

ENGINEERING STATEMENT  
RE DTV BROADCAST ENGINEERING DATA  
APPLICATION FOR MODIFICATION OF  
CONSTRUCTION PERMIT (BPCDT-19991029AGM)  
WTWO-DT, TERRE HAUTE, INDIANA  
CHANNEL 36 1000 KW ERP 290 METERS HAAT

MARCH 2004

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This engineering statement has been prepared on behalf of Nexstar Broadcasting, Inc., licensee of WTWO(TV), Channel 2 Terre Haute, Indiana. The purpose of this engineering statement is to modify its DTV construction permit, FCC File No. BPCDT-19991029AGM, for maximization of digital television (“DTV”) facilities.

WTWO(TV) is licensed to operate on NTSC television Channel 2 with a maximum visual effective radiated power (“ERP”) of 100 kW (horizontal polarization) and height above average terrain (“HAAT”) of 290 meters (951.4 feet). WTWO-DT has been allocated DTV Channel 36 with facilities of 1000 kW directional ERP and HAAT of 290 meters in the revised DTV Table of Allotments.<sup>1</sup> WTWO-DT currently has a construction permit (FCC File No. BPCDT-19991029AGM) for 10.0 kW ERP at 416 meters HAAT. WTWO-DT proposes to maximize its DTV operation by constructing Channel 36 DTV facilities of 1000 kW (horizontal polarization) at an HAAT of 290 meters.

The DTV antenna will be top-mounted on the tower specified in FCC File No. BPCDT-19991029AGM. The tower has an overall structure height above ground of 304.5 meters (999 feet). Exhibit E-1 shows a vertical sketch and the arrangement of the antennas on the tower. The existing transmitter site is located west of U.S. Highway 41, approximately one mile southwest.

The geographic coordinates of the site are:

North Latitude: 39° 14' 33"

West Longitude: 87° 23' 29"

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<sup>1</sup>“In the Matter of Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service”, MM Docket No. 87-286, Memorandum Opinion and Order on Reconsideration of the Sixth Report and Order (FCC 98-24) February 12, 1998, DTV Table of Allotments (Appendix B).

## NAD-27

Tower Registration No. 1027196

Equipment Data

Antenna:	Dielectric	TFU-18GTH-R 04 or equivalent
	Beam Tilt	1.0° electrical
	Power Gain	15.5

Power Data

Transmitter output	80.34 kW	19.05
Total Transmission line efficiency loss	80.3%	0.95 dB
Dielectric, 8", 75 ohm or equivalent, length: 325 meters (1066 feet)		
Input Power to the antenna	64.52 kW	18.10 dBk
Antenna power gain, Main Lobe	15.5	11.90 dBk
Effective Radiated Power, Max.	1000 kW	30 dBk

Elevation Data

Vertical dimension of Channel 36 top mounted antenna	11.0 meters 36.1 feet
Overall height above ground of existing antenna structure (including appurtenances)	304.5 meters 999.0 feet
Center of radiation of Channel 36 antenna above ground	287.4 meters 942.9 feet
Elevation of site above mean sea level	167.6 meters 549.9 feet
Center of radiation of Channel 36 antenna above mean sea level	455 meters 1492.8 feet

Overall height above mean sea level of existing tower (including beacon)	472.1 meters 1548.9 feet
Antenna height above average terrain	290 meters
<u>Coverage</u>	

The average elevation data for 3 to 16 km along the eight cardinal radials 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 36, 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 0.456 to 0.478 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 WTWO-DT, 48 and 41 dBu F(50,90) coverage contours on a map and includes the legal boundaries of Terre Haute, Indiana.

#### Interference Analysis

A study of predicted interference caused by the proposed WTWO-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 2000 census centroids, all studies are based upon data in the current CDBS data base update of the FCC's engineering database. A Longley-Rice study was performed with the proposed maximized WTWO-DT facilities and all relevant stations listed in the FCC data base as of November 25, 2003. The study results and the included stations are listed in Table II. No potentially affected station is predicted to receive more than the 2% de-minimis standard or approach a cumulative 10% interference.

