ENGINEERING EXHIBIT

Application for Digital Television Station Construction Permit

prepared for

Gray Television Licensee, LLC
KCWY-DT Casper, WY
Facility ID 68713
Ch. 12 16.5 kW 553 m

Gray Television Licensee, LLC ("Gray") is the licensee of digital television station KCWY-DT, Channel 12, Facility ID 68713, Casper WY. KCWY-DT is licensed (file# BLCDT-20100909AAY) to operate with 3.2 kW effective radiated power ("ERP") directional at 572 meters antenna height above average terrain ("HAAT"). *Gray* proposes herein to increase the ERP to 16.5 kW and update the HAAT to 553 meters.[1]

KCWY-DT will continue to employ its presently licensed antenna system which is side-mounted on the tower structure associated with FCC Antenna Structure Registration number 1033353. No change to overall structure height will result from this proposal.

The antenna is a horizontally polarized directional Scala model DRV-4/1HW. The directional antenna's azimuthal pattern is supplied in Figure 1 and the elevation pattern is depicted in Figure 2.

Figure 3 supplies a map that demonstrates compliance with §73.625(a)(1) regarding coverage of the entire principal community. The proposed facility's predicted population exceeds 95 percent of the baseline facility's population as described in the *Incentive Auction Closing and Channel Reassignment Public Notice* (*"CCRPN"*, DA 17-317, released April 13, 2017).

[1]The antenna height above ground and above mean sea level are unchanged from licensed values. The antenna HAAT is recalculated to be 553.1 meters, based on FCC 30 meter terrain data developed by OET.

The proposed facility expands the KCWY-DT service contour beyond that established by the *CCRPN*. Interference study per FCC OET Bulletin 69[2] shows that the proposal complies with the 0.5 percent limit of new interference caused to pertinent nearby full service and Class A television stations as required by §73.616. The interference study output report is provided as Table 1 and shows that no predicted interference will be caused to any relevant facility.

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 25 percent antenna relative field in downward elevations, the calculated signal density near the tower at two meters above ground level attributable to the proposed facility is 8.1 $\mu W/cm^2$, which is 4.1 percent of the general population/uncontrolled maximum permitted exposure limit. This is below the five percent threshold limit described in §1.1307(b) regarding sites with multiple emitters, categorically excluding the applicant from responsibility for taking any corrective action in the areas where the proposal's contribution is less than five percent.

