

SUPPLEMENTAL
ENGINEERING STATEMENT
ON BEHALF OF
ORCA RADIO, INC.
FCC FILE NO. BPH-20050816AAL
KWJZ(FM), SEATTLE, WASHINGTON
CHANNEL 255C 58 KW 698 METERS

AUGUST 2005

COHEN, DIPPELL AND EVERIST, P.C.
CONSULTING ENGINEERS
RADIO AND TELEVISION
WASHINGTON, D.C.

COHEN, DIPPELL AND EVERIST, P. C.

City of Washington)
) ss
District of Columbia)

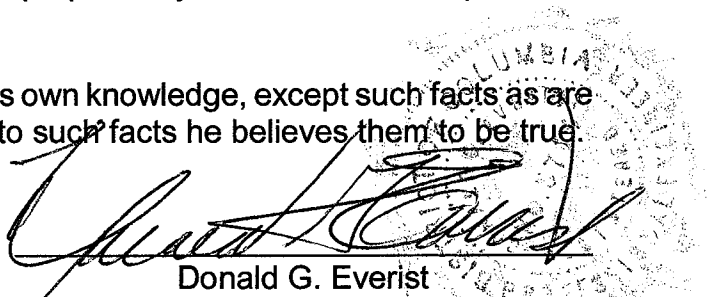
Donald G. Everist, being duly sworn upon his oath, deposes and states that:

He is a graduate electrical engineer, a Registered Professional Engineer in the District of Columbia, and is President, Secretary and Treasurer of Cohen, Dippell and Everist, P.C., Consulting Engineers, Radio - Television, with offices at 1300 L Street, N.W., Suite 1100, Washington, D.C. 20005;

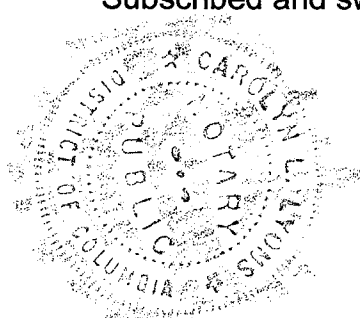
That his qualifications are a matter of record in the Federal Communications Commission;

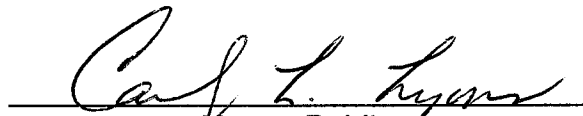
That the attached engineering report was prepared by him or under his supervision and direction and

That the facts stated herein are true of his own knowledge, except such facts as are stated to be on information and belief, and as to such facts he believes them to be true.


Donald G. Everist
District of Columbia
Professional Engineer
Registration No. 5714

Subscribed and sworn to before me this 29th day of August, 2005.




Notary Public

My Commission Expires: 2/28/2008

COHEN, DIPPELL AND EVERIST, P. C.

City of Washington)
) ss
District of Columbia)

Martin R. Doczkat being duly sworn upon his oath, deposes and states that:

He is a graduate electrical engineer of the Pennsylvania State University, and is a staff engineer at Cohen, Dippell and Everist, P.C., Consulting Engineers, Radio - Television, with offices at 1300 L Street, N.W., Suite 1100, Washington, D.C. 20005;

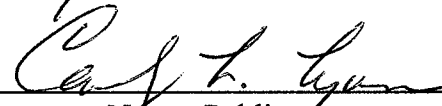
That the attached engineering report was prepared by him or under his supervision and direction and

That the facts stated herein are true of his own knowledge, except such facts as are stated to be on information and belief, and as to such facts he believes them to be true.



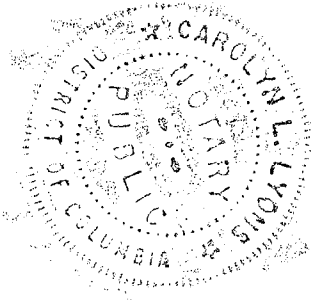
Martin R. Doczkat

Subscribed and sworn to before me this 29th day of August, 2005.



