

## ENGINEERING EXHIBIT

### Application for Digital Television Station Construction Permit

prepared for

#### Gray Television Licensee, LLC

KMTF(DT) Helena, MT

Facility ID 68717

Ch. 29 43.4 kW 646 m

*Gray Television Licensee, LLC (Gray*) is the licensee of television station KMTF(DT), Channel 29, Facility ID 68717, Helena, MT. KMTF is licensed to operate at 43.4 kW effective radiated power (“ERP”) with a directional antenna having a height above average terrain (“HAAT”) of 697 meters (BLCDDT-20060510ABS). *Gray* herein seeks a Construction Permit to indicate corrected geographic coordinates, ground elevation, and antenna height for the KMTF facility. No change in the transmitter’s actual location or operation is proposed. A waiver is requested of the FCC’s April 5, 2013 freeze on contour extensions.

The KMTF license has recently been assigned to *Gray* (BALCDDT-20140519AHJ). As due diligence, it has been determined that the licensed KMTF geographic coordinates and ground elevation do not match those corresponding to the actual tower location. Additionally, the as-built antenna center of radiation (“C/R”) height above ground was found to be lower than the licensed value. The licensed and corrected facility data for KMTF are listed below.

	<u>Lic BLCDDT-20100920ABN</u>	<u>Corrected</u>
Latitude (NAD-27) <sup>1</sup>	46° 49' 35" N	46° 49' 30" N
Longitude	111° 42' 33" W	111° 42' 13" W
Site Elevation (m AMSL)	2377	2357
Antenna C/R (m AGL)	27.4	12.2
Antenna C/R (m AMSL)	2404.4	2369.2
Antenna C/R (m HAAT)	697	646.1

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<sup>1</sup>TV station license data has historically specified geographic coordinates referenced to NAD-27, rounded to the nearest second. With the requirement to file minor modification applications via the Licensing and Management System effective October 2, 2014, coordinates must now be supplied in NAD-83. The corrected coordinates referenced to NAD-83 are 46° 49' 29.4" N-Lat, 111° 42' 15.6" W-Lon.

Thus, a coordinate correction of five seconds latitude and 30 seconds longitude is necessary, corresponding to a distance of 0.45 km. The antenna C/R elevation above ground level is 15.2 meters lower than the licensed value, and 35.2 meters lower with respect to the antenna’s licensed elevation above mean sea level. The correction falls outside of the three seconds described in §73.1690(b)(2) that can be specified in a license modification application and beyond the +2/-4 meter height tolerance specified in §73.1690(c)(1). Thus, a Construction Permit must be obtained as the first step in correcting the KMTF coordinates.

As specified herein, the KMTF facility will continue to operate with the currently licensed 43.4 kW ERP, directional. The correction to site location and ground elevation result in the antenna HAAT changing to 646.1 meters. The antenna supporting tower structure is not registered as the overall structure height is less than 61 meters above ground and passes the FCC’s TOWAIR program for the corrected site location.

The KMTF directional antenna is a horizontally polarized RFS model LPR8DM-2540. The directional antenna’s azimuthal and elevation patterns are depicted in Figures 1, 2, and 2A.

A map is supplied as Figure 3 which depicts the standard predicted coverage contours. This map includes the location of Helena, KMTF’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 dBμ contour.

The KMTF corrected facility’s predicted service population provides a 98.3 percent match of the MB Docket 87-268 Seventh Report and Order Appendix B facility, as detailed in the following table.

<b>Digital Television Population Summary</b>		
Population Summary (2000 Census) OET Bulletin 69 method	Appendix B	Proposed Correction
Within Noise Limited Contour	145,359	144,972
Not affected by terrain losses	139,123	136,825
Lost to all interference	0	0
Net DTV Service	<b>139,123</b>	<b>136,825</b>
Match of Appendix B	---	<b>98.35%</b>

### **Contour Extension – Waiver Request**

The FCC's Public Notice<sup>2</sup> of April 5, 2013 (DA 13-618) imposed limitations on the filing and processing of full power station applications that propose an increase in their authorized noise-limited service contour ("NLSC"). As specified herein, the proposed coordinate correction will place the KMTF NLSC (41 dB $\mu$ ) entirely within the currently authorized contour location except for several very small regions.