#### Other Licensed and Broadcast Facilities

There are no licensed AM stations within 3.22 km of the proposed site. There are two applications for new AM stations (FCC File No. BNP-20010724ADK and File No. BND-20010724ADL) within 3.22 km of the proposed site, however no interference is foreseen. There are no FM stations located within 2 km of the proposed site and there are numerous TV broadcast stations. No adverse technical effect is anticipated by the DTV operation to any other FCC licensed facility, however, if any problems occur, the permittee will take the necessary steps to resolve them.

#### Radio Frequency Field Level ("RFF")

<u>Station</u>	<u>ERP</u> (kW)	<u>HAAT</u> (m)	<u>Frequency</u> (MHz)	<u>Ch</u>	<u>RCAGL</u> (m)	<u>F*</u>	<u>S (μW/cm<sup>2</sup>)</u>	<u>RFF</u> (%)
WTWO-DT Prop. Max	1000	290	605	36	285.4	0.1	4.1	1.0

\*F = assumed value

\*\* RCAGL - 2 meters

The addition of the WTWO-DT facilities will contribute approximately  $4.04 \mu\text{W}/\text{cm}^2$  or 1.0% of the limit for an uncontrolled environment to the total RFF levels from the existing operational facilities.

#### 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 proposed facilities on an existing tower are not located in an officially designated wilderness area.
- (a)(2) The proposed facilities on an existing 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 proposed facilities located on an existing tower are not located near any known Indian religious sites.

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- (a)(6) The proposed facilities located on an existing tower are not located in a flood plain.
  - (a)(7) The placement of the DTV antenna on the existing tower at this site will not involve a significant change in surface features of the ground in the vicinity of the tower.
  - (a)(8) It is not proposed to change the existing tower lighting.
  - (b) Workers and the general public will not be subjected to RFF levels in excess of the current FCC guideline. Authorized personnel will be alerted to areas of the tower where potential radiation levels are in excess of the FCC guideline. A security fence with a locked gate deters unauthorized access to the tower site.

TABLE I  
COMPUTED COVERAGE DATA  
FOR THE PROPOSED DTV OPERATION OF  
WTWO-DT, TERRE HAUTE, INDIANA  
CHANNEL 36 1000 KW ERP 290 METERS HAAT  
MARCH 2004

<u>Radial Bearing</u> N ° E, T	<u>Depression Angle</u>	<u>ERP at Radio Horizon</u> kW	<u>Distance to Contour F(50,90)</u>	
			<u>48 dBu City Grade</u> km	<u>41 dBu Noise-Limited</u> km
0	0.464	1,000	80.6	94.4
45	0.456	1,000	79.5	93.0
90	0.463	1,000	80.6	94.3
135	0.475	1,000	82.2	96.0
180	0.474	1,000	82.2	96.0
225	0.478	1,000	82.8	96.6
270	0.477	1,000	82.5	96.3
315	0.475	1,000	82.3	96.1

\*Based on data from FCC 3-second data base

DTV Channel 36 (602-608 MHz)  
 Average Elevation 3.2 to 16.1 km 165 meters AMSL  
 Center of Radiation 455 meters AMSL  
 Antenna Height Above Average Terrain 290 meters  
 Effective Radiated Power 1000 kW (30 dBk) Max.

North Latitude: 39° 14' 33"  
 West Longitude: 87° 23' 29"

NAD-27

TABLE II  
POTENTIAL INTERFEREES  
OF THE PROPOSED OPERATION OF  
WTWO-DT, TERRE HAUTE, INDIANA  
CHANNEL 36 1000 KW 290 METERS  
MARCH 2004

