

ENGINEERING EXHIBIT

Digital Low Power Television Station Application for Minor Modification of Licensed Facility prepared for

Gray Television Licensee, LLC
K28QT-D Dickinson, ND
Facility ID 186119
Ch. 28 15 kW Nondirectional

Gray Television Licensee, LLC (“Gray”) is the licensee of digital Low Power Television station K28QT-D, Channel 28, Facility ID 186119, Dickinson ND. K28QT-D is licensed to operate at 0.35 kW effective radiated power (“ERP”) with a directional antenna (file# 0000179734). *Gray* herein seeks a minor modification Construction Permit to utilize a nondirectional antenna at increased ERP and antenna height.

No change in site location is proposed. The proposed facility will employ a new antenna system to be side-mounted on the tower structure associated with FCC Antenna Structure Registration number 1050833. No change to the overall structure height is proposed.

The proposed antenna is a Dielectric model TLP-12A/VP-R having elliptical polarization. The proposed ERP is 15 kW horizontally polarized and 4.5 kW vertically polarized using a “full service” out of channel emission mask. Figure 1 depicts the 51 dB μ coverage contour of the proposed and licensed facilities, demonstrating compliance with §73.3572 for a minor change.

Interference study per OET Bulletin 69¹ shows that the proposal complies with the FCC’s interference protection requirements toward all digital television, television translator, LPTV, and Class A stations. The results, summarized in Table 1, show that any new interference does not

¹FCC 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, 1 km cell size, and 1 km terrain increment. Comparisons of various results of this computer program (run on a Mac processor) to the FCC’s implementation of TVStudy show excellent correlation.

exceed the FCC's interference limits (0.5 percent to full power and Class A stations, and 2.0 percent to secondary stations) to any facility.

Human Exposure to Radiofrequency Electromagnetic Field (Environmental)

The proposed facility 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 20 percent antenna relative field in downward elevations (pattern data shows 20 percent or less relative field at angles 10 to 90 degrees below the antenna), the calculated power density attributable to the proposed facility at locations near the transmitter site at a height of two meters above ground level is $2.0 \mu\text{W}/\text{cm}^2$, which is 0.5 percent of the general population / uncontrolled maximum permissible exposure limit. This is well 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. No increase in structure height is proposed.

List of Attachments

Figure 1	Coverage Contour Comparison
Table 1	TVStudy Analysis of Proposal
Form 2100	Saved Version of Engineering Sections of FCC Form at Time of Upload

Chesapeake RF Consultants, LLC

Joseph M. Davis, P.E.	June 29, 2022	
207 Old Dominion Road	Yorktown, VA 23692	703-650-9600

