ENGINEERING EXHIBIT

Application for Minor Modification of Digital Low Power Television Station Construction Permit

prepared for

Gray Television Licensee, LLC
W33ES-D Chula, GA
Facility ID 186162
Ch. 33 3.4 kW Directional

Gray Television Licensee, LLC ("Gray") is the permittee of unbuilt digital Low Power Television station W33ES-D, Channel 33, Chula GA, Facility ID 186162. W33ES-D is authorized to operate pursuant to a Construction Permit ("CP", file# 0000157722) with 15 kW effective radiated power ("ERP"), directional. The current CP was obtained as a displacement of the previously authorized operation on Channel 49 (callsign W49DU-D). *Gray* herein seeks a modification of the current CP to specify reductions in ERP and antenna height, and use of a different directional antenna.

No change in site location is proposed from that which is currently authorized. The proposed facility will employ a new antenna to be side-mounted on the existing tower structure associated with FCC Antenna Structure Registration number 125521. No change to the overall structure height is proposed.

The proposed antenna is a Kathrein model K723147 (single panel) having horizontal polarization. The proposed ERP is 3.4 kW using a "simple" out of channel emission mask. A plot of the directional antenna's azimuthal pattern is supplied in Figure 1. Figure 2 depicts the 51 dBµ coverage contour of the proposed facility as well as those of the current and original CP facilities, demonstrating compliance with §73.3572 for a minor change.

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

[1]FCC Office of Engineering and Technology Bulletin number 69, *Longley-Rice Methodology for Evaluating*

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.

Human Exposure to Radiofrequency Electromagnetic Field (Environmental)

The proposed facility was evaluated for human exposure to Radiofrequency ("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 3 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 4.7 percent of the general population / uncontrolled maximum permissible exposure limit at any location two meters above ground level. 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.

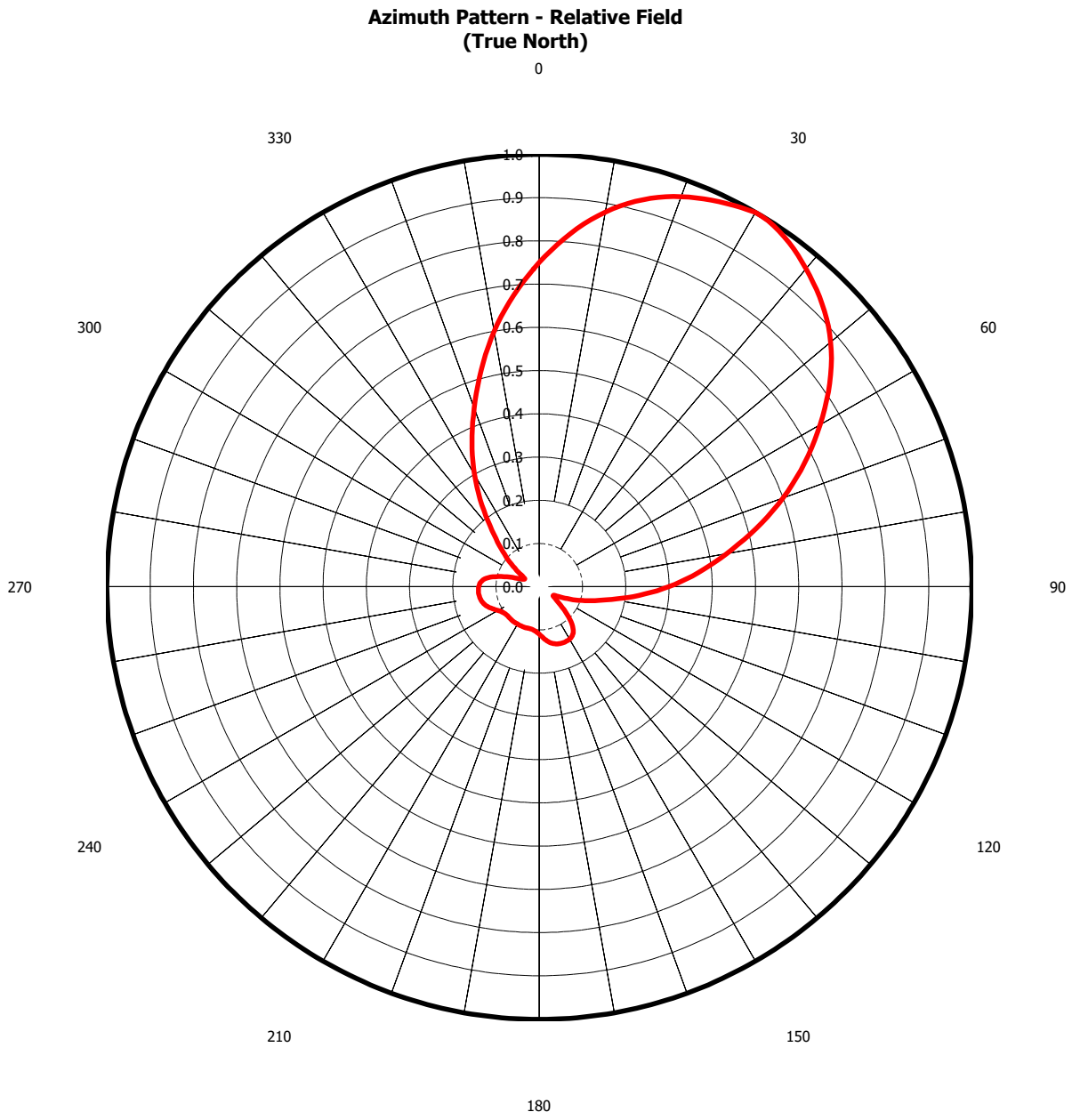
The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power 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. No change in structure height is proposed.