DA 13-618 contemplates waiver of the contour extension limitation for certain cases by stating:

The Bureau will consider, on a case-by-case basis, requests for waiver of the filing limitation imposed by this Public Notice when a modification application is necessary or otherwise in the public interest for technical or other reasons to maintain quality service to the public, such as when zoning restrictions preclude tower construction at a particular site or when unforeseen events, such as extreme weather events or other extraordinary circumstances, require relocation to a new tower site.

For the case at hand, no change is proposed in the actual KMTF operation, which was constructed during the transition and has been in use for approximately nine years. A coverage contour comparison is provided in Figure 4, which shows that the correction will result in very small areas of NLSC extension. The total area within the extension consists of 9.8 square kilometers. This area is 0.06 percent of the total area (17,616.2 sq km) within the corrected KMTF NLSC.

Grant of the KMTF coordinate correction would provide corrected license data to accurately represent the as-built KMTF facility. The correction is consistent with the FCC's Public Notice<sup>3</sup> of January 28, 2015 (DA 15-116) advising licensees to modify their licenses to correct errors in operating parameters prior to the Pre-Auction Licensing Deadline of May 29, 2015. A waiver of the DA 13-618 contour extension filing limitation is justified in this case for the reasons stated above.

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<sup>2</sup>"Media Bureau Announces Limitations on the Filing and Processing of Full Power and Class A Television Station Modification Applications, Effective Immediately, and Reminds Stations of Spectrum Act Preservation Mandate," DA 13-618, Public Notice, released April 5, 2013.

<sup>3</sup>"Media Bureau Designates May 29, 2015 As Pre-Auction Licensing Deadline," DA 15-116, Public Notice, released January 28, 2015.

## **Interference and Other Allocation Factors**

As with the licensed facility, the proposed coordinate correction involves expansion of the KMTF service contour beyond that established by Appendix B values. A detailed interference study per OET Bulletin 69<sup>4</sup> shows that the proposal complies with the 0.5 percent limit of new interference caused to pertinent nearby digital television and Class A television stations. The interference study output report is provided as Table 1. No other stations are located within the culling distances to be considered as potential interference victims.

The site is located 242 km from the U.S. – Canada border, within the international coordination zone. The corrected KMTF facility parameters (43.4 kW / 646 m HAAT) do not exceed the parameters for KMTF (43.4 kW ERP / 697 m HAAT) recognized in the 2008 US – Canada Post Transition Allotment Plan.<sup>5</sup> Further international coordination may be necessary due to the 0.45 km shift in site location.

The nearest FCC monitoring station is 845 km distant at Ferndale, WA. This exceeds 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 three kilometers of the site.

## **Human Exposure to Radiofrequency Electromagnetic Field**

The transmitting location is on Hogback Mountain, 35 km northeast of Helena. Other television and FM radio transmitting facilities are co-located on the same tower structure with KMTF. *Gray* participates in a radiofrequency (“RF”) electromagnetic field exposure safety program, along with the other broadcasters and FCC licensees that utilize the site area. The applicant considers access to the site area to be controlled as it is a remote location, surrounded

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<sup>4</sup>FCC Office of Engineering and Technology Bulletin number 69, *Longley-Rice Methodology for Evaluating TV Coverage and Interference*, February 6, 2004 (“OET-69”). The implementation of OET-69 for this study followed the guidelines of OET-69 as specified therein. A cell size of 2 km was employed. Comparisons of various results of this computer program (run on a Sun Sparc processor) to the Commission’s implementation of OET-69 show excellent correlation.

<sup>5</sup>Exchange of letters dated August 5, 2008 from FCC to Industry Canada and December 15, 2008 from Industry Canada to FCC, and accompanying allotment parameters.

by steep terrain, with access via 4-wheel drive vehicle. Deep snow cover further hampers site access in winter months. These factors serve to discourage and restrict casual access, therefore the site is not likely to be visited by the public.

Recent RF exposure measurements have been conducted to evaluate the level of RF exposure in the vicinity of the KMTF site. In September 2014 the licensee of FM station KIMO (Ch. 297C, Facility ID 83110, Townsend, MT) performed a survey of RF electromagnetic field as a condition of licensing a minor modification of KIMO. KIMO is co-located on the same tower with KMTF. The KIMO license application (BLH-20140915AAM) supplies a report of the measurements, which shows that RF levels at ground level do not exceed the occupational / controlled limit. Some locations in close proximity to the KMTF tower were found to exceed the general population / uncontrolled limit, and those locations are marked by numerous RF warning signs that encircle the area.

