

ENGINEERING EXHIBIT

Digital Television Station

Application for Minor Modification of Construction Permit

prepared for

Gray Television Licensee, LLC
KWNV(DT) Winnemucca, NV
Facility ID 776269
Ch. 16 20 kW 651 m

Gray Television Licensee, LLC (“Gray”), is the permittee of digital television station KWNV, Channel 7, Facility ID 776269, Winnemucca NV (file# 0000195678). KWNV is an unbuilt new full power television station which arose from FCC Auction 112. The digital channel allotment for KWNV was recently changed from Channel 7 to Channel 16 as described in the FCC Report and Order (“R&O”) in MB Docket 23-286¹. Pursuant to the R&O, *Gray* is submitting this minor change application (Form 2100 Schedule A) to obtain a Construction Permit to specify operation on Channel 16.

Gray proposes to construct the Channel 16 facility by installing a transmitting antenna on an existing tower structure atop Winnemucca Mountain, overlooking Winnemucca. The antenna supporting structure is not registered as the overall structure height is less than 61 meters above ground and passes the FCC’s TOWAIR program for the tower location.

The proposed antenna is an elliptically polarized directional Dielectric model TLP-8M/VP (30 percent vertical polarization). The maximum horizontally polarized effective radiated power (“ERP”) is 20 kW and the maximum vertically polarized ERP is 6 kW. The vertically polarized component will not exceed the horizontally polarized component at any azimuth. The directional antenna’s azimuthal patterns are depicted in Figures 1 and 1A for horizontal and vertical polarization, respectively. The antenna’s elevation pattern is supplied in Figure 2.

¹*Amendment of Section 73.622(j), Table of Allotments, Television Broadcast Stations (Winnemucca, NV)*, MB Docket No. 23-286, RM-11960, DA 23-1054, released November 7, 2023.

Figure 3 supplies a map that demonstrates compliance with §73.625(a)(1) regarding coverage of the entire principal community.

The KWNV facility proposed herein conforms exactly to the technical parameters adopted in MB Docket 23-286, therefore realizing a 100.0 percent match of the allotted service population. Since no change in technical parameters from those specified in the Channel 16 allotment will occur, interference analysis to other television facilities is not required.

Human Exposure to Radiofrequency Electromagnetic Field (Environmental)

The proposed operation was evaluated for human exposure to RF energy using the procedures outlined in the FCC's OET Bulletin Number 65. Based on OET-65 equation (10) and considering the antenna relative field in downward elevations, the graph in Figure 4 depicts calculated power density levels attributable to the proposed facility at locations near the site at a height of two meters above ground level. The maximum calculated RF electromagnetic field attributable to the proposed facility is 26.0 percent of the general population / uncontrolled maximum permissible exposure ("MPE") limit and 5.2 percent of the occupational / controlled MPE limit at any location two meters above ground level, which occurs within 10 meters of the site location.

Gray will participate in an RF electromagnetic field exposure safety program, along with other broadcasters and FCC licensees that utilize the Winnemucca Mountain site area. Appropriate exposure abatement and access control procedures will be established and followed in order to comply with the FCC's exposure limits. Post-construction measurements of RF electromagnetic field shall be conducted to ensure compliance. Considering the abatement program and access control, the general public and workers will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, authorized personnel will be trained and/or supervised as necessary for access to any "controlled" areas. *Gray* will coordinate exposure procedures with all pertinent stations and will reduce power or cease operation as necessary to protect persons having access to the site, tower, or antenna from RF electromagnetic field exposure in excess of FCC guidelines.

Engineering Exhibit
Gray Television Licensee, LLC (KWNV)
(page 3 of 3)

