

# EXHIBIT 16

PENN STATE PUBLIC BROADCASTING

## EXHIBIT 16

The following analysis is to confirm that the site for the proposed Huntingdon translator is in compliance with the O.E.T. Bulletin 65 for non controlled areas in the vicinity of an FM broadcast facility. The worksheets attached to FCC Form 349 would not work because there are two transmitting antennas located on the same tower, one full power "Class A" and the proposed translator. The worksheet makes the assumption that all radiation is emanating from the lowest radiating point on the tower structure which raises the predicted radiation exposure level above the uncontrolled limit.

To demonstrate compliance, three sample points will be chosen. A drawing of the site (attachment 1) is included to further illustrate the three locations.

1. In the equipment shelter at the base of the tower.
2. At the closest edge of a mobile home.
3. At the closest edge of a fixed dwelling.

The methodology to be used to calculate the power density at each of the above three locations is taken from O.E.T. Bulletin 65 in the form of the following equation:

$$S = \frac{33.4 (F^2)(ERP_{H+V})}{R^2}$$

Where

- S = power density in uW/cm<sup>2</sup>
- F = relative field factor for the antenna with unity as max radiation
- ERP<sub>H+V</sub> = total radiated power for each antenna in both planes in watts.
- R = slant height from two meters above ground at the sample point to the center of radiation in meters
- 33.4 = multiplication factor = [2.56 (ground reflection factor)] x [1.64 (gain of ½ wave dipole over isotropic)] x [100 (units conversion factor)] / 4 pi

### Sample Point 1.

This location is in the middle of the equipment shelter at the base of the tower. The tower is 15 feet from the building and the building is 15 feet wide so a total distance from the tower of 22 feet will be used which converts to 6.7 meters.

The center of radiation (COR) for WWLY-FM (FM station at top of tower) from the elevation diagram (attachment 2) is 59 meters above ground level (AGL). This will be reduced by 2 meters to 57 meters to compensate for the height of an average person.

The distance from the tower and the adjusted COR yield a downward radiation angle of 83 degrees. From the vertical radiation plot for the Harris FMC-3A antenna (attachment 3) the field factor is 0.74.

The slant distance R is calculated by taking adjusted COR AGL and dividing by the cosine of the compliment of the downward radiation angle which yields a slant distance R of 57.39 meters.

The licensed ERP of station WWLY is 6 kW which when doubled yields an ERP<sub>H+V</sub> of 12 kW.

Substituting these values into the equation from O.E.T. Bulletin 65 yields the following:

$$S_{A1} = \frac{33.4 (0.74)^2 (12,000)}{(57.39)^2} = 66.6 \text{ uW/cm}^2$$

Performing the same procedure for the proposed translator station yields the following results:

COR AGL (adjusted) = 26.9 meters

ERP<sub>H+V</sub> = 110 watts.

Downward radiation angle = 76 degrees

Field Factor F = 0.32 (from vertical radiation plot/tables of translator antenna on attachment 4)

Slant Range R = 27.7 meters

Substituting this into the equation yields

$$S_{A2} = \frac{33.4 (0.32)^2 (110)}{(27.7)^2} = 0.49 \text{ uW/cm}^2$$

Summing the values from the two radiation sources yields

$$\begin{aligned} S_{\text{tot}} &= S_{A1} + S_{A2} \\ &= 66.6 + 0.49 = 67.1 \text{ uW/cm}^2 \end{aligned}$$

From this it can be seen that the total radiation hazard is well below the maximum permissible level of 200 uw/cm<sup>2</sup> for an uncontrolled area as prescribed in O.E.T. Bulletin 65.

Sample Point 2.

This location is at the edge of the mobile home closest to the tower as shown in attachment 1. The distance from the tower is 52 feet which converts to 15.85 meters. Following the same procedure as was used for point 1 yields the following:

For WWLY-FM:

COR AGL = 57 meters  
ERP<sub>H+V</sub> = 12 kW  
Downward Radiation Angle = 74.5 degrees  
Field Factor F = 0.77  
Slant Range R = 59.2 meters

Substituting this into the equation yields

$$S_{A1} = \frac{33.4 (0.77)^2 (12000)}{(59.2)^2} = 67 \text{ uW/cm}^2$$

For proposed translator:

COR AGL = 26.9 meters  
ERPH+V = 110 watts  
Downward Radiation Angle = 59 degrees  
Field Factor F = 0.56  
Slant Range R = 31.2 meters

Substituting this into the equation yields

$$S_{A2} = \frac{33.4 (0.56)^2 (110)}{(31.2)^2} = 1.2 \text{ uW/cm}^2$$

Summing the values from the two radiation sources yields

$$\begin{aligned} S_{\text{tot}} &= S_{A1} + S_{A2} \\ &= 67.0 + 1.2 = 68.2 \text{ uW/cm}^2 \end{aligned}$$

This again is well below the maximum level of 200 uW/cm<sup>2</sup> for an uncontrolled area.

