

ENGINEERING EXHIBIT

Incentive Auction Channel Reassignment

Application for Modification of Digital Television Station Construction Permit prepared for

Gray Television Licensee, LLC

KYTV(DT) Springfield, MO

Facility ID 36003

Ch. 19 1000 kW 625 m

Gray Television Licensee, LLC (“Gray”) is the licensee of digital television station KYTV(DT), Channel 44, Facility ID 36003, Springfield, MO. Reassignment of KYTV from Channel 44 to Channel 19 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 KYTV Channel 19 Construction Permit (“CP”, file# 0000025226). This application is intended to be filed during the second filing window.¹ The CP authorizes operation at 640 kW effective radiated power (“ERP”) at 625 meters antenna height above average terrain (“HAAT”). *Gray* proposes herein to increase the ERP to 1000 kW and decrease the antenna HAAT to 624 meters.

As with the current authorization, the proposed Channel 19 operation will employ a new antenna system to be top-mounted on the KYTV tower in lieu of the existing Channel 44 antenna. The existing tower structure corresponds to FCC Antenna Structure Registration number 1218324. No change to the overall structure height will result.

The proposed antenna is an elliptically polarized nondirectional Dielectric model TFU-24JTH/VP-R O4 (17.7 percent vertical polarization). The horizontally polarized ERP is 1000 kW and the vertically polarized ERP is 177 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. 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 624 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 KYTV NLSC is 46,763 square kilometers, which does not exceed the NLSC area of KOLR(DT) (47,536 sq. km, Ch. 10, Springfield MO, BLCDT-20090810ACN). 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 631 km distant at Grand Island, NE. 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),

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.

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 $1.1 \mu\text{W}/\text{cm}^2$, 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.

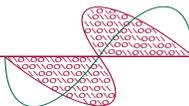
The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power 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 11, 2017
207 Old Dominion Road Yorktown, VA 23692 703-650-9600

