ENGINEERING EXHIBIT

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

prepared for

Gray Television Licensee, LLC
K20PB-D Williston, ND
Facility ID 187437
Ch. 20 15 kW Nondirectional

Gray Television Licensee, LLC ("Gray") is the licensee of digital Low Power Television station K20PB-D, Channel 20, Facility ID 187437, Williston ND. K20PB-D is licensed to operate at 0.2 kW effective radiated power ("ERP") with a nondirectional antenna (file# 0000199516). *Gray* herein seeks a minor modification Construction Permit to increase the ERP to 15 kW.

K20PB-D will continue to employ its presently licensed nondirectional antenna system which is side-mounted on the tower structure associated with FCC Antenna Structure Registration number 1050840. No antenna or tower work is required to carry out this proposal.

The K20PB-D 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 dBμ coverage contour of the proposed and licensed facilities, demonstrating compliance with §73.3572 for a minor change. Since the proposed 51 dBμ contour encompasses that of the licensed facility, no service loss area will be created. Service improvement will result as the population within the 51 dBμ contour increases to 32,383 persons (2010 census), which is a 67 percent increase beyond the 19,385 persons within the licensed K20PB-D facility's 51 dBμ contour.

Interference study per OET Bulletin 69[1] 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 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.

The site location is within the Canadian coordination zone (96.2 km to the Canada border). No known Canadian stations are located within the culling distances for interference analysis on channels relevant to K20PB-D.

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 20 percent antenna relative field in downward elevations (pattern data shows less than 20 percent relative field at angles 20 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 0.5 $\mu W/cm^2$, which is 0.2 percent of the general population/uncontrolled maximum permitted 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

[1]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, 1 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.

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. September 26, 2022
207 Old Dominion Road Yorktown, VA 23692 703-650-9600

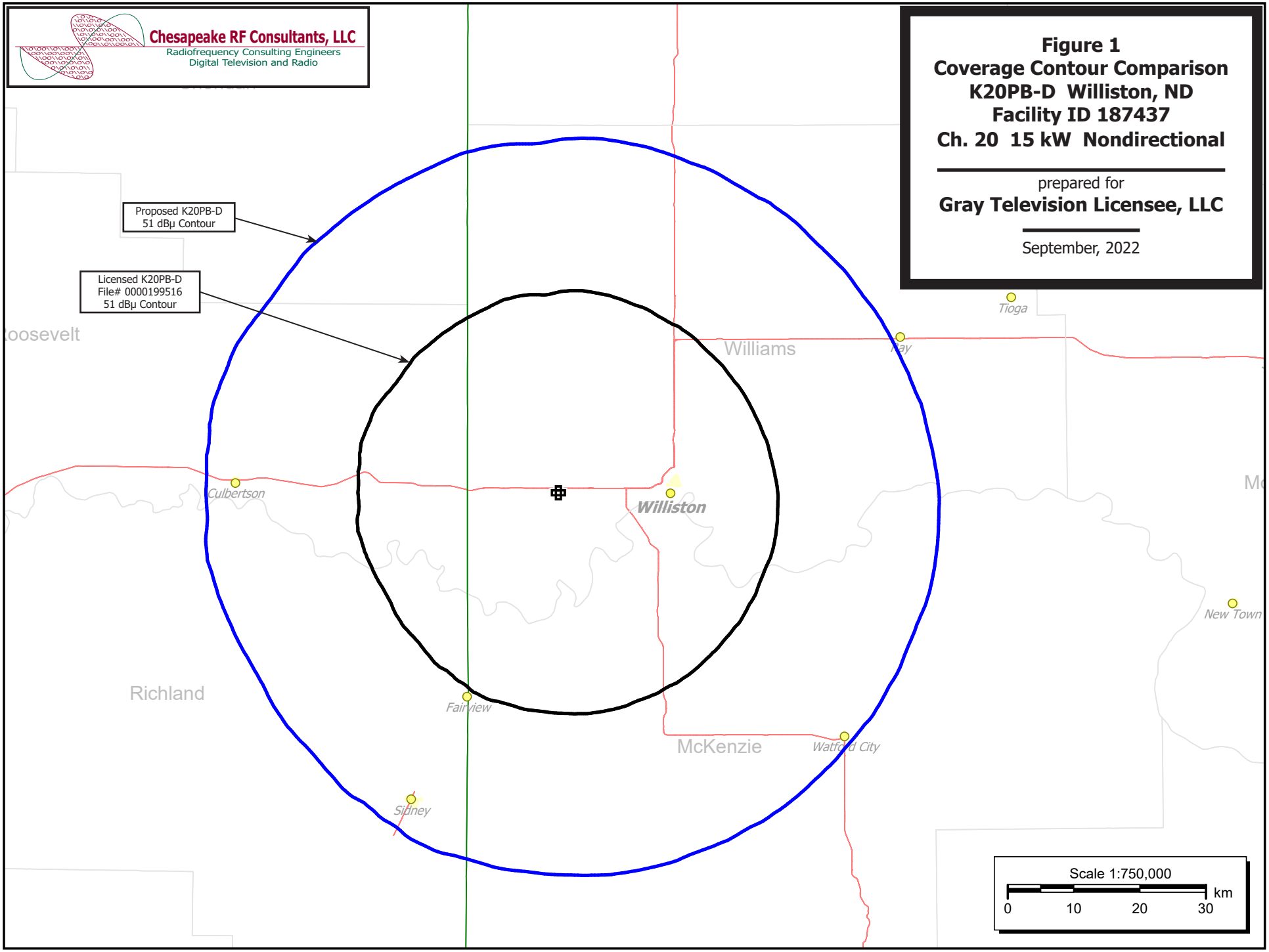
Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
Digital Television and Radio
Figure 1
Coverage Contour Comparison
K20PB-D Williston, ND
Facility ID 187437
Ch. 20 15 kW Nondirectional
prepared for
Gray Television Licensee, LLC
September, 2022
Proposed K20PB-D
51 dBµ Contour
Licensed K20PB-D
File# 0000199516
51 dBµ Contour
Tioga
Williams
Culbertson
Williston
New Town
Richland
Fairview
McKenzie
Watford City
Sidney
Scale 1:750,000
km
0
10
20
30