Based on the recent RF exposure measurements conducted by the licensee of KIMO, KMTF's compliance with the FCC's requirements regarding human exposure to RF electromagnetic field is consistent with the FCC's OET Bulletin 65, which discusses remote sites in the following.

*From Section 4 CONTROLLING EXPOSURE TO RF FIELDS Public Exposure: Compliance with General Population/Uncontrolled MPE Limits* "There may be situations where RF levels may exceed the MPE limits for the general public in remote areas, such as mountain tops, that could conceivably be accessible but are not likely to be visited by the public. In such cases, common sense should dictate how compliance is to be achieved. If the area of concern is properly marked by appropriate warning signs, fencing or the erection of other permanent barriers may not be necessary."

*From Appendix B* "As a general principle, if areas of high RF radiation levels are publicly marked and if access to such areas is impeded or highly improbable (remoteness and natural barriers may be pertinent) then it may be presumed that the facilities producing the RF radiation do not significantly affect the quality of the human environment and do not require the filing of an [E]nvironmental [A]ssessment." "High RF levels are produced at ground level in a remote area not likely to be visited by the public: If the area of concern is marked by appropriate warning signs, an applicant may assume that there is no significant effect on the human environment with regard to exposure of the general public."

Considering the measurements, the general public and workers will not be exposed to RF levels attributable to KMTF 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. The proposal involves continued use of a side-mounted transmitting antenna on an existing antenna support structure. No tower work or change in structure height is proposed.

### **Certification**

The undersigned hereby certifies that the foregoing statement and associated attachments were prepared by him or under his direction, and that they are true and correct to the best of his knowledge and belief.



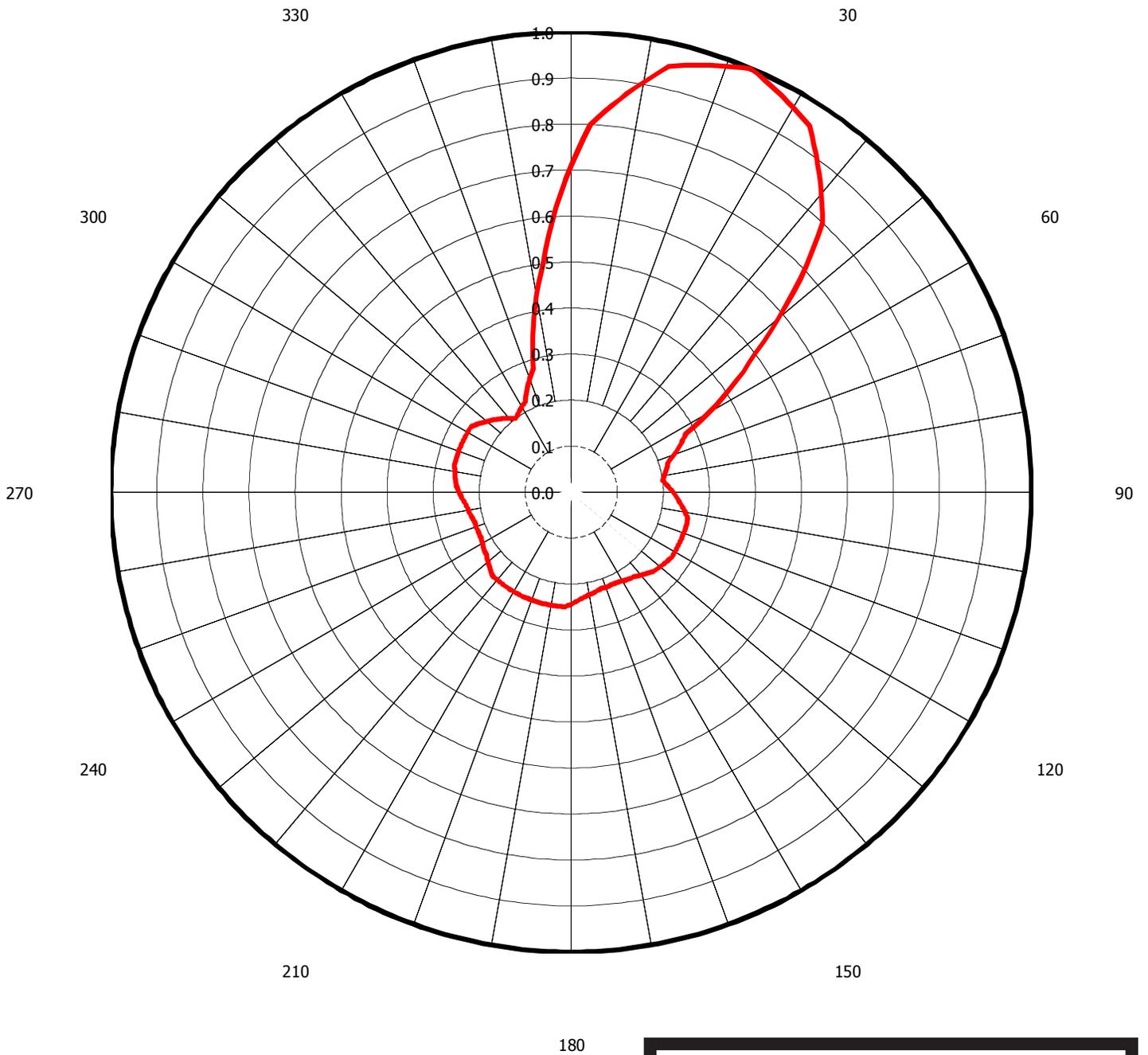
Joseph M. Davis, P.E.  
January 30, 2015