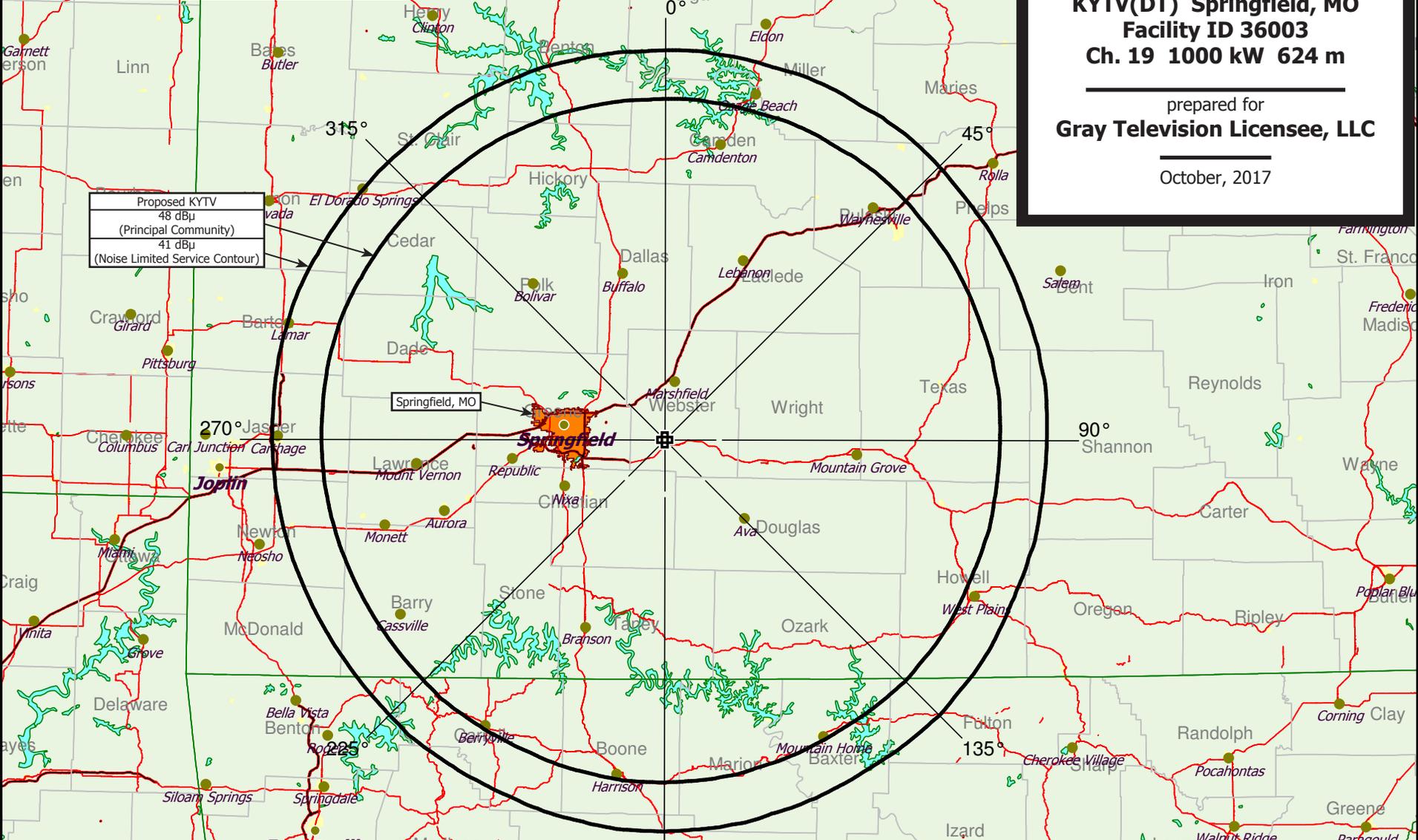


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Digital Television and Radio

Figure 1
Proposed Coverage Contours
KYTV(DT) Springfield, MO
Facility ID 36003
Ch. 19 1000 kW 624 m

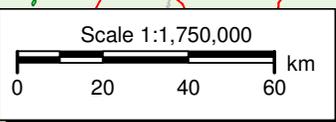
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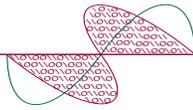
October, 2017



Proposed KYTV
48 dBu
(Principal Community)
41 dBu
(Noise Limited Service Contour)

Proposed Digital Coverage	Area (sq. km)	Population (2010 Census)
Within Noise Limited Service Contour	46,762.7	1,061,476
OET Bulletin 69: TVStudy		
Within noise limited contour	50,006.9	1,095,904
Not affected by terrain losses	49,035.1	1,083,524
Lost to all interference	442.3	6,952
Net Interference-Free Service	48,592.8	1,076,572





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

Figure 2
Maximum ERP per §73.622(f)
KYTV(DT) Springfield, MO
Facility ID 36003
Ch. 19 1000 kW 624 m

prepared for
Gray Television Licensee, LLC

October, 2017

KOLR Ch. 10 Springfield, MO
BLCDT-20090810ACN
36 dBu Contour (NLSC)
Area: 47,536 sq. km