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 1.0 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	Coverage Contour Comparison
Figure 3	Calculated RF Electromagnetic Field
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. January 3, 2022
207 Old Dominion Road Yorktown, VA 23692 703-650-9600

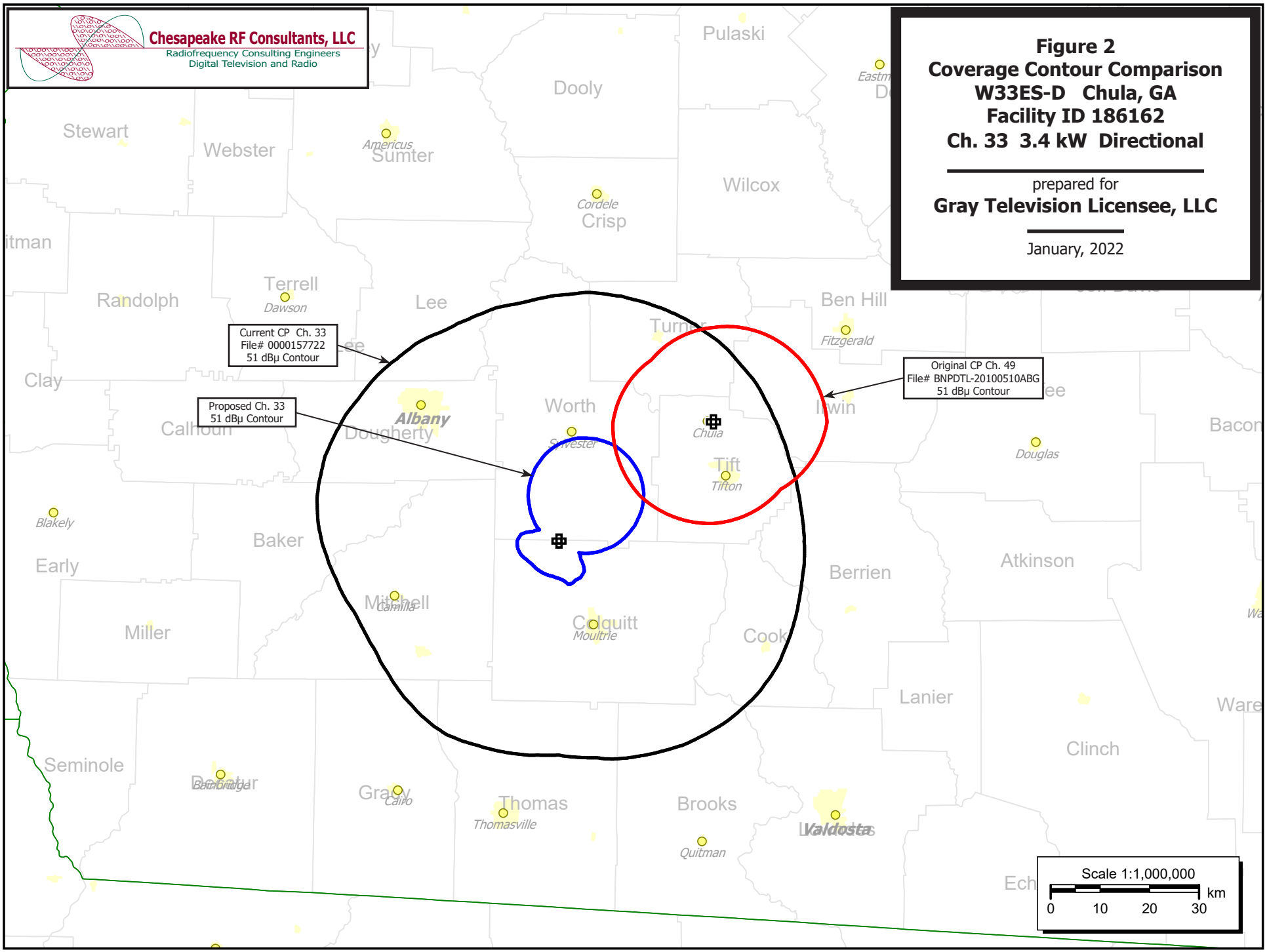


Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
Digital Television and Radio

Figure 1
Antenna Azimuthal Pattern
W33ES-D Chula, GA
Facility ID 186162
Ch. 33 3.4 kW Directional

prepared for
Gray Television Licensee, LLC

January, 2022


Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
Digital Television and Radio
Figure 2
Coverage Contour Comparison
W33ES-D Chula, GA
Facility ID 186162
Ch. 33 3.4 kW Directional
prepared for
Gray Television Licensee, LLC
January, 2022
Current CP Ch. 33
File# 0000157722
51 dBµ Contour
Proposed Ch. 33
51 dBµ Contour
Original CP Ch. 49
File# BNPDTL-20100510ABG
