COMPREHENSIVE TECHNICAL EXHIBIT APPLICATION FOR MODIFICATION OF CONSTRUCTION PERMIT

_____

WSEC - JACKSONVILLE, ILLINOIS
FACILITY ID: 70536

WEST CENTRAL ILLINOIS EDUC. TELECOMM. CORP.

NOVEMBER 2017

APPLICATION FOR MODIFICATION OF CONSTRUCTION PERMIT

The following engineering statement and attached exhibits have been prepared for **West Central Educational Telecommunications Corp.** ("Network Knowledge"), licensee of digital television station WSEC at Jacksonville, Illinois, and are in support of their application for modification of construction permit. This application is the initial maximization application for WSEC. Network Knowledge proposes no change in the antenna location or height, proposing only changes to the horizontal and vertical polarized effective radiated power.

WSEC current operates on television channel 15 with a maximum effective radiated power of 75 kilowatts, horizontally polarized, at a center of radiation of 493 meters above mean sea level utilizing a non-directional antenna. In the post repack environment, WSEC is authorized to operate on channel 18 with a maximum effective radiated power of 82 kilowatts elliptically polarized at a center of radiation of 492 meters above mean sea level, also utilizing a non-directional antenna.

The antenna proposed for use by WSEC is a Dielectric elliptically polarized model TFU-24GTH O4A. This antenna has a vertical component that is 35% of the horizontal component. The technical information for this antenna comprises Exhibit E-1.

Exhibit E-2 provides an illustration of the authorized and proposed noise limited service contours for WSEC on channel 18. The terrain sample used in the creation of this map is the Commission's 30 meter terrain database. This map also demonstrates that the proposed 48 dBu F(50,90) service contour would encompass Jacksonville, Illinois, the community of license.

JEREMY RUCK & ASSOCIATES, INC.

P.O. Box 415
221 S. 1st Avenue
Canton, IL 61520

Tel: 309.647.1200
Fax: 855.332.9537
jeremyruck.com

11.2.2017

2

The closest FCC monitoring station to the proposed facility is at Allegan, Michigan, and is 478 kilometers from the proposed site. This distance exceeds by a significant margin the suggested notification distances in Section 73.1030(c)(3) of the Commission's Rules. Additionally, the WSEC is not located within the West Virginia quiet zone area, and is located 1295 from the Table Mountain receiving zone.

The proposed facility would not constitute a significant environmental impact, and is excluded from environmental processing. Implementation of the construction permit resulting from the proposed technical parameters would not increase the existing environmental impact already present from the WSEC facility. The tower utilized by WSEC is a registered structure, and has been assigned 1018309 as its Antenna Structure Registration Number.

Additionally, the proposed facilities for WSEC would not constitute an RF exposure hazard for 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 4.16 μW/cm^2. This value is considerably less than the upper limit permissible under the uncontrolled environment condition of the Commission's safety standard.

In addition, the WSEC tower also supports the transmitting antenna for W40CV-D at Jacksonville, Illinois.[1] Although it is likely that this facility will not exist in the repacked environment, a generalized version of this facility will be considered for purposes of this analysis. For a worst-case scenario, it will be assumed that the antenna will remain at the current elevation

---

[1] The Facility ID for W40CV-D at Jacksonville, Illinois is 182815.
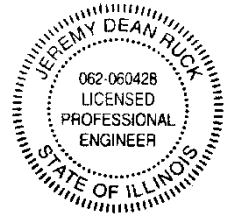
JEREMY RUCK & ASSOCIATES, INC.

JEREMY RUCK & ASSOCIATES, INC.

P.O. Box 415
221 S. 1st Avenue
Canton, IL 61520

Tel: 309.647.1200
Fax: 855.332.9537
jeremyruck.com

11.2.2017

3

of 264 meters above ground level, that the maximum ERP will remain at 15 kW, and that the antenna will function as an isotropic source. Based on these parameters, the calculated power density at two meters above ground would be 7.30 μW/cm^2.

