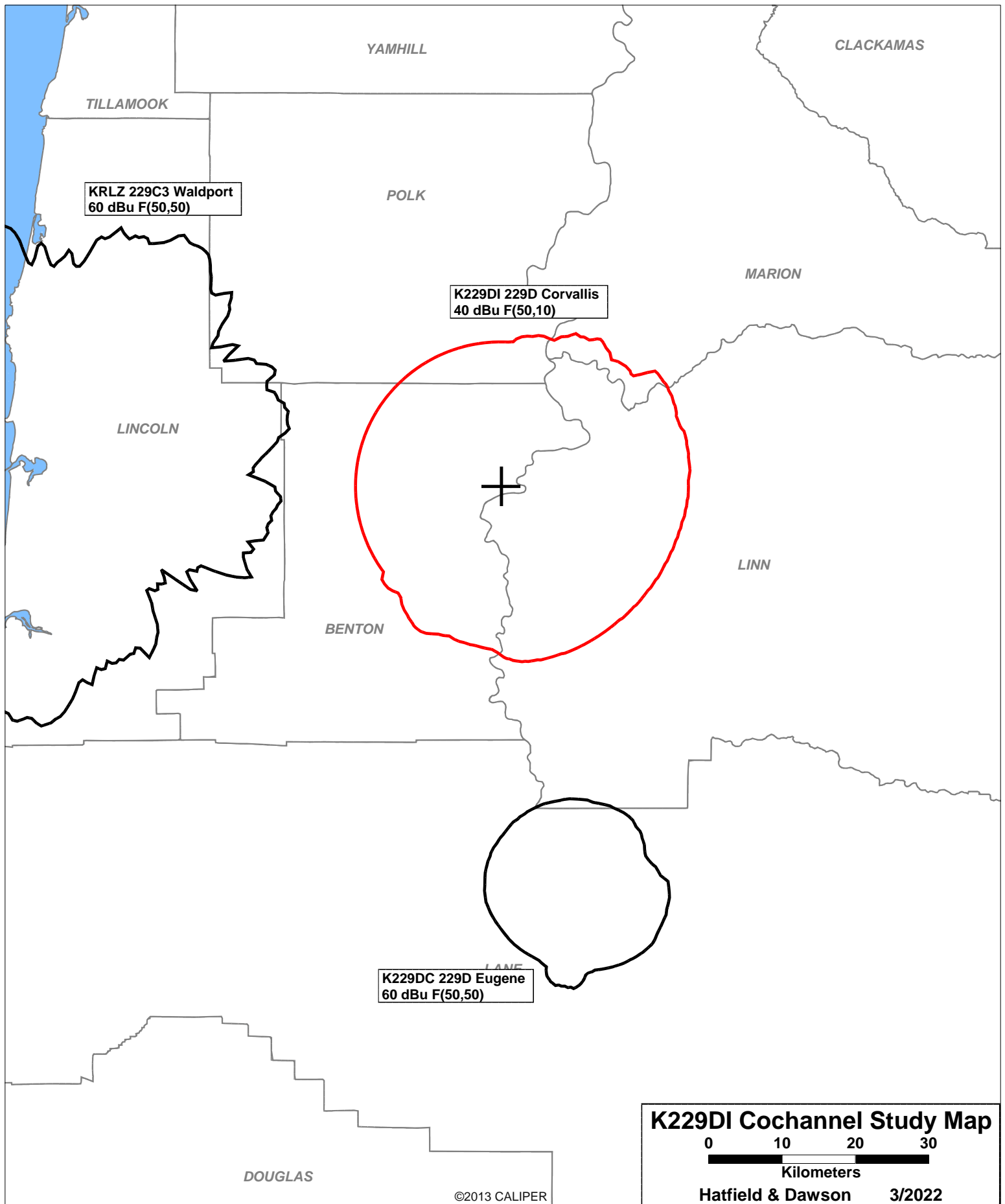
```

=====
SEARCH PARAMETERS                               FM Database Date: 20220307
Channel: 229A      93.7 MHz                      Page 1
Latitude: 44 35 37.6 (NAD83)
Longitude: 123 13 34.1
Safety Zone: 50 km
Job Title: K229DI CORVALLIS