Notary Public

My Commission Expires: 2/28/2008



Introduction

This supplemental engineering report has been prepared on behalf of Orca Radio, Inc. in support of its application for a construction permit for a change in facilities and change in site of FM broadcast station KWJZ(FM) licensed to Seattle, Washington.

This supplemental engineering statement supplies additional information with reference to radiofrequency field levels for the proposed multi-use site. There are no changes from that supplied in the engineering statement entitled, "Engineering Statement Re Application for a Construction Permit for Site Change, KWJZ(FM), Seattle, Washington, Channel 255C, 58 kW, 698 Meters HAAT, August 2005", FCC File No. BPH-20050816AAL.

Environmental Statement

The radiofrequency field evaluation is based on a 116 kW (max) operation (58 kW H plus 58 kW V) with a center of radiation above ground of 218.8 feet (66.7 meters). Based on information from the antenna manufacturer downward field value is 0.05, the proposed operation complies with the FCC Rules, Section 1.1307, as it meets the provisions of the FCC radiation frequency field ("RFF") guideline as the RFF 2 meters above ground is computed to be $2 \mu\text{W}/\text{cm}^2$ or well below the $200 \mu\text{W}/\text{cm}^2$ FCC guideline for uncontrolled exposure limit. This is based upon the methodology contained in OET Bulletin 65 dated August 1997 and Appendix A. Exhibits E-4 and E-5 are supplied for convenience.

Therefore, the RFF study will consider the following stations:

<u>Station</u>	<u>Frequency</u> MHz	<u>Status</u>
KWJZ(FM)	98.9	Prop
KMPS-FM	94.1	Lic
KJAQ(FM)	96.5	CP
KZOK-FM	102.5	Lic

<u>Station</u>	<u>Frequency</u> MHz	<u>Status</u>
KBKS-FM	106.1	Lic
KLSY-FM	92.5	Prop
KWPX(TV)	584-590	Lic
KWPX-DT	578-584	Lic
KWDK(TV)	722-728	Lic
KWDK-DT	638-644	Lic
KHCV(TV)	656-662	Lic
KHCV-DT	650-656	CP
KWOG(TV)	692-698	Lic
KWOG-DT	686-692	CP

The RFF contribution of each station will be calculated using the following formula:

$$S = \frac{33.4(F^2) \text{ Total ERP}}{R^2}$$

where:

S = power density in $\mu\text{W}/\text{cm}^2$

F = relative field factor

Total ERP = ERP Horizontal Polarization + ERP Vertical Polarization

R = RCAGL - 2 meters

ERP = RMS ERP in watts for DTV Stations

ERP = $[0.4 \text{ ERP}_V + \text{ERP}_A]$ for NTSC Stations

ERP_V = peak visual ERP in watts

ERP_A = RMS aural ERP in watts

KWJZ(FM) FM Facility

Channel 255	Freq:	98.9 MHz range
	ERP =	58 kW
	Polarization =	(Horizontal + Vertical)
	RCAGL -2 meters =	64.7 meters

KWJZ(FM) proposes to utilize an ERI, Type 1084-8CP antenna with 1.31° electrical beam tilt. The manufacturer's vertical plane pattern for this antenna is included in Exhibit E-4. Based on this plot, the field factor will be less than 0.05 at any angle greater than 65 degrees below the horizon. A value of 0.05 will be used in the calculation.

$F = 0.05$ (field factor)

KWJZ(FM) facility contributes less than 1.16% RFF for an uncontrolled environment two meters above ground at the tower site.

KMPS-FM FM Facility

Channel 231	Freq:	94.1 MHz
	Max ERP =	73 kW
	Polarization =	Horizontal + Vertical
	RCAGL -2 meters =	64.7 meters

KMPS-FM is using an ERI, Type 1084-8CP antenna with 1.31° electrical beam tilt. The manufacturer's vertical plane pattern for this type of master antenna is included in Exhibit E-4. Based on this plot, the field factor will be less than 0.05 at any angle greater than 65 degrees below the horizon. A value of 0.05 will be used in the calculation.