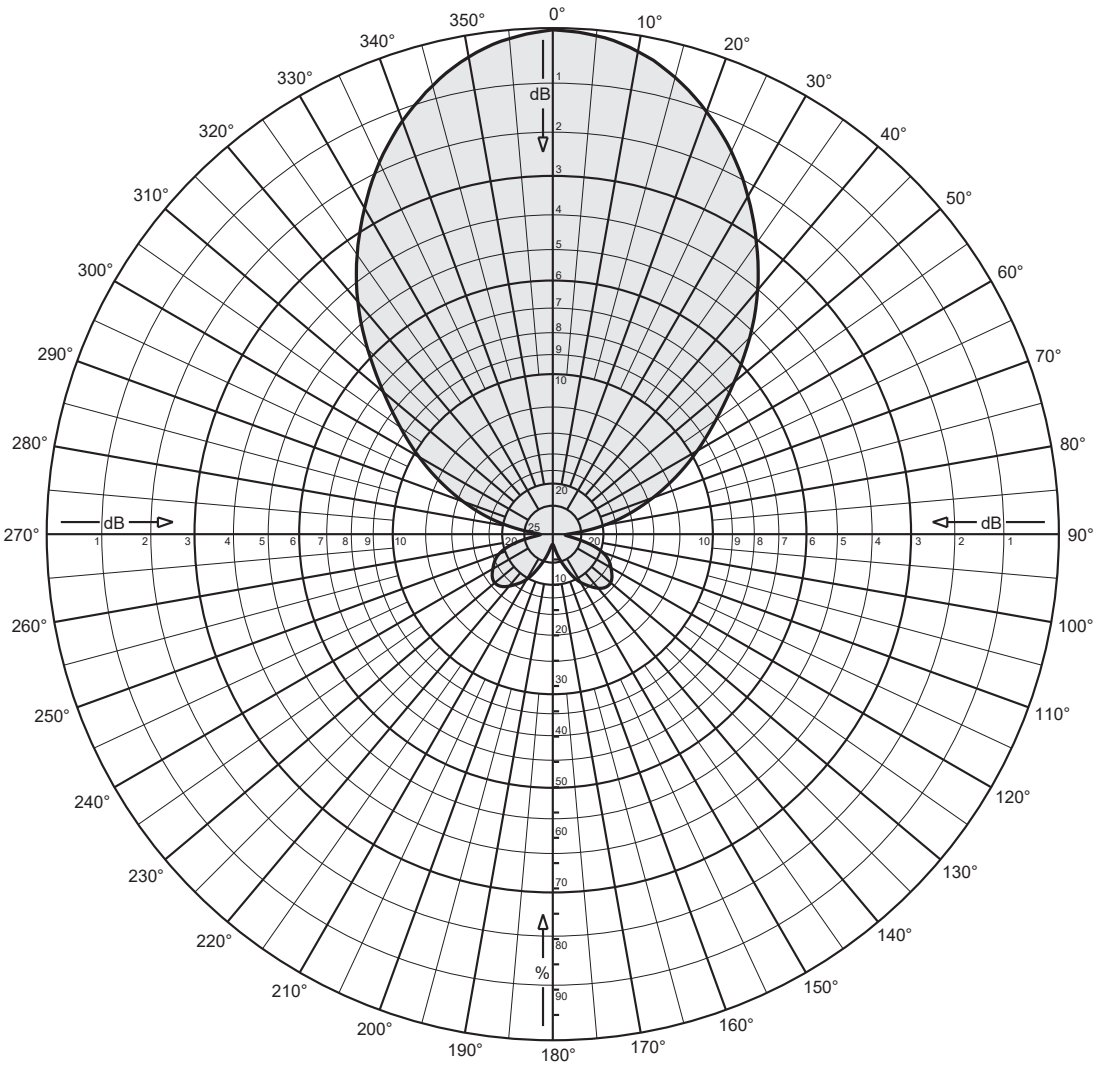
The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power 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. This exhibit is limited to the evaluation of exposure to RF electromagnetic field.

[2]FCC Office of Engineering and Technology Bulletin number 69, *Longley-Rice Methodology for Evaluating TV Coverage and Interference*, February 6, 2004 ("OET-69"). This analysis employed the FCC's current "TVStudy" software with the default application processing template settings, 2 km cell size, and 1.0 km terrain increment. Comparisons of various results of this computer program (run on a Mac processor) to the FCCs implementation of TVStudy show excellent correlation.

List of Attachments

Figure 1	Antenna Azimuthal Pattern
Figure 2	Antenna Elevation Pattern
Figure 3	Proposed Coverage Contours
Table 1	TVStudy Analysis of Proposal
Form 2100	Saved Version of Engineering Sections from FCC Form at Time of Upload

Chesapeake RF Consultants, LLC
Joseph M. Davis, P.E. November 27, 2020
207 Old Dominion Road Yorktown, VA 23692 703-650-9600