The aggregate power density at the site would be the sum of these two values, or 11.5 μW/cm^2. This value is considerably less than the most restrictive limits of the uncontrolled environment condition of the Commission's safety standard. Network Knowledge certifies that it will coordinate with all other users of the site to ensure that workers and other persons are not exposed to levels of radiofrequency radiation in excess of the applicable safety standards.

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, 2019
Jeremy D. Ruck, PE
November 2, 2017

Dielectric®

Horizontal Polarization
AZIMUTH PATTERN
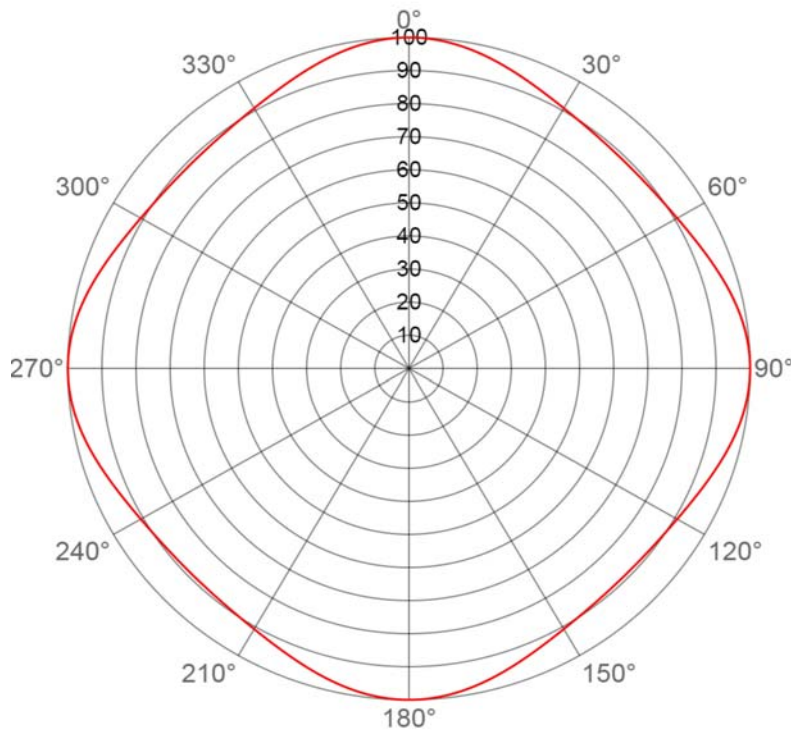
Exhibit No.	
Date	**2 Nov 2017**
Call Letters	**WSEC**
Channel	**18**
Antenna Type	**TFU-24GTH O4A**
Location	**Jacksonville, IL**
Customer	**Network Knowledge**
Gain	**1.1 (0.41 dB)**
	Calculated
Drawing #	**TFU-O4**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	1.000	36	0.895	72	0.951	108	0.951	144	0.895	180	1.000	216	0.895	252	0.951	288	0.951	324	0.895
1	1.000	37	0.894	73	0.956	109	0.947	145	0.897	181	1.000	217	0.894	253	0.956	289	0.947	325	0.897
2	0.999	38	0.893	74	0.960	110	0.943	146	0.899	182	0.999	218	0.893	254	0.960	290	0.943	326	0.899
3	0.998	39	0.892	75	0.964	111	0.939	147	0.901	183	0.998	219	0.892	255	0.964	291	0.939	327	0.901
4	0.997	40	0.891	76	0.968	112	0.935	148	0.903	184	0.997	220	0.891	256	0.968	292	0.935	328	0.903
5	0.995	41	0.890	77	0.972	113	0.931	149	0.905	185	0.995	221	0.890	257	0.972	293	0.931	329	0.905
6	0.993	42	0.889	78	0.976	114	0.927	150	0.908	186	0.993	222	0.889	258	0.976	294	0.927	330	0.908
7	0.991	43	0.889	79	0.979	115	0.924	151	0.911	187	0.991	223	0.889	259	0.979	295	0.924	331	0.911
8	0.989	44	0.889	80	0.983	116	0.920	152	0.914	188	0.989	224	0.889	260	0.983	296	0.920	332	0.914
9	0.986	45	0.889	81	0.986	117	0.917	153	0.917	189	0.986	225	0.889	261	0.986	297	0.917	333	0.917
10	0.983	46	0.889	82	0.989	118	0.914	154	0.920	190	0.983	226	0.889	262	0.989	298	0.914	334	0.920
11	0.979	47	0.889	83	0.991	119	0.911	155	0.924	191	0.979	227	0.889	263	0.991	299	0.911	335	0.924
12	0.976	48	0.889	84	0.993	120	0.908	156	0.927	192	0.976	228	0.889	264	0.993	300	0.908	336	0.927
13	0.972	49	0.890	85	0.995	121	0.905	157	0.931	193	0.972	229	0.890	265	0.995	301	0.905	337	0.931