Sample Point 3.

This point is at the edge of a fixed dwelling in the opposite direction from the tower as was point 2 (attachment 1). The distance from the tower to the house is 207 feet which converts to 63.1 meters. Following the same procedure as was used for points 1 and 2 yields the following:

For WWLY-FM:

COR AGL = 57 meters  
ERPH+V = 12 kW  
Downward Radiation Angle = 42 degrees  
Field Factor F = 0.01  
Slant Range R = 85 meters

Substituting these values into the equation yields

$$S_{A1} = \frac{33.4 (0.01)^2 (12000)}{(85)^2} = 0.005 \text{ uW/cm}^2$$

For the proposed translator:

COR AGL = 26.9 meters  
ERPH+V = 110 watts  
Downward Radiation Angle = 23.1 degrees  
Field Factor F = 0.93  
Slant Range R = 68.6 meters

Substituting these values into the equation yields

$$S_{A2} = \frac{33.4 (0.93)^2 (110)}{(68.6)^2} = 0.68 \text{ uW/cm}^2$$

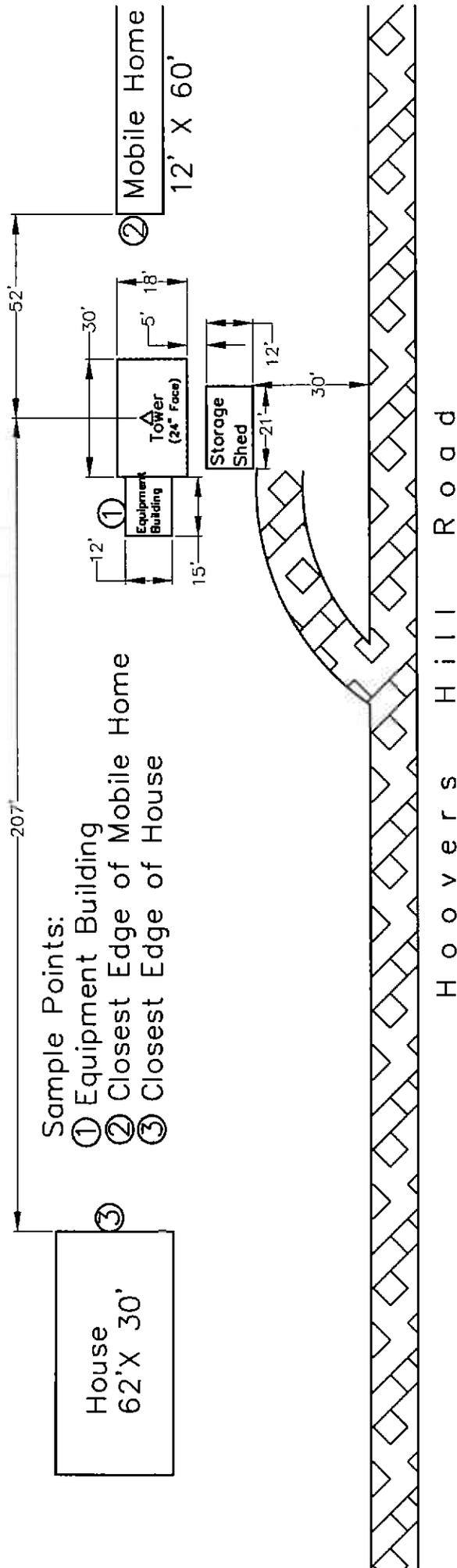
Summing the values from the two radiation sources yields

$$\begin{aligned} S_{\text{tot}} &= S_{A1} + S_{A2} \\ &= 0.005 + 0.68 = 0.685 \text{ uW/cm}^2 \end{aligned}$$

The above result is also far below the 200 uW/cm<sup>2</sup> maximum for an uncontrolled area.

From the three sample points taken in this exhibit, it has been clearly demonstrated that no RF radiation hazard exists for this site with the addition of the proposed translator.

