KRSK-FM 286C1 Molalla, Oregon
NIER Analysis

Facilities Proposed

The proposed operation will be on Channel 286C1 (105.1 MHz) with an effective radiated power of 64 kilowatts. Operation is proposed with a 4-level circularly-polarized omni-directional panel antenna. The antenna will be mounted on an existing free-standing tower located at 4700 Council Crest Drive in Portland, Oregon. The FCC Antenna Structure Registration Number for the tower is 1033770. The other users of this tower are:

Station	Channel	Community	ERP
KBOO	214C1	Portland, OR	26.5 kW
KGON	222C	Portland, OR	100 kW
KPDQ	229C	Portland, OR	100 kW
KXJM	238C	Portland, OR	100 kW
KKSN	246C	Portland, OR	100 kW
KWJJ	258C1	Portland, OR	52 kW
KFIS	281C3/C2	Scappoose, OR	1.65 kW / 7.0 kW

KRSK will not transmit from the “spiral” master antenna shared by the other stations on this tower.

NIER Calculations

Study of the area within 1000 meters of the proposed site reveals no likely sources of non-ionizing radiation other than those listed above. Thus, the ground level NIER values near the base of the proposed structure are believed to be negligible. Precise calculations are made only with regard to the levels from this proposal and the users of the spiral antenna.

The power density calculations shown below were made using the techniques outlined in the EPA report titled: *An Engineering Assessment of the Potential Impact of Federal Radiation Protection Guidance on the AM, FM, and TV Broadcast Services* (Gailey & Tell, April, 1985). All calculations contained herein are based on vertical plane radiation patterns provided by the manufacturers of the panel and spiral antennas. These vertical plane patterns have been entered into the Commission’s FMModel software program.

"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. Equation #1, contained in the Gailey & Tell report and shown below, was used

to calculate the ground level power density figures from each antenna at incremental distances from the base of its supporting tower.

$$S(FW/cm^2) = \frac{(\text{Adjusted ERP in Watts}) \times 1.64 \times 2.56 \times 100}{4 \times B \times (\text{Distance})^2}$$

Where: Adjusted ERP in Watts is the maximum lobe effective radiated power times the element pattern factor times the array pattern factor.

Distance = 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 1000 meters. Values past this point are increasingly negligible.

Calculations of the power density produced by the proposed KRSK antenna system assume the attached vertical plane radiation pattern provided by Shively for the Model 6014-4/3 panel antenna with 0.9 wavelength spacing. The highest calculated ground level power density occurs at a distance of 66 meters from the base of the antenna support structure. At this point the power density is calculated to be 13.0 FW/cm².

Calculations of the power density produced by the users of the Jampro spiral antenna assume the attached vertical plane radiation pattern provided by Mr. Ali R. Mahnad, the designer of the antenna[1].

[1]The vertical plane pattern for the Jampro spiral antenna at 104.1 MHz was provided by Mr. Ali R. Mahnad, Ph.D. (currently of Micro-Tek Engineering), in coordination with Jampro. Mr. Mahnad oversaw the original design and construction of the spiral antenna when he was employed by Jampro, and is the individual most familiar with this antenna.

For the purposes of this analysis, the respective ERP's of all seven stations using the spiral antenna have been summed (assuming the worst-case ERP of 7 kW for KFIS, corresponding to the outstanding upgrade application for that station), and the ground-level power density has been calculated using the 104.1 MHz vertical plane radiation pattern. It is true that the vertical plane radiation pattern will vary for each frequency used on the spiral antenna. However, given the very low fields radiated by the spiral antenna below 45 degrees

The highest calculated ground level power density for all seven users combined occurs at a distance of 627 meters from the base of the antenna support structure. At this point the power density is calculated to be 7.9 FW/cm².