$F = 0.05$ (field factor)

The limit for an uncontrolled environment is 200 $\mu\text{W}/\text{cm}^2$ for a station broadcasting in the 30-300 MHz range.

Therefore:

KMPS-FM FM facility contributes less than 1.46% RFF for an uncontrolled environment two meters above ground at the tower site.

KJAO(FM) FM Facility

Channel 243	Freq:	96.5 MHz
	Max ERP =	52 kW
	Polarization =	Horizontal + Vertical
	RCAGL -2 meters =	64.7 meters

KJAQ(FM) is using an ERI, Type 1084-8CP antenna with 1.31° electrical beam tilt. The manufacturer's vertical plane pattern for this type of master antenna is included in Exhibit E-4. Based on this plot, the field factor will be less than 0.05 at any angle greater than 65 degrees below the horizon. A value of 0.05 will be used in the calculation.

$$S = \frac{33.4 (F^2) \text{ Tot ERP}}{R^2}$$

Tot ERP = 52 kW (Horizontal + Vertical)
R = 64.7 meters
F = 0.05 (field factor)

$$S = 2.1 \mu\text{W}/\text{cm}^2$$

KJAQ(FM) contributes less than 2.1 $\mu\text{W}/\text{cm}^2$ at 2 meters above ground. The limit for an uncontrolled environment is 200 $\mu\text{W}/\text{cm}^2$ for a station broadcasting in 30-300 MHz range.

Therefore:

KJAQ(FM) facility contributes less than 1.04% RFF for an uncontrolled environment two meters above ground at the tower site.

KZOK-FM FM Facility

Channel 273	Freq:	102.5 MHz range
	Max ERP =	73 kW
	Polarization =	Horizontal + Vertical
	RCAGL -2 meters =	64.7 meters

KZOK-FM is using an ERI, Type 1084-8CP antenna with 1.31° electrical beam tilt. The manufacturer's vertical plane pattern for this type of master antenna is included in Exhibit E-4. Based on this plot, the field factor will be less than 0.05 at any angle greater than 65 degrees below the horizon. A value of 0.05 will be used in the calculation.

$$S = \frac{33.4 (F^2) \text{ Tot ERP}}{R^2}$$

Tot ERP = 73 kW (Horizontal + Vertical)
R = 64.7 meters
F = 0.05 (field factor)

$$S = 2.9 \mu\text{W}/\text{cm}^2$$

KZOK-FM contributes less than 2.9 $\mu\text{W}/\text{cm}^2$ at 2 meters above ground. The limit for an uncontrolled environment is 200 $\mu\text{W}/\text{cm}^2$ for a station broadcasting in the 30-300 MHz range.

Therefore:

KZOK-FM facility contributes less than 1.46% RFF for an uncontrolled environment two meters above ground at the tower site.

KBKS-FM FM Facility

Channel 291 Freq: 106.1 MHz range
 ERP = 73 kW
 Polarization = Horizontal + Vertical
 RCAGL -2 meters = 64.7 meters

KBKS-FM is using an ERI, Type 1084-8CP antenna with 1.31° electrical beam tilt. The manufacturer's vertical plane pattern for this type of master antenna is included in Exhibit E-4. Based on this plot, the field factor will be less than 0.05 at any angle greater than 65 degrees below the horizon. A value of 0.05 will be used in the calculation.

$$S = \frac{33.4 (F^2) \text{ Tot ERP}}{R^2}$$

Tot ERP = 73 kW (Horizontal + Vertical)
 R = 64.7 meters
 F = 0.05 (field factor)

$$S = 2.9 \mu\text{W}/\text{cm}^2$$

KBKS-FM contributes 2.9 $\mu\text{W}/\text{cm}^2$ at 2 meters above ground.
 The limit for an uncontrolled environment is 200 $\mu\text{W}/\text{cm}^2$ for a station broadcasting in the 30-300 MHz range.

Therefore:

KBKS-FM facility contributes less than 1.46% RFF for an uncontrolled environment two meters above ground at the tower site.