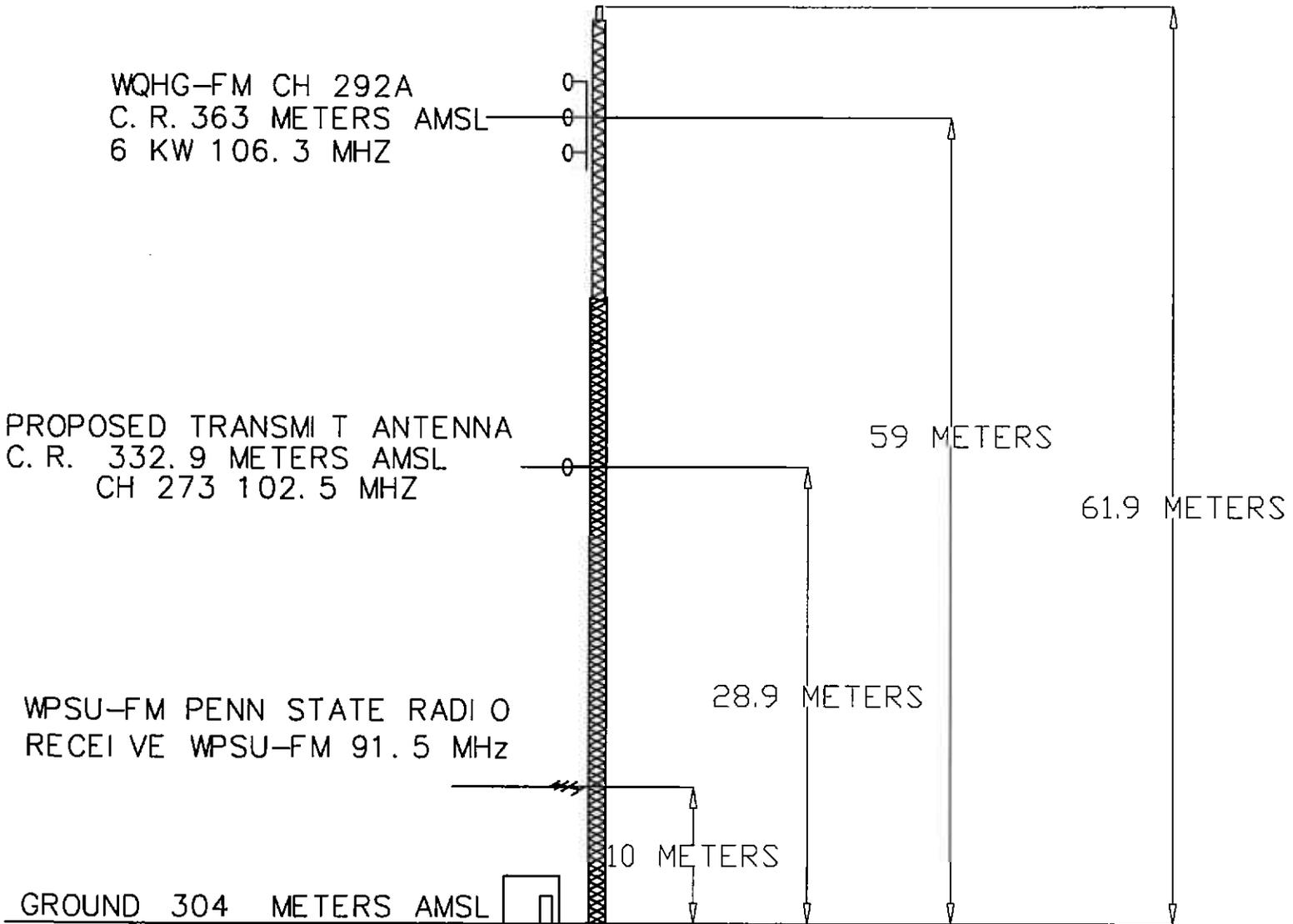
Huntingdon Translator Site  
 (WWLY PA HUNTINGDON)  
 40° 29' 11.00" N Latitude  
 77° 59' 35.00" W Longitude  
 (NAD27)



- Sample Points:
- ① Equipment Building
  - ② Closest Edge of Mobile Home
  - ③ Closest Edge of House

