

ENGINEERING STATEMENT
RE DTV BROADCAST ENGINEERING DATA
APPLICATION FOR MODIFICATION OF
CONSTRUCTION PERMIT (BPEDT-20000421AAL)
KTWU-DT, TOPEKA, KANSAS
CHANNEL 23 960 KW ERP MAX. 281 METERS HAAT

MARCH 2003

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

This engineering statement has been prepared on behalf of Washburn University of Topeka, licensee of KTWU-TV, Channel 11, Topeka Kansas. The purpose of this engineering statement is to modify its construction permit, FCC File No. BPEDT-20000421AAL, for digital television ("DTV") facilities.

KTWU-TV is licensed to operate on NTSC television Channel 11 with a maximum visual effective radiated power (ERP) of 316 kW (horizontal polarization) and height above average terrain (HAAT) of 305 meters (1000.7 feet). KTWU-DT has been allocated DTV Channel 23 with facilities of 815 kW and HAAT of 305.0 meters in the revised DTV Table of Allotments. KTWU-DT proposes to construct Channel 23 DTV facilities of 960 kW (Max. DA) (horizontal polarization) at an HAAT of 281 meters.

The TV antenna will be side-mounted on the new tower at the existing location. The new tower has an overall structure height above ground of 285.7 meters (937.4 feet). Exhibit E-1 shows a vertical sketch and the arrangement of the antennas on the tower. The existing transmitter is located at 301 NW Wanamaker Road, Topeka, Kansas.

The geographic coordinates of the site are:

North Latitude: 39° 03' 50"

West Longitude: 95° 45' 49"

NAD-27

Tower Registration No. 1032651

Equipment Data

Antenna: Dielectric, Type TFU-26DSC-R P230, horizontally polarized antenna with 1.00° electrical beam tilt, non-directional. The vertical plane pattern and directional pattern are herein included as Exhibit E-2(a-d)

Power Data

Transmitter output	23.77 kW	13.76dBk
Total Transmission line efficiency loss	79.8 %	0.98 dB
Dielectric, 6-1/8", 75 ohm or equivalent, length: 268.2 meters (880 feet)		
Input Power to the antenna	18.97 kW	12.78 dBk
Antenna power gain, Main Lobe	50.6	17.04 dBk
Effective Radiated Power, Max.	960 kW	29.82 dBk

Elevation Data

Vertical dimension of Channel 23 side mounted antenna	16.5 meters 54.3 feet
Overall height above ground of new antenna structure (including appurtenances)	285.7 meters 937.4 feet
Center of radiation of Channel 23 antenna above ground	250.55 meters 822.0 feet
Elevation of site above mean sea level	329.4 meters 1080.8 feet
Center of radiation of Channel 23 antenna above mean sea level	579.97 meters 1902.8 feet
Overall height above mean sea level of new tower (including beacon)	615.1 meters 2018.0 feet
Antenna height above average terrain	278 meters

Coverage

The average elevation data for 3 to 16 km along ten degree intervals in azimuth has been determined from the NGDC 3-second database. The F(50,90) DTV coverage contours have been computed from reference to the propagation data for Channel 23, as published by the FCC in Figure 10, Section 73.699 of the FCC Rules and Regulations. Utilizing the formula in Section 73.625(b)(2) of the rules for the effective heights, it is found that the depression angle, A_h , varies from 0.43 to 0.49 degrees. Since the relative vertical field is greater than 90% of the maximum at these depression angles, the maximum power was used in determining the distance to the DTV contour.

Exhibit E-3 shows the proposed KTWU-DT, 48 and 41 dBu F(50,90) coverage contours on a map and includes the legal boundaries of Topeka, Kansas.

Interference Analysis

A study of predicted interference caused by the proposed KTWU-DT operation has been performed using a version of the Longley-Rice program as described in OET Bulletin No. 69 (July 2, 1997) and the Public Notice, "Additional Application Processing Guidelines for Digital Television (DTV)" (August 1998). The FCC's FORTRAN-77 code was modified only to the extent necessary (primarily input/output handling) for the program to run on a Windows98/Intel platform. Comparison of service/interference areas and population indicates that this model closely matches the FCC's evaluation program. Best efforts have been made to use data and calculation identical to the FCC's program. The model employs the Longley-Rice propagation

methodology and evaluates in grid cells of approximately 2 sq. km. Using 3-second terrain data sampled approximately every 0.1 km at one-degree azimuth intervals with 1990 census centroids, all studies are based upon data in the current CDBS data base update of the FCC's engineering database.

Other Licensed and Broadcast Facilities

There is one directional AM station located within 3.22 km of the existing KTWU-DT site and no interference is expected. The proposed operation of KTWU-TV, KTWU-DT and KTLJ-LP are the only stations within 1 km of the proposed tower. No adverse technical effect is anticipated by the DTV operation to any other FCC licensed facility. If required, the licensee of KTWU-DT will install filters or take other measures as necessary to resolve any problem.