These calculations show that the maximum calculated power density produced at two meters above ground level by the proposed operation of KRSK and the present operation of the Jampro spiral antenna users is 20.9 FW/cm^2, just 10.5% of 200 FW/cm^2 (the FCC standard for uncontrolled environments).

Public access to the site is restricted by a locked gate and the antenna tower is posted with warning signs. Pursuant to OST Bulletin No. 65, all station personnel and contractors are required to follow appropriate safety procedures before any work is commenced on the antenna tower, including reduction in power or discontinuance of operation before any maintenance work is undertaken.

Extensive power density measurements have been performed at multiple locations at this site to assure compliance with the applicable standards and the safety of station personnel and contractors, and the general public.

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 radiation in excess of FCC guidelines.

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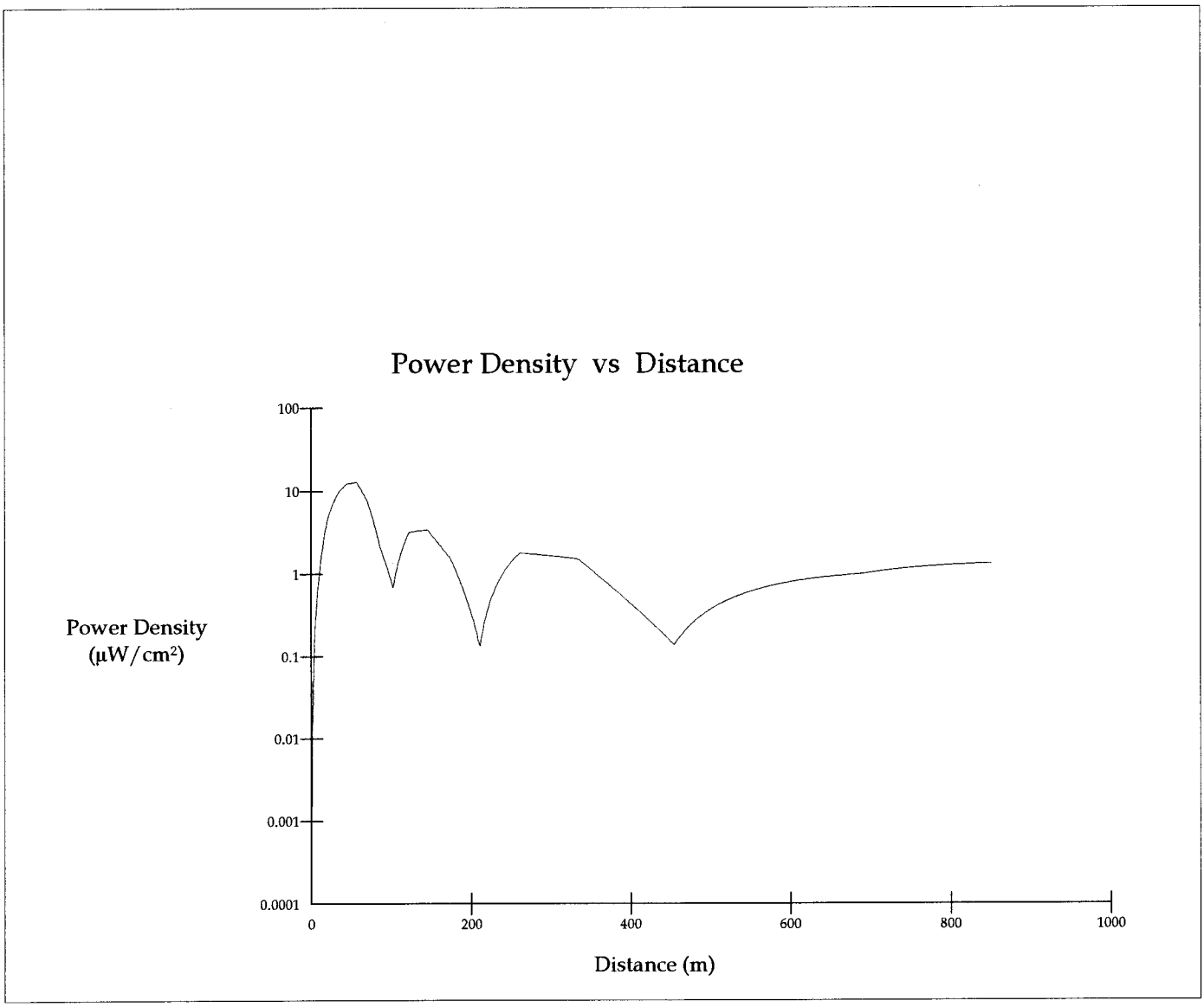
of depression, the impact of this variation will have minimal effect on the contribution of the stations on this antenna, and will not cause the ground-level power density to exceed the uncontrolled environment standard at any location in the vicinity of the tower.

