

ENGINEERING EXHIBIT

Incentive Auction Channel Reassignment

Application for Digital Television Station Construction Permit

prepared for

Gray Television Licensee, LLC

WEAU(DT) Eau Claire, WI

Facility ID 7893

Ch. 17 700 kW 616 m

Gray Television Licensee, LLC (“Gray”) is the licensee of digital television station WEAU(DT), Channel 38, Facility ID 7893, Eau Claire, WI. *Gray* herein proposes construction of the WEAU post-auction facility on Channel 17. Reassignment of WEAU from Channel 38 to Channel 17 was specified in the *Incentive Auction Closing and Channel Reassignment Public Notice (“CCRPN”*, DA 17-317, released April 13, 2017).

The proposed Channel 17 operation will employ a new antenna system to be top-mounted on the WEAU tower in lieu of the existing Channel 38 antenna. *Gray* proposes to operate WEAU with an effective radiated power (“ERP”) of 700 kW at 616 meters antenna height above average terrain (“HAAT”). The existing tower structure corresponds to FCC Antenna Structure Registration number 1033664. No change to the overall structure height will result.

The proposed antenna is an elliptically polarized nondirectional Dielectric model TFU-23JTH/VP-R O6 (33 percent vertical polarization). The horizontally polarized ERP is 700 kW and the vertically polarized ERP is 233.3 kW.

A map is supplied as Figure 1 which depicts the standard predicted coverage contours. This map includes the location of Eau Claire, WEAU’s principal community. As demonstrated thereon, the proposed facility complies with §73.625(a)(1) as the entire principal community will be encompassed by the 48 dB μ contour.

The proposed noise limited service contour (“NLSC”) extends beyond that of the *CCRPN* parameters of 633 kW ERP and 616 meters HAAT. The proposal complies with §73.3700(b)(ii) as described in the following.

WEAU’s reassignment facility experiences a loss of interference-free coverage area within the NLSC when compared to that of its baseline¹ pre-auction facility. Detailed analysis shows that an area of 332.0 square kilometers having a population of 558 persons which received interference-free service from the baseline WEAU facility does not receive interference-free service from the reassignment parameters. A map is supplied as Figure 2 which shows the interference-free results for the *CCRPN* parameters and the baseline interference-free individual cells that are lost at reassignment. Therefore, WEAU qualifies under §73.3700(b)(ii)(A) for a contour extension due the loss of interference-free coverage area resulting from the new channel assignment.

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. The interference study output report is provided as Table 1. This satisfies §73.3700(b)(ii)(C) for the proposed NLSC extension.

The amount of NLSC extension does not exceed one percent in any direction. Figure 3 supplies a coverage contour comparison of the proposed WEAU facility to the reassignment facility’s contour and a one percent extension distance of the reassignment facility’s contour. Here, the contour level is adjusted with the dipole factor to match FCC application processing.

¹“*Final Digital Television Baseline Coverage Area And Population Served Information Related To Incentive Auction Repacking*,” DA 15-1296, Public Notice, Released November 12, 2015.

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, 2 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.

Table 1's results also demonstrate that the proposed contour is within the baseline contour plus one percent. Therefore the proposed contour extension complies with §73.3700(b)(ii)(B).

The proposed WEAU facility's terrain-limited population provides a 101.4 percent match of the *CCRPN* baseline facility, as detailed in the following table. The OET Bulletin 69 report summary in Table 1 also concludes that the proposed service area population is more than 95 percent of the baseline population.

Terrain Limited Population - Match of Reassignment		
Population Summary (2010 Census) OET Bulletin 69: TVStudy	Reassignment Parameters	Proposed
Within Noise Limited Contour	990,989	1,001,913
Not affected by terrain losses	953,782	967,242
Match of Reassignment	---	101.41%

The proposed 700 kW ERP exceeds the maximum allowed for the proposed antenna HAAT of 616 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. The total area within the proposed WEAU NLSC is 43,741 square kilometers, which does not exceed the NLSC area of the licensed WEAU facility (Ch. 38, BLCDDT-20111229AAN). Thus, the 700 kW ERP specified herein is in compliance with §73.622(f)(5) of the FCC's Rules.

