

ENGINEERING EXHIBIT

Incentive Auction Channel Reassignment

Application for Modification of Digital Television Station Construction Permit

prepared for

Gray Television Licensee, LLC

WITN-TV Washington, NC

Facility ID 594

Ch. 34 1000 kW 592 m

Gray Television Licensee, LLC (“Gray”) is the licensee of digital television station WITN-TV, Channel 32, Facility ID 594, Washington, NC. Reassignment of WITN-TV from Channel 32 to Channel 34 was specified in the *Incentive Auction Closing and Channel Reassignment Public Notice* (“CCRPN”, DA 17-317, released April 13, 2017). Gray herein proposes modification of the WITN-TV post-auction Channel 34 Construction Permit (“CP” file# 0000025116). This application is intended to be filed during the second filing window.¹ The CP authorizes operation at 940 kW effective radiated power (“ERP”) at 592 meters antenna height above average terrain (“HAAT”). Gray proposes herein to increase the ERP to 1000 kW.

As with the current authorization, the proposed Channel 34 operation will employ a new antenna system to be top-mounted on the WITN-TV tower in lieu of the existing Channel 32 antenna. The tower structure corresponds to FCC Antenna Structure Registration number 1006359. No change to the overall structure height will result.

The proposed antenna is a nondirectional elliptically polarized Dielectric model TFU-30GTH/VP-R O6 (25 percent vertical polarization). The horizontally polarized ERP is 1000 kW and the vertically polarized ERP is 250 kW.

¹Public Notice “*Incentive Auction Task Force and Media Bureau Announce the Opening of the Second Filing Window for Eligible Full Power and Class A Television Station—October 3 Through November 2, 2017*” DA 17-911, released September 20, 2017.

Figure 1 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 *CCRPN* baseline facility's population.

Interference study per FCC OET Bulletin 69² 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. **FCC processing of this proposal is requested using a 1 km cell size.** The interference study output report is provided as Table 1.

The proposed 1000 kW ERP exceeds the maximum allowed for the proposed antenna HAAT of 592 meters permitted by §73.622(f)(8)(i). Section 73.622(f)(5) permits the maximum ERP to be exceeded in order to provide the same geographic coverage area as the largest station within the same market. As demonstrated in Figure 2, the total area within the proposed WITN-TV NLSC is 45,453 square kilometers, which does not exceed the NLSC area of WNCT-TV (47,150 sq. km, Ch. 10, Greenville NC, BLCDT-20110504ACA). Thus, the 1000 kW ERP specified herein is in compliance with §73.622(f)(5) of the FCC's Rules.

The nearest FCC monitoring station is 425 km distant at Laurel, MD. 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). The site location is beyond the border areas requiring international coordination. There are no authorized AM stations within 3 kilometers of the site.

²FCC 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.

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 10 percent antenna relative field in downward elevations (pattern data shows less than 10 percent relative field at angles 10 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 $1.2 \mu\text{W}/\text{cm}^2$, which is 0.3 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.

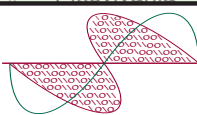
The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power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

List of Attachments

Figure 1	Proposed Coverage Contours
Figure 2	Maximum ERP per §73.622(f)
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.	October 18, 2017	
207 Old Dominion Road	Yorktown, VA 23692	703-650-9600