Proposed KYTV
41 dBu Contour (NLSC)
Area: 46,763 sq. km

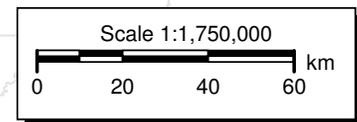
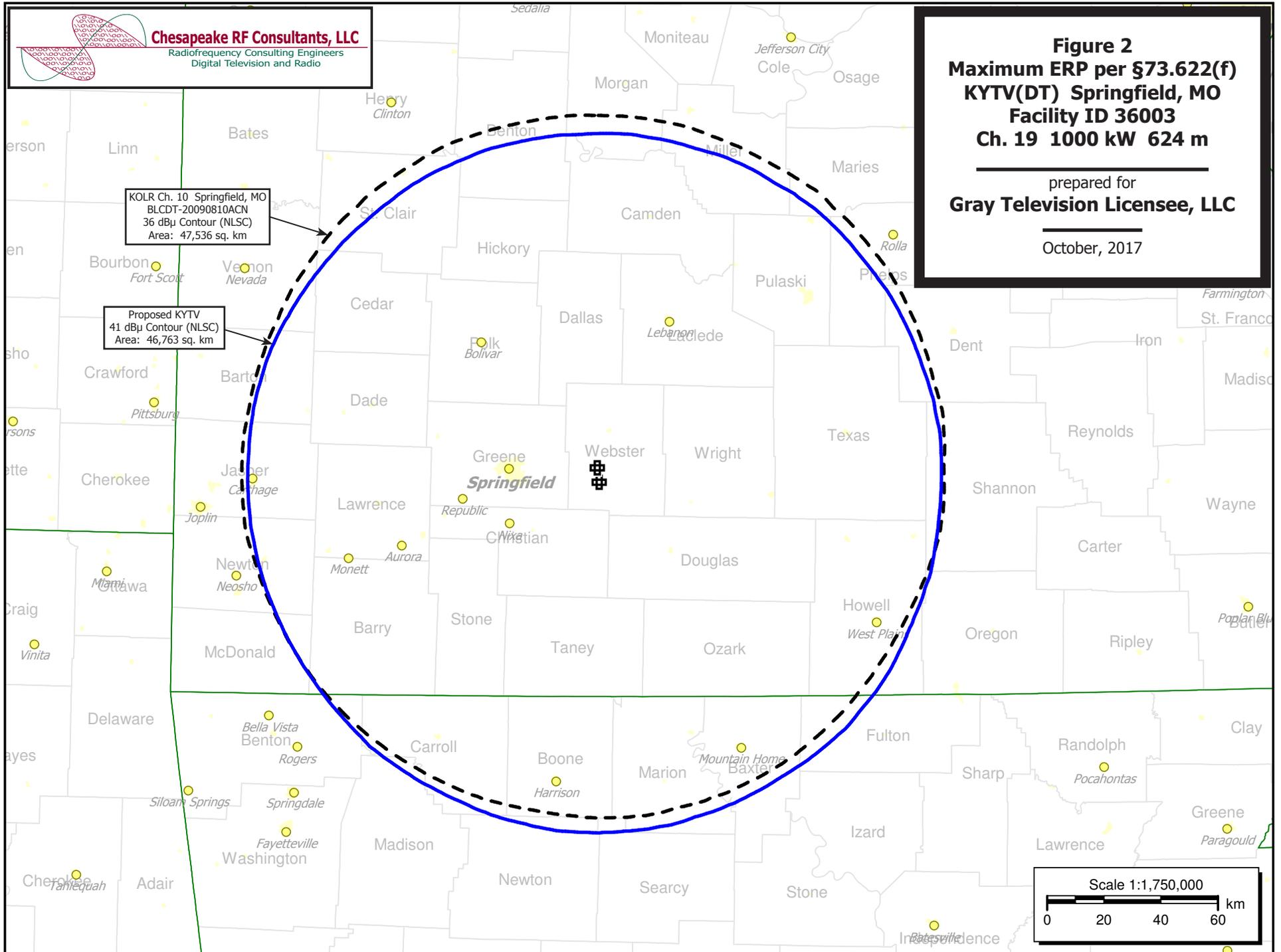
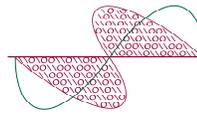


Table 1 KYTV(DT) OET Bulletin 69 Interference Study
 (page 1 of 3)



tvstudy v2.2.3 (6K70F1)
 Database: localhost, Study: KYTV 1000kW_MAX, Model: Longley-Rice
 Start: 2017.10.11 20:01:27

Study created: 2017.10.11 20:00:46

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

Proposal: KYTV D19 DT APP SPRINGFIELD, MO
 File number: KYTV 1000kW_MAX
 Facility ID: 36003
 Station data: User record
 Record ID: 1348
 Country: U.S.
 Zone: II

Stations potentially affected by proposal:

IX	Call	Chan	Svc	Status	City, State	File Number	Distance
Yes	KFSM-TV	D18	DT	LIC	FORT SMITH, AR	BLCDT20060530AIM	184.6 km
No	KCPT	D18	DT	LIC	KANSAS CITY, MO	BLEDT20090821AAU	251.3
No	KWCH-DT	D19	DT	LIC	HUTCHINSON, KS	BLCDT20090929ACC	435.8
Yes	WPSD-TV	D19	DT	CP	PADUCAH, KY	BLANK0000027223	350.6
No	KAUT-TV	D19	DT	CP	OKLAHOMA CITY, OK	BLANK0000025374	444.4
Yes	KSJF-CD	D19	DC	CP	POTEAU, OK	BLANK0000025212	281.5
No	KTEJ	D20	DT	LIC	JONESBORO, AR	BLEDT20110818AAQ	239.8
Yes	KNLJ	D20	DT	LIC	JEFFERSON CITY, MO	BLCDT20110121ACA	185.8

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D19
 Latitude: 37 10 26.00 N (NAD83)
 Longitude: 92 56 28.10 W
 Height AMSL: 1072.0 m
 HAAT: 623.8 m
 Peak ERP: 1000 kW
 Antenna: Omnidirectional
 Elev Pattn: Generic
 Elec Tilt: 1.00