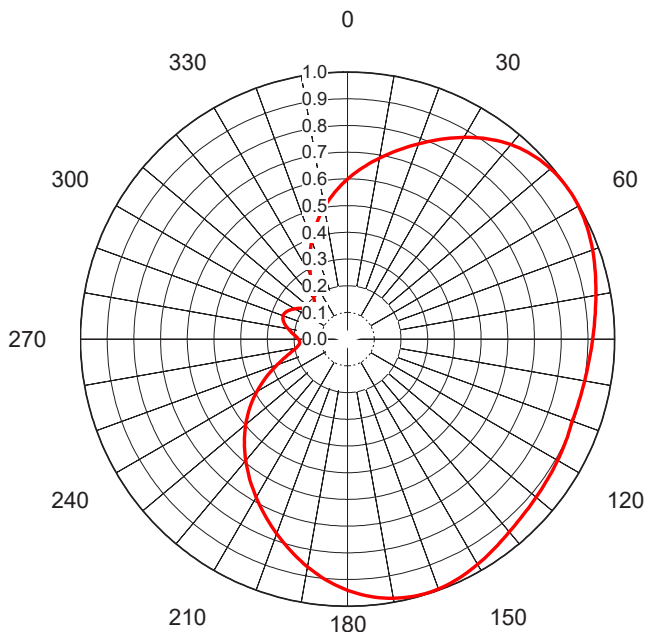


List of Attachments

Figure 1, 1A	Antenna Azimuthal Pattern
Figure 2	Antenna Elevation Pattern
Figure 3	Proposed Coverage Contours
Figure 4	Calculated RF Electromagnetic Field
Form 2100	Saved Version of Engineering Sections of FCC Form at Time of Upload

Chesapeake RF Consultants, LLC

Joseph M. Davis, P.E.	November 30, 2023	
207 Old Dominion Road	Yorktown, VA 23692	703-650-9600



AZIMUTH PATTERN Horizontal Polarization

Proposal No. **20221028jmd**
Date **28-Oct-22**
Call Letters **KWNV (UHF)**
Channel **16**
Frequency **485 MHz**
Antenna Type **TLP-8M/VP**
Gain **1.88 (2.73dB)**
Calculated