Radio Frequency Field Level

This section evaluates the radio frequency field ("RFF") exposure condition created by the operation of the proposed KTWU-DT, the NTSC KTWU-TV operation, and KTLJ-LP. According to the FCC database, there are no other stations located within 2 km.

For NTSC, Channel 11, KTWU-TV uses an Andrew, Type ATW12V4-HTO-11. The antenna manufacturer's data indicates that the elevation pattern for the antenna shows a maximum relative field of less than 0.2 towards the ground in the vicinity of the tower. The RFF level is calculated using this relative field factor and the procedures prescribed in OET Bulletin No. 65 at 316 kW and a radiation center of 275.2 meters above ground. The maximum resulting RFF existing two meters above the base of the tower is computed to be less than 2.9 $\mu\text{W}/\text{sq. cm}$. This is less than 1.5 % of the 200 $\mu\text{W}/\text{sq. cm}$ RFF exposure guideline for the general population.

For the DTV operation KTWU-DT proposes to use a Dielectric, Type TFU-26DSC-R P230 or equivalent antenna. The elevation pattern for this antenna shows a maximum relative field of less than 0.1 towards the ground in the vicinity of the tower. The RFF level is calculated using this relative field factor and the procedures prescribed in OET Bulletin No. 65 at 920 kW and a radiation center of 257 meters above ground. The maximum resulting RFF existing two meters above the base of the tower is computed to be less than $5.2 \mu\text{W}/\text{sq. cm}$. This is less than 1.5 % of the $351.33 \mu\text{W}/\text{sq. cm}$ maximum permissible exposure (MPE) guideline for the general population.

KTLJ-LP specifies 14.2 kW for both horizontal and vertical polarization on UHF channel 43. Assuming the maximum relative field value of 2.0 toward the ground and the procedures described above, the maximum RFF contribution of the UHF antenna 2 meters above the tower base is calculated to be less than $1.0 \mu\text{W}/\text{sq. cm}$ or less than 0.1 % of the $431.33 \mu\text{W}/\text{sq. cm}$ RFF exposure guidelines for the general population.

The total contribution by the NTSC station, the proposed DTV operation, and KTLJ-LP at 2 meters above ground level is less than 7 percent of the current FCC guidelines for general population exposure. Authorized personnel and rigging contractors will be alerted to the potential zone of high radiation on the tower, and if necessary, the station 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.

Section 1.1307

The proposed operation based upon the current OET Bulletin No.65, Edition 97-01 dated August 1997 and Supplement A meets the provisions of the FCC radio frequency field guidelines, and thus, complies with Section 1.1307 of the FCC Rules.

An environmental assessment ("EA") is categorically excluded under Section 1.1306 of the FCC Rules and Regulations since the permittee indicates:

- (a)(1) The existing facilities are not located in an officially designated wilderness area.
- (a)(2) The existing facilities are not located in an officially designated wildlife preserve.
- (a)(3) The proposed facilities will not affect any listed threatened or endangered species or habitats.
- (a)(3)(ii) The proposed facilities 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 will not affect any known districts, sites, buildings, structures, or objects significant in American history, architecture, archaeology, engineering, or culture.
- (a)(5) The existing facilities are not located near any known Indian religious sites.
- (a)(6) The existing facilities are not located in a flood plain.
- (a)(7) The construction of the replacement tower at an existing site will not involve a significant change in surface features of the ground in the vicinity of the tower.
- (a)(8) Dual lighting is used for this tower, and it is noted that it is not located in a residential zoning area and it has not been a source of local controversy.

- (b) Workers and the general public will not be subjected to RFF levels in excess of FCC standard. Authorized personnel will be alerted to areas of the tower where potential radiation levels are in excess of the FCC standard. A security fence with a locked gate deters unauthorized access to the tower site.

TABLE I
DTV COVERAGE DATA
FOR PROPOSED OPERATION OF
KTWU-DT, TOPEKA, KANSAS
CHANNEL 23 960 KW ERP MAX 281 METERS HAAT
MARCH 2003