KLSY-FM FM Facility

Channel 223 Freq: 92.5 MHz range
 ERP = 50 kW
 Polarization = Horizontal + Vertical
 RCAGL -2 meters = 64.7 meters

KLSY-FM proposes to utilize an ERI, Type 1084-8CP antenna with 1.31° electrical beam tilt. The manufacturer's vertical plane pattern for this antenna is included in Exhibit E-5. Based on this plot, the field factor will be less than 0.05 at any angle greater than 65 degrees below the horizon. A value of 0.05 will be used in the calculation.

$$S = \frac{33.4 (F^2) \text{ Tot ERP}}{R^2}$$

Tot ERP = 50 kW (Horizontal + Vertical)
 R = 64.7 meters
 F = 0.05 (field factor)

$$S = 2.0 \mu\text{W}/\text{cm}^2$$

KLSY-FM contributes less than 2.0 $\mu\text{W}/\text{cm}^2$ at 2 meters above ground.
 The limit for an uncontrolled environment is 200 $\mu\text{W}/\text{cm}^2$ for a station broadcasting in 30-300 MHz range.

Therefore:

KLSY-FM FM facility contributes less than 1.0% RFF for an uncontrolled environment two meters above ground at the tower site.

KWPX(TV) NTSC Facility

Channel 33	Freq:	584-590 MHz range
	ERP =	(0.4) [3720 kW (visual)]+[372 kW (aural)]
	Polarization =	Horizontal
	RCAGL -2 meters =	81 meters

KWPX(TV) is using a Dielectric, Type TFU-31ETT-RCTSP antenna with 1.0° electrical beam tilt. The manufacturer's vertical plane pattern is proof that the field factor is less than 0.05 at any angle below the horizon in the vicinity of the proposed tower site. A value of 0.05 will be used in the calculation.

$$S = \frac{33.4 (F^2) \text{ Tot ERP}}{R^2}$$

Tot ERP = 1860 kW (Horizontal Only)
R = 81 meters
F = 0.05 (field factor)

$$S = 23.7 \mu\text{W}/\text{cm}^2$$

KWPX(TV) contributes less than $23.7 \mu\text{W}/\text{cm}^2$ at 2 meters above ground. The limit for an uncontrolled environment is $f/1500$ for a station broadcasting in the 300-1500 MHz range.

$$(587 \text{ MHz})/1500 = 391.3 \mu\text{W}/\text{cm}^2 \text{ is the RFF limit for KWPX(TV)}$$

Therefore:

KWPX(TV) NTSC facility contributes less than 6.0% RFF for an uncontrolled environment two meters above ground at the tower site.

KWPX-DT DTV Facility

Channel 32	Freq:	578-584 MHz range
	ERP =	175 kW
	Polarization =	Horizontal
	RCAGL-2 meters =	81 meters

KWPX-DT is using a Dielectric, Type TFU-31ETT-RCTSP antenna with 1.1° electrical beam tilt. The manufacturer's vertical plane pattern is proof that the field factor is less than 0.05 at any angle below the horizon in the vicinity of the proposed tower site. A value of 0.05 will be used in the calculation.

$$S = \frac{33.4 (F^2) \text{ Tot ERP}}{R^2}$$

Tot ERP = 175 kW (Horizontal Only)
R = 81 meters
F = 0.05 (field factor)

$$S = 2.2 \mu\text{W}/\text{cm}^2$$

KWPX-DT contributes less than $2.2 \mu\text{W}/^2$ at 2 meters above ground. The limit for an uncontrolled environment is $f/1500$ for a station broadcasting in the 300-1500 MHz range.

$(581 \text{ MHz})/1500 = 387.3 \mu\text{W}/^2$ is the RFF limit for KWPX-DT

Therefore:

KWPX-DT DTV facility contributes less than 0.6% RFF for an uncontrolled environment two meters above ground at the tower site.