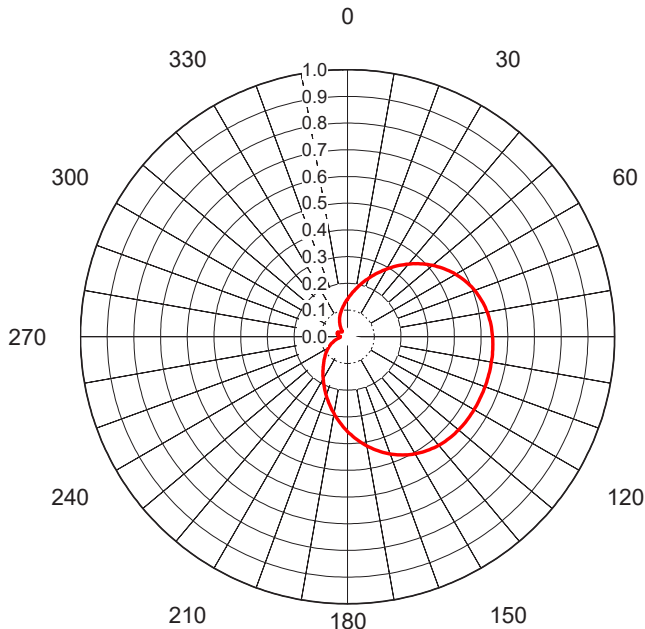
Pattern Number **TLP-M-16 Hpol**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.599	36	0.923	72	0.970	108	0.896	144	0.954	180	0.940	216	0.630	252	0.260	288	0.255
1	0.608	37	0.931	73	0.967	109	0.896	145	0.958	181	0.934	217	0.620	253	0.250	289	0.256
2	0.617	38	0.938	74	0.964	110	0.895	146	0.961	182	0.927	218	0.611	254	0.241	290	0.257
3	0.626	39	0.945	75	0.960	111	0.897	147	0.964	183	0.920	219	0.602	255	0.232	291	0.256
4	0.635	40	0.951	76	0.957	112	0.898	148	0.967	184	0.913	220	0.593	256	0.224	292	0.255
5	0.644	41	0.957	77	0.954	113	0.900	149	0.971	185	0.906	221	0.583	257	0.216	293	0.253
6	0.653	42	0.963	78	0.951	114	0.901	150	0.974	186	0.898	222	0.574	258	0.209	294	0.251
7	0.662	43	0.968	79	0.947	115	0.902	151	0.977	187	0.890	223	0.565	259	0.203	295	0.248
8	0.671	44	0.972	80	0.944	116	0.904	152	0.980	188	0.882	224	0.555	260	0.197	296	0.245
9	0.680	45	0.977	81	0.941	117	0.905	153	0.983	189	0.874	225	0.546	261	0.192	297	0.241
10	0.688	46	0.981	82	0.938	118	0.906	154	0.985	190	0.865	226	0.536	262	0.188	298	0.236
11	0.697	47	0.984	83	0.935	119	0.907	155	0.988	191	0.857	227	0.527	263	0.184	299	0.232
12	0.706	48	0.987	84	0.933	120	0.908	156	0.990	192	0.848	228	0.517	264	0.182	300	0.227
13	0.715	49	0.990	85	0.930	121	0.910	157	0.992	193	0.839	229	0.507	265	0.180	301	0.222
14	0.724	50	0.993	86	0.927	122	0.911	158	0.993	194	0.830	230	0.497	266	0.179	302	0.217
15	0.733	51	0.995	87	0.925	123	0.912	159	0.994	195	0.821	231	0.487	267	0.179	303	0.212
16	0.742	52	0.996	88	0.922	124	0.913	160	0.995	196	0.812	232	0.477	268	0.180	304	0.207
17	0.751	53	0.998	89	0.920	125	0.914	161	0.996	197	0.803	233	0.467	269	0.182	305	0.202
18	0.760	54	0.999	90	0.918	126	0.916	162	0.996	198	0.794	234	0.457	270	0.184	306	0.198
19	0.769	55	1.000	91	0.916	127	0.917	163	0.996	199	0.784	235	0.446	271	0.187	307	0.194
20	0.778	56	1.000	92	0.914	128	0.918	164	0.996	200	0.775	236	0.436	272	0.190	308	0.190
21	0.788	57	1.000	93	0.912	129	0.920	165	0.995	201	0.766	237	0.425	273	0.194	309	0.186
22	0.797	58	1.000	94	0.910	130	0.921	166	0.993	202	0.757	238	0.414	274	0.198	310	0.183
23	0.807	59	0.999	95	0.908	131	0.923	167	0.992	203	0.748	239	0.403	275	0.202	311	0.181
24	0.816	60	0.998	96	0.907	132	0.925	168	0.990	204	0.739	240	0.392	276	0.207	312	0.179
25	0.826	61	0.997	97	0.905	133	0.926	169	0.988	205	0.730	241	0.381	277	0.211	313	0.178
26	0.835	62	0.996	98	0.904	134	0.928	170	0.985	206	0.720	242	0.370	278	0.216	314	0.178
27	0.845	63	0.994	99	0.903	135	0.930	171	0.982	207	0.711	243	0.358	279	0.221	315	0.178
28	0.854	64	0.992	100	0.901	136	0.932	172	0.979	208	0.702	244	0.347	280	0.226	316	0.180
29	0.863	65	0.990	101	0.900	137	0.935	173	0.975	209	0.693	245	0.335	281	0.231	317	0.182
30	0.873	66	0.987	102	0.899	138	0.937	174	0.971	210	0.684	246	0.324	282	0.235	318	0.185
31	0.882	67	0.985	103	0.899	139	0.940	175	0.967	211	0.675	247	0.313	283	0.240	319	0.189
32	0.890	68	0.982	104	0.898	140	0.942	176	0.962	212	0.666	248	0.302	284	0.244	320	0.194
33	0.899	69	0.979	105	0.897	141	0.945	177	0.957	213	0.657	249	0.291	285	0.247	321	0.200
34	0.907	70	0.976	106	0.897	142	0.948	178	0.952	214	0.648	250	0.280	286	0.250	322	0.206
35	0.916	71	0.973	107	0.896	143	0.951	179	0.946	215	0.639	251	0.270	287	0.253	323	0.214

Figure 1
Antenna Azimuthal Pattern
Horizontal Polarization
KWNV(DT) Winnemucca, NV
Facility ID 776269
Ch. 16 20 kW 651 m

prepared for
Gray Television Licensee, LLC

November, 2023



AZIMUTH PATTERN Vertical Polarization

Proposal No. **20221028jmd**
Date **28-Oct-22**
Call Letters **KWNV (UHF)**
Channel **16**
Frequency **485 MHz**
Antenna Type **TLP-8M/VP**
Gain **2.67 (4.27dB)**
Calculated

