ENGINEERING EXHIBIT

Application for Digital Television Station Construction Permit

prepared for

Gray Television Licensee, LLC
KSTF(DT) Scottsbluff, NE
Facility ID 63182
Ch. 29 55 kW 190 m

Gray Television Licensee, LLC ("Gray") is the licensee of digital television station KSTF(DT), Channel 29, Facility ID 63182, Scottsbluff, NE. KSTF is licensed (file# 0000001046) to operate with 3.5 kW effective radiated power ("ERP") at 187 meters antenna height above average terrain ("HAAT"). *Gray* proposes herein to increase the ERP to 55 kW. This application is intended to be filed during the temporary lift of the freeze on minor modification applications that expand the coverage contour.[1]

KSTF will continue to employ its presently licensed directional antenna system which is side-mounted on the tower structure associated with FCC Antenna Structure Registration number 1025886. No change to overall structure height will result from this proposal. The antenna HAAT is adjusted to 190 meters.[2]

The antenna is a circularly polarized ERI model ALP16L2-CSOC-29. The directional antenna's azimuthal pattern is supplied in Figure 1 and the elevation pattern is depicted in Figures 2 and 2A.

[1]Public Notice *"Media Bureau Temporarily Lifts the Freeze on the Filing of Minor Modification Applications that Expand the Contour of Full Power and Class A Television Stations from November 28 through December 7, 2017"* DA 17-1086, released November 6, 2017.

[2]There is no change in antenna height above ground or above mean sea level. The KSTF antenna HAAT is recalculated to be 190.3 meters, based on FCC 30 meter terrain data developed by OET.

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 Incentive Auction[3] baseline facility population.

Interference study per FCC OET Bulletin 69[4] shows that the proposal complies with the 0.5 percent limit of new interference caused to pertinent nearby post-auction full service and Class A television stations and reassignments as required by §73.616. The interference study output report is provided as Table 1. TVStudy analysis also shows that the proposed power increase would not cause impermissible interference to any pre-auction facility that was reassigned or relinquished in the incentive auction.

The nearest FCC monitoring station is 454 km distant at Grand Island, NE. This exceeds by a large margin the threshold minimum distance specified in §73.1030(c)(3) that would suggest consideration of the monitoring station. The site is not located within the areas requiring coordination with "quiet" zones specified in §73.1030(a) and (b). There are no authorized AM stations within 3 kilometers of the site. The site location is beyond the border areas requiring international coordination.

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 (pattern data shows less than 25 percent relative field at angles 15 to 90 degrees below the antenna), the calculated signal density near the tower at two meters above ground level attributable to the proposed facility is 11.2 $\mu W/cm^2$, which is 3.0 percent of the general population/uncontrolled maximum permitted exposure limit. This is below the five percent threshold limit described in §1.1307(b)

[3] *Incentive Auction Closing and Channel Reassignment Public Notice*, DA 17-317, released April 13, 2017.

[4] 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 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.

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. No increase in structure height is proposed.

