

***COMPREHENSIVE TECHNICAL EXHIBIT
APPLICATION FOR CONSTRUCTION PERMIT***

**WVUT - VINCENNES, INDIANA
FACILITY ID: 4329**

**BOARD OF TRUSTEES FOR
THE VINCENNES UNIVERSITY**

JULY 2017

APPLICATION FOR CONSTRUCTION PERMIT

The following engineering statement and attached exhibits have been prepared for **Board of Trustees for the Vincennes University** ("Vincennes"), licensee of digital television station WVUT at Vincennes, University, and are in support of their application for construction permit.¹ This application is the initial construction permit application for WVUT following the Commission's incentive auction. The technical parameters specified in this application are in agreement with those provided under the table of allotments for the facility in the post-repack environment.

WVUT is licensed to operate on television channel 22 with a maximum effective radiated power of 57 kilowatts, horizontally polarized, at a center of radiation of 301.4 meters above mean sea level. The database specified center of radiation elevation above average terrain is 163.9 meters. WVUT has been assigned channel 31 in the post repack environment. It is proposed that WVUT operate on that channel with a maximum effective radiated power of 69.4 kilowatts at a center of radiation of 301.4 meters above mean sea level. This elevation corresponds to an elevation of 161.8 meters above average terrain based on an eight radial sample of the Commission's 30-meter terrain database.

Vincennes proposed to replace the current antenna, a Dielectric model TLP-12C, with a Dielectric model TLP-12C/VP. This antenna is elliptically polarized with a vertical component 35 percent of the horizontal component. The directional pattern for the proposed antenna is congruent with the horizontally polarized component directional pattern of the proposed antenna.

¹ The Facility ID for WVUT at Vincennes, Indiana is 4329.

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As a result, proposed noise limited service contour is identical to the allocated noise limited service contour. No additional studies are therefore required.

Following the text of this technical exhibit is the directional antenna data required under the Commission's Rules. In addition to the data provided by Dielectric, a vertical plane radiation pattern in dBk is also attached. This plot, generated from the manufacturer data, is based on an azimuth of 90 degrees true, which is the tip of the major lobe of the pattern.

The closest FCC monitoring station to the proposed facility is the Allegan, Michigan facility. This facility is located at a distance of 457.8 kilometers from the proposed facility, as calculated by *TV Study*. This value exceeds the notification distance requirements under Section 73.1030(c) of the Commission's Rules. WVUT is not located in the West Virginia quiet zone area, and is located 1531 kilometers from the Table Mountain receiving zone.

The main studio for WVUT complies with the provisions of Section 73.1125 of the Commission's Rules. The main studio is located at Vincennes, Indiana, which is the community of license. Additionally, the main studio is also located within the predicted 48 dBu F(50,90) service contour of WVUT.

The proposed facility would not constitute a significant environment impact, and is excluded from environmental processing. Implementation of the construction permit resulting from the proposed technical would not increase the existing environmental impact already present from the WVUT facility. The tower utilized by WVUT is a registered structure, and has been assigned

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1028983 as its Antenna Structure Registration Number. Construction of the facility does not require tower modification nor does it require ground excavation at the site.

In addition, the proposed facility for WVUT would not constitute an RF exposure hazard to persons in the vicinity of the site. Using the equations in Supplement A of *OET Bulletin 65*, and assuming a relative field value of 0.1 for downward angles, the calculated power density at two meters above ground is $1.45 \mu\text{W}/\text{cm}^2$. This value is considerably less than the upper limit permissible under the uncontrolled environment condition of the Commission's safety standard.

Two FM facilities are co-located with WVUT. These are WVUB and WFML, both licensed to Vincennes, Indiana.² The calculated power density for WVUB, as determined by *FM Model*, is $11.98 \mu\text{W}/\text{cm}^2$ at a distance of 44 meters from the tower base. For WFML, the calculated power density by *FM Model* is $1.37 \mu\text{W}/\text{cm}^2$ at a distance of 53 meters. For a worst-case scenario, the assumption is made that the maximum calculated power density from each facility occurs at all locations in the vicinity of the tower. This aggregate power density, determined by the sum of the three contributors is $14.8 \mu\text{W}/\text{cm}^2$. This value, at the more restrictive FM level, is considerably less than the upper limit permissible under the uncontrolled environment condition of the Commission's Safety Standard.