39.3 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	1000 kW	626.2 m	126.3 km
45.0	1000	611.5	125.4
90.0	1000	583.5	123.6
135.0	1000	621.6	126.0
180.0	1000	636.0	126.9
225.0	1000	624.4	126.2
270.0	1000	646.0	127.5
315.0	1000	641.1	127.2

ERP exceeds maximum
 ERP: 1000 kW ERP maximum: 304 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: 993.1 km

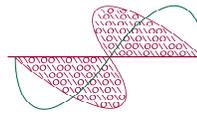
Distance to Mexican border: 1135.8 km

Conditions at FCC monitoring station: Grand Island NE
 Bearing: 313.0 degrees Distance: 630.6 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
 Bearing: 290.8 degrees Distance: 1114.4 km

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



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Digital Television and Radio

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 BLCDT20060530AIM LIC, scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	KFSM-TV	D18	DT	LIC	FORT SMITH, AR	BLCDT20060530AIM	
Undesireds:	KYTV	D19	DT	BL	SPRINGFIELD, MO	DTVBL36003	184.7 km
	KYTV	D19	DT	APP	SPRINGFIELD, MO	KYTV 1000kW_MAX	184.6
	KSNF	D17	DT	CP	JOPLIN, MO	BLANK0000027633	142.9
	KMYA-DT	D18	DT	CP	CAMDEN, AR	BLANK0000028486	314.0
	KVTJ-DT	D18	DT	CP	JONESBORO, AR	BLANK0000028469	329.0
	KCPT	D18	DT	LIC	KANSAS CITY, MO	BLEDT20090821AAU	362.7
	KOPX-TV	D18	DT	CP	OKLAHOMA CITY, OK	BLANK0000026989	301.9
	KSJF-CD	D19	DC	CP	POTEAU, OK	BLANK0000025212	97.2
	Service area		Terrain-limited		IX-free, before	IX-free, after	Percent New IX
	26556.9	906,728	25449.0	884,919	25028.7	878,557	25024.7 878,483 0.02 0.01
Undesired			Total IX		Unique IX, before	Unique IX, after	
KYTV D19 DT BL		23.9	182		23.9	182	
KYTV D19 DT APP		27.9	256			27.9 256	
KSNF D17 DT CP		12.0	1,001	0.0	0	0.0 0	
KMYA-DT D18 DT CP		60.3	1,080	40.1	551	40.1 551	
KVTJ-DT D18 DT CP		48.3	578	28.1	49	28.1 49	
KCPT D18 DT LIC		39.8	1,497	23.9	489	23.9 489	
KOPX-TV D18 DT CP		160.9	1,844	132.8	1,673	132.8 1,673	
KSJF-CD D19 DC CP		135.5	1,881	115.3	1,829	115.3 1,829	

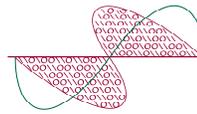
Interference to BLANK0000027223 CP, scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	WPSD-TV	D19	DT	CP	PADUCAH, KY	BLANK0000027223	
Undesireds:	KYTV	D19	DT	BL	SPRINGFIELD, MO	DTVBL36003	350.6 km
	KYTV	D19	DT	APP	SPRINGFIELD, MO	KYTV 1000kW_MAX	350.6
	WHNT-TV	D19	DT	LIC	HUNTSVILLE, AL	BLCDT20111118COZ	350.6
	WTSN-CD	D20	DC	LIC	EVANSVILLE, IN	BLDTL20120328AJA	174.7
	Service area		Terrain-limited		IX-free, before	IX-free, after	Percent New IX
	40913.2	883,814	40439.6	879,213	40224.2	875,575	40144.6 874,312 0.20 0.14
Undesired			Total IX		Unique IX, before	Unique IX, after	
KYTV D19 DT BL		91.6	615		91.6	615	
KYTV D19 DT APP		171.2	1,878			171.2 1,878	
WHNT-TV D19 DT LIC		119.8	2,782	119.8	2,782	119.8 2,782	
WTSN-CD D20 DC LIC		4.0	241	4.0	241	4.0 241	

Interference to BLANK0000025212 CP, scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	KSJF-CD	D19	DC	CP	POTEAU, OK	BLANK0000025212	
Undesireds:	KYTV	D19	DT	BL	SPRINGFIELD, MO	DTVBL36003	281.5 km
	KYTV	D19	DT	APP	SPRINGFIELD, MO	KYTV 1000kW_MAX	281.5
	KFSM-TV	D18	DT	LIC	FORT SMITH, AR	BLCDT20060530AIM	97.2
	KAUT-TV	D19	DT	CP	OKLAHOMA CITY, OK	BLANK0000025374	260.5
	Service area		Terrain-limited		IX-free, before	IX-free, after	Percent New IX
	4687.8	196,194	3965.9	186,330	3946.0	186,151	3946.0 186,151 0.00 0.00
Undesired			Total IX		Unique IX, before	Unique IX, after	