<u>Radial</u>	<u>Effective</u>	<u>Average</u>	<u>Depression</u>		<u>Distance to Contour</u>	
<u>N ° E, T</u>	<u>Height</u>	<u>Elevation</u>	<u>Angle</u>	<u>ERP</u>	<u>48 dBu</u>	<u>41 dBu</u>
	meters	meters		kW	km	km
0	285.7	-285.7	0.473	307.5	74.0	84.5
10	273.0	-273.0	0.463	282.0	72.4	82.2
20	286.5	-286.5	0.474	223.0	72.3	82.2
30	286.4	-286.4	0.474	167.7	70.8	80.1
40	290.9	-290.9	0.478	166.9	71.1	80.6
50	294.3	-294.3	0.480	259.6	73.8	84.3
60	298.3	-298.3	0.484	447.8	77.4	89.4
70	303.6	-303.6	0.488	683.8	80.7	93.8
80	315.8	-315.8	0.497	882.9	83.9	97.5
90	312.3	-312.3	0.495	960.0	84.2	97.8
100	301.6	-301.6	0.486	882.9	82.3	95.9
110	290.0	-290.0	0.477	683.8	79.2	92.1
120	283.2	-283.2	0.471	447.8	75.9	87.3
130	276.9	-276.9	0.466	259.6	72.3	82.1
140	275.2	-275.2	0.465	166.9	69.9	78.8
150	275.8	-275.8	0.465	167.7	70.0	78.9
160	267.2	-267.2	0.458	223.0	70.8	79.8
170	256.1	-256.1	0.449	282.0	71.2	80.1
180	253.0	-253.0	0.446	307.5	71.4	80.4
190	255.2	-255.2	0.448	282.0	71.1	80.1
200	251.7	-251.7	0.445	223.0	69.7	78.2
210	244.4	-244.4	0.439	167.7	67.9	75.9
220	236.0	-236.0	0.431	166.9	67.3	75.2
230	249.2	-249.2	0.443	259.6	70.3	78.9
240	274.6	-274.6	0.464	447.8	75.1	86.1
250	266.8	-266.8	0.458	683.8	76.7	88.8
260	280.3	-280.3	0.469	882.9	79.8	93.1
270	289.5	-289.5	0.477	960.0	81.4	95.2
280	300.8	-300.8	0.486	882.9	82.2	95.8

TABLE I
DTV COVERAGE DATA
FOR PROPOSED OPERATION OF
KTWU-DT, TOPEKA, KANSAS
CHANNEL 23 960 kW ERP MAX 281 METERS HAAT
MARCH 2003
 (continued)

<u>Radial</u>	<u>Effective</u>	<u>Average</u>	<u>Depression</u>		<u>Distance to Contour</u>	
N ° E, T	<u>Height</u>	<u>Elevation</u>	<u>Angle</u>	<u>ERP</u>	<u>48 dBu</u>	<u>41 dBu</u>
	meters	meters		kW	km	km
290	303.1	-303.1	0.487	683.8	80.7	93.7
300	298.4	-298.4	0.484	447.8	77.4	89.4
310	282.1	-282.1	0.471	259.6	72.7	82.7
320	282.5	-282.5	0.471	166.9	70.5	79.7
330	288.6	-288.6	0.476	167.7	70.9	80.4
340	291.3	-291.3	0.478	223.0	72.7	82.8
350	290.4	-290.4	0.477	282.0	73.9	84.5

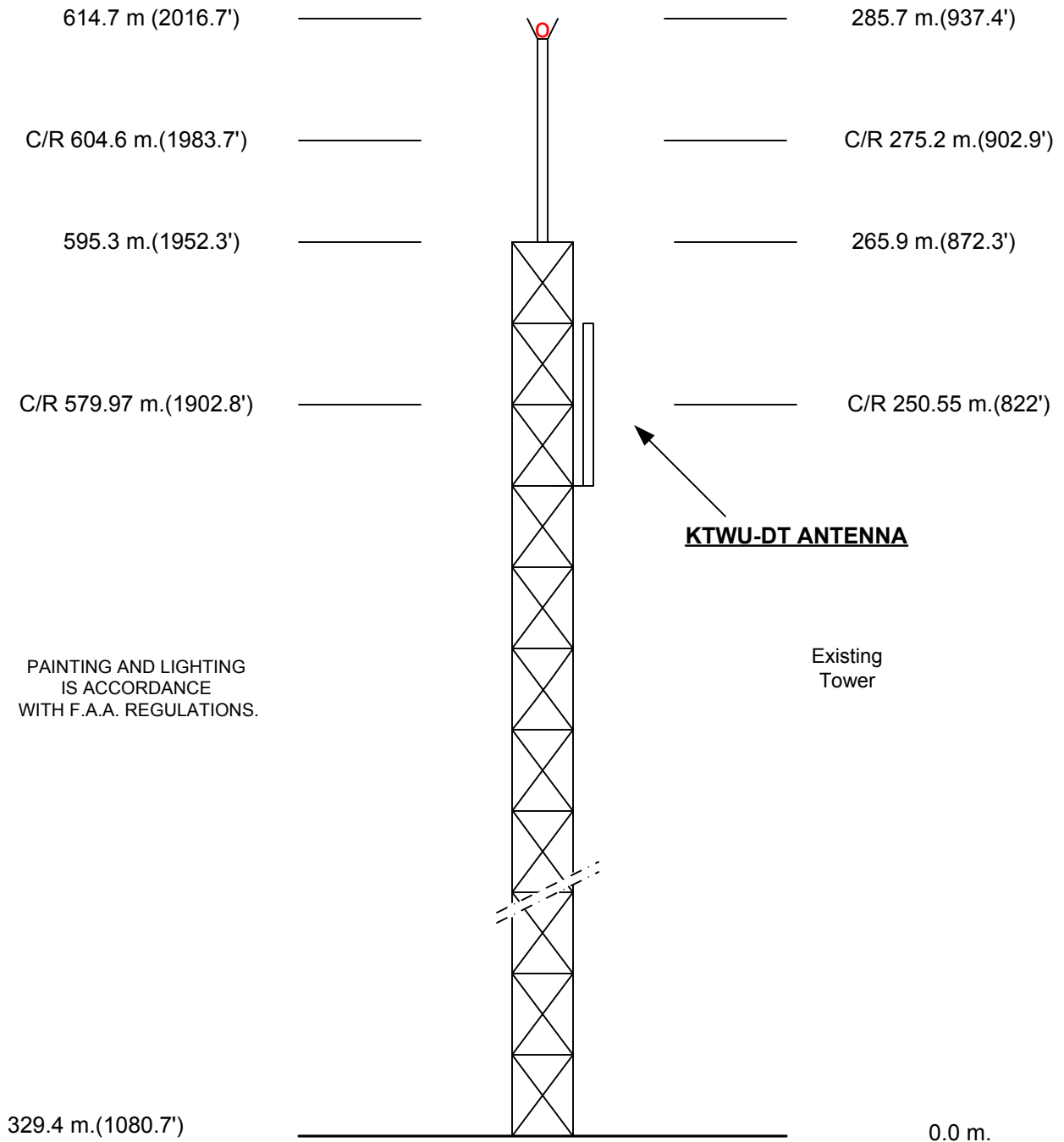
DTV Channel 23 (524-530 MHz)
 Average Elevation 3.2 to 16.1 km 299.1 meters AMSL
 Center of Radiation 579.97 meters AMSL
 Antenna Height Above Average Terrain 281 meters
 Effective Radiated Power 960 kW (29.82 dBk) Max