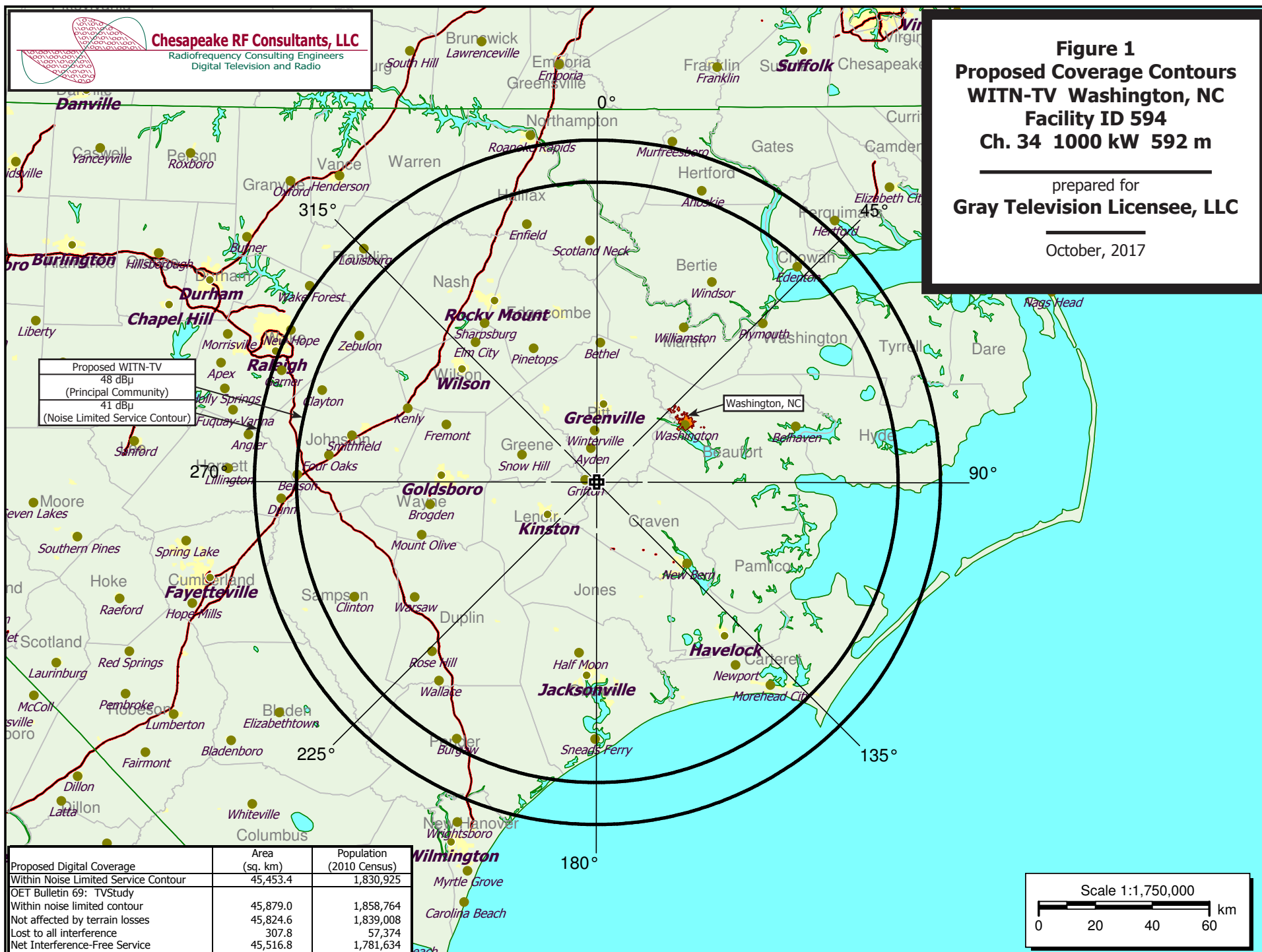


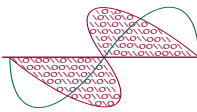
Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
Digital Television and Radio

Figure 1
Proposed Coverage Contours
WITN-TV Washington, NC
Facility ID 594
Ch. 34 1000 kW 592 m

prepared for
Gray Television Licensee, LLC

October, 2017





Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
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Figure 2
Maximum ERP per §73.622(f)
WITN-TV Washington, NC
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Ch. 34 1000 kW 592 m