Vincennes certifies that it will coordinate with all other users of the site to ensure that workers and other personnel are not exposed to levels of radiofrequency radiation in excess of the applicable safety standards. Coordination activities will include, but are not necessarily limited to, a reduction in transmitter power output, or cessation of operation.

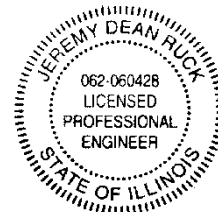
² The Facility ID for WVUB at Vincennes, Indiana is 70241. The Facility ID for WFML at Vincennes, Indiana is 66637.

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The preceding statement and attached exhibits have been prepared by me, or under my direction, and are true and accurate to the best of my belief and knowledge.



Above signature is digitized copy of actual signature
License Expires November 30, 2017

Jeremy D. Ruck, PE
July 10, 2017

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7.10.2017

Horizontal Polarization AZIMUTH PATTERN

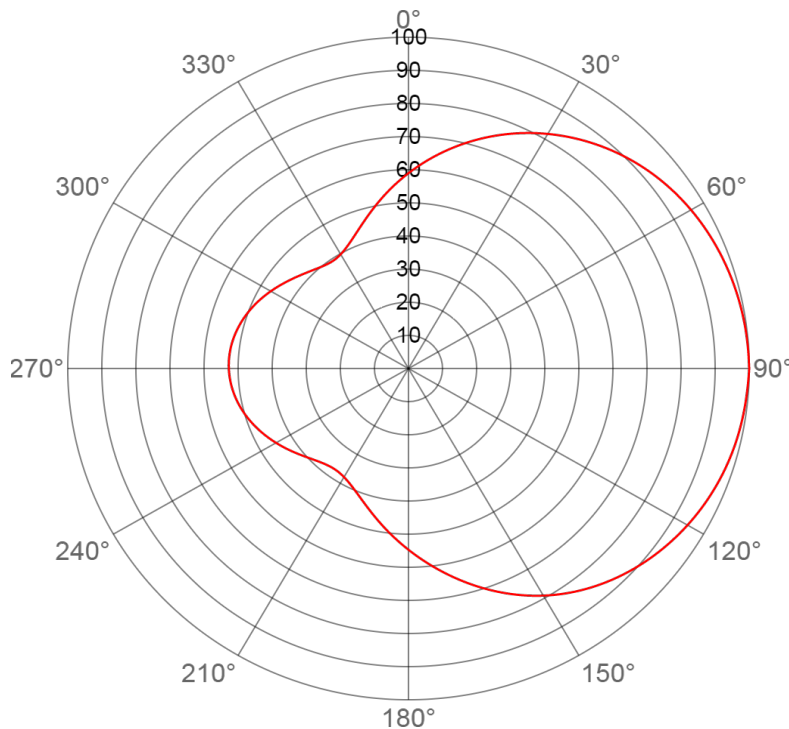


Exhibit No.
Date **26 Apr 2017**
Call Letters **WVUT**
Channel **31**
Antenna Type **TLP-12C/VP**
Location **VINCENNES, IN**
Customer **VINCENNES UNIVERSITY**