North Latitude: 39° 3' 50"
 West Longitude: 95° 45' 49"

(NAD-27)

ABOVE MEAN SEA LEVEL

ABOVE GROUND



(NOT TO SCALE)

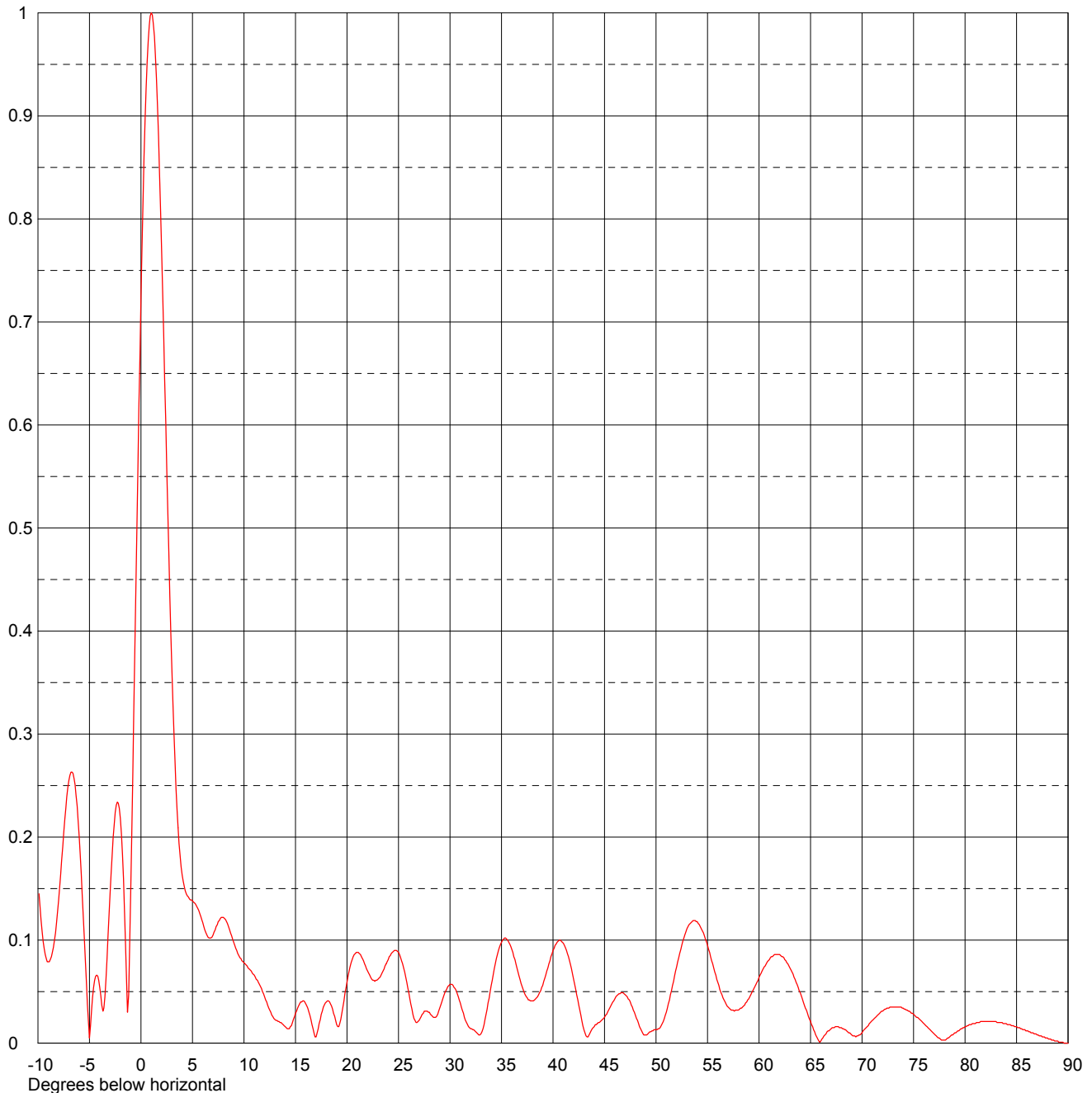
EXHIBIT E - 1
VERTICAL SKETCH
FOR THE DTV OPERATION OF
KTWU-DT, TOPEKA, KANSAS
MARCH 2003