51 dBµ Contour
Pulaski
Dooly
Stewart
Webster
Americus
Sumter
Wilcox
Cordele
Crisp
Randolph
Terrell
Dawson
Lee
Ben Hill
Fitzgerald
Clay
Albany
Worth
Irwin
Calhoun
Dougherty
Sylvester
Chula
Tift
Tifton
Douglas
Bacon
Blakely
Baker
Early
Berrien
Atkinson
Mitchell
Camilla
Colquitt
Moultrie
Miller
Cook
Lanier
Ware
Clinch
Seminole
Bainbridge
Grady
Cairo
Thomas
Thomasville
Brooks
Quitman
Valdosta
Scale 1:1,000,000
km
0
10
20
30

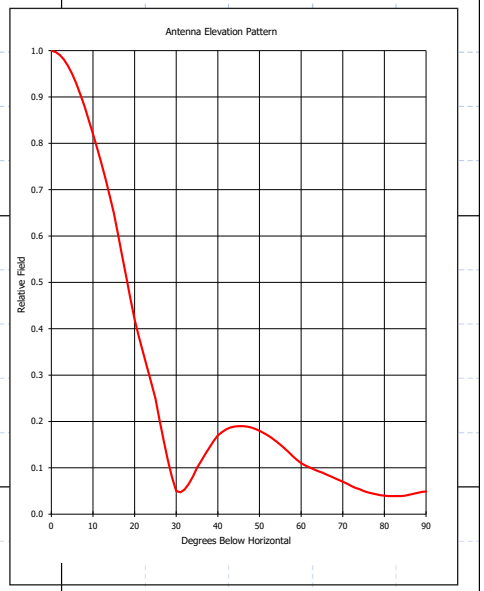
Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
Digital Television and Radio

Figure 3
Calculated RF Electromagnetic Field
W33ES-D Chula, GA
Facility ID 186162
Ch. 33 3.4 kW Directional

prepared for
Gray Television Licensee, LLC

January, 2022

Graph depicts calculated percentage of General Population/Uncontrolled Maximum Exposure Limit attributable to W33ES-D for locations 2 meters above ground level. Flat terrain assumed. Calculations conducted pursuant to FCC OET Bulletin Number 65.