<u>Station</u>	<u>Ch</u>	<u>Status</u>	<u>City/State</u>	<u>Distance from</u> <u>WTWO-DT</u> km	<u>File No.</u>	<u>New</u> <u>Interference</u> percent
WVUT	22	Lic	Vincennes, IN	66.1	BLET-344	0
W29CI	29	Lic	Salem, IL	158.3	BLTTA-20011130AAJ	0
KQIN	36	Lic	Davenport, IA	370.9	BLET-19911230KE	0
KQIN	36	CP	Davenport, IA	358.4	BPET-20020328AAE	0
NEW	36	App	Springfield, IL	188.1	BNPEDT-20030922ADE	0
NEW	36	App	Springfield, IL	203.5	BPEDT-19960129KH	0.2
W56DN	36	App	Evansville, IN	151.1	BPTTL-20030729AEX	0
WFFT-DT	36	Allot	Fort Wayne, IN	278.9		0
WFFT-TV	36	CP	Fort Wayne, IN	279.0	BPCDT-19991029ADC	0
WJYS	36	Lic	Hammond, IN	293.8	BLCDDT-20020801ABI	0
WJYS-DT	36	Allot	Hammond, IN	258.9		0
WTVQ-TV	36	Lic	Lexington, KY	292.8	BLCT-19800619IX	0
WKMU	36	Lic	Murray, KS	300.6	BLEDT-20020304ALG	0
WKMU-DT	36	Allot	Murray, KS	300.7		0
WTTE	36	CP	Columbus, OH	382.2	BPCDT-19991029AGZ	0
WNPX	36	Lic	Cookeville, TN	335.2	BLCDDT-20030130ACD	0
WNPX	36	CP mod	Cookeville, TN	334.7	BMPCDT-20020315AAH	0
WNPX	36	App	Cookeville, TN	334.7	BMPCDT-20030918ABL	0.1
WKZK-DT	36	Allot	Cookeville, TN	390.0		0
WBAK-DT	38	Lic	Terre Haute, IN	1.2	BLCT-19821103KF	0
WBAK-TV	38	CP	Terre Haute, IN	1.2	BPCT-20030422AAW	0
WHMB-TV	40	Lic	Indianapolis, IN	124.8	BLCT-19990922AAW	0