The nearest FCC monitoring station is 464 km distant at Allegan, MI. 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

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 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 $0.9 \mu\text{W}/\text{cm}^2$, 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.

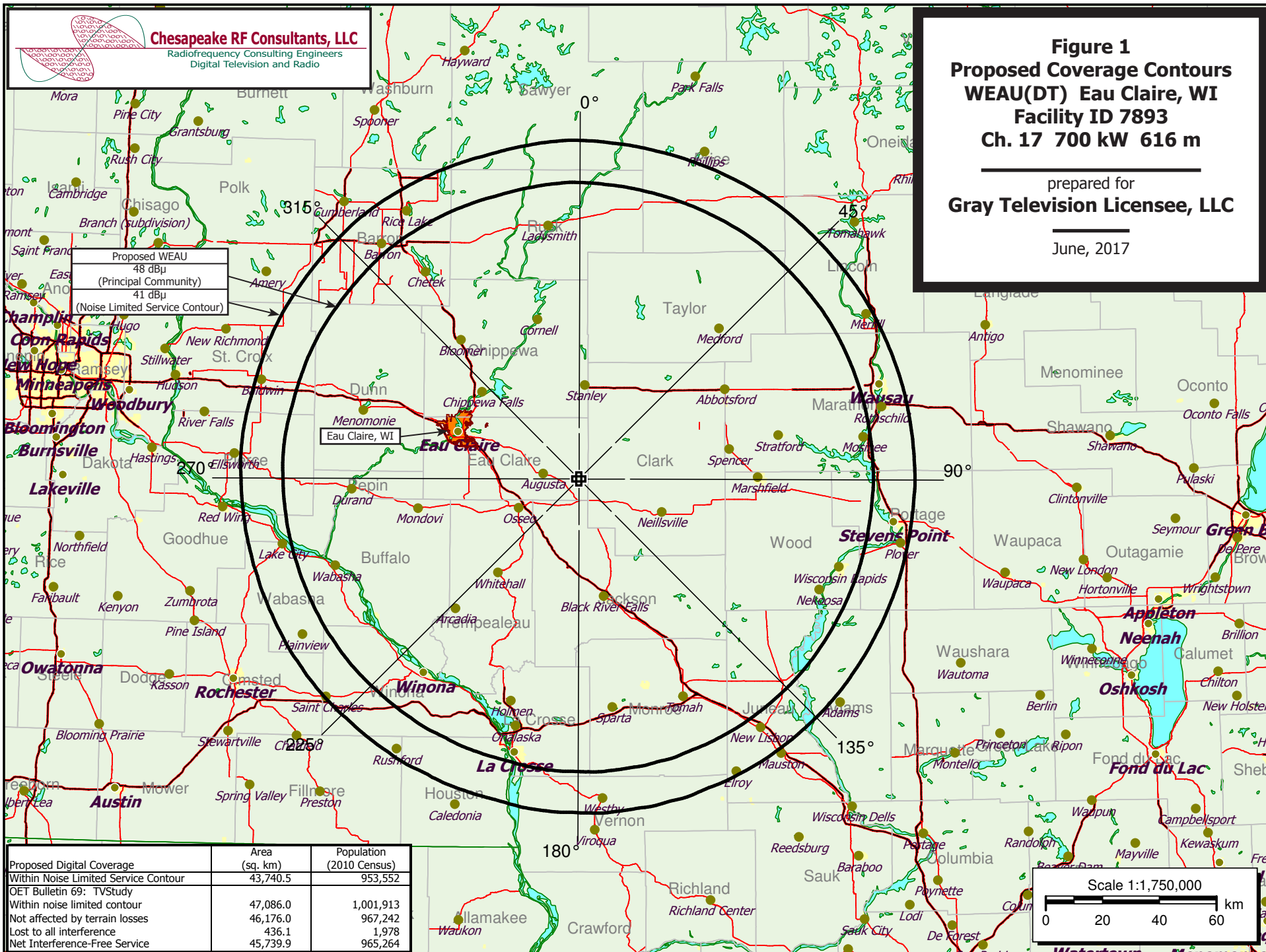
The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power 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.