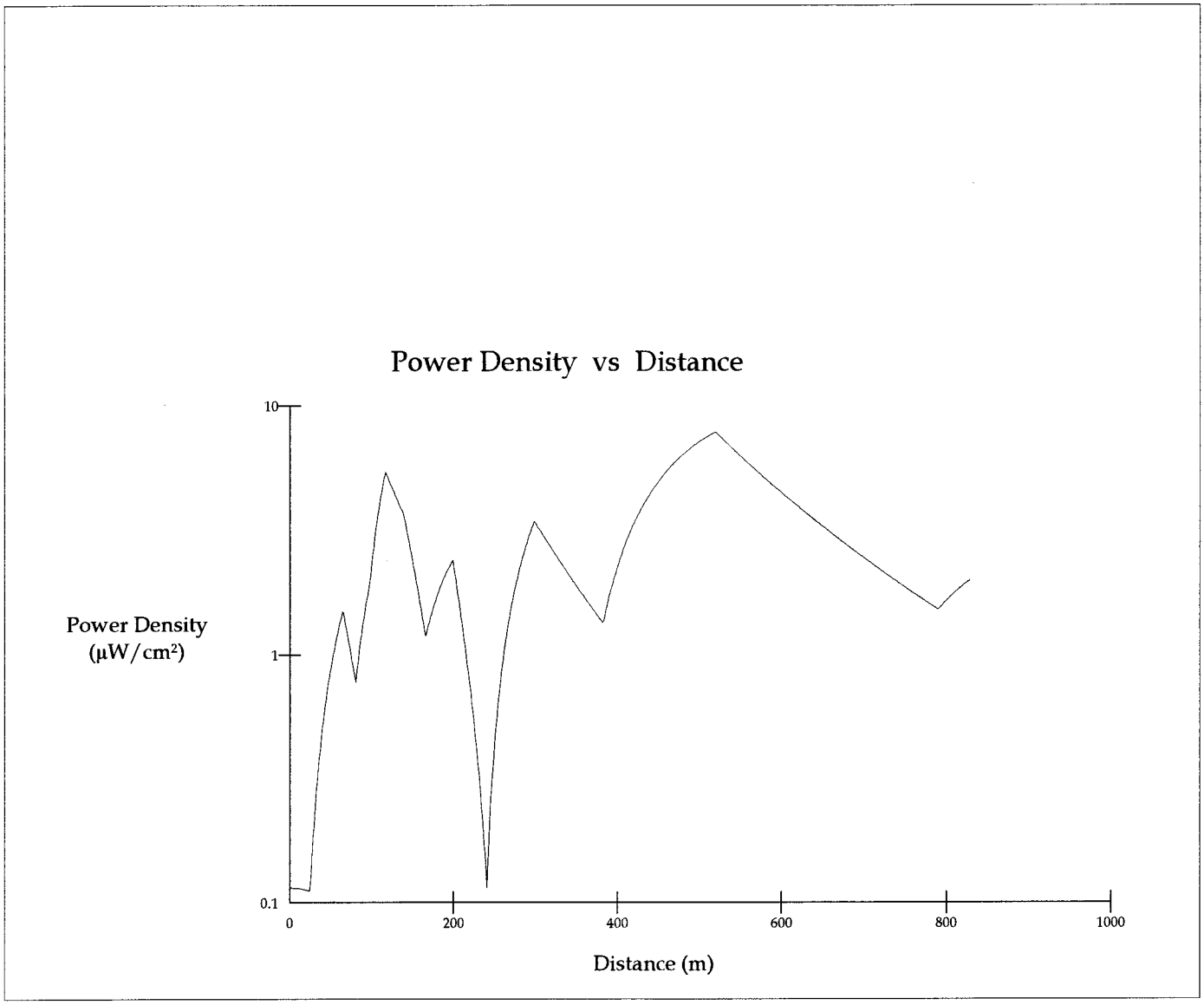


Ground-Level NIER Analysis **OET FMModel**

KRSK(FM) Molalla

Antenna Type:	Shively panel 6014-4/3
Number of Elements:	4
Element Spacing:	0.9 wavelength
Distance:	1000 meters
Horizontal ERP:	64 kW
Vertical ERP:	64 kW