EXHIBIT 16  
Attachment 2

PROPOSED TRANSLATOR VERTICAL SKETCH  
HUNTINGDON, PA, CO-LOCATED WITH WWLY-FM

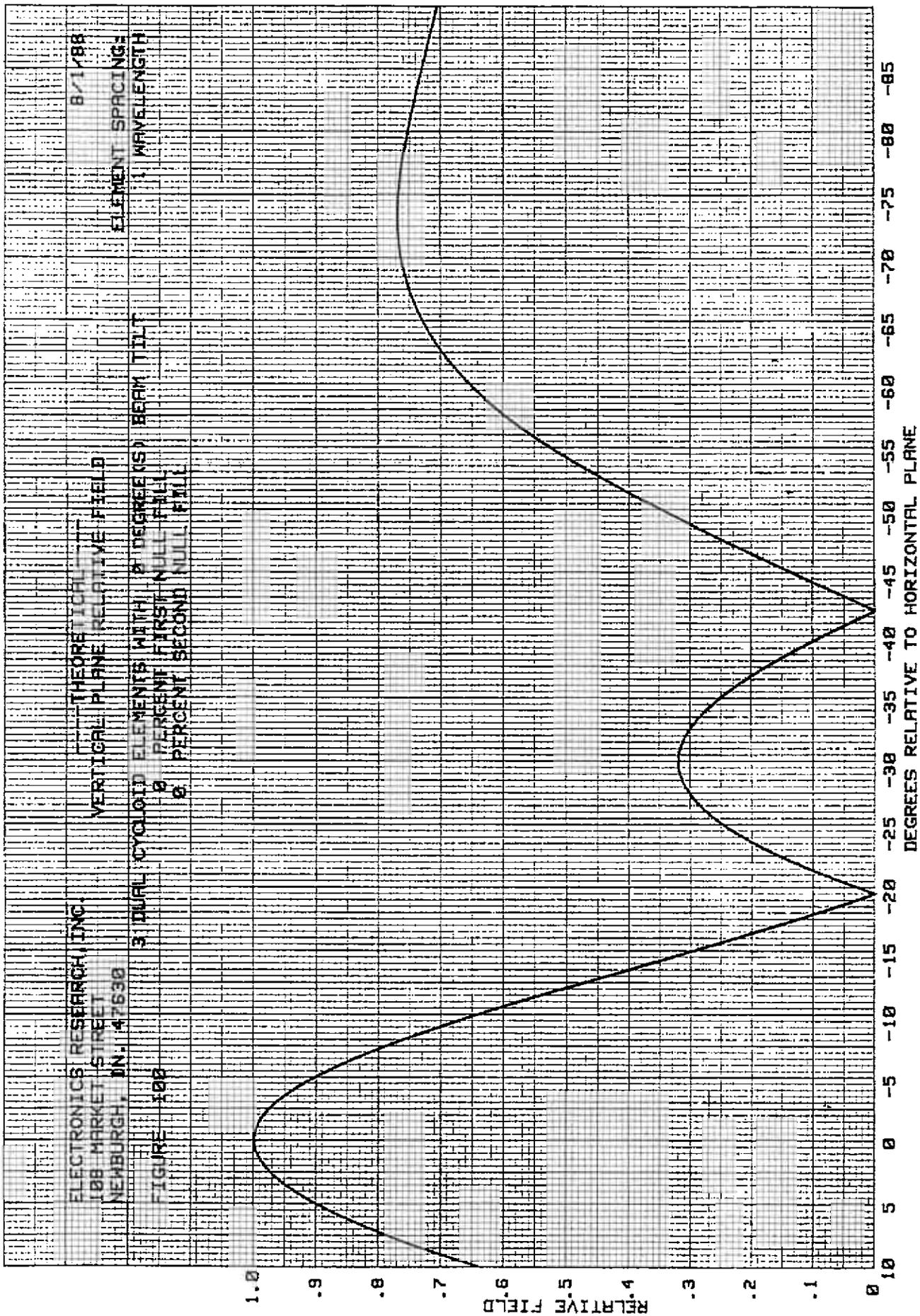


GEOGRAPHICAL COORDINATES

40 DEG 29 MIN 11 SEC (N)  
77 DEG 59 MIN 35 SEC (W)

46 1320

K&E ELECTRONICS  
100 X 10 TO 15 INCH 7.5 IN LENGTH  
APPROX 1/2 INCH DIAMETER



ELECTRONICS RESEARCH, INC.  