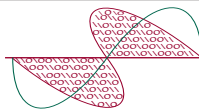
List of Attachments

Figure 1	Proposed Coverage Contours
Figure 2	Reassignment Service Loss
Figure 3	Proposed Contour Expansion
Figure 4	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.	June 20, 2017	
207 Old Dominion Road	Yorktown, VA 23692	703-650-9600



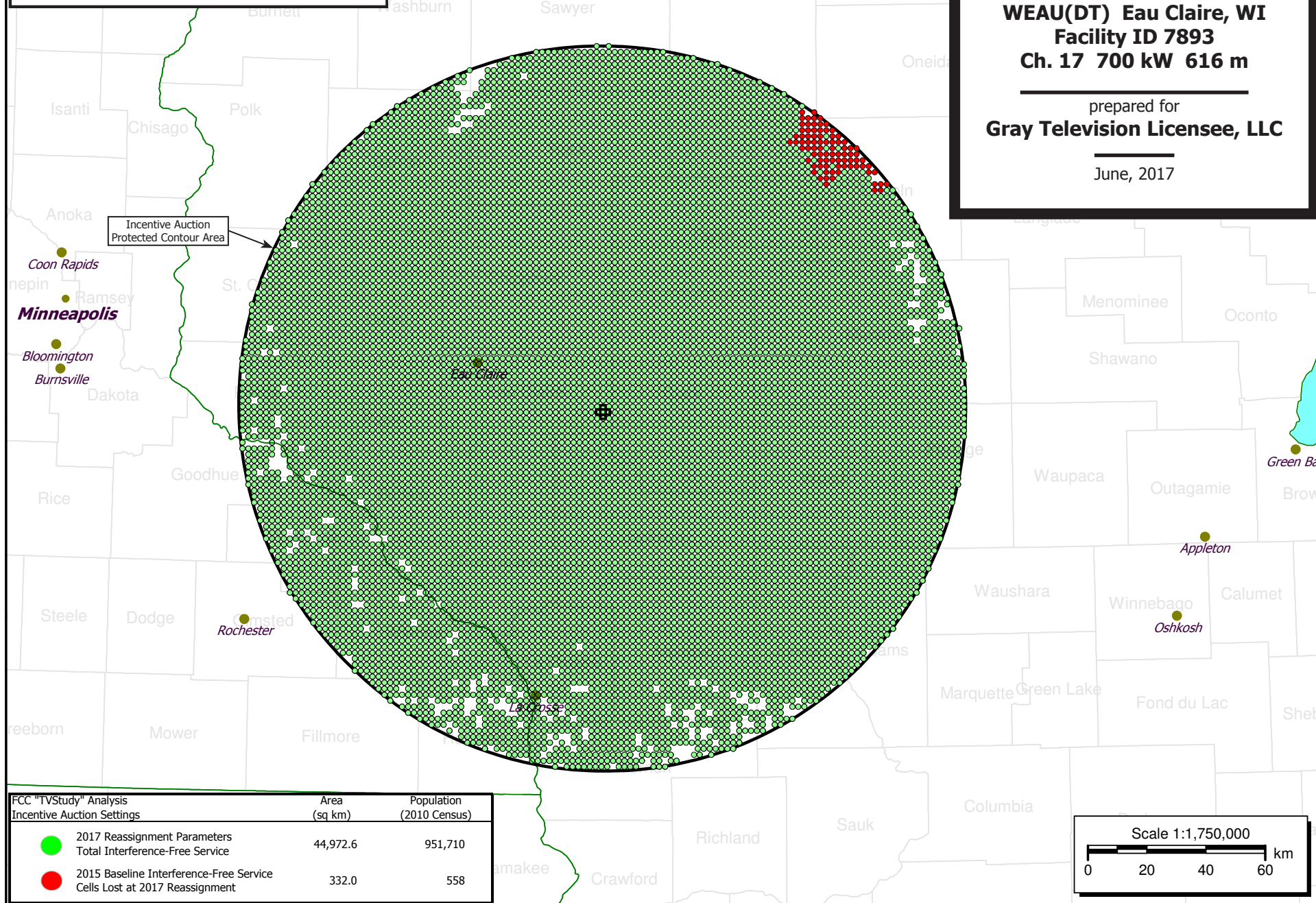


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Digital Television and Radio