```

| Call<br>Status | City<br>St                               | FCC File No.  | Channel<br>Freq. | ERP(kW)<br>HAAT(m)           | Latitude<br>Longitude | Bearing<br>deg-True | Dist<br>(km) | Req<br>(km) |
|----------------|--|---------------|------------------|------------------------------|-----------------------|---------------------|--------------|-------------|
| KKNU<br>LIC    | SPRINGFIELD-EUGENE<br>OR BLH-20060202ABA | 227C0<br>93.3 | 100.000<br>395.0 | 44 0 3.4<br>123 6 49.3       | 172.2                 | 66.48<br>-19.52     | 86<br>SHORT  |             |
| K227DU<br>LIC  | SALEM<br>OR 0000151907                   | 227D<br>93.3  | 0.250<br>0.0     | DA 44 51 17.0<br>123 7 19.0  | 15.8                  | 30.15<br>0.00       | 0<br>TRANS   |             |
| K228EU<br>LIC  | PORTLAND<br>OR BLFT-20110118ABC          | 228D<br>93.5  | 0.099<br>0.0     | DA 45 31 20.4<br>122 44 49.4 | 19.9                  | 109.88<br>0.00      | 0<br>TRANS   |             |
| K228DT<br>LIC  | HAPPY HOLLOW<br>OR BLFT-20000414ACQ      | 228D<br>93.5  | 0.010<br>0.0     | DA 45 12 47.3<br>123 45 18.4 | 329.0                 | 80.52<br>0.00       | 0<br>TRANS   |             |
| KURT<br>LIC    | PRINEVILLE<br>OR BLH-20180620ABA         | 229C2<br>93.7 | 1.000<br>689.0   | 44 26 16.5<br>120 57 16.1    | 94.7                  | 181.45<br>15.45     | 166<br>CLEAR |             |
| K229DC<br>LIC  | EUGENE<br>OR BLFT-20170316AAY            | 229D<br>93.7  | 0.250<br>0.0     | DA 44 0 6.4<br>123 6 51.3    | 172.3                 | 66.38<br>0.00       | 0<br>TRANS   |             |
| KRLZ<br>LIC    | WALDPORT<br>OR BLH-20160202ABJ           | 229C3<br>93.7 | 9.000<br>132.0   | 44 38 39.4<br>124 0 54.4     | 275.4<br>SS           | 62.87<br>-79.13     | 142<br>SHORT |             |
| K229DI<br>LIC  | CORVALLIS<br>OR 0000168278               | 229D<br>93.7  | 0.014<br>0.0     | 44 35 37.6<br>123 13 34.1    | 0.0                   | 0.00<br>0.00        | 0<br>TRANS   |             |
| K230AD<br>LIC  | COTTAGE GROVE<br>OR BLFT-20070207ABB     | 230D<br>93.9  | 0.250<br>0.0     | 43 46 40.4<br>123 2 36.3     | 170.8                 | 91.83<br>0.00       | 0<br>TRANS   |             |
| KPDQ-FM<br>LIC | PORTLAND<br>OR BLH-20060208AMF           | 230C1<br>93.9 | 52.000<br>387.0  | 45 29 19.4<br>122 41 44.3    | 22.5<br>SS            | 107.88<br>-25.12    | 133<br>SHORT |             |
| K231CY<br>LIC  | LEBANON<br>OR BLFT-20171024AAW           | 231D<br>94.1  | 0.250<br>0.0     | DA 44 30 18.4<br>122 57 47.3 | 115.2                 | 23.11<br>0.00       | 0<br>TRANS   |             |
| KMCQ-LP<br>LIC | SALEM<br>OR BLL-20170123FKV              | 232L1<br>94.3 | 0.007<br>109.6   | 44 53 48.1<br>123 5 6.2      | 18.3                  | 35.47<br>6.47       | 29<br>CLOSE  |             |
| K282BH<br>LIC  | PHILOMATH<br>OR BLFT-20141103AAF         | 282D<br>104.3 | 0.015<br>0.0     | 44 38 24.4<br>123 16 29.3    | 323.2                 | 6.44<br>0.00        | 0<br>TRANS   |             |
| K282BY<br>LIC  | SALEM<br>OR BLFT-20180404AAS             | 282D<br>104.3 | 0.180<br>0.0     | DA 44 59 49.4<br>123 9 16.4  | 7.2                   | 45.17<br>0.00       | 0<br>TRANS   |             |