General Population Exposure Limit (%)

0
5
10
15
20

0
50
100
150
200

Horizontal Distance From Antenna (meters)

Table 1 W33ES-D TVStudy Analysis of Proposal


```
tvstudy v2.2.5 (4uoc83)
Database: localhost,  Study: W33ES-D_prop,  Model: Longley-Rice
Start: 2022.01.02 11:11:55

Study created: 2022.01.02 11:11:55

Study build station data: LMS TV 2022-01-02

    Proposal: W33ES-D D33 LD APP CHULA, GA
 File number: W33ES-D prop
 Facility ID: 186162
Station data: User record
   Record ID: 4099
     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	WACX-LD	D32	LD	LIC	ALACHUA, ETC., FL	BLANK0000120906	225.8 km
No	WFSU-TV	D32	DT	LIC	TALLAHASSEE, FL	BLEDT20030730ACW	129.6
Yes	W32FO-D	D32	LD	CP	ALBANY, GA	BLANK0000071975	40.7
No	WSB-TV	D32	DT	LIC	ATLANTA, GA	BLANK0000153268	274.4
No	W32FV-D	D32	LD	CP	COLUMBUS, GA	BLANK0000157650	158.2
No	W32FT-D	D32	LD	CP	CORDELE, GA	BLANK0000155335	68.1
No	W32FN-D	D32	LD	CP	MACON, GA	BLANK0000177554	160.2
No	W44DD-D	D32	LD	CP	VALDOSTA, GA	BLANK0000071821	50.4
No	WPXH-TV	D33	DT	LIC	HOOVER, AL	BLANK0000105366	365.4
No	DDWMOE-LD	D33-	LD	APP	MOBILE, AL	BLANK0000053801	369.2
No	WFRZ-LD	D33	LD	LIC	MONTGOMERY, AL	BLANK0000081666	250.5
No	WDFX-TV	D33	DT	CP	OZARK, AL	BLANK0000035653	167.0
No	WDFX-TV	D33	DT	LIC	OZARK, AL	BLCDT20050915APH	167.0
No	WXCK-LD	D33	LD	LIC	CHIEFLAND, FL	BLANK0000151345	230.3
No	WXCK-LD	N33	TX	LIC	CHIEFLAND, FL	BLTTL19960415IC	230.3
No	W33DJ-D	D33	LD	CP	DESTIN, FL	BLANK0000168364	267.1
No	WUJF-LD	D33	LD	LIC	JACKSONVILLE, FL	BLANK0000164521	248.7
No	W33EN-D	D33	LD	CP	MADISON, FL	BNPDTL20090825AHE	105.3
No	WOFL	D33	DT	LIC	ORLANDO, FL	BLANK0000145405	404.1
No	WPCT	D33	DT	LIC	PANAMA CITY BEACH, FL	BLANK0000062892	223.4
No	WNXG-LD	D33	LD	LIC	TALLAHASSEE, FL	BLANK0000129630	90.2
No	W33EO-D	D33	LD	CP	TALLAHASSEE, FL	BNPDTL20090825ALP	101.6
No	WGCT-LD	D33	LD	LIC	Tampa, FL	BLANK0000059159	416.9
Yes	W31DS-D	D33	LD	APP	ASHBURN, GA	BLANK0000160498	47.2
No	WIRE-CD	D33	DC	LIC	ATLANTA, GA	BLANK0000130086	272.3
No	W33ER-D	D33	LD	CP	AUGUSTA, GA	BLANK0000155485	281.9
No	WCAC-LD	D33	LD	LIC	LAGRANGE, GA	BLDTL20130411AAA	220.4
No	WGNM	D33	DT	LIC	MACON, GA	BLANK0000113679	161.8
No	WDID-LD	D33	LD	LIC	SAVANNAH, GA	BLANK0000106516	255.0
No	WRLK-TV	D33	DT	LIC	COLUMBIA, SC	BLANK0000111852	413.2
No	WNGS-LD	D33	LD	LIC	GREENVILLE, SC	BLANK0000059653	423.3
No	W34EC-D	D34	LD	CP	CHATTAHOOCHEE, FL	BNPDTL20090825AGO	125.4
No	W34FW-D	D34	LD	LIC	JASPER, FL	BLANK0000158188	135.4
No	W40BU	D34-	LD	CP	PANAMA CITY, FL	BLANK0000054799	207.0
No	WXVK-LD	D34z	LD	LIC	Columbus, GA	BLANK0000115071	148.9
No	WXVK-LD	D34z	LD	CP	Columbus, GA	BLANK0000116354	170.2
Yes	WSST-TV	D34	DT	LIC	CORDELE, GA	BLANK0000064103	62.7
No	W34EJ-D	D34	LD	CP	CORDELE, GA	BNPDTL20100510AAY	68.0
No	W34FX-D	D34	LD	CP	MONTROSE, GA	BLANK0000154775	160.1