Table 1 K20PB-D TVStudy Analysis of Proposal


```
tvstudy v2.2.5 (4uoc83)
Database: localhost,  Study: K20PB-D 15kW,  Model: Longley-Rice
Start: 2022.09.23 15:02:44

Study created: 2022.09.23 15:02:43

Study build station data: LMS TV 2022-09-22

    Proposal: K20PB-D D20 LD APP WILLISTON, ND
 File number: K20PB-D 15kW
 Facility ID: 187437
Station data: User record
   Record ID: 4671
     Country: U.S.

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

Search options:
Non-U.S. records included
Baseline record excluded if station has CP

Stations potentially affected by proposal:

IX   Call      Chan       Svc Status  City, State              File Number             Distance
No   K19JR-D   D19        LD  CP      WOLF POINT, MT           BLANK0000013205         123.7 km
No   K19JR-D   D19        LD  LIC     WOLF POINT, MT           BLDTT20120614ACJ        136.2
No   KXMA-TV   D19        DT  LIC     DICKINSON, ND            BLCDT20090715AHZ        171.8
No   KTVQ      D20        DT  CP      BILLINGS, MT             BLANK0000190318         436.8
No   K20LK-D   D20        LD  LIC     COLSTRIP, ETC., MT       BLDTT20120608AAV        344.0
No   K20JS-D   D20        LD  LIC     GLASGOW, MT              BLDTT20110705ABR        205.5
No   K20BP-D   D20        LD  LIC     PHILLIPS COUNTY, MT      BLDTT20111116AUB        351.0
No   KJRE      D20        DT  LIC     ELLENDALE, ND            BLEDT20041109AAB        428.6

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

    Channel: D20
       Mask: Full Service
   Latitude:  48  8  2.00 N (NAD83)
  Longitude: 103 51 38.00 W
Height AMSL: 942.7 m
       HAAT: 0.0 m
   Peak ERP: 15.0 kW
    Antenna: Omnidirectional
Elev Pattrn: Generic
  Elec Tilt: 1.00

49.4 dBu contour:
Azimuth      ERP       HAAT   Distance
  0.0 deg   15.0 kW   261.6 m   55.2 km
 45.0       15.0      276.8     56.1
 90.0       15.0      335.0     59.3
135.0       15.0      348.2     60.0
180.0       15.0      339.6     59.5
225.0       15.0      273.4     55.9
270.0       15.0      260.1     55.1
315.0       15.0      250.7     54.6

Database HAAT does not agree with computed HAAT
Database HAAT: 0 m   Computed HAAT: 293 m

**Proposal 24.36 dBu contour crosses Canadian border, coordination required
Distance to Canadian border: 96.2 km

Distance to Mexican border: 1831.2 km

Conditions at FCC monitoring station: Grand Island NE
Bearing: 149.8 degrees   Distance: 909.2 km
```

Table 1 K20PB-D TVStudy Analysis of Proposal

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

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 187.5 degrees Distance: 893.7 km

No land mobile station failures found

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

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	K20PB-D	D20	LD	APP	WILLISTON, ND	K20PB-D 15kW	
Undesireds:	K19JR-D	D19	LD	CP	WOLF POINT, MT	BLANK0000013205	123.7 km

Service area		Terrain-limited		IX-free		Percent IX	
10234.0	33,729	9879.7	33,273	9879.7	33,273	0.00	0.00

Channel and Facility Information

Section	Question	Response
Facility ID	187437	
State	North Dakota	
City	WILLISTON	
LPD Channel	20	

Antenna Location Data

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	Yes
	ASR Number	1050840
Coordinates (NAD83)	Latitude	48° 08' 02.0" N+
	Longitude	103° 51' 38.0" W-
	Structure Type	GTOWER-Guyed Structure Used for Communication Purposes
	Overall Structure Height	266.4 meters
	Support Structure Height	243.8 meters
	Ground Elevation (AMSL)	714.1 meters
Antenna Data	Height of Radiation Center Above Ground Level	228.6 meters
	Height of Radiation Center Above Mean Sea Level	942.7 meters
	Effective Radiated Power	15.0 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	1.0
	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