14	0.968	50	0.891	86	0.997	122	0.903	158	0.935	194	0.968	230	0.891	266	0.997	302	0.903	338	0.935
15	0.964	51	0.892	87	0.998	123	0.901	159	0.939	195	0.964	231	0.892	267	0.998	303	0.901	339	0.939
16	0.960	52	0.893	88	0.999	124	0.899	160	0.943	196	0.960	232	0.893	268	0.999	304	0.899	340	0.943
17	0.956	53	0.894	89	1.000	125	0.897	161	0.947	197	0.956	233	0.894	269	1.000	305	0.897	341	0.947
18	0.951	54	0.895	90	1.000	126	0.895	162	0.951	198	0.951	234	0.895	270	1.000	306	0.895	342	0.951
19	0.947	55	0.897	91	1.000	127	0.894	163	0.956	199	0.947	235	0.897	271	1.000	307	0.894	343	0.956
20	0.943	56	0.899	92	0.999	128	0.893	164	0.960	200	0.943	236	0.899	272	0.999	308	0.893	344	0.960
21	0.939	57	0.901	93	0.998	129	0.892	165	0.964	201	0.939	237	0.901	273	0.998	309	0.892	345	0.964
22	0.935	58	0.903	94	0.997	130	0.891	166	0.968	202	0.935	238	0.903	274	0.997	310	0.891	346	0.968
23	0.931	59	0.905	95	0.995	131	0.890	167	0.972	203	0.931	239	0.905	275	0.995	311	0.890	347	0.972
24	0.927	60	0.908	96	0.993	132	0.889	168	0.976	204	0.927	240	0.908	276	0.993	312	0.889	348	0.976
25	0.924	61	0.911	97	0.991	133	0.889	169	0.979	205	0.924	241	0.911	277	0.991	313	0.889	349	0.979
26	0.920	62	0.914	98	0.989	134	0.889	170	0.983	206	0.920	242	0.914	278	0.989	314	0.889	350	0.983
27	0.917	63	0.917	99	0.986	135	0.889	171	0.986	207	0.917	243	0.917	279	0.986	315	0.889	351	0.986
28	0.914	64	0.920	100	0.983	136	0.889	172	0.989	208	0.914	244	0.920	280	0.983	316	0.889	352	0.989
29	0.911	65	0.924	101	0.979	137	0.889	173	0.991	209	0.911	245	0.924	281	0.979	317	0.889	353	0.991
30	0.908	66	0.927	102	0.976	138	0.889	174	0.993	210	0.908	246	0.927	282	0.976	318	0.889	354	0.993
31	0.905	67	0.931	103	0.972	139	0.890	175	0.995	211	0.905	247	0.931	283	0.972	319	0.890	355	0.995
32	0.903	68	0.935	104	0.968	140	0.891	176	0.997	212	0.903	248	0.935	284	0.968	320	0.891	356	0.997
33	0.901	69	0.939	105	0.964	141	0.892	177	0.998	213	0.901	249	0.939	285	0.964	321	0.892	357	0.998
34	0.899	70	0.943	106	0.960	142	0.893	178	0.999	214	0.899	250	0.943	286	0.960	322	0.893	358	0.999
35	0.897	71	0.947	107	0.956	143	0.894	179	1.000	215	0.897	251	0.947	287	0.956	323	0.894	359	1.000

Trusted for Decades. Ready for Tomorrow.