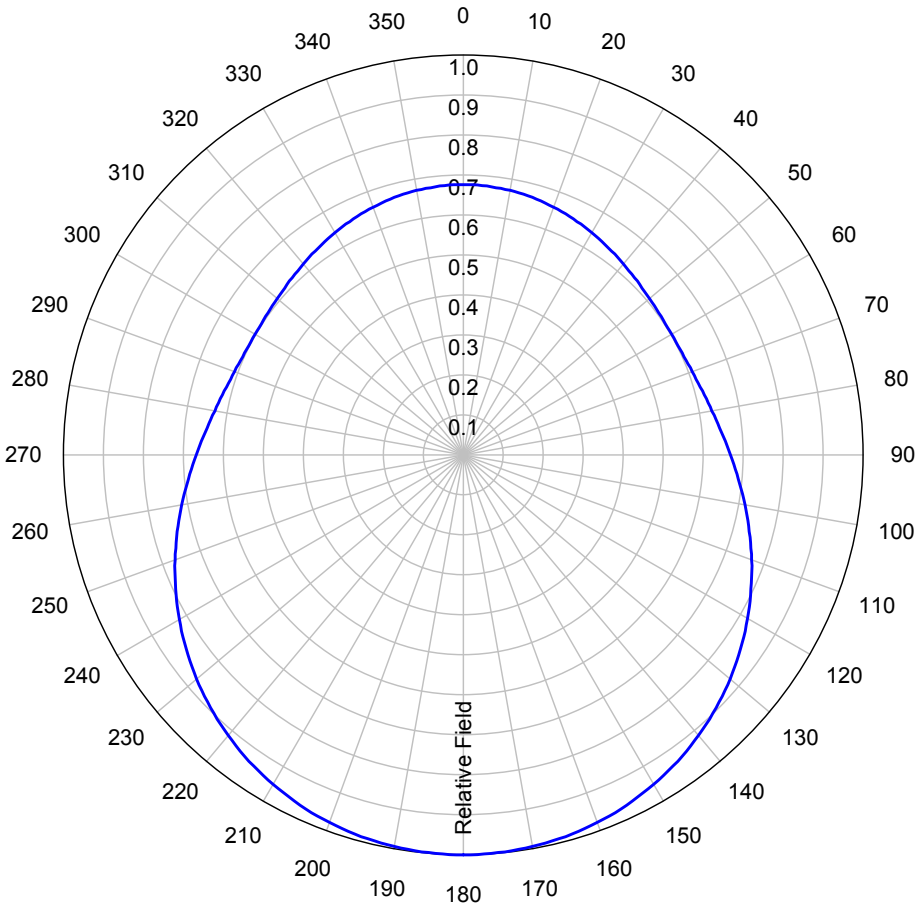
List of Attachments

Figure 1	Antenna Azimuthal Pattern
Figure 2, 2A	Antenna Elevation Pattern
Figure 3	Proposed Coverage Contours
Table 1	OET Bulletin 69 Interference Study
Form 2100	Saved Version of Engineering Sections from FCC Form at Time of Upload

Chesapeake RF Consultants, LLC
Joseph M. Davis, P.E. December 5, 2017
207 Old Dominion Road Yorktown, VA 23692 703-650-9600

AZIMUTH PATTERN

Type:	**ALP-OC**		**Channel:**	**29**
	Numeric	**dBd**	**Location:**	**Scottsbluff NE**
Directivity:	**1.70**	**2.30**	**Polarization:**	**Horizontal**
Peak(s) at:			Note: Pattern shape and directivity may vary with channel and mouting configuration.	



Preliminary, subject to final design and review.

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

Figure 1
Antenna Azimuthal Pattern
KSTF(DT) Scottsbluff, NE
Facility ID 63182
Ch. 29 55 kW 190 m

prepared for
Gray Television Licensee, LLC

December, 2017

ELEVATION PATTERN

Type:	ALP16L2		Channel:	29
Directivity:	Numeric	dBd	Location:	Scottsbluff NE
Main Lobe:	16.59	12.20	Beam Tilt:	-0.50
Horizontal:	14.82	11.71	Polarization:	Horizontal