Antenna Height:	145 meters AGL

Maximum Power Density is 13.0 μW/cm^2 at 66 meters from the antenna structure.



Ground-Level NIER Analysis **OET FMModel**

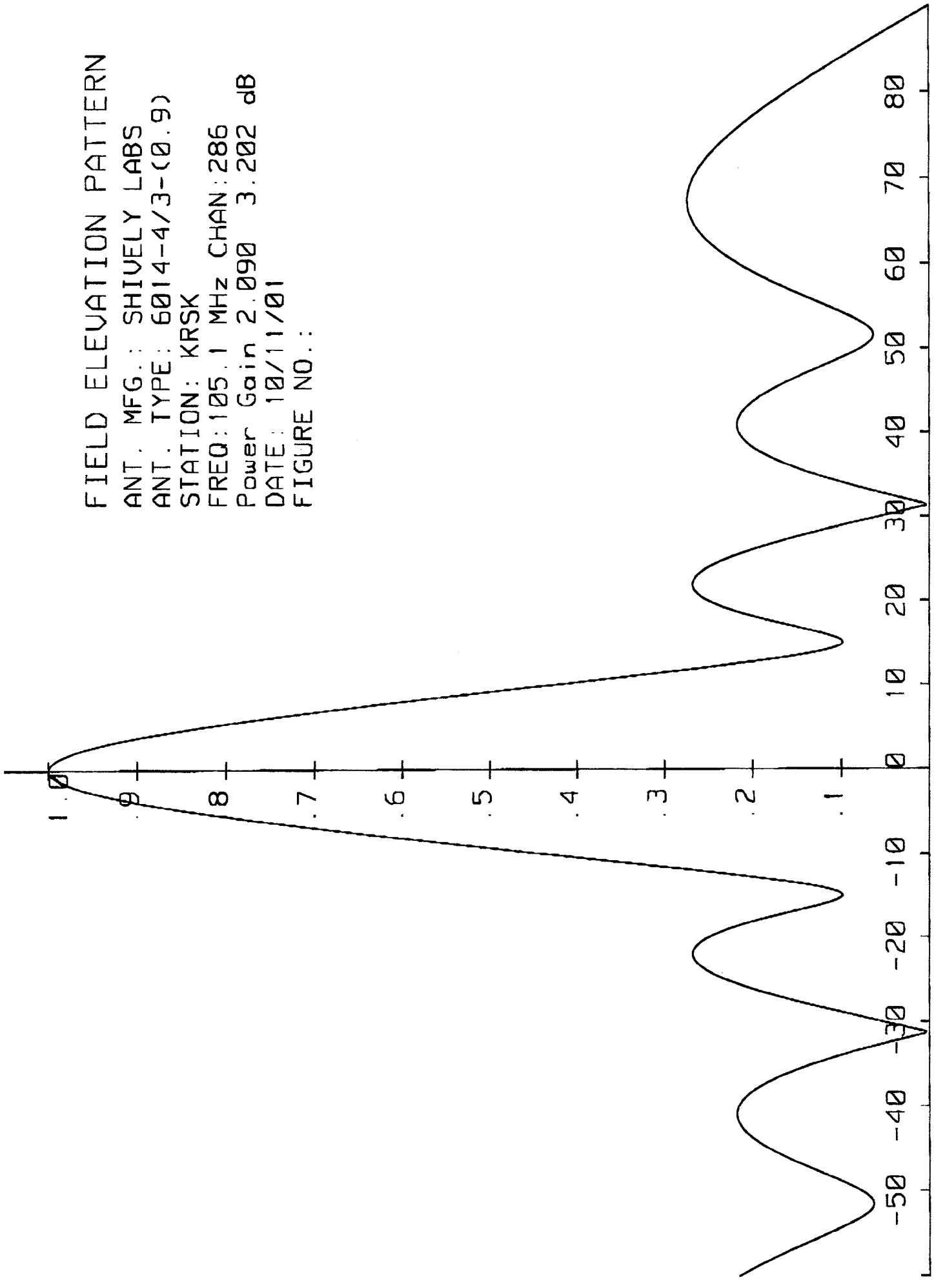
Spiral Antenna Users (KBOO, KGON, KPDQ, KXJM, KKSN, KWJJ, KFIS)