Dielectric®

Vertical Polarization
AZIMUTH PATTERN
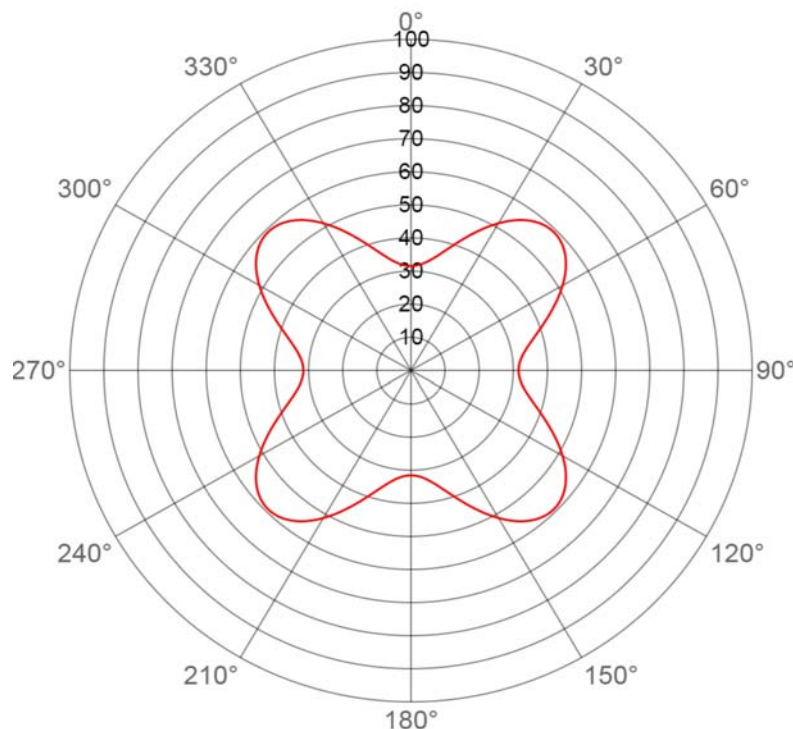
Exhibit No.	
Date	**2 Nov 2017**
Call Letters	**WSEC**
Channel	**18**
Antenna Type	**TFU-24GTH O4A**
Location	**Jacksonville, IL**
Customer	**Network Knowledge**
Gain	**1.1 (0.41 dB)**
	Calculated
Drawing #	**TFU-O4**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.315	36	0.561	72	0.396	108	0.396	144	0.561	180	0.315	216	0.561	252	0.396	288	0.396	324	0.561
1	0.316	37	0.567	73	0.387	109	0.405	145	0.555	181	0.316	217	0.567	253	0.387	289	0.405	325	0.555
2	0.316	38	0.573	74	0.379	110	0.415	146	0.547	182	0.316	218	0.573	254	0.379	290	0.415	326	0.547
3	0.318	39	0.578	75	0.371	111	0.424	147	0.539	183	0.318	219	0.578	255	0.371	291	0.424	327	0.539
4	0.319	40	0.582	76	0.364	112	0.434	148	0.531	184	0.319	220	0.582	256	0.364	292	0.434	328	0.531
5	0.321	41	0.585	77	0.357	113	0.444	149	0.522	185	0.321	221	0.585	257	0.357	293	0.444	329	0.522
6	0.324	42	0.588	78	0.351	114	0.454	150	0.513	186	0.324	222	0.588	258	0.351	294	0.454	330	0.513
7	0.327	43	0.590	79	0.345	115	0.464	151	0.504	187	0.327	223	0.590	259	0.345	295	0.464	331	0.504
8	0.331	44	0.591	80	0.340	116	0.474	152	0.494	188	0.331	224	0.591	260	0.340	296	0.474	332	0.494
9	0.335	45	0.592	81	0.335	117	0.484	153	0.484	189	0.335	225	0.592	261	0.335	297	0.484	333	0.484
10	0.340	46	0.591	82	0.331	118	0.494	154	0.474	190	0.340	226	0.591	262	0.331	298	0.494	334	0.474
11	0.345	47	0.590	83	0.327	119	0.504	155	0.464	191	0.345	227	0.590	263	0.327	299	0.504	335	0.464
12	0.351	48	0.588	84	0.324	120	0.513	156	0.454	192	0.351	228	0.588	264	0.324	300	0.513	336	0.454
13	0.357	49	0.585	85	0.321	121	0.522	157	0.444	193	0.357	229	0.585	265	0.321	301	0.522	337	0.444
14	0.364	50	0.582	86	0.319	122	0.531	158	0.434	194	0.364	230	0.582	266	0.319	302	0.531	338	0.434
15	0.371	51	0.578	87	0.318	123	0.539	159	0.424	195	0.371	231	0.578	267	0.318	303	0.539	339	0.424