Pattern Number **TLP-M-16 Vpol**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.141	36	0.330	72	0.513	108	0.548	144	0.523	180	0.355	216	0.156	252	0.053	288	0.041
1	0.145	37	0.337	73	0.516	109	0.548	145	0.520	181	0.348	217	0.152	253	0.051	289	0.041
2	0.149	38	0.343	74	0.518	110	0.548	146	0.518	182	0.342	218	0.148	254	0.049	290	0.042
3	0.153	39	0.349	75	0.521	111	0.548	147	0.515	183	0.336	219	0.145	255	0.046	291	0.041
4	0.157	40	0.355	76	0.523	112	0.548	148	0.512	184	0.330	220	0.141	256	0.044	292	0.041
5	0.161	41	0.362	77	0.525	113	0.548	149	0.509	185	0.323	221	0.137	257	0.042	293	0.041
6	0.165	42	0.368	78	0.527	114	0.548	150	0.506	186	0.317	222	0.134	258	0.040	294	0.041
7	0.169	43	0.374	79	0.529	115	0.548	151	0.503	187	0.311	223	0.131	259	0.038	295	0.040
8	0.174	44	0.380	80	0.531	116	0.547	152	0.499	188	0.305	224	0.127	260	0.036	296	0.039
9	0.178	45	0.386	81	0.533	117	0.547	153	0.496	189	0.298	225	0.124	261	0.034	297	0.039
10	0.183	46	0.392	82	0.534	118	0.547	154	0.492	190	0.292	226	0.121	262	0.032	298	0.038
11	0.187	47	0.398	83	0.536	119	0.547	155	0.488	191	0.286	227	0.118	263	0.031	299	0.037
12	0.192	48	0.404	84	0.537	120	0.547	156	0.484	192	0.280	228	0.115	264	0.030	300	0.036
13	0.197	49	0.410	85	0.538	121	0.547	157	0.480	193	0.274	229	0.112	265	0.028	301	0.035
14	0.202	50	0.416	86	0.540	122	0.546	158	0.476	194	0.268	230	0.109	266	0.028	302	0.034
15	0.207	51	0.421	87	0.541	123	0.546	159	0.472	195	0.262	231	0.106	267	0.027	303	0.033
16	0.212	52	0.427	88	0.542	124	0.546	160	0.467	196	0.256	232	0.104	268	0.027	304	0.032
17	0.217	53	0.432	89	0.542	125	0.545	161	0.462	197	0.250	233	0.101	269	0.027	305	0.031
18	0.223	54	0.438	90	0.543	126	0.545	162	0.458	198	0.245	234	0.098	270	0.027	306	0.030
19	0.228	55	0.443	91	0.544	127	0.545	163	0.453	199	0.239	235	0.096	271	0.028	307	0.029
20	0.234	56	0.448	92	0.544	128	0.544	164	0.448	200	0.233	236	0.093	272	0.028	308	0.028
21	0.239	57	0.453	93	0.545	129	0.543	165	0.442	201	0.228	237	0.091	273	0.029	309	0.028
22	0.245	58	0.458	94	0.545	130	0.543	166	0.437	202	0.222	238	0.088	274	0.030	310	0.027
23	0.251	59	0.463	95	0.546	131	0.542	167	0.432	203	0.217	239	0.085	275	0.031	311	0.027
24	0.257	60	0.468	96	0.546	132	0.541	168	0.426	204	0.212	240	0.083	276	0.032	312	0.027
25	0.263	61	0.472	97	0.546	133	0.540	169	0.421	205	0.207	241	0.080	277	0.033	313	0.027
26	0.268	62	0.477	98	0.547	134	0.539	170	0.415	206	0.202	242	0.078	278	0.034	314	0.028
27	0.274	63	0.481	99	0.547	135	0.538	171	0.409	207	0.197	243	0.076	279	0.035	315	0.029
28	0.281	64	0.485	100	0.547	136	0.537	172	0.403	208	0.192	244	0.073	280	0.036	316	0.030
29	0.287	65	0.489	101	0.547	137	0.535	173	0.398	209	0.187	245	0.071	281	0.037	317	0.031
30	0.293	66	0.493	102	0.547	138	0.534	174	0.392	210	0.182	246	0.068	282	0.038	318	0.032
31	0.299	67	0.497	103	0.547	139	0.532	175	0.386	211	0.178	247	0.066	283	0.039	319	0.034
32	0.305	68	0.500	104	0.548	140	0.531	176	0.379	212	0.173	248	0.063	284	0.039	320	0.036
33	0.311	69	0.503	105	0.548	141	0.529	177	0.373	213	0.169	249	0.061	285	0.040	321	0.038
34	0.318	70	0.507	106	0.548	142	0.527	178	0.367	214	0.165	250	0.058	286	0.041	322	0.040
35	0.324	71	0.510	107	0.548	143	0.525	179	0.361	215	0.160	251	0.056	287	0.041	323	0.042