Gain **2.1 (3.22 dB)**
Calculated
Drawing # **TLP-C**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.590	36	0.855	72	0.983	108	0.978	144	0.833	180	0.547	216	0.373	252	0.493	288	0.505	324	0.394
1	0.598	37	0.860	73	0.985	109	0.976	145	0.826	181	0.539	217	0.374	253	0.497	289	0.503	325	0.393
2	0.606	38	0.866	74	0.986	110	0.973	146	0.820	182	0.532	218	0.375	254	0.500	290	0.500	326	0.393
3	0.614	39	0.872	75	0.988	111	0.971	147	0.813	183	0.524	219	0.376	255	0.502	291	0.497	327	0.394
4	0.622	40	0.877	76	0.989	112	0.969	148	0.806	184	0.517	220	0.378	256	0.505	292	0.494	328	0.395
5	0.630	41	0.882	77	0.990	113	0.966	149	0.799	185	0.510	221	0.380	257	0.508	293	0.491	329	0.396
6	0.638	42	0.887	78	0.991	114	0.964	150	0.792	186	0.502	222	0.382	258	0.510	294	0.488	330	0.398
7	0.646	43	0.892	79	0.993	115	0.961	151	0.784	187	0.495	223	0.385	259	0.513	295	0.484	331	0.400
8	0.654	44	0.897	80	0.994	116	0.958	152	0.777	188	0.488	224	0.387	260	0.515	296	0.481	332	0.403
9	0.663	45	0.902	81	0.995	117	0.955	153	0.769	189	0.481	225	0.390	261	0.517	297	0.477	333	0.406
10	0.671	46	0.907	82	0.995	118	0.952	154	0.761	190	0.474	226	0.394	262	0.519	298	0.474	334	0.410
11	0.679	47	0.911	83	0.996	119	0.949	155	0.754	191	0.468	227	0.397	263	0.520	299	0.470	335	0.414
12	0.686	48	0.916	84	0.997	120	0.946	156	0.746	192	0.461	228	0.401	264	0.522	300	0.467	336	0.419
13	0.694	49	0.920	85	0.998	121	0.942	157	0.737	193	0.455	229	0.404	265	0.523	301	0.463	337	0.423
14	0.702	50	0.924	86	0.998	122	0.939	158	0.729	194	0.448	230	0.408	266	0.524	302	0.459	338	0.429
15	0.710	51	0.928	87	0.999	123	0.935	159	0.721	195	0.442	231	0.412	267	0.525	303	0.455	339	0.434
16	0.718	52	0.932	88	0.999	124	0.932	160	0.713	196	0.436	232	0.416	268	0.526	304	0.452	340	0.440
17	0.725	53	0.935	89	0.999	125	0.928	161	0.704	197	0.430	233	0.420	269	0.527	305	0.448	341	0.446
18	0.733	54	0.939	90	1.000	126	0.924	162	0.696	198	0.425	234	0.424	270	0.527	306	0.444	342	0.452
19	0.741	55	0.942	91	0.999	127	0.920	163	0.687	199	0.420	235	0.428	271	0.528	307	0.440	343	0.459
20	0.748	56	0.946	92	0.998	128	0.916	164	0.679	200	0.414	236	0.432	272	0.528	308	0.437	344	0.465
21	0.755	57	0.949	93	0.997	129	0.912	165	0.670	201	0.410	237	0.437	273	0.528	309	0.433	345	0.472
22	0.763	58	0.952	94	0.996	130	0.907	166	0.662	202	0.405	238	0.441	274	0.527	310	0.430	346	0.479
23	0.770	59	0.955	95	0.995	131	0.903	167	0.653	203	0.401	239	0.445	275	0.527	311	0.426	347	0.487
24	0.777	60	0.958	96	0.995	132	0.898	168	0.645	204	0.396	240	0.449	276	0.526	312	0.423	348	0.494
25	0.784	61	0.960	97	0.994	133	0.893	169	0.637	205	0.393	241	0.453	277	0.525	313	0.419	349	0.502
26	0.791	62	0.963	98	0.993	134	0.889	170	0.628	206	0.389	242	0.457	278	0.524	314	0.416	350	0.510
27	0.798	63	0.965	99	0.992	135	0.884	171	0.620	207	0.386	243	0.461	279	0.523	315	0.413	351	0.517
28	0.804	64	0.968	100	0.990	136	0.878	172	0.611	208	0.383	244	0.465	280	0.522	316	0.410	352	0.525
29	0.811	65	0.970	101	0.989	137	0.873	173	0.603	209	0.381	245	0.469	281	0.520	317	0.407	353	0.533
30	0.818	66	0.972	102	0.988	138	0.868	174	0.595	210	0.378	246	0.472	282	0.518	318	0.405	354	0.541
31	0.824	67	0.974	103	0.986	139	0.862	175	0.587	211	0.377	247	0.476	283	0.517	319	0.402	355	0.549
32	0.830	68	0.976	104	0.985	140	0.857	176	0.579	212	0.375	248	0.480	284	0.515	320	0.400	356	0.557
33	0.837	69	0.978	105	0.983	141	0.851	177	0.571	213	0.374	249	0.483	285	0.512	321	0.398	357	0.565
34	0.843	70	0.980	106	0.981	142	0.845	178	0.563	214	0.373	250	0.487	286	0.510	322	0.396	358	0.573
35	0.849	71	0.982	107	0.980	143	0.839	179	0.555	215	0.373	251	0.490	287	0.508	323	0.395	359	0.581