**Chesapeake RF Consultants, LLC**  
207 Old Dominion Road  
Yorktown, VA 23692  
703-650-9600

### List of Attachments

Figure 1	Antenna Azimuthal Pattern
Figure 2	Antenna Elevation Pattern
Figure 3	Proposed Coverage Contours
Figure 4	Coverage Contour Comparison
Table 1	OET Bulletin 69 Interference Study
Form 2100	Technical Specifications from FCC Form at Time of Upload

**Azimuth Pattern - Relative Field  
(True North)**



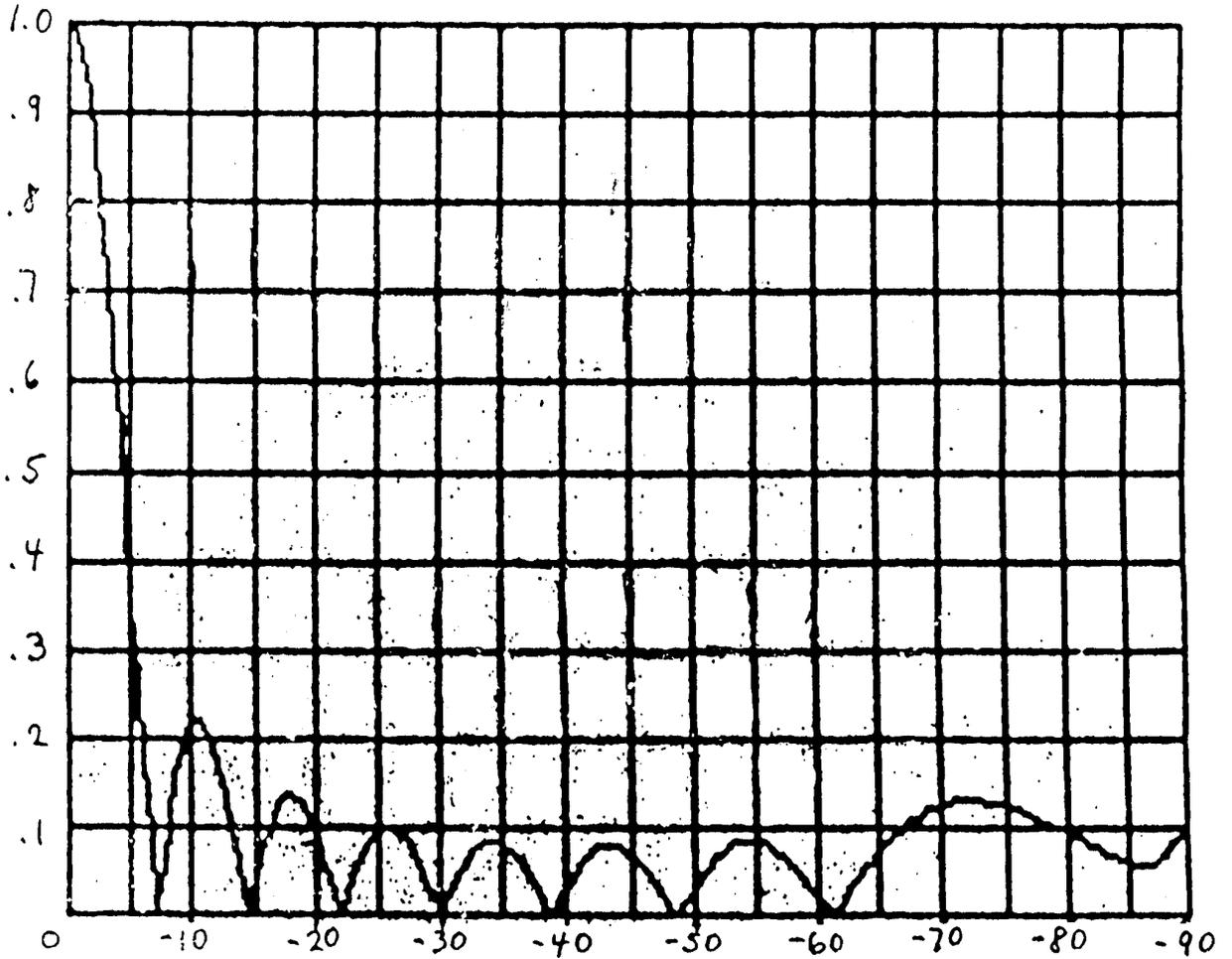
**Figure 1**  
**Antenna Azimuthal Pattern**  
**KMTF(DT) Helena, MT**  
**Facility ID 68717**  
**Ch. 29 43.4 kW 646 m**