188 MARKET STREET  
NEWBURGH, IN. 47630

3 DUAL CYCLOID ELEMENTS WITH 0 DEGREES BEAM TILT  
10 PERCENT FIRST NULL FILL  
10 PERCENT SECOND NULL FILL

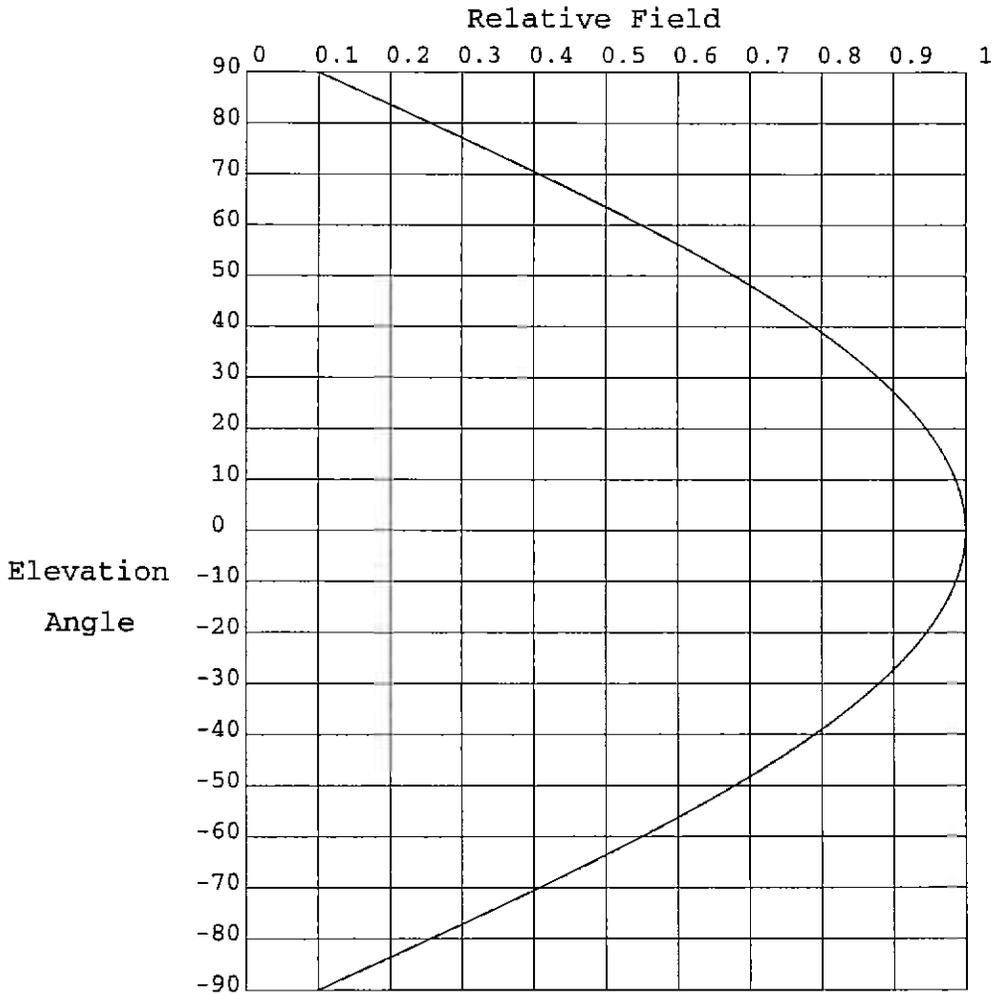
8/1/88  
ELEMENT SPACING

WAVELENGTH

FIGURE 10B

DEGREES RELATIVE TO HORIZONTAL PLANE

EXHIBIT 16



Elevation Pattern

Scale: Linear

Systems With Reliability Inc.