===== END OF FM SPACING STUDY FOR CHANNEL 229 =====



KPDQ-FM 230C1 Portland  
60 dBu F(50,50)

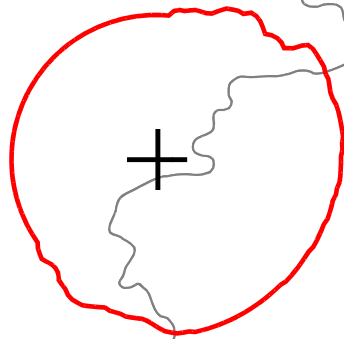
YAMHILL

CLACKAMAS

POLK

MARION

LINCOLN



K229DI 229D Corvallis  
54 dBu F(50,10)

LINN

BENTON

LANE  
©2013 CALIPER

## K229DI 1Adj Study Map

0 5 10 15

Kilometers

Hatfield & Dawson

3/2022

YAMHILL

CLACKAMAS

POLK

MARION

K227DU 227D Salem  
60 dBu F(50,50)

K229DI 229D Corvallis  
100 dBu F(50,10)



K231CY 231D Lebanon  
60 dBu F(50,50)

BENTON

LINN

LANE

©2013 CALIPER

**K229DI 2Adj Study Map**

0 5 10 15  
Kilometers

Hatfield & Dawson 3/2022

## K229DI Free Space Interference Area Calculator Interference Area to KGNU

Antenna Height: 52 meters AGL  
 Contour Level: 107.1 dBu equals 0.2 V/m  
 ERP in Watts: 120 Watts

Maximum distance  
 to interfering contour is: 1112.5 feet equals 339.1 meters

Antenna: BKG77-3 0.9

| Depression<br>Angle (degrees) | Nicom<br>BKG77-3 0.9<br>Relative<br>Field | Adjusted<br>ERP (Watts) | Free Space Distance To<br>107.1 dBu Contour<br>Along the depression<br>angle | Horizontal<br>Distance<br>(meters) | Contour<br>AGL<br>(meters) |
|-------------------------------|---|-------------------------|--|------------------------------------|----------------------------|
| -90                           | 0.106                                     | 1.3                     | 35.9 meters  | 0                                  | 16.1                       |
| -89                           | 0.107                                     | 1.4                     | 36.3   | 0.6                                | 15.7                       |
| -88                           | 0.108                                     | 1.4                     | 36.6   | 1.3                                | 15.4                       |
| -87                           | 0.109                                     | 1.4                     | 37.0   | 1.9                                | 15.1                       |
| -86                           | 0.110                                     | 1.5                     | 37.3   | 2.6                                | 14.8                       |
| -85                           | 0.111                                     | 1.5                     | 37.6   | 3.3                                | 14.5                       |
| -84                           | 0.116                                     | 1.6                     | 39.3   | 4.1                                | 12.9                       |
| -83                           | 0.120                                     | 1.7                     | 40.7   | 5.0                                | 11.6                       |
| -82                           | 0.125                                     | 1.9                     | 42.4   | 5.9                                | 10.0                       |
| -81                           | 0.129                                     | 2.0                     | 43.7   | 6.8                                | 8.8                        |
| -80                           | 0.133                                     | 2.1                     | 45.1   | 7.8                                | 7.6                        |
| -79                           | 0.141                                     | 2.4                     | 47.8   | 9.1                                | 5.1                        |
| -78                           | 0.148                                     | 2.6                     | 50.2   | 10.4                               | 2.9                        |
| -77                           | 0.155                                     | 2.9                     | 52.6   | 11.8                               | 0.8 X                      |
| -76                           | 0.161                                     | 3.1                     | 54.6   | 13.2                               | -1.0 X                     |
| -75                           | 0.167                                     | 3.3                     | 56.6   | 14.7                               | -2.7 X                     |
| -74                           | 0.174                                     | 3.6                     | 59.0   | 16.3                               | -4.7 X                     |
| -73                           | 0.180                                     | 3.9                     | 61.0   | 17.8                               | -6.4 X                     |
| -72                           | 0.186                                     | 4.2                     | 63.1   | 19.5                               | -8.0 X                     |
| -71                           | 0.191                                     | 4.4                     | 64.8   | 21.1                               | -9.2 X                     |
| -70                           | 0.195                                     | 4.6                     | 66.1   | 22.6                               | -10.1 X                    |
| -69                           | 0.200                                     | 4.8                     | 67.8   | 24.3                               | -11.3 X                    |
| -68                           | 0.204                                     | 5.0                     | 69.2   | 25.9                               | -12.1 X                    |
| -67                           | 0.206                                     | 5.1                     | 69.9   | 27.3                               | -12.3 X                    |
| -66                           | 0.208                                     | 5.2                     | 70.5   | 28.7                               | -12.4 X                    |
| -65                           | 0.209                                     | 5.2                     | 70.9   | 30.0                               | -12.2 X                    |
| -64                           | 0.208                                     | 5.2                     | 70.5   | 30.9                               | -11.4 X                    |
| -63                           | 0.206                                     | 5.1                     | 69.9   | 31.7                               | -10.2 X                    |
| -62                           | 0.203                                     | 4.9                     | 68.8   | 32.3                               | -8.8 X                     |
| -61                           | 0.199                                     | 4.8                     | 67.5   | 32.7                               | -7.0 X                     |
| -60                           | 0.193                                     | 4.5                     | 65.4   | 32.7                               | -4.7 X                     |
| -59                           | 0.186                                     | 4.2                     | 63.1   | 32.5                               | -2.1 X                     |
| -58                           | 0.177                                     | 3.8                     | 60.0   | 31.8                               | 1.1 X                      |
| -57                           | 0.167                                     | 3.3                     | 56.6   | 30.8                               | 4.5                        |
| -56                           | 0.155                                     | 2.9                     | 52.6   | 29.4                               | 8.4                        |
| -55                           | 0.142                                     | 2.4                     | 48.2   | 27.6                               | 12.6                       |
| -54                           | 0.127                                     | 1.9                     | 43.1   | 25.3                               | 17.2                       |
| -53                           | 0.110                                     | 1.5                     | 37.3   | 22.4                               | 22.2                       |
| -52                           | 0.092                                     | 1.0                     | 31.2   | 19.2                               | 27.4                       |
| -51                           | 0.073                                     | 0.6                     | 24.8   | 15.6                               | 32.8                       |
| -50                           | 0.052                                     | 0.3                     | 17.6   | 11.3                               | 38.5                       |
| -49                           | 0.031                                     | 0.1                     | 10.5   | 6.9                                | 44.1                       |