Date	03 Mar 2003
Call Letters	KTWU-DT Channel 23
Location	Topeka, Kansas
Customer	
Antenna Type	TFU-26DSC-R P230

ELEVATION PATTERN

RMS Gain at Main Lobe	22.0 (13.42 dB)	Beam Tilt	1.00 Degrees
RMS Gain at Horizontal	11.6 (10.64 dB)	Frequency	527.00 MHz
Calculated / Measured	Calculated	Drawing #	26Q220100-90



Remarks:



Date **03 Mar 2003**
Call Letters **KTWU-DT** Channel **23**
Location **Topeka, Kansas**
Customer
Antenna Type **TFU-26DSC-R P230**

TABULATION OF ELEVATION PATTERN

Elevation Pattern Drawing # **26Q220100-90**

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.158	2.4	0.602	10.6	0.071	30.5	0.053	51.0	0.030	71.5	0.027
-9.5	0.099	2.6	0.517	10.8	0.068	31.0	0.039	51.5	0.051	72.0	0.031
-9.0	0.079	2.8	0.436	11.0	0.066	31.5	0.022	52.0	0.074	72.5	0.034
-8.5	0.093	3.0	0.363	11.5	0.057	32.0	0.014	52.5	0.095	73.0	0.035
-8.0	0.138	3.2	0.300	12.0	0.045	32.5	0.011	53.0	0.111	73.5	0.035
-7.5	0.204	3.4	0.248	12.5	0.032	33.0	0.009	53.5	0.118	74.0	0.034
-7.0	0.255	3.6	0.209	13.0	0.023	33.5	0.028	54.0	0.118	74.5	0.031
-6.5	0.257	3.8	0.181	13.5	0.020	34.0	0.056	54.5	0.109	75.0	0.028
-6.0	0.201	4.0	0.163	14.0	0.016	34.5	0.082	55.0	0.095	75.5	0.024
-5.5	0.102	4.2	0.152	14.5	0.016	35.0	0.098	55.5	0.077	76.0	0.019
-5.0	0.005	4.4	0.145	15.0	0.029	35.5	0.101	56.0	0.059	76.5	0.014
-4.5	0.061	4.6	0.142	15.5	0.040	36.0	0.091	56.5	0.044	77.0	0.009
-4.0	0.054	4.8	0.139	16.0	0.038	36.5	0.073	57.0	0.035	77.5	0.005
-3.5	0.045	5.0	0.138	16.5	0.023	37.0	0.055	57.5	0.032	78.0	0.003
-3.0	0.145	5.2	0.136	17.0	0.006	37.5	0.044	58.0	0.032	78.5	0.006
-2.8	0.183	5.4	0.133	17.5	0.028	38.0	0.041	58.5	0.036	79.0	0.010
-2.6	0.213	5.6	0.129	18.0	0.040	38.5	0.045	59.0	0.043	79.5	0.013
-2.4	0.231	5.8	0.123	18.5	0.036	39.0	0.056	59.5	0.053	80.0	0.016
-2.2	0.233	6.0	0.117	19.0	0.018	39.5	0.073	60.0	0.064	80.5	0.018
-2.0	0.218	6.2	0.110	19.5	0.029	40.0	0.090	60.5	0.074	81.0	0.019
-1.8	0.183	6.4	0.105	20.0	0.059	40.5	0.099	61.0	0.081	81.5	0.021
-1.6	0.129	6.6	0.102	20.5	0.081	41.0	0.097	61.5	0.086	82.0	0.021
-1.4	0.060	6.8	0.102	21.0	0.088	41.5	0.084	62.0	0.086	82.5	0.021
-1.2	0.047	7.0	0.105	21.5	0.082	42.0	0.062	62.5	0.081	83.0	0.021
-1.0	0.145	7.2	0.110	22.0	0.070	42.5	0.037	63.0	0.073	83.5	0.020
-0.8	0.259	7.4	0.115	22.5	0.061	43.0	0.013	63.5	0.062	84.0	0.019
-0.6	0.379	7.6	0.119	23.0	0.062	43.5	0.008	64.0	0.049	84.5	0.017
-0.4	0.500	7.8	0.122	23.5	0.070	44.0	0.016	64.5	0.034	85.0	0.016
-0.2	0.617	8.0	0.122	24.0	0.081	44.5	0.020	65.0	0.021	85.5	0.014
0.0	0.725	8.2	0.120	24.5	0.089	45.0	0.025	65.5	0.008	86.0	0.012
0.2	0.819	8.4	0.116	25.0	0.088	45.5	0.034	66.0	0.002	86.5	0.010
0.4	0.896	8.6	0.110	25.5	0.073	46.0	0.043	66.5	0.009	87.0	0.008
0.6	0.953	8.8	0.104	26.0	0.049	46.5	0.048	67.0	0.014	87.5	0.006
0.8	0.988	9.0	0.098	26.5	0.024	47.0	0.047	67.5	0.016	88.0	0.005
1.0	1.000	9.2	0.092	27.0	0.022	47.5	0.040	68.0	0.015	88.5	0.003
1.2	0.990	9.4	0.087	27.5	0.031	48.0	0.027	68.5	0.012	89.0	0.002
1.4	0.959	9.6	0.083	28.0	0.030	48.5	0.014	69.0	0.008	89.5	0.001
1.6	0.910	9.8	0.080	28.5	0.025	49.0	0.008	69.5	0.007	90.0	0.000
1.8	0.846	10.0	0.078	29.0	0.034	49.5	0.011	70.0	0.010		
2.0	0.771	10.2	0.076	29.5	0.049	50.0	0.013	70.5	0.016		
2.2	0.688	10.4	0.073	30.0	0.057	50.5	0.017	71.0	0.022		