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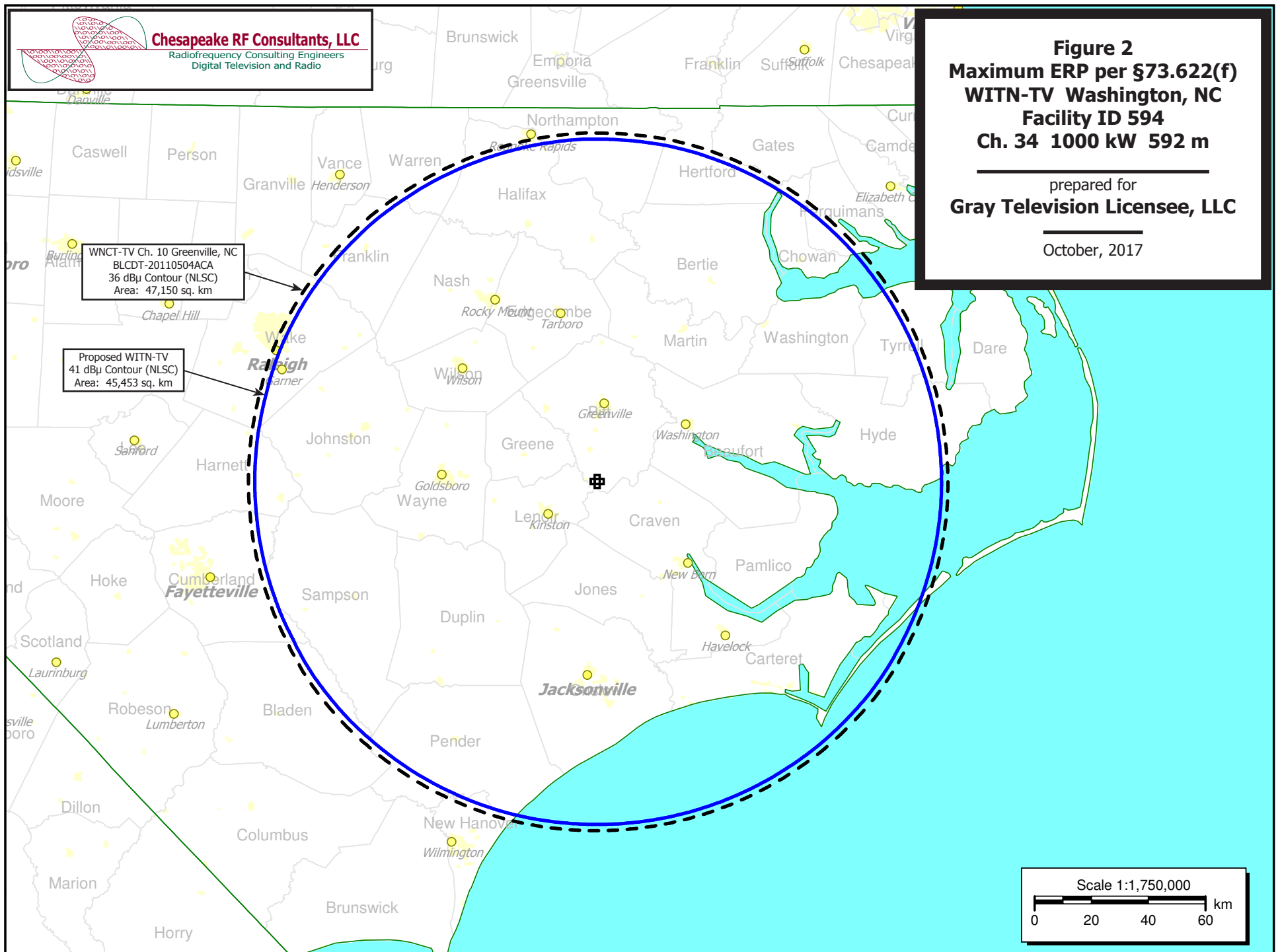
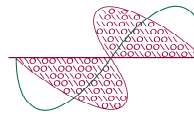


Table 1 WITN-TV OET Bulletin 69 Interference Study
(page 1 of 3)



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

tvstudy v2.2.3 (6K70F1)
Database: localhost, Study: WITN-TV 1000KW 1km, Model: Longley-Rice
Start: 2017.10.18 14:53:07

Study created: 2017.10.18 14:52:19

Study build station data: LMS TV 2017-10-07 LMSTV

Proposal: WITN-TV D34 DT APP WASHINGTON, NC
File number: WITN-TV 1000KW
Facility ID: 594
Station data: User record
Record ID: 518
Country: U.S.