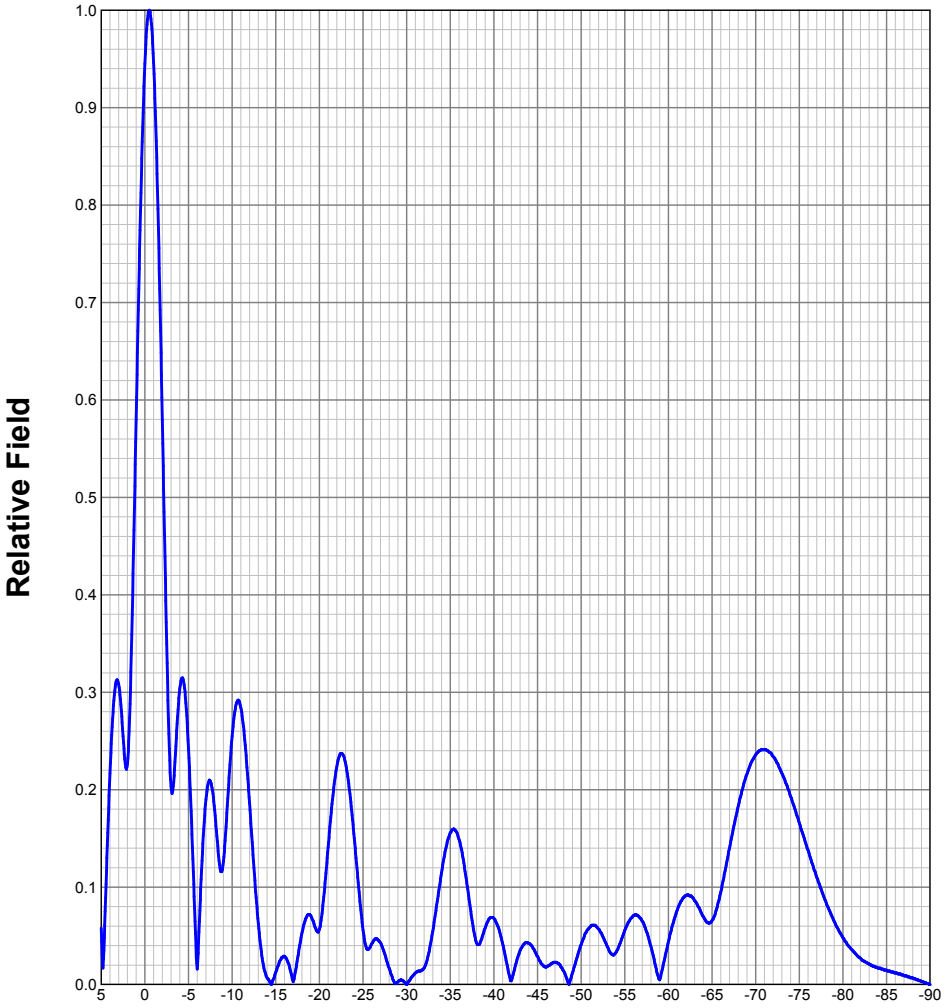

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Figure 2
Antenna Elevation Pattern
KSTF(DT) Scottsbluff, NE
Facility ID 63182
Ch. 29 55 kW 190 m

prepared for
Gray Television Licensee, LLC

December, 2017

ELEVATION PATTERN

Type:	ALP16L2		Channel:	29
Directivity:	Numeric	dBd	Location:	Scottsbluff NE
Main Lobe:	16.59	12.20	Beam Tilt:	-0.50
Horizontal:	14.82	11.71	Polarization:	Horizontal