16	0.379	52	0.573	88	0.316	124	0.547	160	0.414	196	0.379	232	0.573	268	0.316	304	0.547	340	0.414
17	0.387	53	0.567	89	0.316	125	0.555	161	0.405	197	0.387	233	0.567	269	0.316	305	0.555	341	0.405
18	0.396	54	0.561	90	0.315	126	0.561	162	0.396	198	0.396	234	0.561	270	0.315	306	0.561	342	0.396
19	0.405	55	0.555	91	0.316	127	0.567	163	0.387	199	0.405	235	0.555	271	0.316	307	0.567	343	0.387
20	0.415	56	0.547	92	0.316	128	0.573	164	0.379	200	0.415	236	0.547	272	0.316	308	0.573	344	0.379
21	0.424	57	0.539	93	0.318	129	0.578	165	0.371	201	0.424	237	0.539	273	0.318	309	0.578	345	0.371
22	0.434	58	0.531	94	0.319	130	0.582	166	0.364	202	0.434	238	0.531	274	0.319	310	0.582	346	0.364
23	0.444	59	0.522	95	0.321	131	0.585	167	0.357	203	0.444	239	0.522	275	0.321	311	0.585	347	0.357
24	0.454	60	0.513	96	0.324	132	0.588	168	0.351	204	0.454	240	0.513	276	0.324	312	0.588	348	0.351
25	0.464	61	0.504	97	0.327	133	0.590	169	0.345	205	0.464	241	0.504	277	0.327	313	0.590	349	0.345
26	0.474	62	0.494	98	0.331	134	0.591	170	0.340	206	0.474	242	0.494	278	0.331	314	0.591	350	0.340
27	0.484	63	0.484	99	0.335	135	0.592	171	0.335	207	0.484	243	0.484	279	0.335	315	0.592	351	0.335
28	0.494	64	0.474	100	0.340	136	0.591	172	0.331	208	0.494	244	0.474	280	0.340	316	0.591	352	0.331
29	0.504	65	0.464	101	0.345	137	0.590	173	0.327	209	0.504	245	0.464	281	0.345	317	0.590	353	0.327
30	0.513	66	0.454	102	0.351	138	0.588	174	0.324	210	0.513	246	0.454	282	0.351	318	0.588	354	0.324
31	0.522	67	0.444	103	0.357	139	0.585	175	0.321	211	0.522	247	0.444	283	0.357	319	0.585	355	0.321
32	0.531	68	0.434	104	0.364	140	0.582	176	0.319	212	0.531	248	0.434	284	0.364	320	0.582	356	0.319
33	0.539	69	0.424	105	0.371	141	0.578	177	0.318	213	0.539	249	0.424	285	0.371	321	0.578	357	0.318
34	0.547	70	0.414	106	0.379	142	0.573	178	0.316	214	0.547	250	0.414	286	0.379	322	0.573	358	0.316
35	0.555	71	0.405	107	0.387	143	0.567	179	0.316	215	0.555	251	0.405	287	0.387	323	0.567	359	0.316

Trusted for Decades. Ready for Tomorrow.