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Vertical Polarization AZIMUTH PATTERN

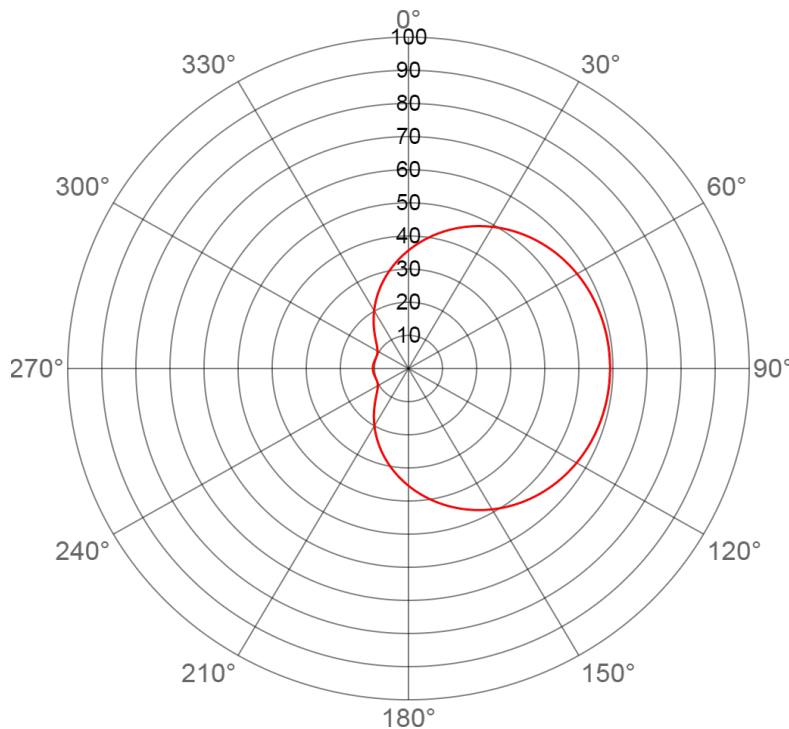


Exhibit No.
Date **26 Apr 2017**
Call Letters **WVUT**
Channel **31**
Antenna Type **TLP-12C/VP**
Location **VINCENNES, IN**
Customer **VINCENNES UNIVERSITY**