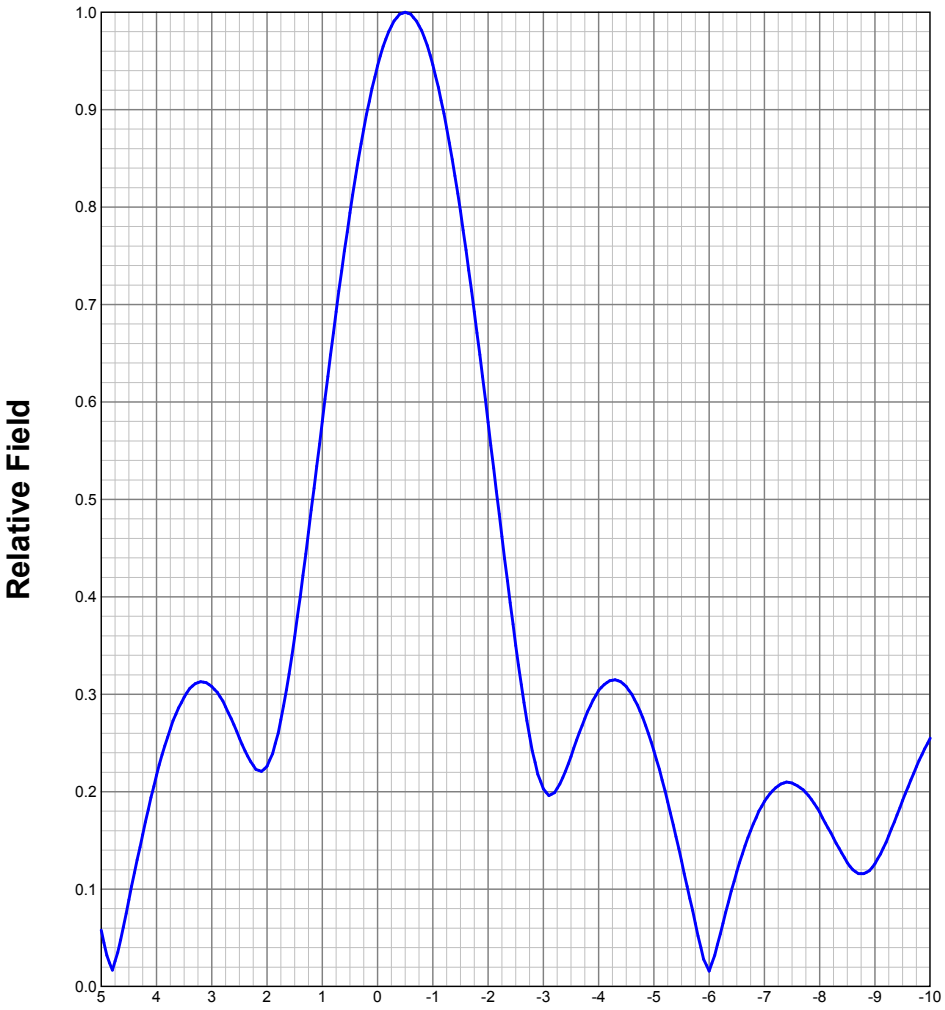

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Figure 2A - Detail
Antenna Elevation Pattern
KSTF(DT) Scottsbluff, NE
Facility ID 63182
Ch. 29 55 kW 190 m

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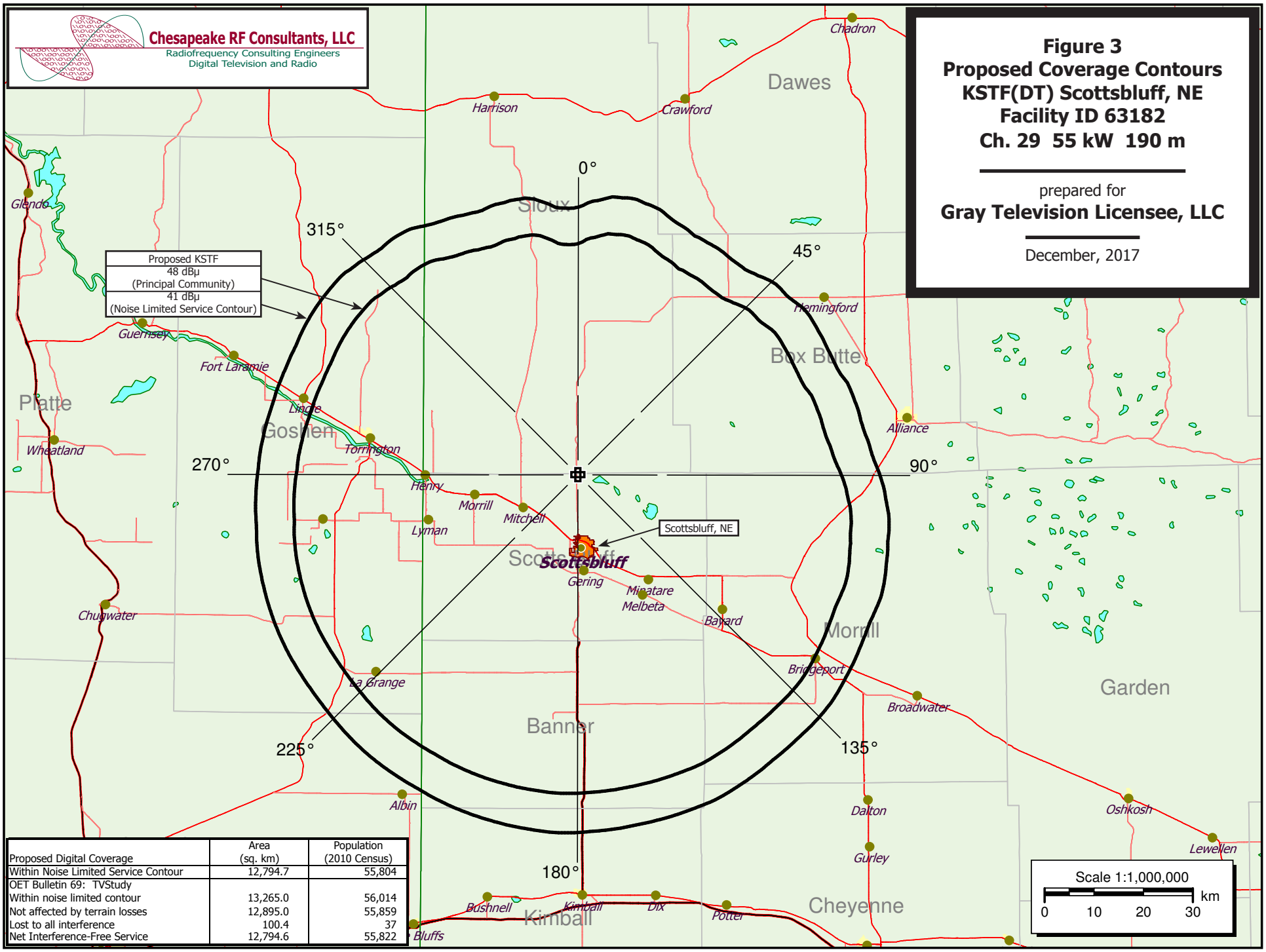