Dielectric®

ELEVATION PATTERN

Exhibit No.	
Date	**2 Nov 2017**
Call Letters	**WSEC**
Channel	**18**
Antenna Type	**TFU-24GTH O4A**
Location	**Jacksonville, IL**
Customer	**Network Knowledge**

Future fill is available!

RMS Gain at Main Lobe	**22.0 (13.42 dB)**	Beam Tilt	**0.5 Degrees**
RMS Gain at Horizontal	**20.1 (13.02 dB)**	Drawing #	**24G220050**
	Calculated		
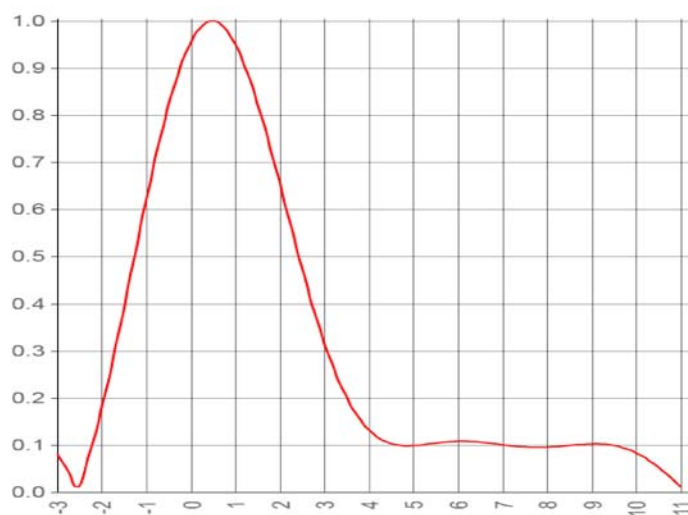
Degrees below horizontal
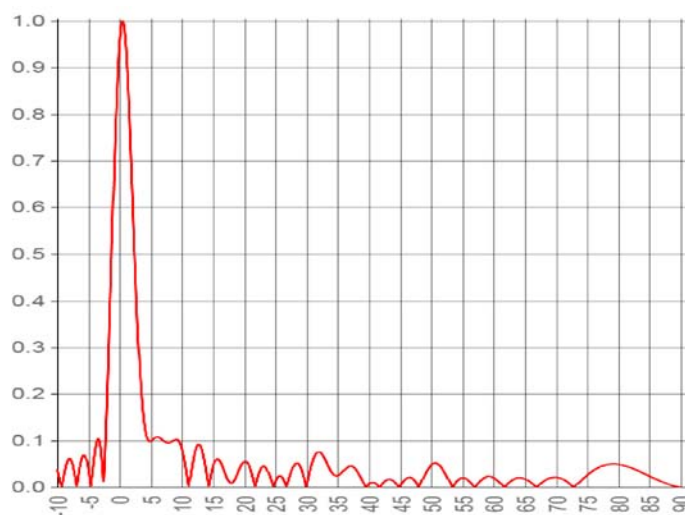
Degrees below horizontal