KWDK(TV) NTSC Facility

Channel 56	Freq:	722-728 MHz range
	ERP =	(0.4) [3980 kW (visual)]+[398 kW (aural)]
	Polarization =	Horizontal
	RCAGL -2 meters =	58 meters

KWDK(TV) is using a PSI, Type USM25AC2/56 antenna with 0.75° electrical beam tilt. The manufacturer's vertical plane pattern is proof that the field factor is less than 0.04 at any angle below the horizon in the vicinity of the proposed tower site. A value of 0.04 will be used in the calculation.

$S = \frac{33.4 (F^2) \text{ Tot ERP}}{R^2}$	Tot ERP = 1990 kW (Horizontal Only)
	R = 58 meters
	F = 0.04 (field factor)

$S = 31.6 \mu\text{W}/^2$

KWDK(TV) contributes less than $31.6 \mu\text{W}/^2$ at 2 meters above ground. The limit for an uncontrolled environment is $f/1500$ for a station broadcasting in the 300-1500 MHz range.

$(725 \text{ MHz})/1500 = 483.3 \mu\text{W}/^2$ is the RFF limit for KWDK(TV)

Therefore:

KWDK(TV) NTSC facility contributes less than 6.5% RFF for an uncontrolled environment two meters above ground at the tower site.

KWDK-DT DTV Facility

Channel 42	Freq:	638-644 MHz range
	ERP =	144 kW
	Polarization =	Horizontal + Vertical
	RCAGL -2 meters =	58 meters

KWDK-DT is using a SWR, Type SWED160I antenna with 1.0° electrical beam tilt. The field factor is assumed to be less than 0.1 at any angle below the horizon in the vicinity of the proposed tower site. A value of 0.1 will be used in the calculation.

$$S = \frac{33.4 (F^2) \text{ Tot ERP}}{R^2}$$

Tot ERP = 144 kW (Horizontal + Vertical)
R = 58 meters
F = 0.1 (field factor)

$$S = 28.6 \mu\text{W}/^2$$

KWDK-DT contributes less than 28.6 $\mu\text{W}/^2$ at 2 meters above ground. The limit for an uncontrolled environment is f/1500 for a station broadcasting in the 300-1500 MHz range.

$$(641 \text{ MHz})/1500 = 427.3 \mu\text{W}/^2 \text{ is the RFF limit for KWDK-DT}$$

Therefore:

KWDK-DT DTV facility contributes less than 6.7% RFF for an uncontrolled environment two meters above ground at the tower site.

KHCV(TV) NTSC Facility

Channel 45	Freq:	656-662 MHz range
	ERP =	(0.4) [2000 kW (visual)]+[200 kW (aural)]
	Polarization =	Horizontal
	RCAGL -2 meters =	77 meters

KHCV(TV) will use a Bogner, Type BU(I)24N-G antenna with 0.5° electrical beam tilt. The field factor is assumed to be less than 0.1 at any angle below the horizon in the vicinity of the proposed tower site. A value of 0.1 will be used in the calculation.

$$S = \frac{33.4 (F^2) \text{ Tot ERP}}{R^2}$$

Tot ERP = 1000 kW (Horizontal Only)
R = 77 meters
F = 0.1 (field factor)

$$S = 56.3 \mu\text{W}/^2$$

KHCV(TV) contributes less than 56.3 $\mu\text{W}/^2$ at 2 meters above ground. The limit for an uncontrolled environment is f/1500 for a station broadcasting in the 300-1500 MHz range.

$$(659 \text{ MHz})/1500 = 439.3 \mu\text{W}/^2 \text{ is the RFF limit for KHCV(TV)}$$

Therefore:

KHCV(TV) NTSC facility contributes less than 12.8% RFF for an uncontrolled environment two meters above ground at the tower site.

KHCV-DT DTV Facility

Channel 44	Freq:	650-656 MHz range
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ERP =	240 kW
Polarization =	Horizontal
RCAGL -2 meters =	77 meters

KHCV-DT is using a Bogner, Type BU(I)24N-G antenna with 0.5° electrical beam tilt. The field factor is assumed to be less than 0.1 at any angle below the horizon in the vicinity of the proposed tower site. A value of 0.1 will be used in the calculation.