Figure 2
Reassignment Service Loss
WEAU(DT) Eau Claire, WI
Facility ID 7893
Ch. 17 700 kW 616 m

prepared for
Gray Television Licensee, LLC

June, 2017





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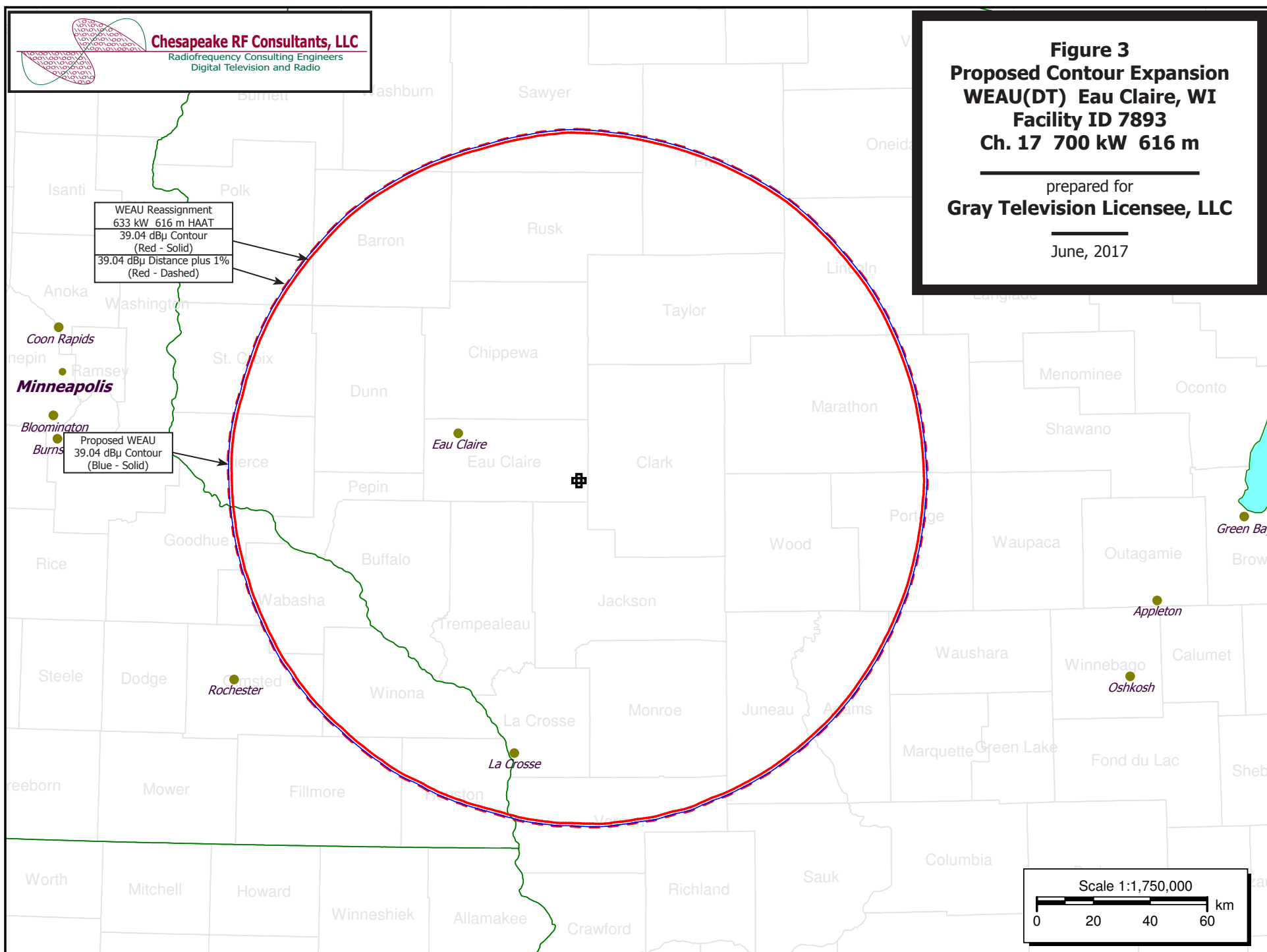
Figure 3
Proposed Contour Expansion
WEAU(DT) Eau Claire, WI
Facility ID 7893
Ch. 17 700 kW 616 m