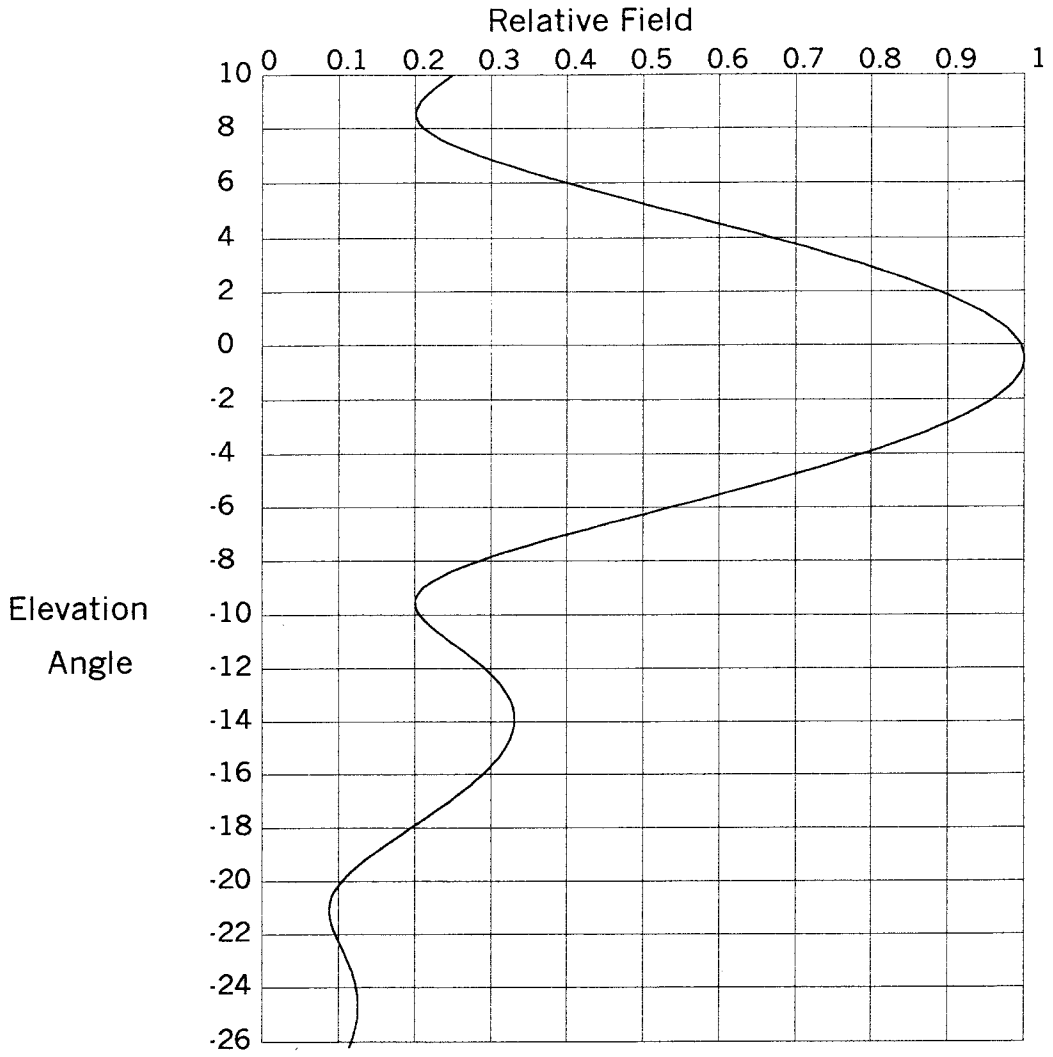
Antenna Type: Jampro Spiral Antenna
Number of Elements: dna
Element Spacing: dna