Stations potentially affected by proposal:

IX	Call	Chan	Svc	Status	City, State	File Number	Distance
No	WLPS-CD	D33	DC	CP	LUMBERTON-PEMBROKE, NC	BLANK0000026947	172.8 km
Yes	WTVZ-TV	D33	DT	LIC	NORFOLK, VA	BLCDT20090602ABA	179.2
No	WRC-TV	D34	DT	CP	WASHINGTON, DC	BLANK0000026891	398.3
Yes	WYBE-CD	D34	DC	CP	PINEHURST, NC	BLANK0000027048	185.3
No	WGWG	D34	DT	LIC	CHARLESTON, SC	BLCDT20060630ADJ	344.4
Yes	WNSC-TV	D34	DT	CP	ROCK HILL, SC	BLANK0000025025	334.8
Yes	WSLS-TV	D34	DT	CP	ROANOKE, VA	BLANK0000029619	320.2
No	WFMY-TV	D35	DT	CP	GREENSBORO, NC	BLANK0000028086	228.1

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D34
Latitude: 35 21 55.90 N (NAD83)
Longitude: 77 23 34.60 W
Height AMSL: 603.5 m
HAAT: 591.9 m
Peak ERP: 1000 kW
Antenna: Omnidirectional
Elev Pattn: Generic
Elec Tilt: 0.75

40.7 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	1000 kW	587.2 m	120.6 km
45.0	1000	592.7	120.9
90.0	1000	596.2	121.1
135.0	1000	597.7	121.2
180.0	1000	589.5	120.7
225.0	1000	595.5	121.1
270.0	1000	588.4	120.6
315.0	1000	588.3	120.6

ERP exceeds maximum

ERP: 1000 kW ERP maximum: 336 kW

**Proposal service area extends beyond baseline plus 1.0%
Proposal service area population is more than 95.0% of baseline

Distance to Canadian border: 814.9 km

Distance to Mexican border: 2133.3 km

Conditions at FCC monitoring station: Laurel MD
Bearing: 6.7 degrees Distance: 425.3 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 290.6 degrees Distance: 2491.8 km

Table 1 WITN-TV OET Bulletin 69 Interference Study
(page 2 of 3)



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 BLCDT20090602ABA LIC, scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	WTVZ-TV	D33	DT	LIC	NORFOLK, VA	BLCDT20090602ABA	
Undesireds:	WITN-TV	D34	DT	BL	WASHINGTON, NC	DTVBL594	179.3 km
	WITN-TV	D34	DT	APP	WASHINGTON, NC	WITN-TV 1000KW	179.2
	WHUT-TV	D33	DT	LIC	WASHINGTON, DC	BLEDT20071018AIJ	243.3
	Service area	Terrain-limited		IX-free, before		IX-free, after	Percent New IX
34102.1	2,155,169	34085.9	2,154,958	33913.8	2,153,997	33883.5 2,153,404	0.09 0.03
Undesired				Total IX	Unique IX, before	Unique IX, after	
WITN-TV D34 DT BL				149.7 441	149.7 441		
WITN-TV D34 DT APP				180.1 1,034		180.1 1,034	
WHUT-TV D33 DT LIC				22.3 520	22.3 520	22.3 520	

Interference to BLCDT20090602ABA LIC, scenario 2

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	WTVZ-TV	D33	DT	LIC	NORFOLK, VA	BLCDT20090602ABA	
Undesireds:	WITN-TV	D34	DT	BL	WASHINGTON, NC	DTVBL594	179.3 km
	WITN-TV	D34	DT	APP	WASHINGTON, NC	WITN-TV 1000KW	179.2
	WHUT-TV	D33	DT	CP	WASHINGTON, DC	BPEDT20120627AAD	243.3
	Service area	Terrain-limited		IX-free, before		IX-free, after	Percent New IX
34102.1	2,155,169	34085.9	2,154,958	33692.1	2,141,472	33661.7 2,140,879	0.09 0.03
Undesired				Total IX	Unique IX, before	Unique IX, after	
WITN-TV D34 DT BL				149.7 441	149.7 441		
WITN-TV D34 DT APP				180.1 1,034		180.1 1,034	
WHUT-TV D33 DT CP				244.1 13,045	244.1 13,045	244.1 13,045	