S = 33.4 (F²) Tot ERP Tot ERP = 240 kW (Horizontal Only)
R = 77 meters
F = 0.1 (field factor)

$$S = 13.5 \text{ } \mu\text{W}/^{\circ}$$

KHCv-DT contributes less than $13.5 \mu\text{W}^2$ at 2 meters above ground. The limit for an uncontrolled environment is f/1500 for a station broadcasting in the 300-1500 MHz range.

$(653 \text{ MHz})/1500 = 435.3 \text{ } \mu\text{W}/^2$ is the RFF limit for KHCV-DT

Therefore:

KHCV-DT DTV facility contributes less than 3.1% RFF for an uncontrolled environment two meters above ground at the tower site.

KWOG(TV) NTSC Facility

Channel 51	Freq:	692-698 MHz range
	ERP =	(0.4) [3800 kW (visual)]+[380 kW (aural)]
	Polarization =	Horizontal
	RCAGL -2 meters =	83 meters

KWOG(TV) is using an Andrew, Type ATW25H3-HTC2U-51 antenna with 0.75° electrical beam tilt. The manufacturer's vertical plane pattern is proof that the field factor is less than 0.042 at any angle below the horizon in the vicinity of the proposed tower site. A value of 0.042 will be used in the calculation.

$$S = \frac{33.4 (F^2) \text{ Tot ERP}}{R^2}$$

Tot ERP = 1900 kW (Horizontal Only)
R = 83 meters
F = 0.042 (field factor)

$$S = 16.2 \mu W/\mu^2$$

KWOG(TV) contributes less than $16.2 \mu\text{W}/\text{m}^2$ at 2 meters above ground. The limit for an uncontrolled environment is f/1500 for a station broadcasting in the 300-1500 MHz range.

$(695 \text{ MHz})/1500 = 463.3 \text{ } \mu\text{W}/^2$ is the RFF limit for KWOG(TV)

Therefore:

KWOG(TV) NTSC facility contributes less than 3.5% RFF for an uncontrolled environment two meters above ground at the tower site.

KWOG-DT DTV Facility

Channel 50	Freq:	686-692 MHz range
	ERP =	240 kW
	Polarization =	Horizontal
	RCAGL -2 meters =	83 meters

KWOG-DT will use an Andrew, Type ATW25H3-HTC2U-51 antenna with 1.25° electrical beam tilt. The manufacturer's vertical plane pattern is proof that the field factor is less than 0.042 at any angle below the horizon in the vicinity of the proposed tower site. A value of 0.042 will be used in the calculation.

$$S = \frac{33.4 (F^2) \text{ Tot ERP}}{R^2}$$

Tot ERP = 240 kW (Horizontal Only)
R = 83 meters
F = 0.042 (field factor)

$$S = 2.1 \mu\text{W}/^2$$

KWOG-DT contributes less than 2.1 $\mu\text{W}/^2$ at 2 meters above ground. The limit for an uncontrolled environment is $f/1500$ for a station broadcasting in the 300-1500 MHz range.

$$(689 \text{ MHz})/1500 = 459.3 \mu\text{W}/^2 \text{ is the RFF limit for KWOG-DT}$$

Therefore:

KWOG-DT facility contributes less than 0.5% RFF for an uncontrolled environment two meters above ground at the tower site.

Total Uncontrolled RFF at Site

The total uncontrolled RFF contribution for all transmitters can now be calculated:

$$\text{Total uncontrolled RFF} = 1.46\% + 1.04\% + 1.46\% + 1.46\% + 1.00\% + 1.16\% + 24.2\% + 0.6\% + 6.5\% + 6.7\% + 12.8\% + 3.1\% + 3.5\% + 0.5\%$$

$$\text{Total uncontrolled RFF} = 65.5\%$$

The licensee indicates that access to the site is approximately 5 miles from a main road. The road is not regularly traveled as the only purpose the access road serves is to provide access to the tower site. Therefore, it is believed this site qualifies under Situation B of OET Bulletin 65 as discussed below.