|     |       |       |       |       |       |
|-----|-------|-------|-------|-------|-------|
| -48 | 0.008 | 0.0   | 2.7   | 1.8   | 50.0  |
| -47 | 0.015 | 0.0   | 5.1   | 3.5   | 48.3  |
| -46 | 0.039 | 0.2   | 13.2  | 9.2   | 42.5  |
| -45 | 0.063 | 0.5   | 21.4  | 15.1  | 36.9  |
| -44 | 0.088 | 0.9   | 29.8  | 21.5  | 31.3  |
| -43 | 0.112 | 1.5   | 38.0  | 27.8  | 26.1  |
| -42 | 0.136 | 2.2   | 46.1  | 34.3  | 21.1  |
| -41 | 0.159 | 3.0   | 53.9  | 40.7  | 16.6  |
| -40 | 0.181 | 3.9   | 61.4  | 47.0  | 12.5  |
| -39 | 0.201 | 4.8   | 68.2  | 53.0  | 9.1   |
| -38 | 0.219 | 5.8   | 74.3  | 58.5  | 6.3   |
| -37 | 0.235 | 6.6   | 79.7  | 63.6  | 4.0   |
| -36 | 0.249 | 7.4   | 84.4  | 68.3  | 2.4   |
| -35 | 0.260 | 8.1   | 88.2  | 72.2  | 1.4 X |
| -34 | 0.266 | 8.5   | 90.2  | 74.8  | 1.6 X |
| -33 | 0.270 | 8.7   | 91.6  | 76.8  | 2.1   |
| -32 | 0.269 | 8.7   | 91.2  | 77.4  | 3.7   |
| -31 | 0.265 | 8.4   | 89.9  | 77.0  | 5.7   |
| -30 | 0.256 | 7.9   | 86.8  | 75.2  | 8.6   |
| -29 | 0.242 | 7.0   | 82.1  | 71.8  | 12.2  |
| -28 | 0.223 | 6.0   | 75.6  | 66.8  | 16.5  |
| -27 | 0.200 | 4.8   | 67.8  | 60.4  | 21.2  |
| -26 | 0.172 | 3.6   | 58.3  | 52.4  | 26.4  |
| -25 | 0.140 | 2.4   | 47.5  | 43.0  | 31.9  |
| -24 | 0.102 | 1.2   | 34.6  | 31.6  | 37.9  |
| -23 | 0.061 | 0.4   | 20.7  | 19.0  | 43.9  |
| -22 | 0.015 | 0.0   | 5.1   | 4.7   | 50.1  |
| -21 | 0.034 | 0.1   | 11.5  | 10.8  | 47.9  |
| -20 | 0.087 | 0.9   | 29.5  | 27.7  | 41.9  |
| -19 | 0.144 | 2.5   | 48.8  | 46.2  | 36.1  |
| -18 | 0.202 | 4.9   | 68.5  | 65.1  | 30.8  |
| -17 | 0.263 | 8.3   | 89.2  | 85.3  | 25.9  |
| -16 | 0.326 | 12.8  | 110.5 | 106.3 | 21.5  |
| -15 | 0.389 | 18.2  | 131.9 | 127.4 | 17.9  |
| -14 | 0.453 | 24.6  | 153.6 | 149.1 | 14.8  |
| -13 | 0.516 | 32.0  | 175.0 | 170.5 | 12.6  |
| -12 | 0.578 | 40.1  | 196.0 | 191.7 | 11.2  |
| -11 | 0.638 | 48.8  | 216.3 | 212.4 | 10.7  |
| -10 | 0.697 | 58.3  | 236.4 | 232.8 | 11.0  |
| -9  | 0.750 | 67.5  | 254.3 | 251.2 | 12.2  |
| -8  | 0.799 | 76.6  | 270.9 | 268.3 | 14.3  |
| -7  | 0.844 | 85.5  | 286.2 | 284.1 | 17.1  |
| -6  | 0.884 | 93.8  | 299.8 | 298.1 | 20.7  |
| -5  | 0.919 | 101.3 | 311.6 | 310.5 | 24.8  |
| -4  | 0.947 | 107.6 | 321.1 | 320.4 | 29.6  |
| -3  | 0.970 | 112.9 | 328.9 | 328.5 | 34.8  |
| -2  | 0.986 | 116.7 | 334.4 | 334.2 | 40.3  |
| -1  | 0.996 | 119.0 | 337.7 | 337.7 | 46.1  |
| 0   | 1.000 | 120.0 | 339.1 | 339.1 | 52.0  |