Interference to BLANK0000027048 CP, scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	WYBE-CD	D34	DC	CP	PINEHURST, NC	BLANK0000027048	
Undesireds:	WITN-TV	D34	DT	BL	WASHINGTON, NC	DTVBL594	185.2 km
	WITN-TV	D34	DT	APP	WASHINGTON, NC	WITN-TV 1000KW	185.3
	WSLS-TV	D34	DT	CP	ROANOKE, VA	BLANK0000029619	235.4
	WFMY-TV	D35	DT	CP	GREENSBORO, NC	BLANK0000028086	87.0
	Service area	Terrain-limited		IX-free, before		IX-free, after	Percent New IX
213.4	38,321	213.4	38,321	201.4	35,954	199.4 35,954	0.99 0.00
Undesired				Total IX	Unique IX, before	Unique IX, after	
WITN-TV D34 DT BL				5.0 631	5.0 631		
WITN-TV D34 DT APP				7.0 631		7.0 631	
WSLS-TV D34 DT CP				2.0 337	1.0 113	1.0 113	
WFMY-TV D35 DT CP				6.0 1,623	5.0 1,399	5.0 1,399	

Interference to BLANK0000025025 CP, scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	WNSC-TV	D34	DT	CP	ROCK HILL, SC	BLANK0000025025	
Undesireds:	WITN-TV	D34	DT	BL	WASHINGTON, NC	DTVBL594	334.7 km
	WITN-TV	D34	DT	APP	WASHINGTON, NC	WITN-TV 1000KW	334.8
	WRLK-TV	D33	DT	CP	COLUMBIA, SC	BLANK0000025032	80.5
	WATC-DT	D34	DT	CP	ATLANTA, GA	BLANK0000025455	326.4

Table 1 WITN-TV OET Bulletin 69 Interference Study
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WGWG	D34	DT	LIC	CHARLESTON, SC	BLCDT20060630ADJ	245.2
WVLT-TV	D34	DT	CP	KNOXVILLE, TN	BLANK0000025085	295.5
WSLS-TV	D34	DT	CP	ROANOKE, VA	BLANK0000029619	273.8
WFMY-TV	D35	DT	CP	GREENSBORO, NC	BLANK0000028086	156.6
WMYA-TV	D35	DT	CP	ANDERSON, SC	BLANK0000027765	116.3

Service area	Terrain-limited	IX-free, before	IX-free, after	Percent New IX
15668.0 2,096,733	15476.6 2,089,626	14813.7 2,058,411	14811.7 2,058,417	0.01 -0.00

Undesired	Total IX	Unique IX, before	Unique IX, after
WITN-TV D34 DT BL	35.0 815	5.0 17	
WITN-TV D34 DT APP	46.0 1,009		7.0 11
WRLK-TV D33 DT CP	354.7 6,013	233.7 3,813	233.7 3,813
WATC-DT D34 DT CP	5.0 124	2.0 0	2.0 0
WGWG D34 DT LIC	253.4 4,829	97.5 1,236	93.4 1,200
WVLT-TV D34 DT CP	1.0 30	1.0 30	1.0 30
WSLS-TV D34 DT CP	141.5 21,640	96.6 18,154	95.6 18,113
WFMY-TV D35 DT CP	14.9 2,283	6.0 412	6.0 412
WMYA-TV D35 DT CP	50.2 1,836	46.1 1,578	46.1 1,578