Gain **2.1 (3.22 dB)**
Calculated
Drawing # **TLP-C**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.356	36	0.515	72	0.585	108	0.584	144	0.512	180	0.354	216	0.172	252	0.100	288	0.101	324	0.174
1	0.362	37	0.518	73	0.586	109	0.583	145	0.509	181	0.349	217	0.168	253	0.100	289	0.101	325	0.178
2	0.367	38	0.521	74	0.586	110	0.582	146	0.505	182	0.344	218	0.164	254	0.101	290	0.101	326	0.183
3	0.372	39	0.524	75	0.587	111	0.581	147	0.502	183	0.338	219	0.160	255	0.101	291	0.101	327	0.187
4	0.377	40	0.527	76	0.588	112	0.580	148	0.498	184	0.333	220	0.156	256	0.101	292	0.101	328	0.192
5	0.382	41	0.530	77	0.588	113	0.579	149	0.495	185	0.328	221	0.152	257	0.102	293	0.101	329	0.197
6	0.387	42	0.533	78	0.589	114	0.578	150	0.491	186	0.323	222	0.148	258	0.102	294	0.101	330	0.202
7	0.392	43	0.536	79	0.589	115	0.577	151	0.487	187	0.317	223	0.144	259	0.102	295	0.101	331	0.206
8	0.397	44	0.538	80	0.590	116	0.575	152	0.483	188	0.312	224	0.141	260	0.103	296	0.102	332	0.211
9	0.402	45	0.541	81	0.590	117	0.574	153	0.479	189	0.307	225	0.137	261	0.103	297	0.102	333	0.216
10	0.407	46	0.544	82	0.590	118	0.573	154	0.476	190	0.302	226	0.134	262	0.103	298	0.103	334	0.221
11	0.412	47	0.546	83	0.591	119	0.571	155	0.471	191	0.296	227	0.131	263	0.104	299	0.104	335	0.226
12	0.416	48	0.548	84	0.591	120	0.570	156	0.467	192	0.291	228	0.128	264	0.104	300	0.105	336	0.231
13	0.421	49	0.551	85	0.591	121	0.568	157	0.463	193	0.286	229	0.125	265	0.104	301	0.106	337	0.236
14	0.426	50	0.553	86	0.591	122	0.567	158	0.459	194	0.281	230	0.122	266	0.104	302	0.107	338	0.241
15	0.431	51	0.555	87	0.591	123	0.565	159	0.455	195	0.275	231	0.120	267	0.104	303	0.109	339	0.246
16	0.435	52	0.557	88	0.592	124	0.563	160	0.450	196	0.270	232	0.117	268	0.104	304	0.111	340	0.252
17	0.440	53	0.559	89	0.592	125	0.561	161	0.446	197	0.265	233	0.115	269	0.105	305	0.112	341	0.257
18	0.444	54	0.561	90	0.592	126	0.559	162	0.442	198	0.260	234	0.113	270	0.105	306	0.114	342	0.262
19	0.449	55	0.563	91	0.592	127	0.557	163	0.437	199	0.255	235	0.111	271	0.105	307	0.116	343	0.267
20	0.453	56	0.565	92	0.591	128	0.555	164	0.432	200	0.250	236	0.109	272	0.105	308	0.119	344	0.272
21	0.457	57	0.567	93	0.591	129	0.553	165	0.428	201	0.244	237	0.108	273	0.104	309	0.121	345	0.278
22	0.462	58	0.568	94	0.591	130	0.551	166	0.423	202	0.239	238	0.106	274	0.104	310	0.124	346	0.283
23	0.466	59	0.570	95	0.591	131	0.549	167	0.418	203	0.234	239	0.105	275	0.104	311	0.126	347	0.288
24	0.470	60	0.571	96	0.591	132	0.546	168	0.414	204	0.229	240	0.104	276	0.104	312	0.129	348	0.293
25	0.474	61	0.573	97	0.590	133	0.544	169	0.409	205	0.224	241	0.103	277	0.104	313	0.132	349	0.299
26	0.478	62	0.574	98	0.590	134	0.541	170	0.404	206	0.219	242	0.102	278	0.104	314	0.136	350	0.304
27	0.482	63	0.576	99	0.590	135	0.539	171	0.399	207	0.214	243	0.101	279	0.103	315	0.139	351	0.309
28	0.486	64	0.577	100	0.589	136	0.536	172	0.394	208	0.209	244	0.101	280	0.103	316	0.142	352	0.315
29	0.490	65	0.578	101	0.589	137	0.533	173	0.389	209	0.205	245	0.100	281	0.103	317	0.146	353	0.320
30	0.494	66	0.579	102	0.588	138	0.531	174	0.384	210	0.200	246	0.100	282	0.102	318	0.150	354	0.325
31	0.497	67	0.580	103	0.588	139	0.528	175	0.379	211	0.195	247	0.100	283	0.102	319	0.153	355	0.330
32	0.501	68	0.581	104	0.587	140	0.525	176	0.374	212	0.190	248	0.100	284	0.102	320	0.157	356	0.336
33	0.504	69	0.582	105	0.586	141	0.522	177	0.369	213	0.186	249	0.100	285	0.101	321	0.161	357	0.341
34	0.508	70	0.583	106	0.586	142	0.519	178	0.364	214	0.181	250	0.100	286	0.101	322	0.166	358	0.346
35	0.511	71	0.584	107	0.585	143	0.515	179	0.359	215	0.177	251	0.100	287	0.101	323	0.170	359	0.351

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ELEVATION PATTERN

Exhibit No.