prepared for  
**Gray Television Licensee, LLC**

January, 2015



RELATIVE FIELD



DEGREES BELOW HORIZONTAL



**Figure 2**  
**Antenna Elevation Pattern**  
**KMTF(DT) Helena, MT**  
**Facility ID 68717**  
**Ch. 29 43.4 kW 646 m**

prepared for  
**Gray Television Licensee, LLC**

January, 2015

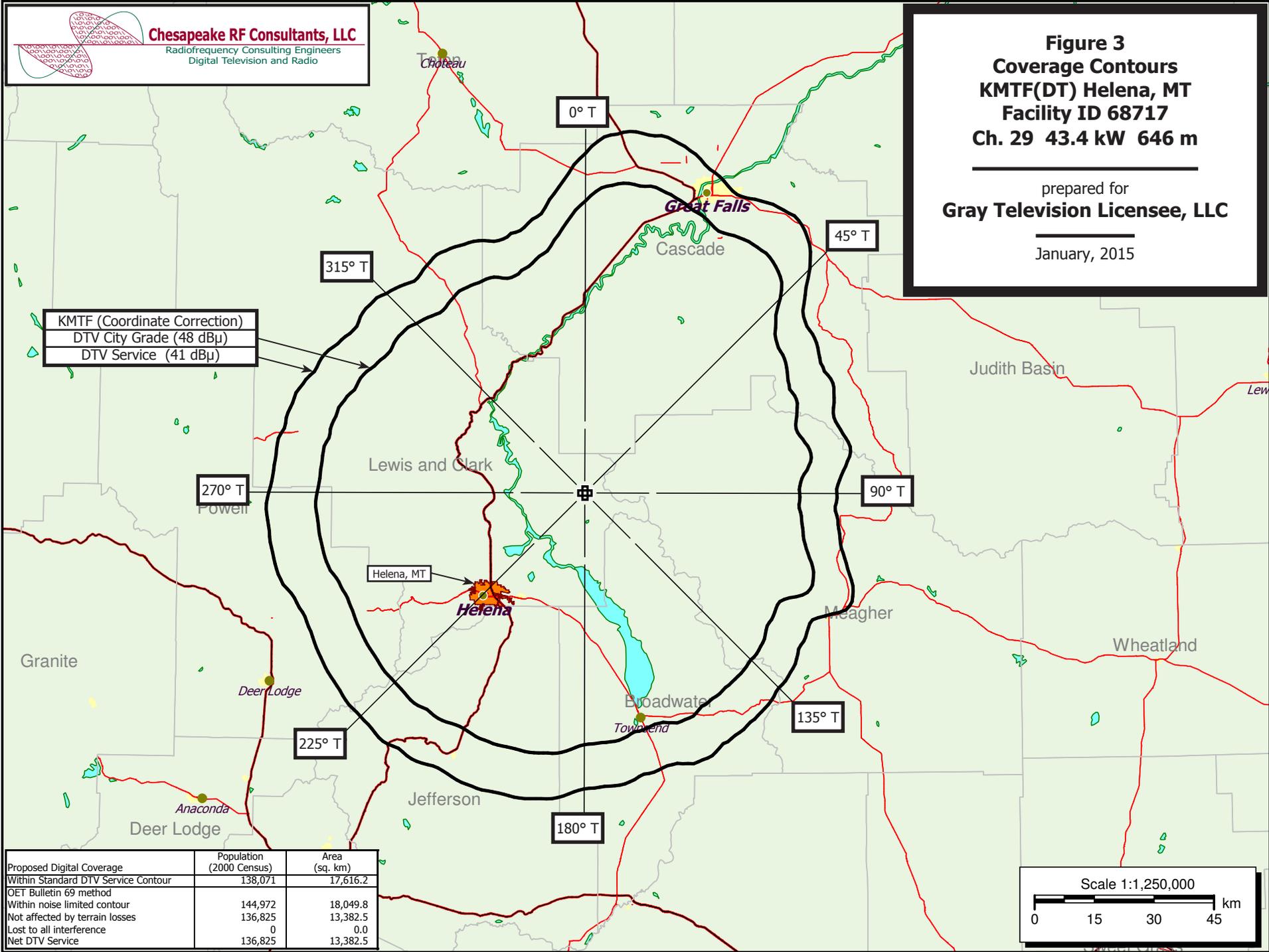
**Figure 3**  
**Coverage Contours**  
**KMTF(DT) Helena, MT**  
**Facility ID 68717**  
**Ch. 29 43.4 kW 646 m**