ABOVE MEAN SEA LEVEL

ABOVE GROUND

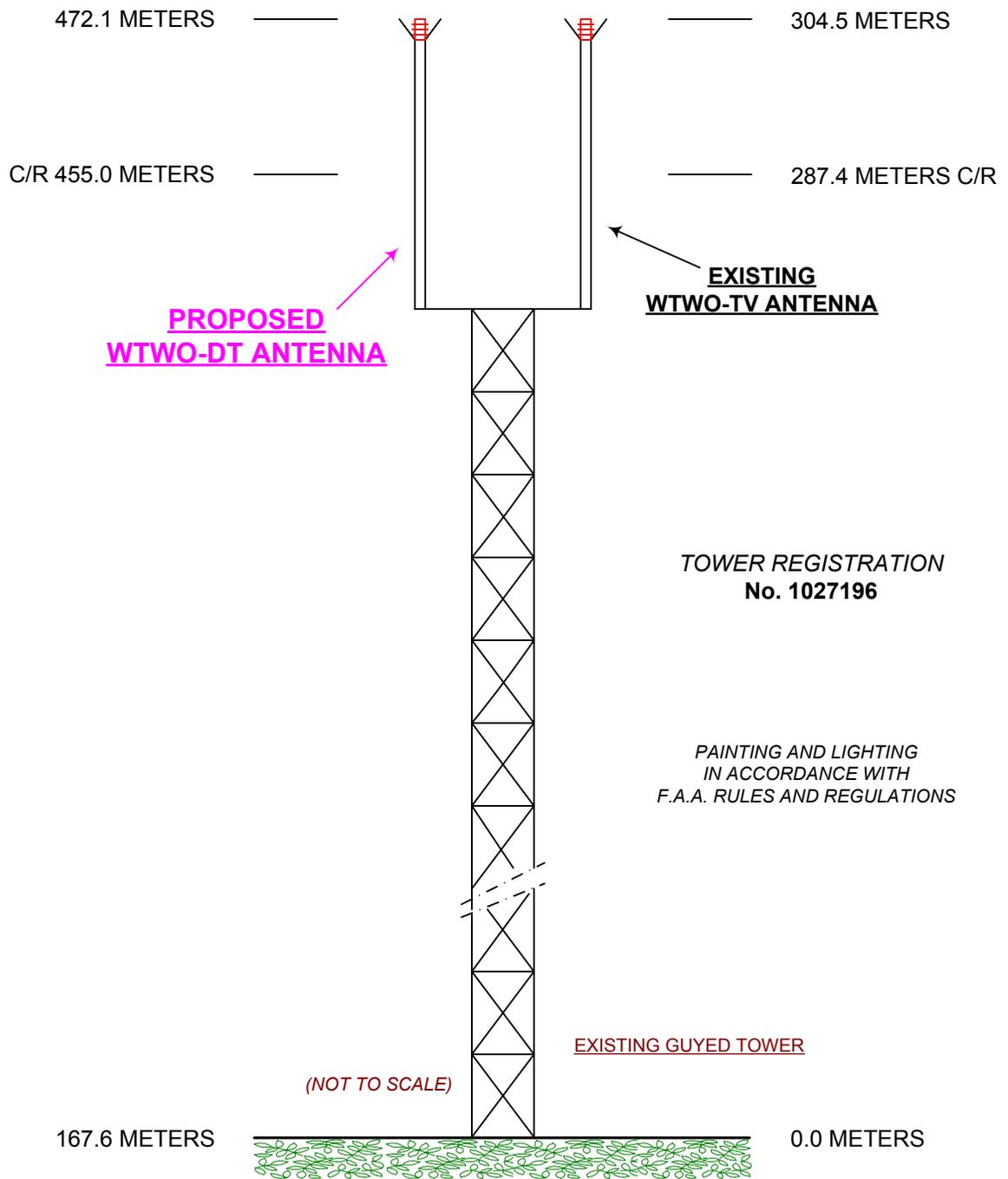


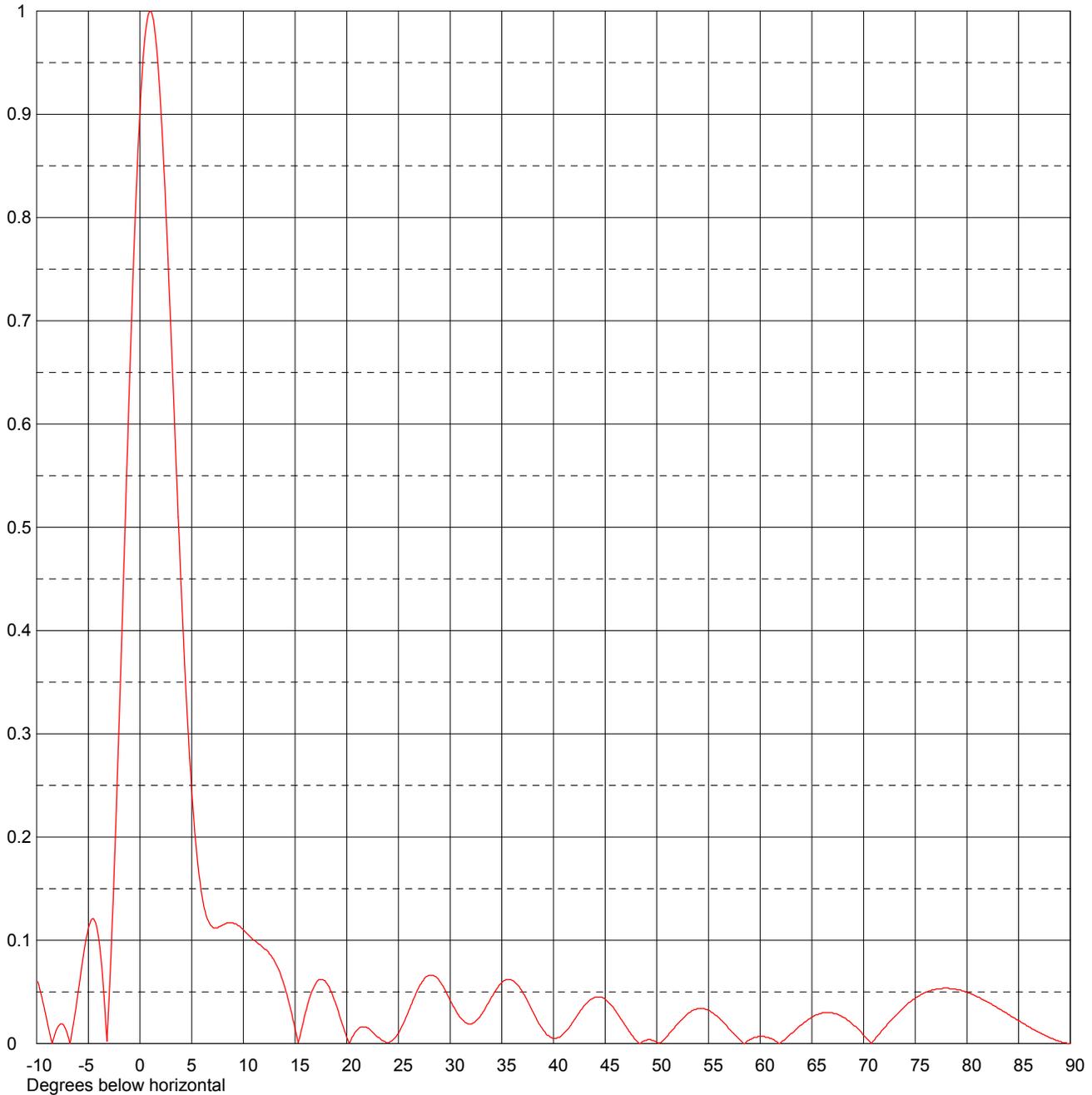
EXHIBIT E-1  
VERTICAL SKETCH  
**WTWO-DT, TERRE HAUTE, INDIANA**  
MARCH 2004



Date **02 Dec 2003**  
Call Letters **WTWO-DT** Channel **36**  
Location **Terre Haute, IN**  
Customer  
Antenna Type **TFU-18GTH-R 04**

### ELEVATION PATTERN

RMS Gain at Main Lobe	<b>15.5 (11.90 dB)</b>	Beam Tilt	<b>1.00 Degrees</b>
RMS Gain at Horizontal	<b>12.7 (11.04 dB)</b>	Frequency	<b>605.00 MHz</b>
Calculated / Measured	<b>Calculated</b>	Drawing #	<b>18G15510</b>



Remarks:



Date **02 Dec 2003**  
 Call Letters **WTWO-DT** Channel **36**  
 Location **Terre Haute, IN**  
 Customer  
 Antenna Type **TFU-18GTH-R O4**