Date

26 Apr 2017

Call Letters

WVUT

Channel

31

Antenna Type

TLP-12C/VP

Location

VINCENNES, IN

Customer

VINCENNES UNIVERSITY

RMS Gain at Main Lobe

12.0 (10.79 dB)

Beam Tilt

1 Degrees

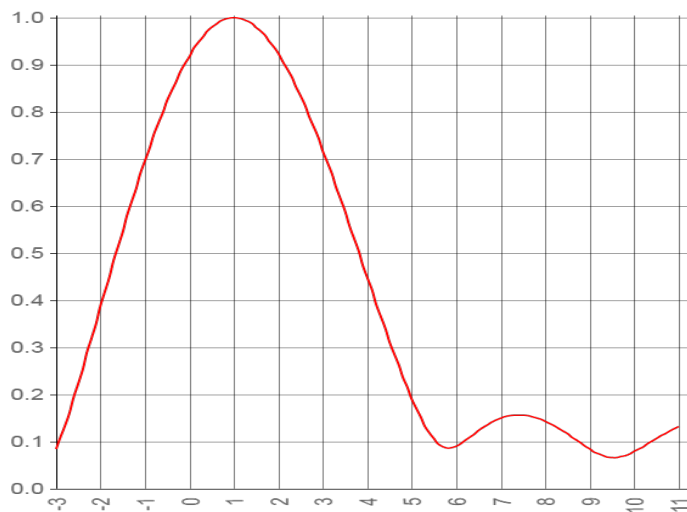
RMS Gain at Horizontal

10.1 (10.06 dB)