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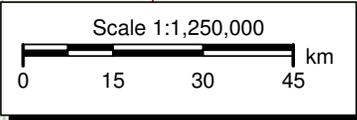
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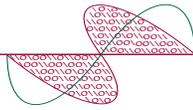
January, 2015



KMTF (Coordinate Correction)  
 DTV City Grade (48 dBμ)  
 DTV Service (41 dBμ)

Proposed Digital Coverage	Population (2000 Census)	Area (sq. km)
Within Standard DTV Service Contour	138,071	17,616.2
OET Bulletin 69 method		
Within noise limited contour	144,972	18,049.8
Not affected by terrain losses	136,825	13,382.5
Lost to all interference	0	0.0
Net DTV Service	136,825	13,382.5



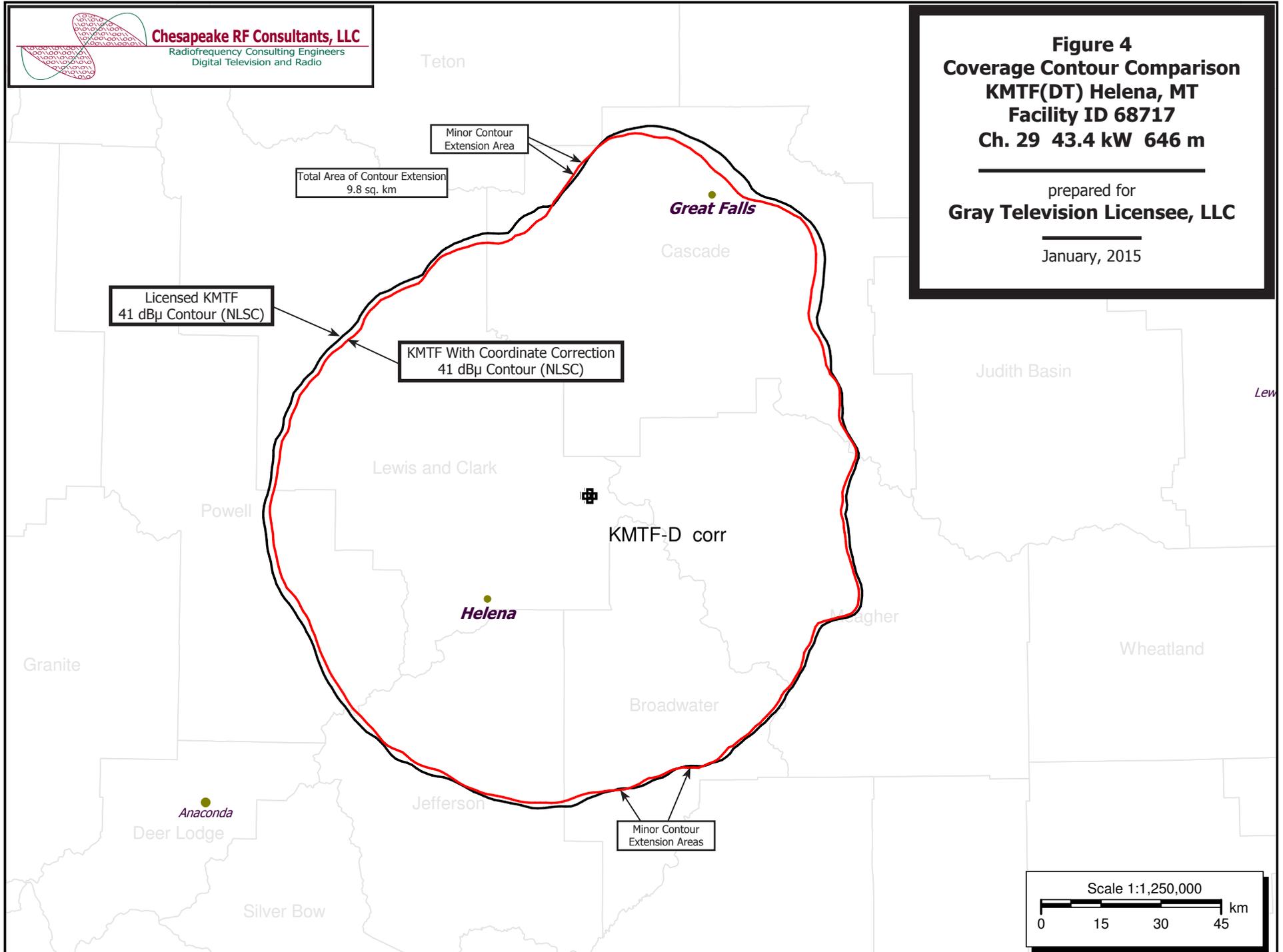


**Chesapeake RF Consultants, LLC**  
Radiofrequency Consulting Engineers  
Digital Television and Radio

**Figure 4**  
**Coverage Contour Comparison**  
**KMTF(DT) Helena, MT**  
**Facility ID 68717**  
**Ch. 29 43.4 kW 646 m**

prepared for  
**Gray Television Licensee, LLC**

January, 2015



**Table 1 KMTF OET Bulletin 69 Interference Study**  
(worst-case scenarios shown page 1 of 2)



TW Census data selected 2000  
Data Base Selected  
/space/software/cdbs/pt\_tvdb.sff

TV INTERFERENCE and SPACING ANALYSIS PROGRAM

Date: 01-29-2015 Time: 16:19:56

Record Selected for Analysis

KMTF USERRECORD-01 HELENA MT US  
Channel 29 ERP 43.4 kW HAAT 647. m RCAMSL 02369 m  
Latitude 046-49-30 Longitude 0111-42-13  
Status APP Zone 2 Border Site number: 01  