Figure 1A
Antenna Azimuthal Pattern
Vertical Polarization
KWNV(DT) Winnemucca, NV
Facility ID 776269
Ch. 16 20 kW 651 m

prepared for
Gray Television Licensee, LLC

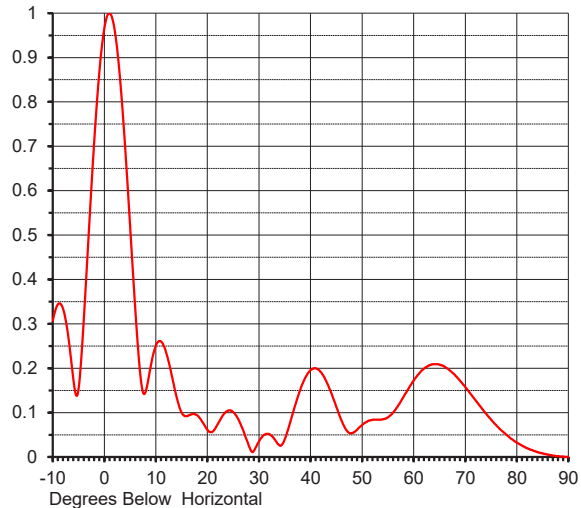
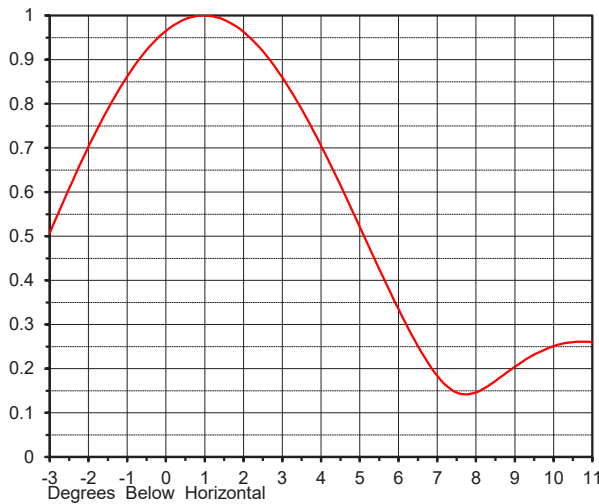
November, 2023

ELEVATION PATTERN

Proposal No. 20221028jmd
Date 28-Oct-22
Call Letters KWNV (UHF)
Channel 16
Frequency 485 MHz
Antenna Type TLP-8M/VP

RMS Directivity at Main Lobe 8.0 (9.04 dB)
RMS Directivity at Horizontal 7.5 (8.75 dB)
Calculated