DRV-4/1 HW
Horizontal polarization
Horizontal plane pattern

KATHREIN
USA

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

Figure 1
Antenna Azimuthal Pattern
KCWY-DT Casper, WY
Facility ID 68713
Ch. 12 16.5 kW 553 m

prepared for
Gray Television Licensee, LLC

November, 2020

VERTICAL RADIATION PATTERN -Relative Field

Elevation	Relative
-18.00	0.209
-17.00	0.245
-16.00	0.272
-15.00	0.288
-14.00	0.292
-13.00	0.284
-12.00	0.262
-11.00	0.230
-10.00	0.192
-9.00	0.159
-8.00	0.159
-7.00	0.201
-6.00	0.277
-5.00	0.370
-4.00	0.468
-3.00	0.570
-2.00	0.667
-1.00	0.756
0.00	0.835
1.00	0.901
2.00	0.952
3.00	0.985
4.50	**1.000**
5.00	0.996
6.00	0.974
7.00	0.933
8.00	0.878
9.00	0.808
10.00	0.728
11.00	0.639
12.00	0.544
13.00	0.449
14.00	0.356
15.00	0.270
16.00	0.197
17.00	0.152
18.00	0.143
19.00	0.165
20.00	0.196
21.00	0.224
22.00	0.242
23.00	0.250
24.00	0.250
25.00	0.237
26.00	0.220
27.00	0.194
28.00	0.164
29.00	0.129
30.00	0.089
31.00	0.052
32.00	0.013
33.00	0.024
34.00	0.057
35.00	0.088
36.00	0.113
37.00	0.134
38.00	0.149
39.00	0.159
40.00	0.164
41.00	0.164
42.00	0.160