```
No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

    Channel: D33
       Mask: Simple
   Latitude:  31 19 53.00 N (NAD83)
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```
  Longitude:  83 51 43.00 W
Height AMSL: 125.5 m
       HAAT: 0.0 m
   Peak ERP: 3.40 kW
    Antenna: KAT 723147 30.0 deg
Elev Pattrn: Generic

50.6 dBu contour:
Azimuth      ERP       HAAT   Distance
  0.0 deg   1.91 kW     8.2 m   20.3 km
 45.0       2.88       21.5     22.2
 90.0      0.306       27.5     12.7
135.0      0.028       22.4      7.1
180.0      0.041       26.0      7.8
225.0      0.034       22.0      7.4
270.0      0.067       24.8      8.8
315.0      0.057       11.5      8.4

Database HAAT does not agree with computed HAAT
Database HAAT: 0 m   Computed HAAT: 20 m

Distance to Canadian border: 1154.7 km

Distance to Mexican border: 1404.9 km

Conditions at FCC monitoring station: Powder Springs GA
Bearing: 344.2 degrees   Distance: 292.7 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 302.9 degrees   Distance: 2153.3 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 BLANK0000071975 CP scenario 1

             Call      Chan  Svc Status  City, State              File Number             Distance
Desired:     W32FO-D   D32   LD  CP      ALBANY, GA               BLANK0000071975

Undesireds:  W33ES-D   D33   LD  APP     CHULA, GA                W33ES-D prop             40.7 km
             WSWG      D31   DT  LIC     VALDOSTA, GA             BLANK0000063722          88.4
             WFSU-TV   D32   DT  LIC     TALLAHASSEE, FL          BLEDT20030730ACW        145.2
             W32FT-D   D32   LD  CP      CORDELE, GA              BLANK0000155335          50.8
             W44DD-D   D32   LD  CP      VALDOSTA, GA             BLANK0000071821          88.4
             W31DS-D   D33   LD  APP     ASHBURN, GA              BLANK0000160498          21.6

        Service area       Terrain-limited       IX-free, before       IX-free, after    Percent New IX
  2783.5     135,454    2783.5     135,454    2523.5     134,147    2523.5     134,147     0.00     0.00

Undesired                          Total IX     Unique IX, before      Unique IX, after
W33ES-D D33 LD APP          1.0          52                    0.0             0
WFSU-TV D32 DT LIC        153.7         700                   69.8           490
W32FT-D D32 LD CP          38.4          84                    0.0             0
W44DD-D D32 LD CP          17.2         510                   16.2           458
W31DS-D D33 LD APP        150.7         237                   90.0           149

-------------------------------------------------------------------------------------------------------
Interference to BLANK0000071975 CP scenario 2

             Call      Chan  Svc Status  City, State              File Number             Distance
Desired:     W32FO-D   D32   LD  CP      ALBANY, GA               BLANK0000071975