Beam Tilt 1.00 deg
Pattern Number 08L080100-16

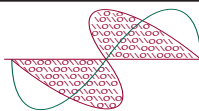


Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.307	10.0	0.251	30.0	0.035	50.0	0.072	70.0	0.158
-9.0	0.344	11.0	0.260	31.0	0.050	51.0	0.080	71.0	0.143
-8.0	0.334	12.0	0.235	32.0	0.051	52.0	0.084	72.0	0.128
-7.0	0.272	13.0	0.188	33.0	0.040	53.0	0.084	73.0	0.113
-6.0	0.175	14.0	0.136	34.0	0.026	54.0	0.085	74.0	0.098
-5.0	0.153	15.0	0.100	35.0	0.040	55.0	0.089	75.0	0.084
-4.0	0.305	16.0	0.092	36.0	0.076	56.0	0.100	76.0	0.072
-3.0	0.507	17.0	0.096	37.0	0.116	57.0	0.116	77.0	0.060
-2.0	0.703	18.0	0.094	38.0	0.151	58.0	0.135	78.0	0.050
-1.0	0.862	19.0	0.079	39.0	0.179	59.0	0.154	79.0	0.040
0.0	0.965	20.0	0.061	40.0	0.196	60.0	0.172	80.0	0.032
1.0	1.000	21.0	0.057	41.0	0.200	61.0	0.187	81.0	0.026
2.0	0.963	22.0	0.074	42.0	0.191	62.0	0.199	82.0	0.020
3.0	0.860	23.0	0.094	43.0	0.172	63.0	0.206	83.0	0.015
4.0	0.705	24.0	0.104	44.0	0.145	64.0	0.209	84.0	0.011
5.0	0.521	25.0	0.101	45.0	0.113	65.0	0.208	85.0	0.008
6.0	0.335	26.0	0.085	46.0	0.082	66.0	0.203	86.0	0.005
7.0	0.184	27.0	0.058	47.0	0.060	67.0	0.195	87.0	0.003
8.0	0.146	28.0	0.026	48.0	0.054	68.0	0.185	88.0	0.002
9.0	0.204	29.0	0.014	49.0	0.061	69.0	0.172	89.0	0.001
								90.0	0.000

Figure 2
Antenna Elevation Pattern
KWNV(DT) Winnemucca, NV
Facility ID 776269
Ch. 16 20 kW 651 m