Proposed Digital Coverage	Area (sq. km)	Population (2010 Census)
Within Noise Limited Service Contour	12,794.7	55,804
OET Bulletin 69: TVStudy		
Within noise limited contour	13,265.0	56,014
Not affected by terrain losses	12,895.0	55,859
Lost to all interference	100.4	37
Net Interference-Free Service	12,794.6	55,822

Table 1 KSTF OET Bulletin 69 Interference Study
(page 1 of 2)

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

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tvstudy v2.2.4 (Z2Qqz3)
Database: localhost,  Study: KSTF 55kW_Prop,  Model: Longley-Rice
Start: 2017.12.05 16:45:21

Study created: 2017.12.05 16:45:21

Study build station data: LMS TV 2017-12-04 LMSTV

    Proposal: KSTF D29 DT APP SCOTTSBLUFF, NE
 File number: KSTF 55kW
 Facility ID: 63182
Station data: User record
   Record ID: 1528
     Country: U.S.
        Zone: II

Stations potentially affected by proposal:

IX   Call      Chan       Svc Status  City, State              File Number            Distance
Yes  KDEN-TV   D29        DT  LIC     LONGMONT, CO             BLCDT20100317AAM       234.8 km
No   KGWN-TV   D30        DT  LIC     CHEYENNE, WY             BLCDT20070327AEQ       149.2

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

    Channel: D29
   Latitude:  41 59 58.40 N (NAD83)
  Longitude: 103 40 32.20 W
Height AMSL: 1484.6 m
       HAAT: 190.3 m
   Peak ERP: 55.0 kW
    Antenna: ERI-ALP16L2-CSOC-29 (ID 1000511) 0.0 deg
Elev Pattrn: Generic
  Elec Tilt: 0.50

40.2 dBu contour:
Azimuth      ERP       HAAT   Distance
  0.0 deg   25.1 kW    87.5 m   55.3 km
 45.0       20.8      104.1     56.5
 90.0       24.5      157.7     61.5
135.0       43.9      236.7     70.0
180.0       55.0      269.1     73.5
225.0       43.9      259.7     71.6
270.0       24.5      224.0     66.2
315.0       20.8      183.2     62.5

Distance to Canadian border: 778.0 km

Distance to Mexican border: 1163.2 km

Conditions at FCC monitoring station: Grand Island NE
Bearing: 103.6 degrees   Distance: 453.1 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 212.8 degrees   Distance: 247.4 km
ERP: 48.7 kW   Field strength: 9.6 dBu, 0.0 mV/m