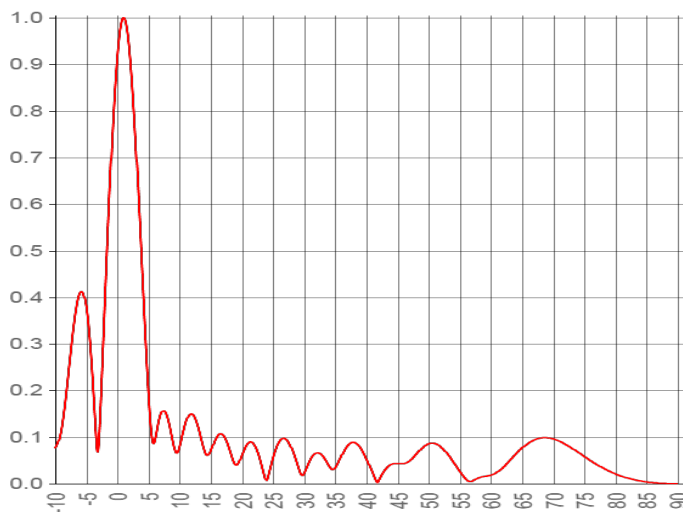
Drawing #

12L120100

Calculated



Degrees below horizontal



Degrees below horizontal

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10	0.076	10	0.079	30	0.022	50	0.086	70	0.096
-9	0.117	11	0.132	31	0.051	51	0.086	71	0.091
-8	0.221	12	0.149	32	0.066	52	0.078	72	0.084
-7	0.339	13	0.120	33	0.059	53	0.064	73	0.076
-6	0.409	14	0.071	34	0.038	54	0.045	74	0.067
-5	0.379	15	0.070	35	0.034	55	0.026	75	0.058
-4	0.227	16	0.101	36	0.060	56	0.010	76	0.049
-3	0.084	17	0.104	37	0.082	57	0.006	77	0.041
-2	0.385	18	0.074	38	0.089	58	0.013	78	0.034
-1	0.696	19	0.041	39	0.078	59	0.016	79	0.027
0	0.919	20	0.062	40	0.053	60	0.018	80	0.021
1	1.000	21	0.087	41	0.023	61	0.025	81	0.016
2	0.923	22	0.083	42	0.008	62	0.036	82	0.012
3	0.718	23	0.049	43	0.030	63	0.050	83	0.009
4	0.447	24	0.008	44	0.041	64	0.064	84	0.006
5	0.192	25	0.056	45	0.043	65	0.077	85	0.004
6	0.090	26	0.090	46	0.043	66	0.087	86	0.002
7	0.150	27	0.096	47	0.050	67	0.094	87	0.001
8	0.143	28	0.075	48	0.063	68	0.098	88	0.001
9	0.084	29	0.037	49	0.077	69	0.099	89	0.000

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System Summary

Exhibit No.	
Date	26 Apr 2017
Call Letters	WVUT
Channel	31
Antenna Type	TLP-12C/VP
Location	VINCENNES, IN
Customer	VINCENNES UNIVERSITY

Antenna

ERP:	69.4 kW (18.41 dBk)	24.1 kW (13.82 dBk)
Peak Gain*:	19.1 (12.81 dB)	6.7 (8.25 dB)

Antenna Input Power:

3.6 kW

Transmission Line

Type:	Transmission Line	
Size:	3-1/8"	
Impedance:	50 ohm	
Length:	530 ft (161.5 m)	
	Attenuation:	1.3 dB
	Efficiency:	73.62 %

Transmitter Output

4.9 kW (6.94 dBk)

* Gain is with respect to half wave dipole.

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WVUT Proposed Vertical Pattern ERP in dBk at 90 Degrees True

Angle	EREL	dBk ERP
-4.00	0.2270	5.53
-3.00	0.0840	-3.10
-2.00	0.3850	10.12
-1.00	0.6960	15.27
0.00	0.9190	17.68
1.00	1.0000	18.41
2.00	0.9230	17.72
3.00	0.7180	15.54
4.00	0.4470	11.42
5.00	0.1920	4.08
6.00	0.0900	-2.50
7.00	0.1500	1.94
8.00	0.1430	1.52
9.00	0.0840	-3.10
10.00	0.0790	-3.63
11.00	0.1320	0.83
12.00	0.1490	1.88
13.00	0.1200	0.00
14.00	0.0710	-4.56
15.00	0.0700	-4.68
16.00	0.1010	-1.50
17.00	0.1040	-1.25
18.00	0.0740	-4.20
19.00	0.0410	-9.33
20.00	0.0620	-5.74
21.00	0.0870	-2.80
22.00	0.0830	-3.20
23.00	0.0490	-7.78
24.00	0.0080	-23.52
25.00	0.0560	-6.62
26.00	0.0900	-2.50
27.00	0.0960	-1.94
28.00	0.0750	-4.09
29.00	0.0370	-10.22
30.00	0.0220	-14.74
31.00	0.0510	-7.44
32.00	0.0660	-5.20
34.00	0.0380	-9.99
36.00	0.0600	-6.02
38.00	0.0890	-2.60
40.00	0.0530	-7.10
42.00	0.0080	-23.52
44.00	0.0410	-9.33
46.00	0.0430	-8.92
48.00	0.0630	-5.60
50.00	0.0860	-2.90
52.00	0.0780	-3.74
54.00	0.0450	-8.52
56.00	0.0100	-21.59
58.00	0.0130	-19.31
60.00	0.0180	-16.48
62.00	0.0360	-10.46
64.00	0.0640	-5.46
66.00	0.0870	-2.80
68.00	0.0980	-1.76
70.00	0.0960	-1.94
72.00	0.0840	-3.10
74.00	0.0670	-5.06
76.00	0.0490	-7.78
78.00	0.0340	-10.96
80.00	0.0210	-15.14
82.00	0.0120	-20.00
84.00	0.0060	-26.02
86.00	0.0020	-35.57
88.00	0.0010	-41.59

Effective Radiated Power in dBk.