prepared for
Gray Television Licensee, LLC

November, 2023

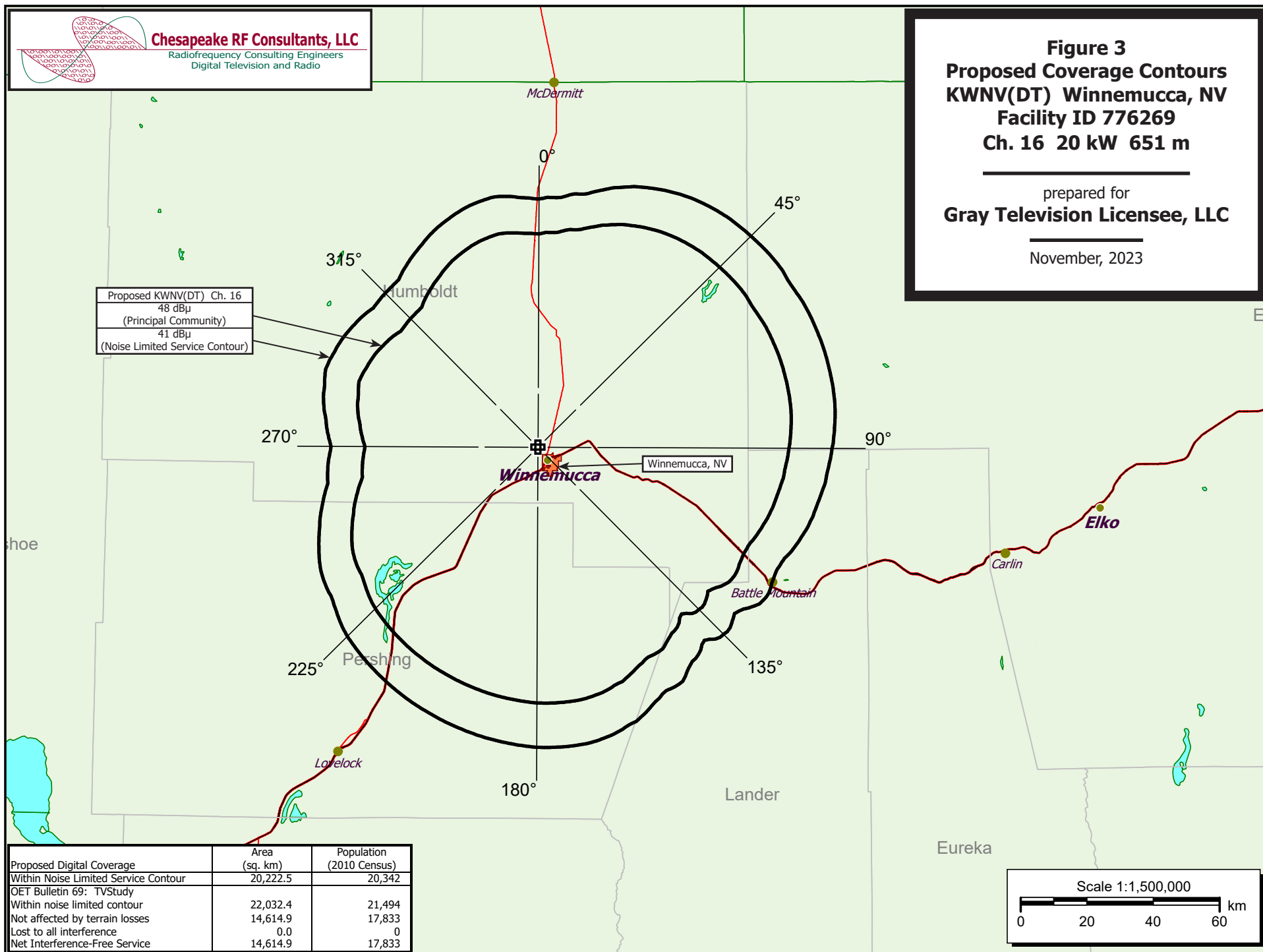


Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
Digital Television and Radio

Figure 3
Proposed Coverage Contours
KWNV(DT) Winnemucca, NV
Facility ID 776269
Ch. 16 20 kW 651 m

prepared for
Gray Television Licensee, LLC

November, 2023



Proposed KWNV(DT) Ch. 16
48 dBu
(Principal Community)
41 dBu
(Noise Limited Service Contour)

Proposed Digital Coverage	Area (sq. km)	Population (2010 Census)
Within Noise Limited Service Contour	20,222.5	20,342
OET Bulletin 69: TVStudy		
Within noise limited contour	22,032.4	21,494
Not affected by terrain losses	14,614.9	17,833
Lost to all interference	0.0	0
Net Interference-Free Service	14,614.9	17,833

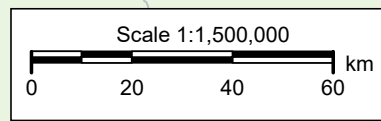
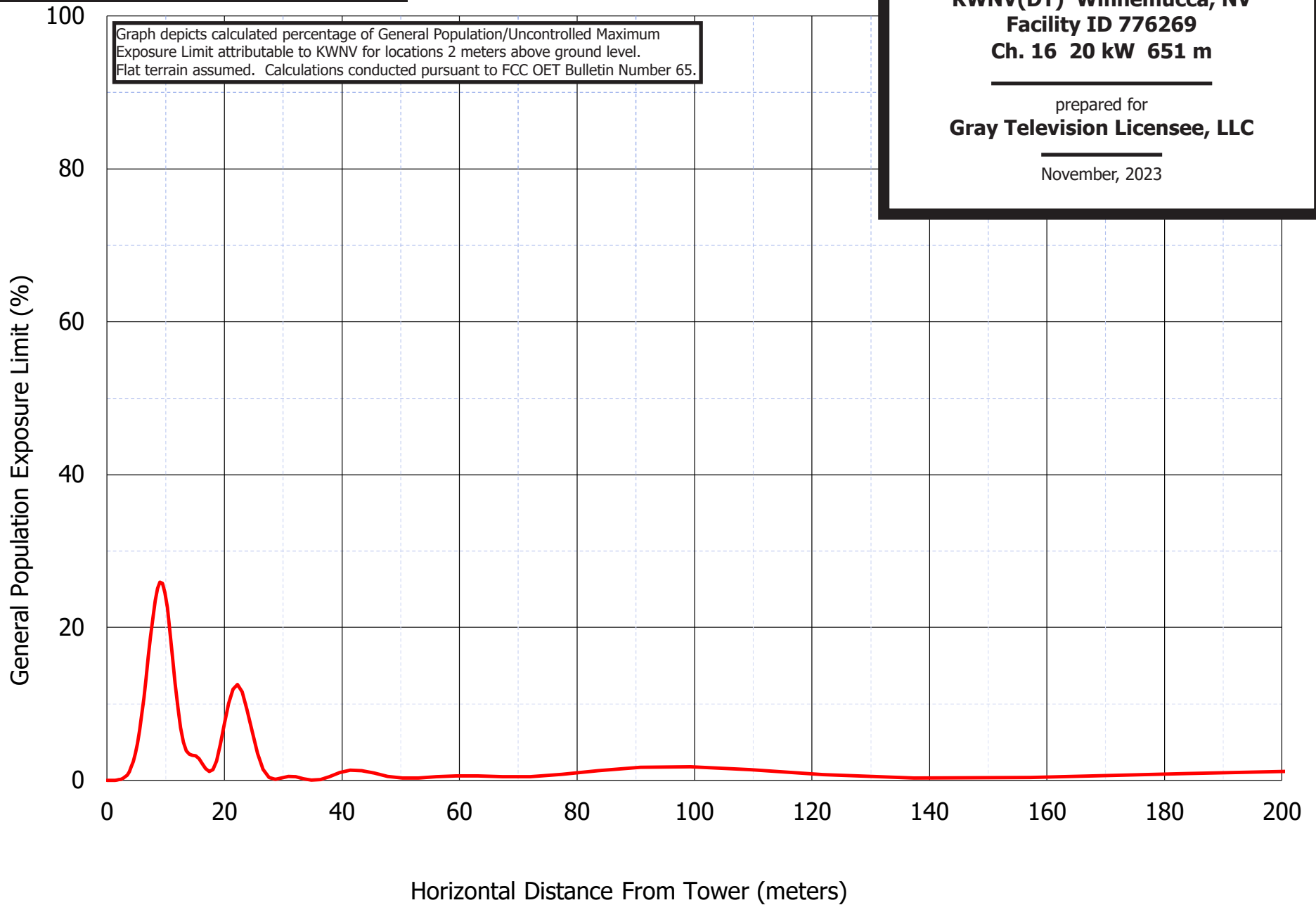