**TABULATION OF ELEVATION PATTERN**

Elevation Pattern Drawing # **18G15510**

Angle	Field										
-10.0	0.063	2.4	0.830	10.6	0.104	30.5	0.033	51.0	0.007	71.5	0.009
-9.5	0.045	2.6	0.785	10.8	0.102	31.0	0.025	51.5	0.013	72.0	0.015
-9.0	0.022	2.8	0.737	11.0	0.100	31.5	0.020	52.0	0.019	72.5	0.021
-8.5	0.000	3.0	0.688	11.5	0.096	32.0	0.019	52.5	0.024	73.0	0.026
-8.0	0.015	3.2	0.637	12.0	0.092	32.5	0.022	53.0	0.029	73.5	0.031
-7.5	0.019	3.4	0.586	12.5	0.087	33.0	0.028	53.5	0.032	74.0	0.036
-7.0	0.008	3.6	0.535	13.0	0.080	33.5	0.036	54.0	0.034	74.5	0.040
-6.5	0.016	3.8	0.486	13.5	0.070	34.0	0.045	54.5	0.034	75.0	0.044
-6.0	0.049	4.0	0.438	14.0	0.055	34.5	0.053	55.0	0.032	75.5	0.047
-5.5	0.084	4.2	0.393	14.5	0.036	35.0	0.059	55.5	0.029	76.0	0.050
-5.0	0.112	4.4	0.351	15.0	0.014	35.5	0.062	56.0	0.025	76.5	0.051
-4.5	0.121	4.6	0.312	15.5	0.008	36.0	0.061	56.5	0.020	77.0	0.053
-4.0	0.102	4.8	0.277	16.0	0.030	36.5	0.057	57.0	0.014	77.5	0.053
-3.5	0.048	5.0	0.245	16.5	0.047	37.0	0.050	57.5	0.009	78.0	0.054
-3.0	0.043	5.2	0.218	17.0	0.058	37.5	0.041	58.0	0.004	78.5	0.053
-2.8	0.089	5.4	0.194	17.5	0.062	38.0	0.031	58.5	0.000	79.0	0.052
-2.6	0.140	5.6	0.173	18.0	0.059	38.5	0.021	59.0	0.004	79.5	0.051
-2.4	0.196	5.8	0.157	18.5	0.050	39.0	0.013	59.5	0.006	80.0	0.050
-2.2	0.256	6.0	0.143	19.0	0.037	39.5	0.008	60.0	0.007	80.5	0.048
-2.0	0.319	6.2	0.132	19.5	0.021	40.0	0.005	60.5	0.006	81.0	0.045
-1.8	0.384	6.4	0.124	20.0	0.006	40.5	0.006	61.0	0.005	81.5	0.043
-1.6	0.450	6.6	0.119	20.5	0.006	41.0	0.010	61.5	0.002	82.0	0.040
-1.4	0.516	6.8	0.115	21.0	0.013	41.5	0.015	62.0	0.001	82.5	0.037
-1.2	0.582	7.0	0.113	21.5	0.016	42.0	0.023	62.5	0.005	83.0	0.034
-1.0	0.646	7.2	0.112	22.0	0.015	42.5	0.030	63.0	0.010	83.5	0.031
-0.8	0.707	7.4	0.112	22.5	0.011	43.0	0.037	63.5	0.014	84.0	0.028
-0.6	0.764	7.6	0.113	23.0	0.006	43.5	0.042	64.0	0.018	84.5	0.025
-0.4	0.817	7.8	0.114	23.5	0.003	44.0	0.045	64.5	0.022	85.0	0.022
-0.2	0.864	8.0	0.115	24.0	0.001	44.5	0.045	65.0	0.026	85.5	0.019
0.0	0.905	8.2	0.116	24.5	0.004	45.0	0.043	65.5	0.028	86.0	0.016
0.2	0.939	8.4	0.117	25.0	0.010	45.5	0.038	66.0	0.030	86.5	0.013
0.4	0.966	8.6	0.117	25.5	0.020	46.0	0.032	66.5	0.030	87.0	0.011
0.6	0.985	8.8	0.117	26.0	0.032	46.5	0.024	67.0	0.030	87.5	0.008
0.8	0.997	9.0	0.117	26.5	0.044	47.0	0.017	67.5	0.028	88.0	0.006
1.0	1.000	9.2	0.116	27.0	0.055	47.5	0.009	68.0	0.026	88.5	0.004
1.2	0.996	9.4	0.115	27.5	0.063	48.0	0.003	68.5	0.022	89.0	0.002
1.4	0.984	9.6	0.114	28.0	0.066	48.5	0.001	69.0	0.018	89.5	0.001
1.6	0.965	9.8	0.112	28.5	0.065	49.0	0.003	69.5	0.014	90.0	0.000
1.8	0.940	10.0	0.110	29.0	0.060	49.5	0.003	70.0	0.008		
2.0	0.908	10.2	0.108	29.5	0.052	50.0	0.001	70.5	0.003		
2.2	0.871	10.4	0.106	30.0	0.042	50.5	0.002	71.0	0.003		

Remarks:



## SYSTEM SUMMARY

### Antenna:

Type:	<b>TFU-18GTH-R O4</b>	ERP:	<b>1000 kW</b>	<b>( 30.00 dBk )</b>
Channel:	<b>36</b>	RMS Gain*:	<b>15.5</b>	<b>( 11.90 dB )</b>
Location:	<b>Terre Haute, IN</b>	Input Power:	<b>64.52 kW</b>	<b>( 18.10 dBk )</b>

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### Transmission Line:

Type:	<b>EIA Style Rigid TL</b>	Attenuation:	<b>0.95 dB</b>
Size:	<b>8" 75 ohm</b>	Efficiency:	<b>80.3%</b>
Length	<b>1066 ft</b>	<b>325 m</b>	

### Transmitter:

Average Power Required: **80.34 kW** ( **19.05 dBk** )

\* Gain is with respect to half wave dipole.