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10	0.038	10	0.083	30	0.004	50	0.048	70	0.021
-9	0.022	11	0.011	31	0.056	51	0.050	71	0.017
-8	0.061	12	0.071	32	0.075	52	0.034	72	0.009
-7	0.011	13	0.087	33	0.058	53	0.010	73	0.002
-6	0.062	14	0.026	34	0.032	54	0.011	74	0.014
-5	0.038	15	0.043	35	0.025	55	0.019	75	0.026
-4	0.072	16	0.057	36	0.036	56	0.013	76	0.036
-3	0.081	17	0.026	37	0.045	57	0.001	77	0.043
-2	0.176	18	0.009	38	0.036	58	0.015	78	0.048
-1	0.619	19	0.031	39	0.013	59	0.023	79	0.050
0	0.955	20	0.055	40	0.006	60	0.020	80	0.049
1	0.952	21	0.037	41	0.008	61	0.009	81	0.046
2	0.655	22	0.013	42	0.005	62	0.004	82	0.042
3	0.317	23	0.044	43	0.016	63	0.015	83	0.036
4	0.132	24	0.027	44	0.013	64	0.020	84	0.030
5	0.099	25	0.012	45	0.003	65	0.017	85	0.023
6	0.108	26	0.022	46	0.018	66	0.009	86	0.017
7	0.100	27	0.010	47	0.018	67	0.002	87	0.011
8	0.095	28	0.047	48	0.001	68	0.012	88	0.006
9	0.102	29	0.043	49	0.027	69	0.019	89	0.002

Trusted for Decades. Ready for Tomorrow.

System Summary

Exhibit No.	
Date	**2 Nov 2017**
Call Letters	**WSEC**
Channel	**18**
Antenna Type	**TFU-24GTH O4A**
Location	**Jacksonville, IL**
Customer	**Network Knowledge**

Antenna	**Hpol**	**Vpol**
ERP:	750.0 kW (28.75 dBk)	262.1 kW (24.18 dBk)
RMS Gain*:	16.3 (12.12 dB)	5.7 (7.56 dB)

Antenna Input Power: 46.0 kW

Transmission Line

Type:	Transmission Line		
Size:	6-1/8" 75 ohm		
Impedance:	75 ohm		
Length:	1000 ft (304.8 m)	Attenuation:	1.1 dB
		Efficiency:	78.02 %

Transmitter Output

59.0 kW (17.71 dBk)

* Gain is with respect to half wave dipole.

Trusted for Decades. Ready for Tomorrow.

Mechanicals

Exhibit No.

Date	**2 Nov 2017**
Call Letters	**WSEC**
Channel	**18**
Antenna Type	**TFU-24GTH O4A**
Location	**Jacksonville, IL**
Customer	**Network Knowledge**

Preliminary Specifications

Top Mounted

Mechanical Specification without ice TIA-222-G

Basic Wind Speed	90 mph
Structure Class	II
Exposure Category	C
Topography Category	1

Mechanical Specifications

Height less Lightning Protector	(H2)	50.5 ft (15.4 m)
Height with Lightning Protector	(H4)	54.5 ft (16.6 m)
Center of Radiation	(H3)	25.2 ft (7.7 m)

Trusted for Decades. Ready for Tomorrow.

WSEC-D.CP
Latitude: 39-36-09 N
Longitude: 090-02-47 W
ERP: 82.00 kW
Channel: 18
Frequency: 497.0 MHz
AMSL Height: 492.0 m
Horiz. Pattern: Omni
Vert. Pattern: Yes
Elec Tilt: 0.5
Prop Model: None

WSEC-D.X
Latitude: 39-36-09 N
Longitude: 090-02-47 W
ERP: 750.00 kW
Channel: 18
Frequency: 497.0 MHz
AMSL Height: 491.9 m
Horiz. Pattern: Omni
Vert. Pattern: Yes
Elec Tilt: 0.5
Prop Model: None

Jeremy Ruck & Associates, Inc.

Authorized 48 dBu
F(50,90) Contour

Proposed 48 dBu
F(50,90) Contour

Community of License
Jacksonville, Illinois

WSEC-D.XP

Exhibit E-2
Service Contour Comparison
WSEC - Jacksonville, Illinois
Network Knowledge
November, 2017

Scale 1:1,000,000
km
0   10   20   30