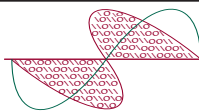
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WEAU Reassignment
633 kW 616 m HAAT
39.04 dBu Contour
(Red - Solid)
39.04 dBu Distance plus 1%
(Red - Dashed)

Proposed WEAU
39.04 dBu Contour
(Blue - Solid)





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Figure 4
Maximum ERP per §73.622(f)
WEAU(DT) Eau Claire, WI
Facility ID 7893
Ch. 17 700 kW 616 m

prepared for
Gray Television Licensee, LLC
June, 2017

WEAU Licensed Ch. 38
BLCDT-20111229AAN
41 dBμ Contour (NLSC)
Area: 46,382 sq. km

Proposed WEAU
41 dBμ Contour (NLSC)
Area: 43,741 sq. km

Scale 1:1,750,000
0 20 40 60 km

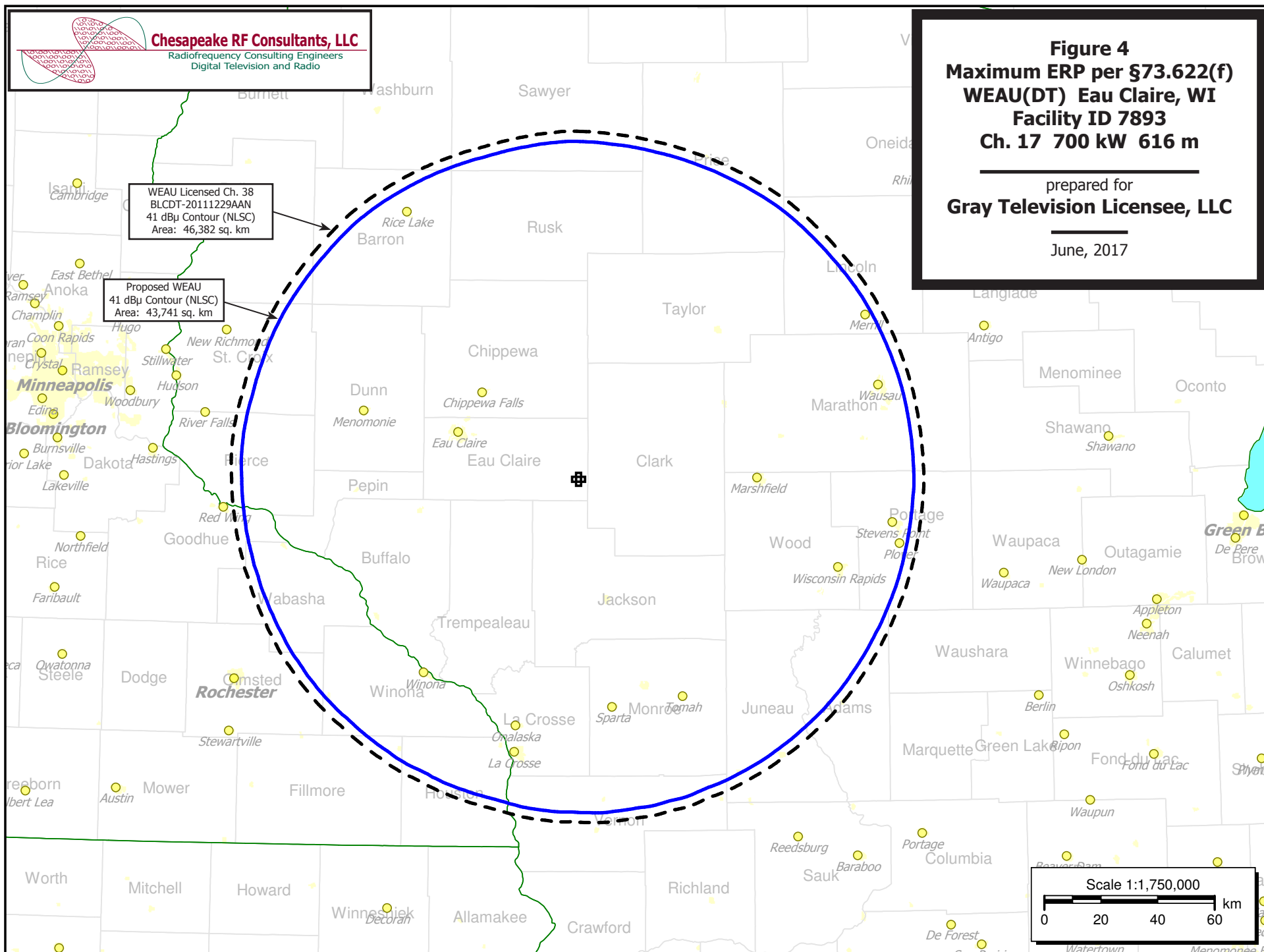
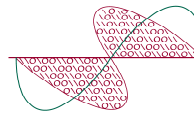