Distance: 1000 meters
Horizontal ERP: 485.5 kW (total for 7 stations)
Vertical ERP: 485.5 kW (total for 7 stations)

Antenna Height: 170 meters AGL

Maximum Power Density is 7.9 μW/cm^2 at 627 meters from the antenna structure.


FIELD ELEVATION PATTERN
ANT. MFG.: SHIVELY LABS
ANT. TYPE: 6014-4/3-(0.9)
STATION: KRSK
FREQ:105.1 MHz CHAN:286
Power Gain 2.090 3.202 dB
DATE: 10/11/01
FIGURE NO.:
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
0
10
20
30
40
50
60
70
80
-50
-40
-30
-20
-10



Elevation Pattern

Scale: Linear

Units: Field, Relative

Micro-Tek Engineering

Date: 2/17/01

CLIENT: *KJUN-FM*
ANTENNA TYPE: Multi-Channel FM Spiral Antenna
FREQUENCY: 104.1
PATTERN POL.: Circular
DIRECTIVITY(Peak): 6.345/8.024dBd
DIRECTIVITY(Horiz):

Beam Tilt (Deg.) : -.5

Null Fill(s)(%) : *20, 0, 0*

Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
3.2	.766 (-2.31)	-4.4	.742 (-2.587)	-12.0	.293 (-10.675)
3.0	.789 (-2.056)	-4.6	.718 (-2.876)	-12.2	.30 (-10.455)
2.8	.811 (-1.818)	-4.8	.693 (-3.183)	-12.4	.307 (-10.26)
2.6	.832 (-1.597)	-5.0	.668 (-3.508)	-12.6	.313 (-10.091)
2.4	.852 (-1.391)	-5.2	.642 (-3.852)	-12.8	.318 (-9.947)
2.2	.871 (-1.201)	-5.4	.615 (-4.217)	-13.0	.323 (-9.828)
2.0	.889 (-1.025)	-5.6	.589 (-4.602)	-13.2	.326 (-9.733)
1.8	.905 (-0.864)	-5.8	.562 (-5.009)	-13.4	.329 (-9.662)
1.6	.921 (-0.718)	-6.0	.535 (-5.437)	-13.6	.331 (-9.615)
1.4	.935 (-0.586)	-6.2	.508 (-5.888)	-13.8	.331 (-9.59)
1.2	.948 (-0.467)	-6.4	.481 (-6.363)	-14.0	.332 (-9.589)
1.0	.959 (-0.362)	-6.6	.454 (-6.86)	-14.2	.331 (-9.61)
.8	.969 (-0.271)	-6.8	.427 (-7.382)	-14.4	.329 (-9.653)
.6	.978 (-0.193)	-7.0	.402 (-7.926)	-14.6	.327 (-9.718)