From Pages 77 and 78, guidance for such a situation is provided from the FCC publication entitled, “*Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, OET Bulletin 65, Edition 97-01, August 1997*”, “*Appendix B, Summary of 1986 Mass Media Bureau, Public Notice on RF Compliance*”.

A portion is abstracted as follows:

Situations

(B) High RF levels are produced at ground level in a remote area not likely to be visited by the public.

- If the area of concern is marked by appropriate warning signs, an applicant may assume that there is no significant effect on the human environment with regard to exposure of the general public. It is recommended that fences also be used where feasible.

The tower site owner indicates that they are in the process of having an RFF site survey performed and any further restrictions other than the current fencing about the tower sites that are required will be undertaken.

Authorized personnel and rigging contractors will be alerted to the potential zone of high radiation on the tower, and if necessary, KWJZ(FM) will operate with reduced power or terminate the operation of the transmitter as appropriate when it is necessary for authorized personnel or contractors to perform work on the tower. Workers and the general public, therefore, will not be subjected to RFF levels in excess of the current FCC guidelines.

An environmental assessment (“EA”) is categorically excluded under Section 1.1306 of the FCC Rules and Regulations since the licensee understands that:

- (a)(1) The proposed facilities located on an existing tower are not located in an officially designated wilderness area.
- (a)(2) The proposed facilities located on an existing tower are not located in an officially designated wildlife preserve.
- (a)(3) The proposed facilities located on an existing tower will not affect any listed threatened or endangered species or habitats.

- (a)(3)(ii) The proposed facilities located on an existing tower will not jeopardize the continued existence of any proposed endangered or threatened species or likely to result in the destruction or adverse modification of proposed critical habitats.
- (a)(4) The proposed facilities located on an existing tower will not affect any known districts, sites, buildings, structures, or objects significant in American history, architecture, archaeology, engineering, or culture.
- (a)(5) The proposed facilities located on an existing tower are not located near any known Indian religious sites.
- (a)(6) The proposed facilities located on an existing tower are not located in a flood plain.
- (a)(7) The location of the existing FM antenna on an existing tower will not alter significantly the surface features at the site.
- (a)(8) It is not proposed to change the tower lighting and complies with FAA requirements.
- (b) A security fence with a locked gate will surrounds the tower. Workers and the general public will not be subjected to RFF levels in excess of the current FCC guidelines based on the methodology contained in OET Bulletin 65, Edition 97-01 and Appendix A. Authorized personnel will be alerted to areas of the tower where potential RFF levels are in excess of the current FCC guidelines and the transmitter power will be reduced or terminated as required.