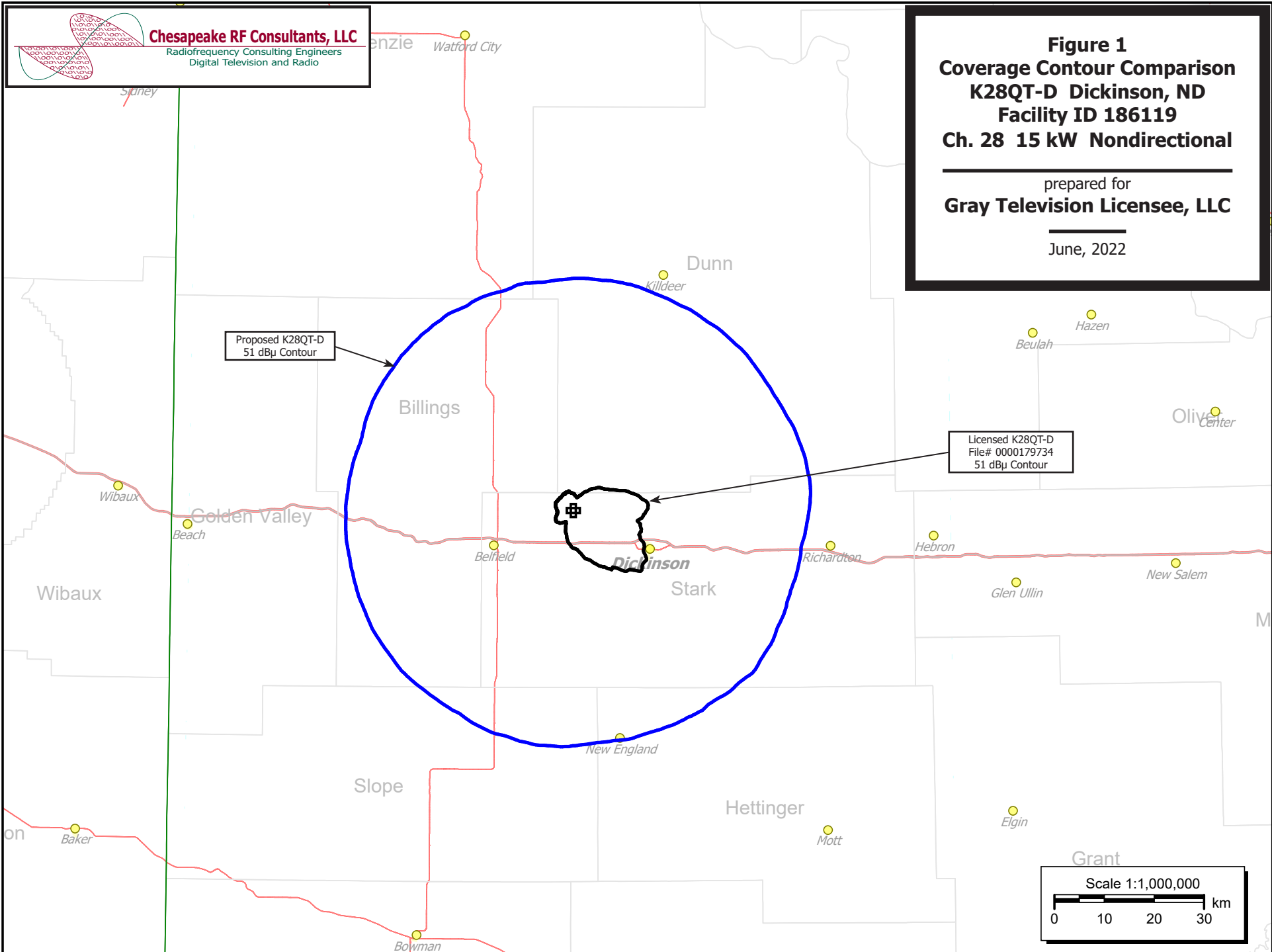


Table 1 K28QT-D TVStudy Analysis of Proposal
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tvstudy v2.2.5 (4uoc83)
Database: localhost, Study: K28QT-D 15kW prop, Model: Longley-Rice
Start: 2022.06.29 11:45:27

Study created: 2022.06.29 11:45:27

Study build station data: LMS TV 2022-06-29

Proposal: K28QT-D D28 LD APP DICKINSON, ND
File number: K28QT-D 15kW prop
Facility ID: 186119
Station data: User record
Record ID: 4507
Country: U.S.

Build options:
Protect pre-transition records not on baseline channel

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	K27LT-D	D27	LD	LIC	BAKER, MT	BLDTT20120227AAE	116.7 km
No	K27LX-D	D27	LD	CP	MINOT, ND	BLANK0000178367	185.3
No	K28ON-D	D28	LD	LIC	CASTLE ROCK, ETC., MT	BLANK0000062952	324.8
No	K28OB-D	D28	LD	LIC	PLENTYWOOD, MT	BLANK0000067787	228.0
No	K28MS-D	D28	LD	LIC	BISMARCK, ND	BLANK0000122205	169.5
No	K28QQ-D	D28	LD	LIC	WILLISTON, ND	BLANK0000122037	143.4

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D28
Mask: Full Service
Latitude: 46 56 53.00 N (NAD83)
Longitude: 102 59 27.00 W
Height AMSL: 929.9 m
HAAT: 0.0 m
Peak ERP: 15.0 kW
Antenna: Omnidirectional
Elev Pattn: Generic
Elec Tilt: 0.50

50.1 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	15.0 kW	146.8 m	47.5 km
45.0	15.0	147.7	47.6
90.0	15.0	155.8	48.1
135.0	15.0	167.1	48.9
180.0	15.0	154.3	48.0
225.0	15.0	152.8	47.9
270.0	15.0	132.2	46.5
315.0	15.0	144.3	47.3

Database HAAT does not agree with computed HAAT
Database HAAT: 0 m Computed HAAT: 150 m

Proposal 25.14 dBu contour does not cross Canadian border
Distance to Canadian border: 228.0 km

Distance to Mexican border: 1712.2 km

Conditions at FCC monitoring station: Grand Island NE
Bearing: 149.8 degrees Distance: 762.5 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:

Table 1 K28QT-D TVStudy Analysis of Proposal
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Bearing: 194.2 degrees Distance: 776.4 km

Study cell size: 1.00 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%

Interference to proposal scenario 1

Desired:	Call K28QT-D	Chan D28	Svc LD	Status APP	City, State DICKINSON, ND	File Number K28QT-D 15kW prop	Distance
	Service area 7117.7 25,806	Terrain-limited 6795.9		25,376	6795.9	IX-free 25,376	Percent IX 0.00 0.00

**Channel and
Facility
Information**

Section	Question	Response
Facility ID	186119	
State	North Dakota	
City	DICKINSON	
LPD Channel	28	

Primary station proposed to be rebroadcast:

Facility Id	Call Sign	City	State
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**Antenna Location
Data**

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	Yes
	ASR Number	1050833
Coordinates (NAD83)	Latitude	46° 56' 53.0" N+
	Longitude	102° 59' 27.0" W-
	Structure Type	TOWER-A free standing or guyed struct
	Overall Structure Height	197.8 meters
	Support Structure Height	158.5 meters
	Ground Elevation (AMSL)	814.1 meters
Antenna Data	Height of Radiation Center Above Ground Level	115.8 meters
	Height of Radiation Center Above Mean Sea Level	929.9 meters
	Effective Radiated Power	15 kW

**Antenna
Technical Data**

Section	Question	Response
Antenna Type	Antenna Type	Non-Directional
	Do you have an Antenna ID?	
	Antenna ID	
Antenna Manufacturer and Model	Manufacturer:	Dielectric
	Model	TLP-12A/VP-R
	Rotation	
	Electrical Beam Tilt	0.5
	Mechanical Beam Tilt	Not Applicable
	toward azimuth	
	Polarization	Elliptical
Elevation Radiation 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	
	Out-of-Channel Emission Mask:	Full Service