.4	.985 (-0.128)	-7.2	.376 (-8.492)	-14.8	.323 (-9.804)
.2	.991 (-0.077)	-7.4	.352 (-9.078)	-15.0	.319 (-9.912)
.0	.996 (-0.038)	-7.6	.328 (-9.68)	-15.2	.315 (-10.042)
-.2	.999 (-0.013)	-7.8	.306 (-10.294)	-15.4	.309 (-10.193)
-.4	1.00 (0)	-8.0	.285 (-10.91)	-15.6	.303 (-10.366)
-.6	1.00 (0)	-8.2	.266 (-11.517)	-15.8	.296 (-10.561)
-.8	.998 (-0.013)	-8.4	.248 (-12.101)	-16.0	.289 (-10.778)
-1.0	.995 (-0.039)	-8.6	.233 (-12.641)	-16.2	.281 (-11.016)
-1.2	.991 (-0.078)	-8.8	.221 (-13.114)	-16.4	.273 (-11.278)
-1.4	.985 (-0.131)	-9.0	.211 (-13.499)	-16.6	.264 (-11.562)
-1.6	.978 (-0.196)	-9.2	.205 (-13.774)	-16.8	.255 (-11.869)
-1.8	.969 (-0.274)	-9.4	.201 (-13.927)	-17.0	.245 (-12.2)
-2.0	.959 (-0.366)	-9.6	.201 (-13.957)	-17.2	.236 (-12.555)
-2.2	.947 (-0.471)	-9.8	.202 (-13.872)	-17.4	.226 (-12.934)
-2.4	.934 (-0.59)	-10.0	.207 (-13.693)	-17.6	.215 (-13.337)
-2.6	.92 (-0.723)	-10.2	.213 (-13.441)	-17.8	.205 (-13.766)
-2.8	.905 (-0.869)	-10.4	.22 (-13.14)	-18.0	.195 (-14.219)
-3.0	.888 (-1.03)	-10.6	.229 (-12.811)	-18.2	.184 (-14.697)
-3.2	.87 (-1.206)	-10.8	.238 (-12.469)	-18.4	.174 (-15.199)
-3.4	.851 (-1.397)	-11.0	.247 (-12.129)	-18.6	.164 (-15.724)
-3.6	.831 (-1.603)	-11.2	.257 (-11.799)	-18.8	.154 (-16.27)
-3.8	.811 (-1.824)	-11.4	.267 (-11.485)	-19.0	.144 (-16.833)
-4.0	.789 (-2.062)	-11.6	.276 (-11.191)	-19.2	.135 (-17.409)
-4.2	.766 (-2.316)	-11.8	.284 (-10.921)	-19.4	.126 (-17.989)

Micro-Tek Engineering

Date: 2/17/01

CLIENT: *KJUN-FM*
ANTENNA TYPE: Multi-Channel FM Spiral Antenna
FREQUENCY: 104.1
PATTERN POL.: Circular
DIRECTIVITY(Peak): 6.345/8.024dBd
DIRECTIVITY(Horiz):