Interference to BLANK0000029619 CP, scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	WSLS-TV	D34	DT	CP	ROANOKE, VA	BLANK0000029619	
Undesireds:	WITN-TV	D34	DT	BL	WASHINGTON, NC	DTVBL594	320.2 km
	WITN-TV	D34	DT	APP	WASHINGTON, NC	WITN-TV 1000KW	320.2
	WUNL-TV	D33	DT	CP	WINSTON-SALEM, NC	BLANK0000028084	93.9
	WRC-TV	D34	DT	CP	WASHINGTON, DC	BLANK0000026891	330.7
	WNSC-TV	D34	DT	CP	ROCK HILL, SC	BLANK0000025025	273.8
	WVLT-TV	D34	DT	CP	KNOXVILLE, TN	BLANK0000025085	365.3
	WNPB-TV	D34	DT	CP	MORGANTOWN, WV	BLANK0000026236	279.3
	WFMY-TV	D35	DT	CP	GREENSBORO, NC	BLANK0000028086	150.4
	WAHU-CD	D35	DC	CP	CHARLOTTESVILLE, VA	BLANK0000025654	170.7

Service area	Terrain-limited	IX-free, before	IX-free, after	Percent New IX
39556.0 1,448,666	33181.2 1,275,688	31875.5 1,230,883	31848.4 1,229,959	0.09 0.08

Undesired	Total IX	Unique IX, before	Unique IX, after
WITN-TV D34 DT BL	271.4 8,725	140.7 4,134	
WITN-TV D34 DT APP	302.5 9,782		167.8 5,058
WUNL-TV D33 DT CP	744.6 30,660	329.0 12,615	328.0 12,521
WRC-TV D34 DT CP	107.4 1,877	64.9 1,356	64.9 1,362
WNSC-TV D34 DT CP	391.1 14,113	88.3 1,616	87.3 1,616
WVLT-TV D34 DT CP	21.1 2,049	20.1 2,049	20.1 2,049
WNPB-TV D34 DT CP	45.5 411	41.5 411	41.5 411
WFMY-TV D35 DT CP	336.0 14,818	68.4 1,749	69.4 1,774
WAHU-CD D35 DC CP	60.9 572	38.6 363	38.6 363

Interference to proposal, scenario 1
3.12% interference

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	WITN-TV	D34	DT	APP	WASHINGTON, NC	WITN-TV 1000KW	
Undesireds:	WTVZ-TV	D33	DT	LIC	NORFOLK, VA	BLCDT20090602ABA	179.2 km
	WGWG	D34	DT	LIC	CHARLESTON, SC	BLCDT20060630ADJ	344.4
	WNSC-TV	D34	DT	CP	ROCK HILL, SC	BLANK0000025025	334.8
	WSLS-TV	D34	DT	CP	ROANOKE, VA	BLANK0000029619	320.2

Service area	Terrain-limited	IX-free	Percent IX
45879.0 1,858,764	45824.6 1,839,008	45516.8 1,781,634	0.67 3.12

Undesired	Total IX	Unique IX	Prct Unique IX
WTVZ-TV D33 DT LIC	34.3 132	34.3 132	0.07 0.01
WGWG D34 DT LIC	17.0 231	16.0 28	0.04 0.00
WNSC-TV D34 DT CP	3.0 1,251	0.0 0	0.00 0.00
WSLS-TV D34 DT CP	257.5 57,214	254.5 55,963	0.56 3.04

**Channel and
Facility
Information**

Section	Question	Response
Proposed Community of License	Facility ID	594
	State	North Carolina
	City	WASHINGTON
	DTV Channel	34
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	1006359
Coordinates (NAD83)	Latitude	35° 21' 55.9" N+
	Longitude	077° 23' 34.6" W-
	Structure Type	GTOWER-Guyed Structure Used for Communication Purposes
	Overall Structure Height	605.0 meters
	Support Structure Height	566.0 meters
	Ground Elevation (AMSL)	7.9 meters
Antenna Data	Height of Radiation Center Above Ground Level	595.6 meters
	Height of Radiation Center Above Average Terrain	591.9 meters
	Height of Radiation Center Above Mean Sea Level	603.5 meters
	Effective Radiated Power	1000 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:	DIE
	Model	TFU-30GTH/VP-R O6
	Rotation	
	Electrical Beam Tilt	0.75
	Mechanical Beam Tilt	Not Applicable
	toward azimuth	
	Polarization	Elliptical
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	

**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