Table 1 WEAU(DT) OET Bulletin 69 Interference Study
(page 1 of 3)



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tvstudy v2.2.2

Database: localhost, Study: WEAU 700KW PROP (944), Model: Longley-Rice
Start: 2017.06.20 13:28:21

Study created: 2017.06.20 13:28:16

Study build station data: LMS TV 2017-06-19 LMSTV

Proposal: WEAU D17 DT APP EAU CLAIRE, WI
File number: WEAU 700KW PROP
Facility ID: 7893
Station data: User record
Record ID: 547
Country: U.S.

Stations potentially affected:

Call	Chan	Svc	Status	City, State	File Number	Distance
KPXM-TV	D16	DT	BL	ST. CLOUD, MN	DTVBL35907	230.1 km
WJFW-TV	D16	DT	LIC	RHINELANDER, WI	BLCDT20070222AOP	177.0
KWQC-TV	D17	DT	BL	DAVENPORT, IA	DTVBL6885	375.5
KDAO-CD	D17	DC	BL	MARSHALLTOWN, IA	DTVBL46753	328.8
WBME-CD	D17	DC	BL	MILWAUKEE, WI	DTVBL71422	297.8
KVIN	D18	DT	LIC	MASON CITY, IA	BLEDT20090612AHJ	192.1
KQDS-TV	D18	DT	BL	DULUTH, MN	DTVBL35525	253.1
WMSN-TV	D18	DT	BL	MADISON, WI	DTVBL10221	212.2

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D17
Latitude: 44 39 50.00 N (NAD83)
Longitude: 90 57 41.00 W
Height AMSL: 933.0 m
HAAT: 615.5 m
Peak ERP: 700 kW
Antenna: Omnidirectional

39.0 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	700 kW	628.0 m	123.1 km
45.0	700	619.4	122.6
90.0	700	609.0	122.0
135.0	700	612.0	122.2
180.0	700	594.3	121.2
225.0	700	598.1	121.4
270.0	700	623.9	122.9
315.0	700	639.2	123.8

Database HAAT does not agree with computed HAAT

Database HAAT: 616 m Computed HAAT: 615 m

ERP exceeds maximum

ERP: 700 kW ERP maximum: 311 kW

Proposal service area is within baseline plus 1.0%

Proposal service area population is more than 95.0% of baseline

Distance to Canadian border: 377.9 km

Distance to Mexican border: 1892.1 km

Conditions at FCC monitoring station: Allegan MI

Bearing: 117.9 degrees Distance: 463.0 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:

Bearing: 251.8 degrees Distance: 1271.2 km

Table 1 WEAU(DT) OET Bulletin 69 Interference Study
(page 2 of 3)



No land mobile station failures found

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%

Interference to DTVBL35907 BL, scenario 1
Proposal causes no interference.