## Facilities Proposed

The proposed operation will be on Channel 229D (93.7 MHz) with an effective radiated power of 120 watts. Operation is proposed with a 3-element circularly-polarized omni-directional antenna with 0.9 wavelength spacing. The antenna will be side-mounted on the existing tower used by KEJO(AM) and KLOO(AM). The antenna will be shared by K229DI and K243CW.

The proposed antenna support structure does not exceed 60.96 meters (200 feet) above ground and does not require notification to the Federal Aviation Administration. Therefore, this structure does not require an Antenna Structure Registration Number.

## RF Exposure Calculations

The power density calculations shown below were made using the techniques outlined in OET Bulletin No. 65. "Ground level" calculations in this report have been made at a reference height of 2 meters above ground to provide a worst-case estimate of exposure for persons standing on the ground in the vicinity of the tower. The equation shown below was used to calculate the ground level power density figures from each antenna.

$$S(\mu W / cm^2) = \frac{33.40981 \times AdjERP(Watts)}{D^2}$$

Where: *AdjERP(Watts)* is the maximum lobe effective radiated power times the element pattern factor times the array pattern factor.

*D* is the distance in meters from the center of radiation to the calculation point.

Ground level power densities have been calculated for locations extending from the base of the tower to a distance of 500 meters. Values past this point are increasingly negligible.

Calculations of the power density produced by the proposed antenna system assume a Type 2 element pattern, which is the element pattern used in the Commission's FMModel software for the Nicom BKG77-3(0.9) antenna proposed for use. The highest calculated ground level power density occurs at a distance of 17 meters from the base of the antenna support structure. At this point the power density is calculated to be 0.3  $\mu W/cm^2$ , which is 0.15% of 200  $\mu W/cm^2$  (the FCC standard for uncontrolled environments).