ELECTRONICS RESEARCH, INC.
7777 GARDNER ROAD
CHANDLER, IN. 47610

FIGURE 1F

-----THEORETICAL-----
VERTICAL PLANE RELATIVE FIELD

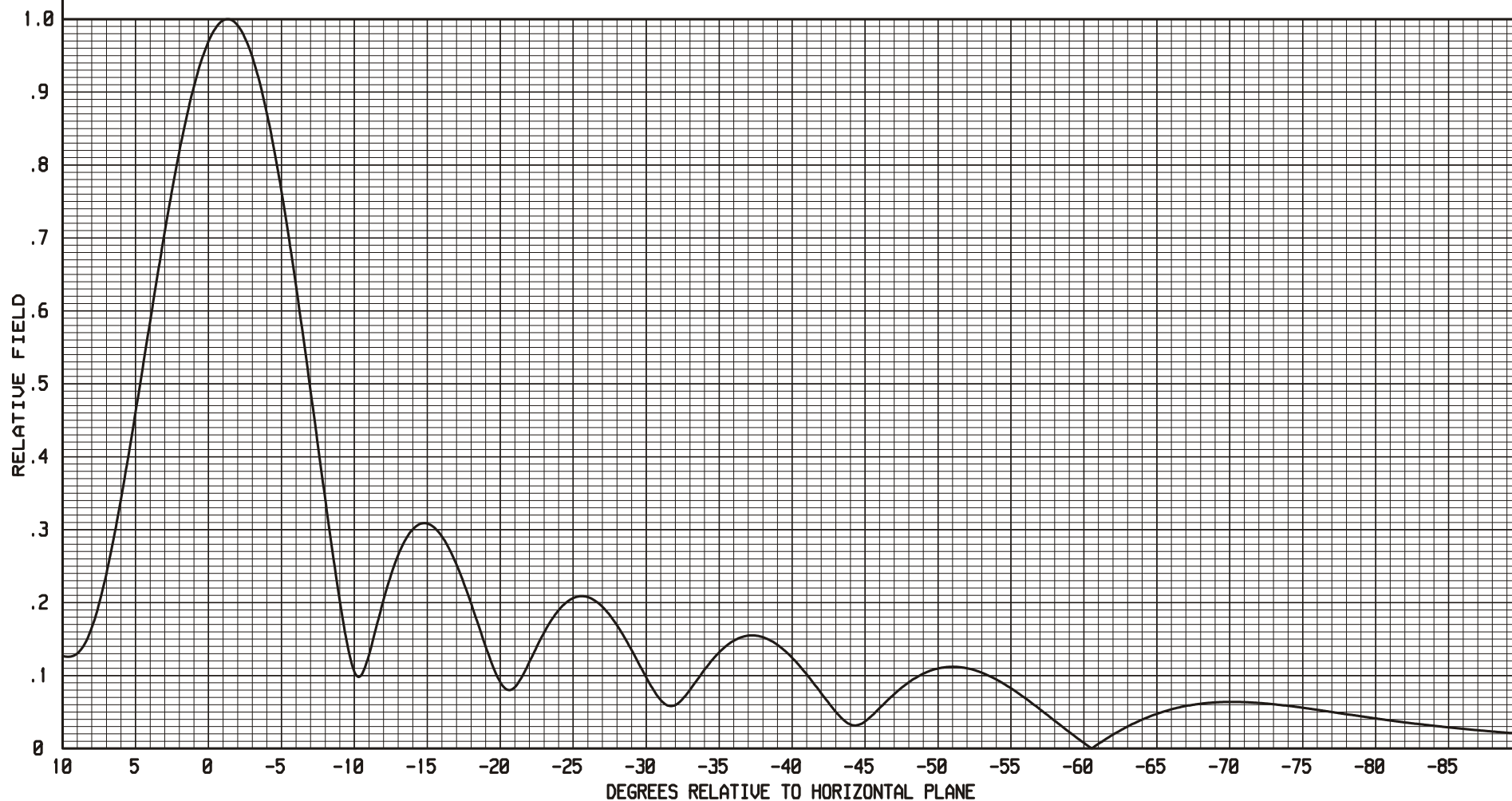
8 LEVELS OF TYPE 1000 ELEMENTS
-1.31 DEGREE(S) BEAM TILT
10 PERCENT FIRST NULL FILL
8 PERCENT SECOND NULL FILL

POWER GAIN IS 3.100 IN THE HORIZONTAL PLANE(3.299 IN THE MAX.)
[POWER GAINS AT 95% ANTENNA EFFICIENCY]

MARCH 31, 2005

98.9 MHz.

BAY SPACING:
92.00 INCHES



ELECTRONICS RESEARCH, INC.
7777 GARDNER ROAD
CHANDLER, IN. 47610

FIGURE 1E

----THEORETICAL----
VERTICAL PLANE RELATIVE FIELD

8 LEVELS OF TYPE 1000 ELEMENTS
-1.31 DEGREE(S) BEAM TILT
9 PERCENT FIRST NULL FILL
7 PERCENT SECOND NULL FILL

POWER GAIN IS 2.978 IN THE HORIZONTAL PLANE(3.147 IN THE MAX.)
[POWER GAINS AT 95% ANTENNA EFFICIENCY]

MARCH 31, 2005

92.5 MHz.

BAY SPACING:
92.00 INCHES