Remarks:



Date **03 Mar 2003**
Call Letters **KTWU-DT** Channel **23**
Location **Topeka, Kansas**
Customer
Antenna Type **TFU-26DSC-R P230**

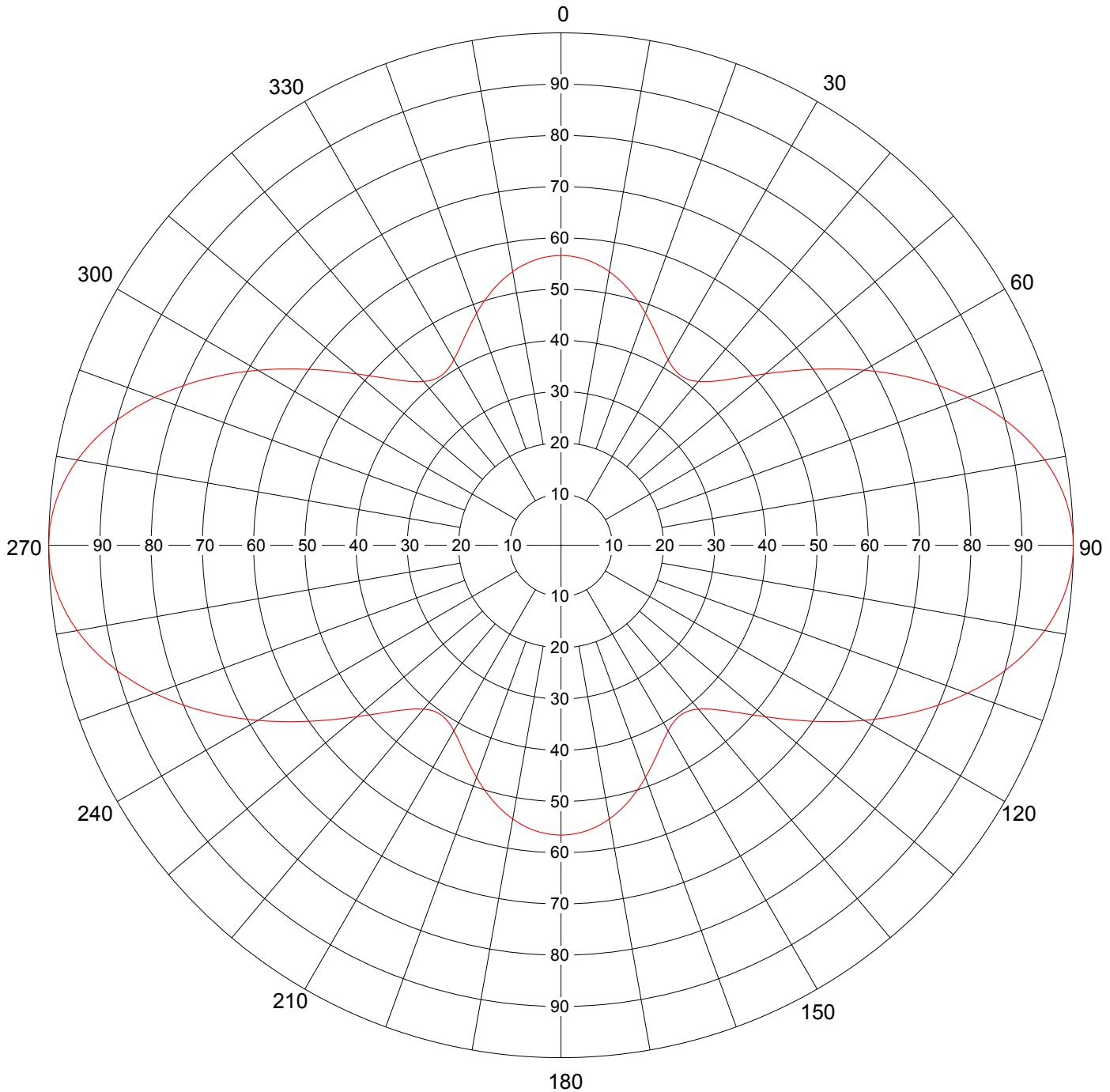
AZIMUTH PATTERN

Gain
Calculated / Measured

2.30 (3.62 dB)
Calculated

Frequency
Drawing #

527 MHz
TFU-P230



Remarks:



Date **03 Mar 2003**
Call Letters **KTWU-DT** Channel **23**
Location **Topeka, Kansas**
Customer
Antenna Type **TFU-26DSC-R P230**

TABULATION OF AZIMUTH PATTERN

Azimuth Pattern Drawing # **TFU-P230**

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
0	0.566	45	0.457	90	1.000	135	0.457	180	0.566	225	0.457	270	1.000	315	0.457
1	0.565	46	0.468	91	1.000	136	0.447	181	0.565	226	0.468	271	1.000	316	0.447
2	0.565	47	0.480	92	0.998	137	0.438	182	0.565	227	0.480	272	0.998	317	0.438
3	0.563	48	0.493	93	0.996	138	0.430	183	0.563	228	0.493	273	0.996	318	0.430
4	0.562	49	0.506	94	0.993	139	0.423	184	0.562	229	0.506	274	0.993	319	0.423
5	0.560	50	0.520	95	0.990	140	0.417	185	0.560	230	0.520	275	0.990	320	0.417
6	0.557	51	0.535	96	0.985	141	0.413	186	0.557	231	0.535	276	0.985	321	0.413
7	0.554	52	0.550	97	0.980	142	0.409	187	0.554	232	0.550	277	0.980	322	0.409
8	0.551	53	0.566	98	0.973	143	0.407	188	0.551	233	0.566	278	0.973	323	0.407
9	0.547	54	0.582	99	0.967	144	0.406	189	0.547	234	0.582	279	0.967	324	0.406
10	0.542	55	0.599	100	0.959	145	0.405	190	0.542	235	0.599	280	0.959	325	0.405
11	0.538	56	0.615	101	0.950	146	0.406	191	0.538	236	0.615	281	0.950	326	0.406
12	0.533	57	0.632	102	0.941	147	0.408	192	0.533	237	0.632	282	0.941	327	0.408
13	0.527	58	0.649	103	0.931	148	0.411	193	0.527	238	0.649	283	0.931	328	0.411
14	0.522	59	0.666	104	0.921	149	0.414	194	0.522	239	0.666	284	0.921	329	0.414
15	0.516	60	0.683	105	0.909	150	0.418	195	0.516	240	0.683	285	0.909	330	0.418
16	0.509	61	0.700	106	0.898	151	0.423	196	0.509	241	0.700	286	0.898	331	0.423
17	0.503	62	0.717	107	0.885	152	0.428	197	0.503	242	0.717	287	0.885	332	0.428
18	0.496	63	0.734	108	0.872	153	0.434	198	0.496	243	0.734	288	0.872	333	0.434