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



KYTV D19 DT BL	7.9	160	4.0	20		
KYTV D19 DT APP	7.9	160			4.0	20
KFSM-TV D18 DT LIC	15.9	159	8.0	19	8.0	19
KAUT-TV D19 DT CP	7.9	140	0.0	0	0.0	0

Interference to BLCDT20110121ACA LIC, scenario 1

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	KNLJ	D20	DT	LIC	JEFFERSON CITY, MO	BLCDT20110121ACA	
Undesireds:	KYTV	D19	DT	BL	SPRINGFIELD, MO	DTVBL36003	185.7 km
	KYTV	D19	DT	APP	SPRINGFIELD, MO	KYTV 1000kW_MAX	185.8
	KTEJ	D20	DT	LIC	JONESBORO, AR	BLEDT20110818AAQ	332.4
	WAND	D20	DT	CP	DECATUR, IL	BLANK0000028607	312.5
	Service area		Terrain-limited		IX-free, before	IX-free, after	Percent New IX
	28685.0	655,000	28295.9	642,705	28160.2	641,087	28156.3 641,525 0.01 -0.07
Undesired			Total IX		Unique IX, before	Unique IX, after	
KYTV D19 DT BL		23.8	865		19.8	841	
KYTV D19 DT APP		27.8	427			23.8 403	
KTEJ D20 DT LIC		27.7	208		23.8	184	23.8 184
WAND D20 DT CP		88.2	569		88.2	569	88.2 569

Interference to proposal, scenario 1
0.64% interference

Desired:	Call	Chan	Svc	Status	City, State	File Number	Distance
	KYTV	D19	DT	APP	SPRINGFIELD, MO	KYTV 1000kW_MAX	
Undesireds:	KFSM-TV	D18	DT	LIC	FORT SMITH, AR	BLCDT20060530AIM	184.6 km
	WPSD-TV	D19	DT	CP	PADUCAH, KY	BLANK0000027223	350.6
	KNLJ	D20	DT	LIC	JEFFERSON CITY, MO	BLCDT20110121ACA	185.8
	Service area		Terrain-limited		IX-free	Percent IX	
	50006.9	1,095,904	49035.1	1,083,524	48592.8	1,076,572	0.90 0.64
Undesired			Total IX		Unique IX	Prcnt Unique IX	
KFSM-TV D18 DT LIC		39.9	359		39.9	359	0.08 0.03
WPSD-TV D19 DT CP		303.6	5,427		303.6	5,427	0.62 0.50
KNLJ D20 DT LIC		98.7	1,166		98.7	1,166	0.20 0.11

Channel and Facility Information

Section	Question	Response
Proposed Community of License	Facility ID	36003
	State	Missouri
	City	SPRINGFIELD
	DTV Channel	19
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	1218324
Coordinates (NAD83)	Latitude	37° 10' 26.0" N+
	Longitude	092° 56' 28.1" W-
	Structure Type	TOWER-A free standing or guyed struct
	Overall Structure Height	609.4 meters
	Support Structure Height	574.6 meters
	Ground Elevation (AMSL)	471.5 meters
Antenna Data	Height of Radiation Center Above Ground Level	600.5 meters
	Height of Radiation Center Above Average Terrain	623.8 meters
	Height of Radiation Center Above Mean Sea Level	1072.0 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-24JTH/VP-R O4
	Rotation	
	Electrical Beam Tilt	1.0
	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
<p>Post-Incentive Auction Expedited Processing</p>	<p>It will operate on the DTV channel for this station as established in the post-incentive auction channel reassignment public notice.</p>	<p>Yes</p>
	<p>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.</p>	<p>No</p>
	<p>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.</p>	<p>Yes</p>
	<p>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.</p>	<p>Yes</p>
<p>Environmental Effect</p>	<p>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.)</p>	<p>No</p>
<p>Broadcast Facility</p>	<p>The proposed facility complies with the applicable engineering standards and assignment requirements of 47 C.F.R. Sections 73.616, 73.622(j), 73.623(e), 73.625, 73.1030, and 73.1125.</p>	<p>Yes</p>