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 KSTF OET Bulletin 69 Interference Study
(page 2 of 2)

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

Interference to BLCDT20100317AAM LIC scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	KDEN-TV	D29	DT	LIC	LONGMONT, CO	BLCDT20100317AAM	
Undesireds:	KSTF	D29	DT	BL	SCOTTSBLUFF, NE	DTVBL63182	234.8 km
	KSTF	D29	DT	APP	SCOTTSBLUFF, NE	KSTF 55kW	234.8
	KTFD-TV	D28	DT	CP	DENVER, CO	BLANK0000029913	49.8
	KGWN-TV	D30	DT	LIC	CHEYENNE, WY	BLCDT20070327AEQ	111.6

Service area		Terrain-limited		IX-free, before		IX-free, after		Percent New IX	
24382.5	3,376,799	22908.1	3,351,182	22621.4	3,319,903	22605.3	3,319,865	0.07	0.00

Undesired	Total IX		Unique IX, before		Unique IX, after	
KSTF D29 DT BL	4.0	0	4.0	0		
KSTF D29 DT APP	20.0	38			20.0	38
KTFD-TV D28 DT CP	222.8	30,256	218.8	30,245	218.8	30,245
KGWN-TV D30 DT LIC	63.9	1,034	59.9	1,023	59.9	1,023

Interference to proposal scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	KSTF	D29	DT	APP	SCOTTSBLUFF, NE	KSTF 55kW	
Undesireds:	KDEN-TV	D29	DT	LIC	LONGMONT, CO	BLCDT20100317AAM	234.8 km

Service area		Terrain-limited		IX-free		Percent IX	
13265.0	56,014	12895.0	55,859	12794.6	55,822	0.78	0.07

Undesired	Total IX		Unique IX		Prcnt Unique IX	
KDEN-TV D29 DT LIC	100.3	37	100.3	37	0.78	0.07

Channel and Facility Information

Section	Question	Response
Proposed Community of License	Facility ID	63182
	State	Nebraska
	City	SCOTTSBLUFF
	DTV Channel	29
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	1025886
Coordinates (NAD83)	Latitude	41° 59' 58.4" N+
	Longitude	103° 40' 32.2" W-
	Structure Type	GTOWER-Guyed Structure Used for Communication Purposes
	Overall Structure Height	152.1 meters
	Support Structure Height	151.5 meters
	Ground Elevation (AMSL)	1339.6 meters
Antenna Data	Height of Radiation Center Above Ground Level	145.0 meters
	Height of Radiation Center Above Average Terrain	190.3 meters
	Height of Radiation Center Above Mean Sea Level	1484.6 meters
	Effective Radiated Power	55 kW

Antenna Technical Data

Section	Question	Response
Antenna Type	Antenna Type	Directional Custom
	Do you have an Antenna ID?	Yes
	Antenna ID	119293
Antenna Manufacturer and Model	Manufacturer:	ERI
	Model	ALP16L2-CSOC-29
	Rotation	0.0 degrees
	Electrical Beam Tilt	0.5
	Mechanical Beam Tilt	Not Applicable
	toward azimuth	
	Polarization	Circular
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	V_A (Authorized Value)	Degree	V_A (Authorized Value)	Degree	V_A (Authorized Value)	Degree	V_A (Authorized Value)
0	0.676	**90**	0.668	**180**	1	**270**	0.668
10	0.672	**100**	0.715	**190**	0.994	**280**	0.631
20	0.659	**110**	0.767	**200**	0.978	**290**	0.609
30	0.642	**120**	0.82	**210**	0.951	**300**	0.602
40	0.623	**130**	0.871	**220**	0.915	**310**	0.608
50	0.608	**140**	0.915	**230**	0.871	**320**	0.623
60	0.602	**150**	0.951	**240**	0.82	**330**	0.642
70	0.609	**160**	0.978	**250**	0.767	**340**	0.659
80	0.631	**170**	0.994	**260**	0.715	**350**	0.672

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 Section 1.1306 of 47 C.F.R.)	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