19	0.489	64	0.751	109	0.858	154	0.440	199	0.489	244	0.751	289	0.858	334	0.440
20	0.482	65	0.767	110	0.844	155	0.447	200	0.482	245	0.767	290	0.844	335	0.447
21	0.475	66	0.783	111	0.830	156	0.454	201	0.475	246	0.783	291	0.830	336	0.454
22	0.468	67	0.799	112	0.815	157	0.461	202	0.468	247	0.799	292	0.815	337	0.461
23	0.461	68	0.815	113	0.799	158	0.468	203	0.461	248	0.815	293	0.799	338	0.468
24	0.454	69	0.830	114	0.783	159	0.475	204	0.454	249	0.830	294	0.783	339	0.475
25	0.447	70	0.844	115	0.767	160	0.482	205	0.447	250	0.844	295	0.767	340	0.482
26	0.440	71	0.858	116	0.751	161	0.489	206	0.440	251	0.858	296	0.751	341	0.489
27	0.434	72	0.872	117	0.734	162	0.496	207	0.434	252	0.872	297	0.734	342	0.496
28	0.428	73	0.885	118	0.717	163	0.503	208	0.428	253	0.885	298	0.717	343	0.503
29	0.423	74	0.898	119	0.700	164	0.509	209	0.423	254	0.898	299	0.700	344	0.509
30	0.418	75	0.909	120	0.683	165	0.516	210	0.418	255	0.909	300	0.683	345	0.516
31	0.414	76	0.921	121	0.666	166	0.522	211	0.414	256	0.921	301	0.666	346	0.522
32	0.411	77	0.931	122	0.649	167	0.527	212	0.411	257	0.931	302	0.649	347	0.527
33	0.408	78	0.941	123	0.632	168	0.533	213	0.408	258	0.941	303	0.632	348	0.533
34	0.406	79	0.950	124	0.615	169	0.538	214	0.406	259	0.950	304	0.615	349	0.538
35	0.405	80	0.959	125	0.599	170	0.542	215	0.405	260	0.959	305	0.599	350	0.542
36	0.406	81	0.967	126	0.582	171	0.547	216	0.406	261	0.967	306	0.582	351	0.547
37	0.407	82	0.973	127	0.566	172	0.551	217	0.407	262	0.973	307	0.566	352	0.551
38	0.409	83	0.980	128	0.550	173	0.554	218	0.409	263	0.980	308	0.550	353	0.554
39	0.413	84	0.985	129	0.535	174	0.557	219	0.413	264	0.985	309	0.535	354	0.557
40	0.417	85	0.990	130	0.520	175	0.560	220	0.417	265	0.990	310	0.520	355	0.560
41	0.423	86	0.993	131	0.506	176	0.562	221	0.423	266	0.993	311	0.506	356	0.562
42	0.430	87	0.996	132	0.493	177	0.563	222	0.430	267	0.996	312	0.493	357	0.563
43	0.438	88	0.998	133	0.480	178	0.565	223	0.438	268	0.998	313	0.480	358	0.565
44	0.447	89	1.000	134	0.468	179	0.565	224	0.447	269	1.000	314	0.468	359	0.565