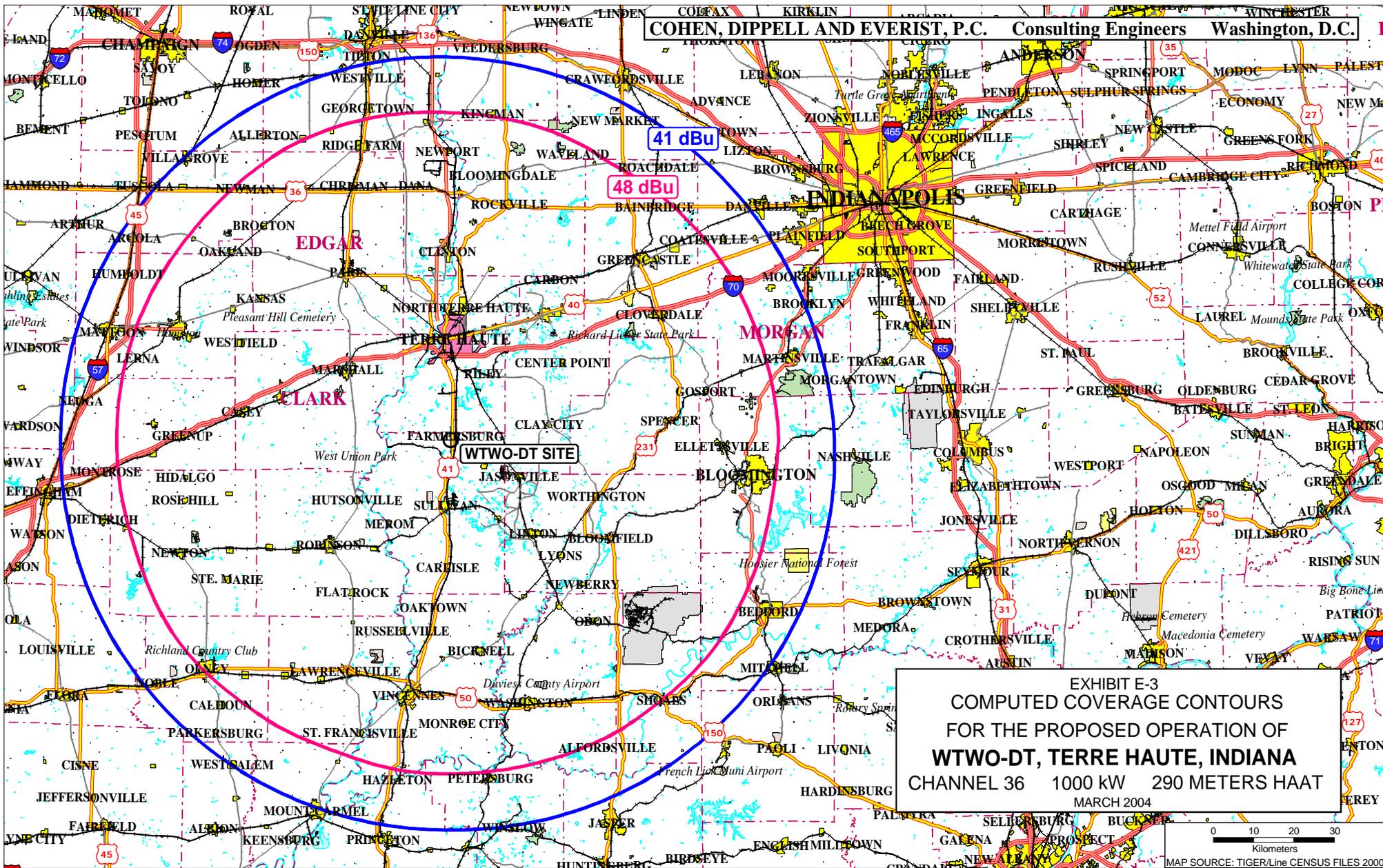


EXHIBIT E-3  
COMPUTED COVERAGE CONTOURS  
FOR THE PROPOSED OPERATION OF  
WTWO-DT, TERRE HAUTE, INDIANA  
CHANNEL 36 1000 kW 290 METERS HAAT  
MARCH 2004

0 10 20 30  
Kilometers  
MAP SOURCE: TIGER/Line CENSUS FILES 2000