Beam Tilt (Deg.) : -.5
Null Fill(s)(%) : *20, 0, 0*

Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
-19.6	.118 (-18.566)	-27.2	.095 (-20.408)	-54.0	.061 (-24.271)
-19.8	.111 (-19.124)	-27.4	.091 (-20.835)	-55.0	.052 (-25.737)
-20.0	.104 (-19.649)	-27.6	.086 (-21.309)	-56.0	.043 (-27.367)
-20.2	.099 (-20.12)	-27.8	.081 (-21.833)	-57.0	.035 (-29.006)
-20.4	.094 (-20.519)	-28.0	.076 (-22.414)	-58.0	.03 (-30.336)
-20.6	.091 (-20.827)	-28.2	.07 (-23.059)	-59.0	.028 (-30.978)
-20.8	.089 (-21.031)	-28.4	.065 (-23.775)	-60.0	.029 (-30.854)
-21.0	.088 (-21.126)	-28.6	.059 (-24.576)	-61.0	.031 (-30.282)
-21.2	.088 (-21.117)	-28.8	.053 (-25.476)	-62.0	.033 (-29.616)
-21.4	.089 (-21.017)	-29.0	.047 (-26.497)	-63.0	.035 (-29.049)
-21.6	.091 (-20.845)	-29.2	.041 (-27.669)	-64.0	.037 (-28.65)
-21.8	.093 (-20.62)	-29.4	.035 (-29.035)	-65.0	.038 (-28.432)
-22.0	.096 (-20.361)	-29.6	.029 (-30.664)	-66.0	.038 (-28.389)
-22.2	.099 (-20.085)	-29.8	.023 (-32.673)	-67.0	.038 (-28.507)
-22.4	.102 (-19.806)	-30.0	.017 (-35.284)	-68.0	.036 (-28.773)
-22.6	.106 (-19.532)	-31.0	.012 (-38.364)	-69.0	.035 (-29.174)
-22.8	.109 (-19.273)	-32.0	.038 (-28.338)	-70.0	.033 (-29.701)
-23.0	.112 (-19.032)	-33.0	.06 (-24.479)	-71.0	.03 (-30.344)
-23.2	.115 (-18.815)	-34.0	.075 (-22.481)	-72.0	.028 (-31.098)
-23.4	.117 (-18.622)	-35.0	.084 (-21.508)	-73.0	.025 (-31.956)
-23.6	.119 (-18.455)	-36.0	.086 (-21.262)	-74.0	.023 (-32.914)
-23.8	.121 (-18.315)	-37.0	.083 (-21.617)	-75.0	.02 (-33.97)
-24.0	.123 (-18.204)	-38.0	.075 (-22.517)	-76.0	.018 (-35.12)
-24.2	.124 (-18.12)	-39.0	.064 (-23.906)	-77.0	.015 (-36.363)
-24.4	.125 (-18.065)	-40.0	.053 (-25.592)	-78.0	.013 (-37.696)
-24.6	.125 (-18.038)	-41.0	.045 (-26.915)	-79.0	.011 (-39.118)
-24.8	.125 (-18.039)	-42.0	.045 (-26.846)	-80.0	.009 (-40.625)
-25.0	.125 (-18.068)	-43.0	.053 (-25.486)	-81.0	.008 (-42.213)
-25.2	.124 (-18.126)	-44.0	.064 (-23.848)	-82.0	.006 (-43.876)
-25.4	.123 (-18.213)	-45.0	.075 (-22.473)	-83.0	.005 (-45.601)
-25.6	.121 (-18.329)	-46.0	.084 (-21.473)	-84.0	.004 (-47.373)
-25.8	.119 (-18.475)	-47.0	.091 (-20.835)	-85.0	.003 (-49.167)
-26.0	.117 (-18.651)	-48.0	.094 (-20.523)	-86.0	.003 (-50.953)
-26.2	.114 (-18.858)	-49.0	.094 (-20.505)	-87.0	.002 (-52.693)
-26.4	.111 (-19.097)	-50.0	.092 (-20.759)	-88.0	.002 (-54.346)
-26.6	.108 (-19.37)	-51.0	.086 (-21.268)	-89.0	.002 (-55.882)
-26.8	.104 (-19.678)	-52.0	.079 (-22.026)	-90.0	.001 (-57.299)
-27.0	.10 (-20.023)	-53.0	.071 (-23.029)		

Micro-Tek Engineering

Date: 2/17/01

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