Interference to DTVBL35907 BL, scenario 2
Proposal causes no interference.

Interference to BLCDT20070222AOP LIC, scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	WJFW-TV	D16	DT	LIC	RHINELANDER, WI	BLCDT20070222AOP	
Undesireds:	WEAU	D17	DT	BL	EAU CLAIRE, WI	DTVBL7893	177.0 km
	WEAU	D17	DT	APP	EAU CLAIRE, WI	WEAU 700KW PROP	177.0
	WCWF	D15	DT	BL	SURING, WI	DTVBL73042	176.8
	WTVO	D16	DT	LIC	ROCKFORD, IL	BLCDT20021024AAS	375.7
	WTOM-TV	D16	DT	BL	CHEBOYGAN, MI	DTVBL21254	377.8
	KPXM-TV	D16	DT	BL	ST. CLOUD, MN	DTVBL35907	351.8
Service area		Terrain-limited		IX-free, before		IX-free, after	Percent New IX
28736.7		277,530		28263.0		268,295	0.01
				28142.6		267,623	0.00
Undesired			Total IX		Unique IX, before		Unique IX, after
WEAU D17 DT BL			104.3		590		104.3
WEAU D17 DT APP			108.3		592		108.3
WCWF D15 DT BL			4.0		41		4.0
KPXM-TV D16 DT BL			12.0		39		12.0

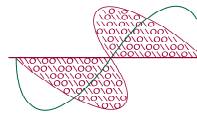
Interference to DTVBL6885 BL, scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	KWQC-TV	D17	DT	BL	DAVENPORT, IA	DTVBL6885	
Undesireds:	WEAU	D17	DT	BL	EAU CLAIRE, WI	DTVBL7893	375.5 km
	WEAU	D17	DT	APP	EAU CLAIRE, WI	WEAU 700KW PROP	375.5
	WTVO	D16	DT	LIC	ROCKFORD, IL	BLCDT20021024AAS	147.6
	WRSP-TV	D16	DT	BL	SPRINGFIELD, IL	DTVBL62009	185.7
	KDAO-CD	D17	DC	BL	MARSHALLTOWN, IA	DTVBL46753	227.3
	WYIN	D17	DT	LIC	GARY, IN	BLEDT20040206AAA	248.7
	WALV-CD	D17	DC	BL	INDIANAPOLIS, IN	DTVBL70161	386.0
	KMIZ	D17	DT	LIC	COLUMBIA, MO	BLCDT20110722ADS	337.4
	KETC	D17	DT	BL	ST. LOUIS, MO	DTVBL62182	314.6
	WBME-CD	D17	DC	BL	MILWAUKEE, WI	DTVBL71422	284.0
	WSEC	D18	DT	BL	JACKSONVILLE, IL	DTVBL70536	192.1
Service area		Terrain-limited		IX-free, before		IX-free, after	Percent New IX
31454.0		1,080,077		31277.9		1,069,215	0.00
				31149.5		1,061,540	0.00
Undesired			Total IX		Unique IX, before		Unique IX, after
WEAU D17 DT BL			36.0		743		24.0
WEAU D17 DT APP			40.0		746		24.0
WYIN D17 DT LIC			96.4		6,884		68.4
KETC D17 DT BL			20.0		3,803		8.0

Interference to DTVBL46753 BL, scenario 1
Proposal causes no interference.