Remarks:

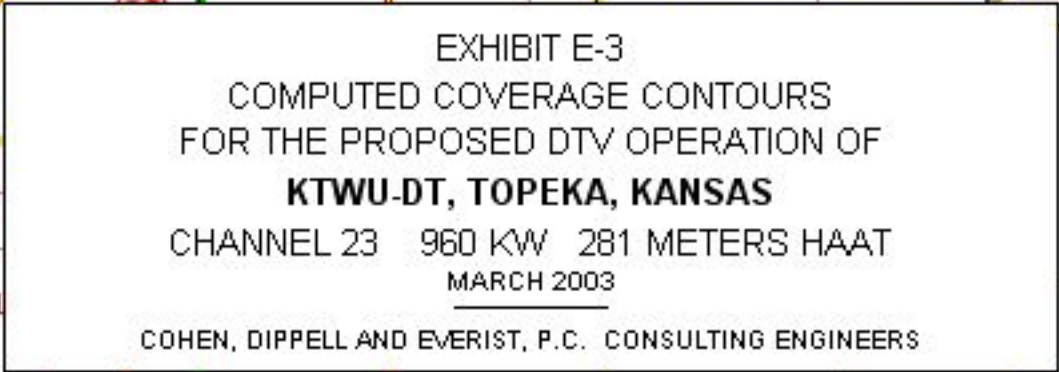


EXHIBIT E-4
POWER MAXIMIZATION
FOR THE PROPOSED DTV OPERATION OF
KTWU-DT, TOPEKA, KANSAS
CHANNEL 23 960 KW MAX ERP 281 METERS HAAT
MARCH 2003

KTWU- TV has been allotted channel 23 with an ERP of 815.1 kW at 305 m HAAT for its DTV facilities. KTWU-TV proposes to construct facilities of 960 kW ERP at 281 m HAAT. According to the guidelines specified in §73.622, an application that specifies an antenna HAAT within 25 m below that specified in Appendix B may adjust its power upward to a level at or below the adjusted DTV power in accordance with the formula:

$$\text{dB} = 20\log(H1/H2)$$

H1 = Reference antenna HAAT specified in the DTV Table

H2 = Actual antenna HAAT

without an interference showing.

$$H1 = 305 \text{ m}$$

$$H2 = 281 \text{ m}$$

$$\text{dB} = 20\log(305/281)$$

$$\text{dB} = 0.712$$

$$\text{Allotted: } 815.1 \text{ kW} = 29.11 \text{ dBk}$$

$$\text{Adjusted: } 29.11 \text{ dBk} + 0.712 \text{ dB} = 29.82 \text{ dBk} = 960 \text{ kW}$$

Therefore, KTWU-DT proposes to construct DTV facilities with an adjusted ERP of 960 kW at 281 m HAAT.