Undesireds:  W33ES-D   D33   LD  APP     CHULA, GA                W33ES-D prop             40.7 km
             WSWG      D31   DT  LIC     VALDOSTA, GA             BLANK0000063722          88.4
             WFSU-TV   D32   DT  LIC     TALLAHASSEE, FL          BLEDT20030730ACW        145.2
```

	W32FT-D	D32	LD	CP	CORDELE, GA	BLANK0000155335	50.8
	W44DD-D	D32	LD	CP	VALDOSTA, GA	BLANK0000071821	88.4

Service area		Terrain-limited		IX-free, before		IX-free, after		Percent New IX	
2783.5	135,454	2783.5	135,454	2613.6	134,296	2613.6	134,296	0.00	0.00

Undesired		Total IX	Unique IX, before		Unique IX, after	
W33ES-D D33 LD APP	1.0	52			0.0	0
WFSU-TV D32 DT LIC	153.7	700	114.3	564	114.3	564
W32FT-D D32 LD CP	38.4	84	0.0	0	0.0	0
W44DD-D D32 LD CP	17.2	510	16.2	458	16.2	458

Interference to BLANK0000160498 APP scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	W31DS-D	D33	LD	APP	ASHBURN, GA	BLANK0000160498	
Undesireds:	W33ES-D	D33	LD	APP	CHULA, GA	W33ES-D prop	47.2 km
	W32FO-D	D32	LD	CP	ALBANY, GA	BLANK0000071975	21.6
	W32FT-D	D32	LD	CP	CORDELE, GA	BLANK0000155335	29.2
	WDFX-TV	D33	DT	CP	OZARK, AL	BLANK0000035653	165.1
	WXCK-LD	D33	LD	LIC	CHIEFLAND, FL	BLANK0000151345	276.8
	WGNM	D33	DT	LIC	MACON, GA	BLANK0000113679	120.5
	WXVK-LD	D34z	LD	LIC	Columbus, GA	BLANK0000115071	111.4
	WSST-TV	D34	DT	LIC	CORDELE, GA	BLANK0000064103	24.1
	W34EJ-D	D34	LD	CP	CORDELE, GA	BNPDTL20100510AAY	29.2

Service area		Terrain-limited		IX-free, before		IX-free, after		Percent New IX	
2263.3	95,033	2262.3	95,023	2108.6	63,480	2100.5	62,583	0.38	1.41

Undesired		Total IX	Unique IX, before		Unique IX, after	
W33ES-D D33 LD APP	9.1	897			8.1	897
W32FO-D D32 LD CP	49.7	29,164	45.6	25,240	45.6	25,240
W32FT-D D32 LD CP	14.1	238	0.0	0	0.0	0
WDFX-TV D33 DT CP	6.1	5	1.0	0	0.0	0
WGNM D33 DT LIC	11.1	5,532	3.0	1,604	3.0	1,604
WSST-TV D34 DT LIC	100.0	775	64.6	384	64.6	384
W34EJ-D D34 LD CP	24.2	370	0.0	0	0.0	0

Interference to BLANK0000160498 APP scenario 2

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	W31DS-D	D33	LD	APP	ASHBURN, GA	BLANK0000160498	
Undesireds:	W33ES-D	D33	LD	APP	CHULA, GA	W33ES-D prop	47.2 km
	W32FO-D	D32	LD	CP	ALBANY, GA	BLANK0000071975	21.6
	W32FT-D	D32	LD	CP	CORDELE, GA	BLANK0000155335	29.2
	WXCK-LD	D33	LD	LIC	CHIEFLAND, FL	BLANK0000151345	276.8
	WGNM	D33	DT	LIC	MACON, GA	BLANK0000113679	120.5
	WXVK-LD	D34z	LD	LIC	Columbus, GA	BLANK0000115071	111.4
	WSST-TV	D34	DT	LIC	CORDELE, GA	BLANK0000064103	24.1
	W34EJ-D	D34	LD	CP	CORDELE, GA	BNPDTL20100510AAY	29.2

Service area		Terrain-limited		IX-free, before		IX-free, after		Percent New IX	
2263.3	95,033	2262.3	95,023	2109.6	63,480	2100.5	62,583	0.43	1.41

Undesired		Total IX	Unique IX, before		Unique IX, after	
W33ES-D D33 LD APP	9.1	897			9.1	897
W32FO-D D32 LD CP	49.7	29,164	45.6	25,240	45.6	25,240
W32FT-D D32 LD CP	14.1	238	0.0	0	0.0	0
WGNM D33 DT LIC	11.1	5,532	3.0	1,604	3.0	1,604
WSST-TV D34 DT LIC	100.0	775	67.7	389	67.7	389
W34EJ-D D34 LD CP	24.2	370	0.0	0	0.0	0

Interference to BLANK0000064103 LIC scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	WSST-TV	D34	DT	LIC	CORDELE, GA	BLANK0000064103	
Undesireds:	W33ES-D	D33	LD	APP	CHULA, GA	W33ES-D prop	62.7 km

Table 1 W33ES-D TVStudy Analysis of Proposal

	WGNM	D33	DT	LIC	MACON, GA	BLANK0000113679	99.5
	WBIH	D34	DT	LIC	SELMA, AL	BLANK0000110807	294.5
	WATC-DT	D34	DT	LIC	ATLANTA, GA	BLANK0000107129	249.0
	WBVJ-CD	D35+	DC	LIC	VALDOSTA, GA	BLANK0000004708	113.7