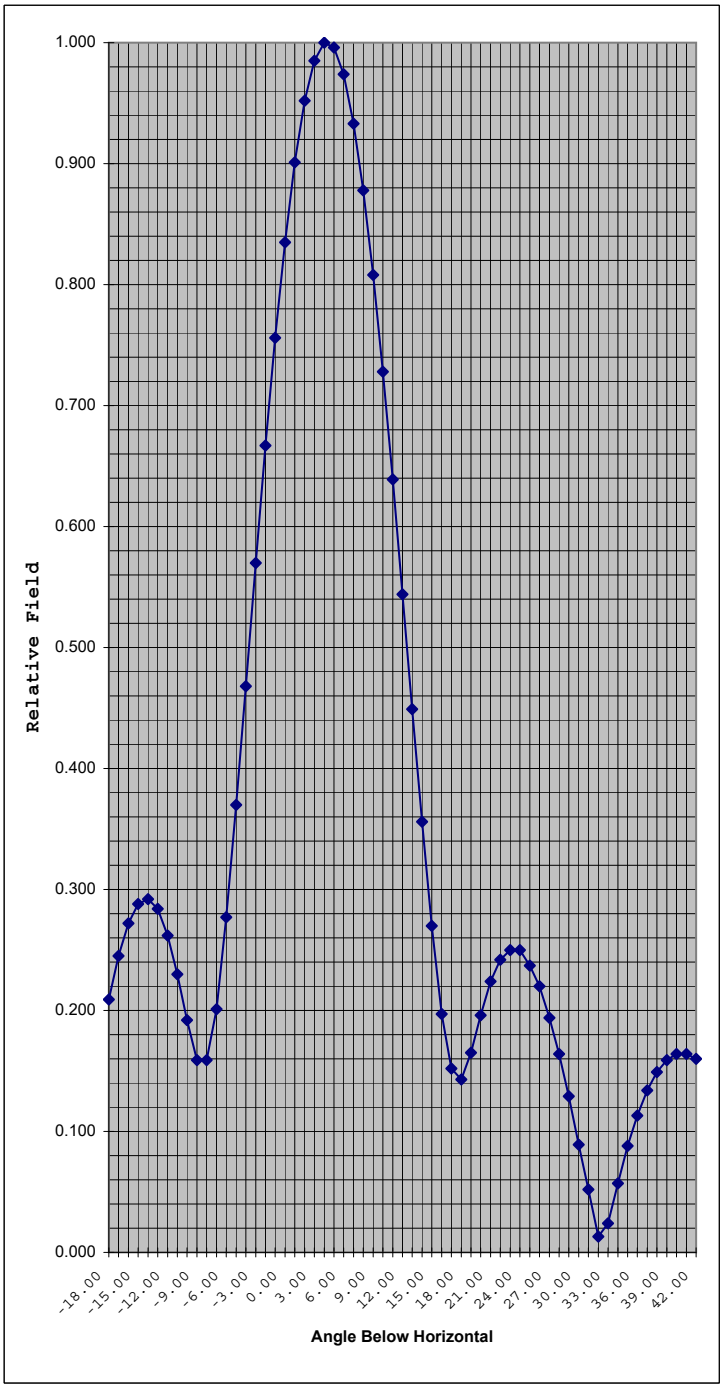


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Figure 2
Antenna Elevation Pattern
KCWY-DT Casper, WY