Figure 4
Calculated RF Electromagnetic Field
KWNV(DT) Winnemucca, NV
Facility ID 776269
Ch. 16 20 kW 651 m

prepared for
Gray Television Licensee, LLC

November, 2023



Channel and
Facility
Information

Section	Question		Response
Facility ID	776269		
State	Nevada		
City	WINNEMUCCA		
DTV Channel	16		
Facility Type	Facility Type	Commercial	
	Station Type	Main	
Zone	Zone	2	

Antenna Location
Data

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	No
	ASR Number	
Coordinates (NAD83)	Latitude	41° 00' 31.0" N+
	Longitude	117° 46' 13.0" W-
	Structure Type	LTOWER-Lattice Tower
	Overall Structure Height	24.4 meters
	Support Structure Height	18.3 meters
	Ground Elevation (AMSL)	2041.9 meters
Antenna Data	Height of Radiation Center Above Ground Level	21.3 meters
	Height of Radiation Center Above Average Terrain	650.8 meters
	Height of Radiation Center Above Mean Sea Level	2063.2 meters
	Effective Radiated Power	20 kW

Antenna
Technical Data

Section	Question	Response
Antenna Type	Antenna Type	Directional Custom
	Do you have an Antenna ID?	Yes
	Antenna ID	1010974
Antenna Manufacturer and Model	Manufacturer:	Dielectric
	Model	TLP-8M/VP
	Rotation	110 degrees
	Electrical Beam Tilt	1.0
	Mechanical Beam Tilt	Not Applicable
	toward azimuth	
	Polarization	Elliptical
DTV and DTS: Elevation Pattern	Does the proposed antenna propose elevation radiation patterns that vary with azimuth for reasons other than the use of mechanical beam tilt?	No
	Uploaded file for elevation antenna (or radiation) pattern data	

Directional Antenna Relative Field Values (Pre-rotated Pattern)

Degree	Value	Degree	Value	Degree	Value	Degree	Value
0	0.895	90	0.775	180	0.257	270	0.778
10	0.908	100	0.684	190	0.227	280	0.873
20	0.921	110	0.593	200	0.183	290	0.951
30	0.942	120	0.497	210	0.194	300	0.993
40	0.974	130	0.392	220	0.278	310	0.998
50	0.995	140	0.280	230	0.393	320	0.976
60	0.985	150	0.197	240	0.502	330	0.944
70	0.940	160	0.184	250	0.599	340	0.918
80	0.865	170	0.226	260	0.688	350	0.901

Additional Azimuths

Degree	V _A
52	0.996
307	1.000