Units: Field, Relative

CLIENT: Carl Fisher

Date: 3/11/03

ANTENNA TYPE: FMEC/1

FREQUENCY: 102.5

PATTERN POL.: Circular

DIRECTIVITY(Peak) 0.883/-0.539 dBd

Beam Tilt (Deg.) : 0

DIRECTIVITY(Horiz) 0.883/-0.539 dBd

Null Fill(s) (%) 0, 0, 0

Micro-Tek Eng. ver. 2.5.03

## Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	
3.2	.999 (-0.012)	-4.4	.997 (-0.023)	-12.0	.98 (-0.173 )
3.0	.999 (-0.011)	-4.6	.997 (-0.025)	-12.2	.98 (-0.178 )
2.8	.999 (-0.009)	-4.8	.997 (-0.027)	-12.4	.979 (-0.184 )
2.6	.999 (-0.008)	-5.0	.997 (-0.03)	-12.6	.978 (-0.19 )
2.4	.999 (-0.007)	-5.2	.996 (-0.032)	-12.8	.978 (-0.196 )
2.2	.999 (-0.006)	-5.4	.996 (-0.035)	-13.0	.977 (-0.203 )
2.0	.999 (-0.005)	-5.6	.996 (-0.037)	-13.2	.976 (-0.209 )
1.8	1.00 (-0.004)	-5.8	.995 (-0.04)	-13.4	.975 (-0.215 )
1.6	1.00 (-0.003)	-6.0	.995 (-0.043)	-13.6	.975 (-0.222 )
1.4	1.00 (-0.002)	-6.2	.995 (-0.046)	-13.8	.974 (-0.229 )
1.2	1.00 (-0.002)	-6.4	.994 (-0.049)	-14.0	.973 (-0.235 )
1.0	1.00 (-0.001)	-6.6	.994 (-0.052)	-14.2	.973 (-0.242 )
.8	1.00 (-0.001)	-6.8	.994 (-0.055)	-14.4	.972 (-0.249 )
.6	1.00 (0)	-7.0	.993 (-0.058)	-14.6	.971 (-0.256 )
.4	1.00 (0)	-7.2	.993 (-0.062)	-14.8	.97 (-0.263 )
.2	1.00 (0)	-7.4	.993 (-0.065)	-15.0	.969 (-0.271 )
.0	1.00 (0)	-7.6	.992 (-0.069)	-15.2	.969 (-0.278 )
-.2	1.00 (0)	-7.8	.992 (-0.073)	-15.4	.968 (-0.285 )
-.4	1.00 (0)	-8.0	.991 (-0.076)	-15.6	.967 (-0.293 )
-.6	1.00 (0)	-8.2	.991 (-0.08)	-15.8	.966 (-0.3 )
-.8	1.00 (-0.001)	-8.4	.99 (-0.084)	-16.0	.965 (-0.308 )
-1.0	1.00 (-0.001)	-8.6	.99 (-0.088)	-16.2	.964 (-0.316 )
-1.2	1.00 (-0.002)	-8.8	.989 (-0.093)	-16.4	.963 (-0.324 )
-1.4	1.00 (-0.002)	-9.0	.989 (-0.097)	-16.6	.962 (-0.332 )
-1.6	1.00 (-0.003)	-9.2	.988 (-0.101)	-16.8	.962 (-0.34 )
-1.8	1.00 (-0.004)	-9.4	.988 (-0.106)	-17.0	.961 (-0.348 )
-2.0	.999 (-0.005)	-9.6	.987 (-0.11)	-17.2	.96 (-0.357 )
-2.2	.999 (-0.006)	-9.8	.987 (-0.115)	-17.4	.959 (-0.365 )
-2.4	.999 (-0.007)	-10.0	.986 (-0.12)	-17.6	.958 (-0.374 )
-2.6	.999 (-0.008)	-10.2	.986 (-0.124)	-17.8	.957 (-0.383 )
-2.8	.999 (-0.009)	-10.4	.985 (-0.129)	-18.0	.956 (-0.391 )
-3.0	.999 (-0.011)	-10.6	.985 (-0.134)	-18.2	.955 (-0.4 )
-3.2	.999 (-0.012)	-10.8	.984 (-0.14)	-18.4	.954 (-0.409 )
-3.4	.998 (-0.014)	-11.0	.983 (-0.145)	-18.6	.953 (-0.418 )
-3.6	.998 (-0.015)	-11.2	.983 (-0.15)	-18.8	.952 (-0.427 )
-3.8	.998 (-0.017)	-11.4	.982 (-0.156)	-19.0	.951 (-0.437 )
-4.0	.998 (-0.019)	-11.6	.982 (-0.161)	-19.2	.95 (-0.446 )
-4.2	.998 (-0.021)	-11.8	.981 (-0.167)	-19.4	.949 (-0.456 )