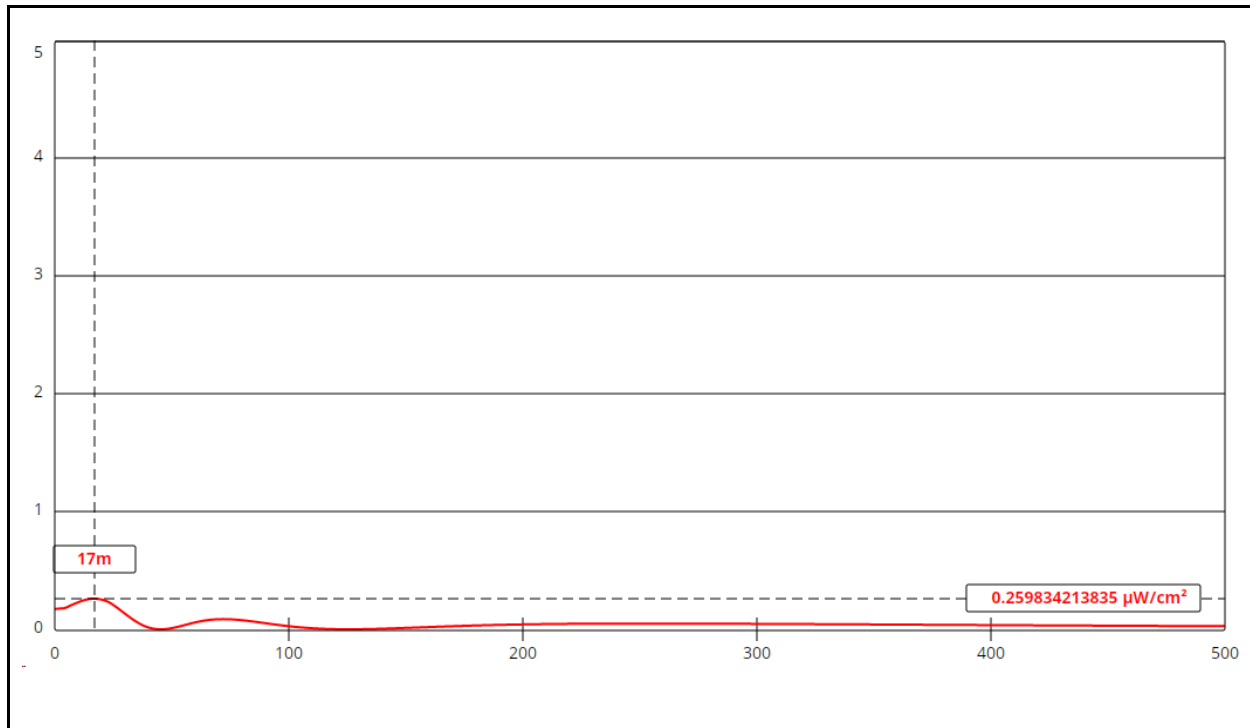
The permittee/licensee in coordination with other users of the site must reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency exposure in excess of FCC guidelines.

### **AM Station KEJO**

The translator antenna will be installed on the tower used by AM station KEJO 1240 kHz. KEJO operates with 1 kilowatt nondirectional full time. The radiator is 88.4 electrical degrees tall, or 24.6% of the station wavelength. Using Tables 1-4 in OET Bulletin No. 65, the fencing distance requirement for this station is 1 meter from the tower base. The tower is fenced to at least this distance.

### **AM Station KLOO**

The translator antenna will be installed on the tower used by AM station KLOO 1340 kHz. KLOO operates with 1 kilowatt nondirectional full time. The radiator is 95.6 electrical degrees tall, or 26.6% of the station wavelength. Using Tables 1-4 in OET Bulletin No. 65, the fencing distance requirement for this station is 1 meter from the tower base. The tower is fenced to at least this distance.