Service area		Terrain-limited		IX-free, before		IX-free, after		Percent New IX	
11963.6	331,377	11861.0	330,571	11758.4	329,696	11665.9	329,168	0.79	0.16

Undesired		Total IX		Unique IX, before		Unique IX, after	
W33ES-D D33 LD APP	92.4	528				92.4	528
WGNM D33 DT LIC	32.1	435		3.0	0	3.0	0
WBIH D34 DT LIC	30.2	280		11.1	7	11.1	7
WATC-DT D34 DT LIC	88.5	868		44.2	431	44.2	431

Interference to proposal scenario 1
**MX: 14.96% interference received

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	W33ES-D	D33	LD	APP	CHULA, GA	W33ES-D prop	
Undesireds:	WDFX-TV	D33	DT	CP	OZARK, AL	BLANK0000035653	167.0 km
	WXCK-LD	D33	LD	LIC	CHIEFLAND, FL	BLANK0000151345	230.3
	WNXG-LD	D33	LD	LIC	TALLAHASSEE, FL	BLANK0000129630	90.2
	W31DS-D	D33	LD	APP	ASHBURN, GA	BLANK0000160498	47.2

Service area		Terrain-limited		IX-free		Percent IX	
534.2	6,584	534.2	6,584	508.8	5,599	4.75	14.96

Undesired	Total IX		Unique IX		Prcnt Unique IX	
WDFX-TV D33 DT CP	2.0	0	1.0	0	0.19	0.00
WNXG-LD D33 LD LIC	11.2	716	6.1	124	1.14	1.88
W31DS-D D33 LD APP	18.3	861	13.2	269	2.47	4.09

Interference to proposal scenario 2
**MX: 14.96% interference received

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	W33ES-D	D33	LD	APP	CHULA, GA	W33ES-D prop	
Undesireds:	WXCK-LD	D33	LD	LIC	CHIEFLAND, FL	BLANK0000151345	230.3 km
	WNXG-LD	D33	LD	LIC	TALLAHASSEE, FL	BLANK0000129630	90.2
	W31DS-D	D33	LD	APP	ASHBURN, GA	BLANK0000160498	47.2

Service area		Terrain-limited		IX-free		Percent IX	
534.2	6,584	534.2	6,584	509.8	5,599	4.56	14.96

Undesired	Total IX		Unique IX		Prcnt Unique IX	
WNXG-LD D33 LD LIC	11.2	716	6.1	124	1.14	1.88
W31DS-D D33 LD APP	18.3	861	13.2	269	2.47	4.09

Channel and Facility Information

Section	Question	Response
Facility ID	186162	
State	Georgia	
City	CHULA	
LPD Channel	33	

Primary station proposed to be rebroadcast:

Facility Id	Call Sign	City	State

Antenna Location Data

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	Yes
	ASR Number	1255221
Coordinates (NAD83)	Latitude	31° 19' 53.0" N+
	Longitude	083° 51' 43.0" W-
	Structure Type	GTOWER-Guyed Structure Used for Communication Purposes
	Overall Structure Height	304.8 meters
	Support Structure Height	304.8 meters
	Ground Elevation (AMSL)	110.3 meters
Antenna Data	Height of Radiation Center Above Ground Level	15.2 meters
	Height of Radiation Center Above Mean Sea Level	125.5 meters
	Effective Radiated Power	3.4 kW

Antenna Technical Data

Section	Question	Response
Antenna Type	Antenna Type	Directional Custom
	Do you have an Antenna ID?	Yes
	Antenna ID	1008960
Antenna Manufacturer and Model	Manufacturer:	KAT
	Model	1x K723147
	Rotation	30 degrees
	Electrical Beam Tilt	Not Applicable
	Mechanical Beam Tilt	Not Applicable
	toward azimuth	
	Polarization	Horizontal
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:	Simple

Directional Antenna Relative Field Values (Pre-rotated Pattern)

Degree	Value	Degree	Value	Degree	Value	Degree	Value
0	1.000	**90**	0.04	**180**	0.10	**270**	0.04
10	0.96	**100**	0.06	**190**	0.10	**280**	0.09
20	0.88	**110**	0.12	**200**	0.10	**290**	0.17
30	0.75	**120**	0.14	**210**	0.11	**300**	0.30
40	0.60	**130**	0.14	**220**	0.13	**310**	0.44
50	0.44	**140**	0.13	**230**	0.14	**320**	0.60
60	0.30	**150**	0.11	**240**	0.14	**330**	0.75
70	0.17	**160**	0.10	**250**	0.12	**340**	0.88
80	0.09	**170**	0.10	**260**	0.06	**350**	0.96

Additional Azimuths

Degree	V_A