Interference to DTVBL71422 BL, scenario 1

Table 1 WEAU(DT) OET Bulletin 69 Interference Study
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Digital Television and Radio

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	WBME-CD	D17	DC	BL	MILWAUKEE, WI	DTVBL71422	
Undesireds:	WEAU	D17	DT	BL	EAU CLAIRE, WI	DTVBL7893	297.8 km
	WEAU	D17	DT	APP	EAU CLAIRE, WI	WEAU 700KW PROP	297.8
	WTVO	D16	DT	LIC	ROCKFORD, IL	BLCDDT20021024AAS	136.6
	KWQC-TV	D17	DT	BL	DAVENPORT, IA	DTVBL6885	284.0
	WYIN	D17	DT	LIC	GARY, IN	BLEDT20040206AAA	200.7
	WOTV	D17	DT	BL	BATTLE CREEK, MI	DTVBL10212	209.5
	WMEU-CD	D18	DC	BL	CHICAGO, IL	DTVBL168662	139.1
	WMSN-TV	D18	DT	BL	MADISON, WI	DTVBL10221	130.4

Service area	Terrain-limited	IX-free, before	IX-free, after	Percent New IX
10322.9 1,822,297	10307.0 1,822,217	10267.3 1,821,494	10267.3 1,821,494	0.00 0.00

Undesired	Total IX	Unique IX, before	Unique IX, after
WEAU D17 DT BL 19.8	257	4.0 53	
WEAU D17 DT APP 19.8	257		4.0 53
KWQC-TV D17 DT BL 8.0	157	0.0 0	0.0 0
WYIN D17 DT LIC 23.9	479	4.0 109	4.0 109
WOTV D17 DT BL 23.9	405	8.0 170	8.0 170

Interference to BLEDT20090612AHJ LIC, scenario 1
Proposal causes no interference.

Interference to BLEDT20090612AHJ LIC, scenario 2
Proposal causes no interference.

Interference to DTVBL35525 BL, scenario 1
Proposal causes no interference.

Interference to DTVBL35525 BL, scenario 2
Proposal causes no interference.

Interference to DTVBL10221 BL, scenario 1
Proposal causes no interference.

Interference to DTVBL10221 BL, scenario 2
Proposal causes no interference.

Interference to proposal, scenario 1

	Call	Chan	Svc	Status	City, State	File Number	Distance
Desired:	WEAU	D17	DT	APP	EAU CLAIRE, WI	WEAU 700KW PROP	
Undesireds:	WJFW-TV	D16	DT	LIC	RHINELANDER, WI	BLCDDT20070222AOP	177.0 km
	KWQC-TV	D17	DT	BL	DAVENPORT, IA	DTVBL6885	375.5
	KDAO-CD	D17	DC	BL	MARSHALLTOWN, IA	DTVBL46753	328.8
	WBME-CD	D17	DC	BL	MILWAUKEE, WI	DTVBL71422	297.8
	KYIN	D18	DT	LIC	MASON CITY, IA	BLEDT20090612AHJ	192.1
	WMSN-TV	D18	DT	BL	MADISON, WI	DTVBL10221	212.2

Service area	Terrain-limited	IX-free	Percent IX
47086.0 1,001,913	46176.0 967,242	45739.9 965,264	0.94 0.20

Undesired	Total IX	Unique IX	Prct Unique IX
WJFW-TV D16 DT LIC 364.0	742	364.0 742	0.79 0.08
KWQC-TV D17 DT BL 68.0	1,221	68.0 1,221	0.15 0.13
WBME-CD D17 DC BL 4.0	15	4.0 15	0.01 0.00

Channel and Facility Information

Section	Question	Response
Proposed Community of License	Facility ID	7893
	State	Wisconsin
	City	EAU CLAIRE
	DTV Channel	17
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	1033664
Coordinates (NAD83)	Latitude	44° 39' 50.0" N+
	Longitude	090° 57' 41.0" W-
	Structure Type	TOWER-A free standing or guyed struct
	Overall Structure Height	608.9 meters
	Support Structure Height	577.9 meters
	Ground Elevation (AMSL)	334.3 meters
Antenna Data	Height of Radiation Center Above Ground Level	598.7 meters
	Height of Radiation Center Above Average Terrain	615.5 meters
	Height of Radiation Center Above Mean Sea Level	933.0 meters
	Effective Radiated Power	700 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-23JTH/VP-R O6
	Rotation	
	Electrical Beam Tilt	1
	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