## Ground-Level RF Exposure

OET FMModel

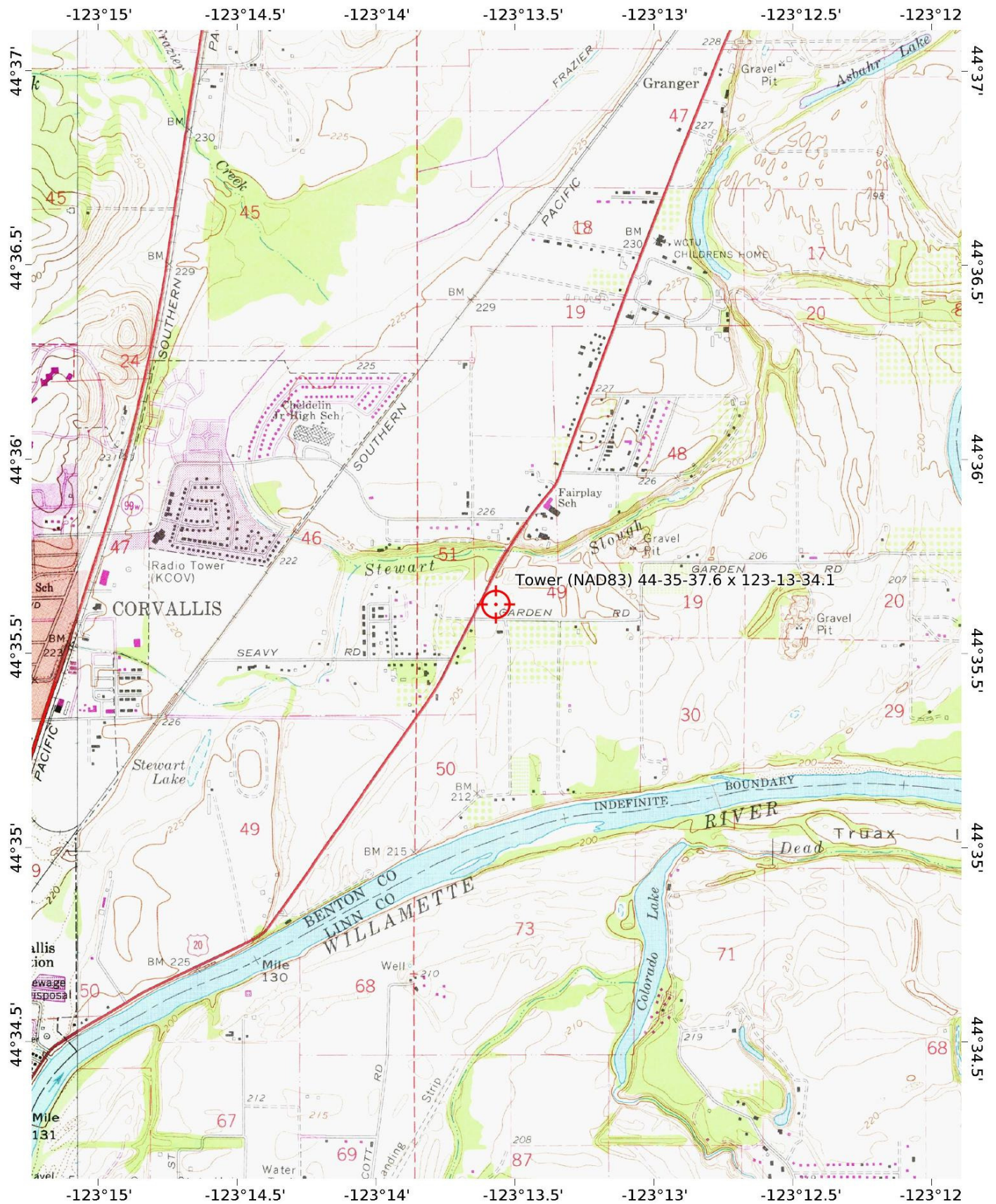
### K229DI Corvallis

Antenna Type: Nicom BKG77-3(0.9) (Type 2)  
 No. of Elements: 3  
 Element Spacing: 0.9 wavelength

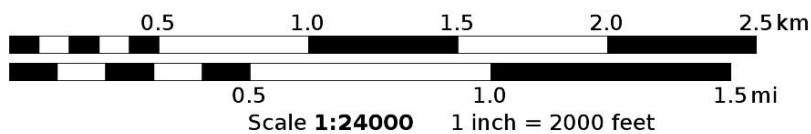
Distance: 500 meters  
 Horizontal ERP: 120 W  
 Vertical ERP: 120 W

Antenna Height: 52 meters AGL

Maximum Calculated Power Density is 0.3  $\mu\text{W}/\text{cm}^2$  at 17 meters from the antenna structure.



Mercator Projection  
WGS84  
USNG Zone 10TDQ  
 CALTOPO



Hatfield & Dawson Consulting Engineers