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Page 1 of 2

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Beam Tilt (Deg.) : 0

DIRECTIVITY(Horiz) 0.883/-0.539 dBd

Null Fill(s)(%) 0, 0, 0

Micro-Tek Eng. ver. 2.5.03

Attachment 4

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## Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
-19.6	.948 (-0.465)	-27.2	.90 (-0.911)	-54.0	.629 (-4.027 )
-19.8	.947 (-0.475)	-27.4	.899 (-0.924)	-55.0	.616 (-4.205 )
-20.0	.946 (-0.485)	-27.6	.898 (-0.939)	-56.0	.603 (-4.39 )
-20.2	.945 (-0.495)	-27.8	.896 (-0.953)	-57.0	.59 (-4.58 )
-20.4	.944 (-0.505)	-28.0	.895 (-0.967)	-58.0	.577 (-4.778 )
-20.6	.942 (-0.515)	-28.2	.893 (-0.981)	-59.0	.564 (-4.982 )
-20.8	.941 (-0.525)	-28.4	.892 (-0.996)	-60.0	.55 (-5.193 )
-21.0	.94 (-0.535)	-28.6	.89 (-1.01)	-61.0	.536 (-5.411 )
-21.2	.939 (-0.546)	-28.8	.889 (-1.025)	-62.0	.523 (-5.638 )
-21.4	.938 (-0.556)	-29.0	.887 (-1.04)	-63.0	.509 (-5.873 )
-21.6	.937 (-0.567)	-29.2	.886 (-1.055)	-64.0	.495 (-6.116 )
-21.8	.936 (-0.578)	-29.4	.884 (-1.07)	-65.0	.48 (-6.369 )
-22.0	.934 (-0.589)	-29.6	.883 (-1.085)	-66.0	.466 (-6.631 )
-22.2	.933 (-0.6)	-29.8	.881 (-1.101)	-67.0	.452 (-6.904 )
-22.4	.932 (-0.611)	-30.0	.879 (-1.116)	-68.0	.437 (-7.187 )
-22.6	.931 (-0.622)	-31.0	.871 (-1.195)	-69.0	.423 (-7.483 )
-22.8	.93 (-0.633)	-32.0	.863 (-1.277)	-70.0	.408 (-7.791 )
-23.0	.928 (-0.645)	-33.0	.855 (-1.363)	-71.0	.393 (-8.112 )
-23.2	.927 (-0.656)	-34.0	.846 (-1.451)	-72.0	.378 (-8.448 )
-23.4	.926 (-0.668)	-35.0	.837 (-1.543)	-73.0	.363 (-8.799 )
-23.6	.925 (-0.68)	-36.0	.828 (-1.638)	-74.0	.348 (-9.167 )
-23.8	.923 (-0.692)	-37.0	.819 (-1.737)	-75.0	.333 (-9.553 )
-24.0	.922 (-0.704)	-38.0	.809 (-1.839)	-76.0	.318 (-9.959 )
-24.2	.921 (-0.716)	-39.0	.799 (-1.944)	-77.0	.302 (-10.387 )
-24.4	.92 (-0.728)	-40.0	.789 (-2.054)	-78.0	.287 (-10.839 )
-24.6	.918 (-0.74)	-41.0	.779 (-2.167)	-79.0	.272 (-11.317 )
-24.8	.917 (-0.753)	-42.0	.769 (-2.283)	-80.0	.256 (-11.826 )
-25.0	.916 (-0.765)	-43.0	.758 (-2.404)	-81.0	.241 (-12.367 )
-25.2	.914 (-0.778)	-44.0	.747 (-2.529)	-82.0	.225 (-12.946 )
-25.4	.913 (-0.791)	-45.0	.736 (-2.658)	-83.0	.21 (-13.569 )
-25.6	.912 (-0.803)	-46.0	.725 (-2.791)	-84.0	.194 (-14.241 )
-25.8	.91 (-0.816)	-47.0	.714 (-2.928)	-85.0	.178 (-14.97 )
-26.0	.909 (-0.83)	-48.0	.702 (-3.071)	-86.0	.163 (-15.768 )
-26.2	.908 (-0.843)	-49.0	.69 (-3.217)	-87.0	.147 (-16.648 )
-26.4	.906 (-0.856)	-50.0	.679 (-3.369)	-88.0	.131 (-17.627 )
-26.6	.905 (-0.87)	-51.0	.666 (-3.525)	-89.0	.116 (-18.733 )
-26.8	.903 (-0.883)	-52.0	.654 (-3.687)	-90.0	.10 (-20 )
-27.0	.902 (-0.897)	-53.0	.642 (-3.854)	90.0	.00 (-50 )

Systems With Reliability Inc.

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