Facility ID 68713
Ch. 12 16.5 kW 553 m

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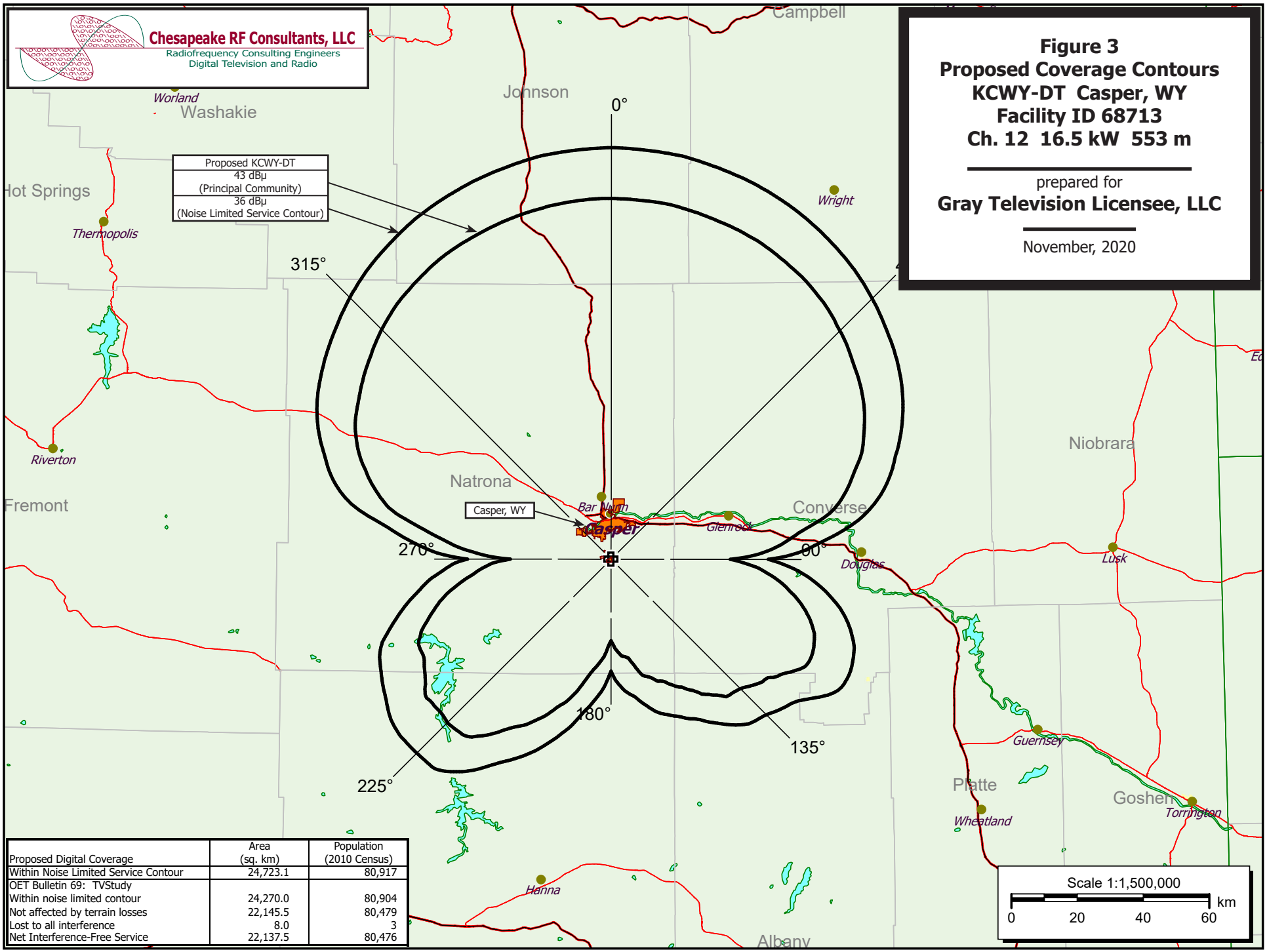

Proposed Digital Coverage	Area (sq. km)	Population (2010 Census)
Within Noise Limited Service Contour	24,723.1	80,917
OET Bulletin 69: TVStudy		
Within noise limited contour	24,270.0	80,904
Not affected by terrain losses	22,145.5	80,479
Lost to all interference	8.0	3
Net Interference-Free Service	22,137.5	80,476

Table 1 KCWY-DT TVStudy Analysis of Proposal


```
tvstudy v2.2.5 (4uoc83)
Database: localhost,  Study: KCWY-DT 16.5kW,  Model: Longley-Rice
Start: 2020.11.27 08:57:37

Study created: 2020.11.27 08:57:37

Study build station data: LMS TV 2020-11-26

    Proposal: KCWY-DT D12 DT APP CASPER, WY
 File number: KCWY-DT 16.5kW
 Facility ID: 68713
Station data: User record
   Record ID: 3355
     Country: U.S.
        Zone: II

Search options:
Baseline record excluded if station has CP

Stations potentially affected by proposal:

IX   Call      Chan       Svc Status  City, State              File Number             Distance
No   KQCK      D11        DT  LIC     CHEYENNE, WY             BLCDT20040513ABA        261.0 km
No   KKCO      D12        DT  CP      GRAND JUNCTION, CO       BLANK0000036039         457.1
No   KRNE-TV   D12        DT  LIC     MERRIMAN, NE             BLEDT20090225ABL        375.4
No   KGWR-TV   D13        DT  LIC     ROCK SPRINGS, WY         BLCDT20090225AAK        273.0
No   KSGW-TV   D13        DT  LIC     SHERIDAN, WY             BLCDT20051206AEI        218.7

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

    Channel: D12
   Latitude:  42 44 37.00 N (NAD83)
  Longitude: 106 18 26.00 W
Height AMSL: 2512.1 m
       HAAT: 553.1 m
   Peak ERP: 16.5 kW
    Antenna: SCA-DRV-4/1HW (ID 87355) 0.0 deg
Elev Pattrn: Generic
  Elec Tilt: 4.50

36.0 dBu contour:
Azimuth      ERP       HAAT   Distance
  0.0 deg   16.5 kW   856.9 m  124.2 km
 45.0       4.81      803.2    111.5
 90.0      0.007      488.3     47.4
135.0      0.396      291.1     67.1
180.0      0.007      230.4     34.4
225.0      0.396      541.5     83.1
270.0      0.007      390.0     42.8
315.0       4.81      823.3    111.9

Distance to Canadian border: 695.3 km

Distance to Mexican border: 1218.3 km

Conditions at FCC monitoring station: Grand Island NE
Bearing: 104.6 degrees   Distance: 682.8 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 162.7 degrees   Distance: 301.0 km


Study cell size: 2.00 km
Profile point spacing: 1.00 km

Maximum new IX to full-service and Class A: 0.50%
Maximum new IX to LPTV: 2.00%
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Table 1 KCWY-DT TVStudy Analysis of Proposal

Interference to proposal scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	KCWY-DT	D12	DT	APP	CASPER, WY	KCWY-DT 16.5kW	
Undesireds:	KRNE-TV	D12	DT	LIC	MERRIMAN, NE	BLEDT20090225ABL	375.4 km

Service area		Terrain-limited		IX-free		Percent IX	
24270.0	80,904	22145.5	80,479	22137.5	80,476	0.04	0.00

Undesired	Total IX		Unique IX		Prcnt Unique IX	
KRNE-TV D12 DT LIC	8.0	3	8.0	3	0.04	0.00

Channel and Facility Information

Section	Question	Response
Proposed Community of License	Facility ID	68713
	State	Wyoming
	City	CASPER
	DTV Channel	12
	Designated Market Area	CASPER-RIVERTON
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?	Yes
	ASR Number	1033353
Coordinates (NAD83)	Latitude	42° 44' 37.0" N+
	Longitude	106° 18' 26.0" W-
	Structure Type	LTOWER-Lattice Tower
	Overall Structure Height	122.8 meters
	Support Structure Height	121.9 meters
	Ground Elevation (AMSL)	2445.1 meters
Antenna Data	Height of Radiation Center Above Ground Level	67.1 meters
	Height of Radiation Center Above Average Terrain	553.1 meters
	Height of Radiation Center Above Mean Sea Level	2512.2 meters
	Effective Radiated Power	16.5 kW

Antenna Technical Data

Section	Question	Response
Antenna Type	Antenna Type	Directional Custom
	Do you have an Antenna ID?	Yes
	Antenna ID	87355
Antenna Manufacturer and Model	Manufacturer:	SCA
	Model	DRV-4/1HW
	Rotation	0 degrees
	Electrical Beam Tilt	4.5
	Mechanical Beam Tilt	Not Applicable
	toward azimuth	
	Polarization	Horizontal
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	1	**90**	0.02	**180**	0.02	**270**	0.02
10	0.97	**100**	0.06	**190**	0.04	**280**	0.11
20	0.88	**110**	0.11	**200**	0.07	**290**	0.2
30	0.76	**120**	0.14	**210**	0.11	**300**	0.33
40	0.62	**130**	0.16	**220**	0.15	**310**	0.46
50	0.46	**140**	0.15	**230**	0.16	**320**	0.62
60	0.33	**150**	0.11	**240**	0.14	**330**	0.76
70	0.2	**160**	0.07	**250**	0.11	**340**	0.88
80	0.11	**170**	0.04	**260**	0.06	**350**	0.97

Additional Azimuths

Degree	V_A

Construction Permit Certifications

Section	Question	Response
Post-Incentive Auction Expedited Processing	It will operate on the DTV channel for this station as established in the post-incentive auction channel reassignment public notice.	Yes
	It will operate post-incentive auction facilities that do not expand the noise-limited service contour in any direction beyond that established by the post-incentive auction channel reassignment public notice.	No
	It will operate post-incentive auction facilities that match or reduce by no more than five percent with respect to predicted population from those defined in the post-incentive auction channel reassignment public notice.	Yes
	The antenna structure to be used by this facility has been registered by the Commission and will not require re-registration to support the proposed antenna, OR the FAA has previously determined that the proposed structure will not adversely affect safety in air navigation and this structure qualifies for later registration under the Commission's phased registration plan, OR the proposed installation on this structure does not require notification to the FAA pursuant to 47 C.F.R. Section 17.7.	Yes
Environmental Effect	Would a Commission grant of Authorization for this location be an action which may have a significant environmental effect? (See 47 C.F.R. Section 1.1306)	No
Broadcast Facility	The proposed facility complies with the applicable engineering standards and assignment requirements of 47 C.F.R. Sections 73.616, 73.622(i), 73.623(e), 73.625, 73.1030, and 73.1125.	Yes