Dir Antenna Make CDB Model 00000000068037 Beam tilt N Ref Azimuth 23.  
Last update Cutoff date Docket  
Comments  
Applicant

Cell Size for Service Analysis 2.0 km/side

Distance Increments for Longley-Rice Analysis 1.00 km

Facility (site # 01) meets maximum height/power limits

Site number	1			
Azimuth	ERP	HAAT	41.0 dBu F(50,90)	
(Deg)	(kW)	(m)	(km)	
0.0	21.878	559.4	85.3	
45.0	23.766	422.8	79.0	
90.0	2.120	415.3	63.2	
135.0	2.626	534.1	68.9	
180.0	2.543	720.3	74.0	
225.0	2.460	951.9	78.8	
270.0	2.418	955.4	78.7	
315.0	2.178	617.5	70.4	

Evaluation toward Class A Stations from site # 01

No Spacing violations or contour overlap  
to Class A stations from site # 01

Class A Evaluation Complete

Checks to Site Number 01

Proposed facility OK to FCC Monitoring Stations

Proposed facility OK toward West Virginia quiet zone

**Table 1 KMTF OET Bulletin 69 Interference Study**  
 (worst-case scenarios shown page 2 of 2)



Proposed facility OK toward Table Mountain

Proposed facility is within the Canadian coordination distance  
 Distance to border = 241.8km

Proposed facility is beyond the Mexican coordination distance

Proposed station is OK toward AM broadcast stations

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 Start of Interference Analysis

	Proposed Station			
Channel	Call	City/State	ARN	
29	KMTF	HELENA MT	USERRECORD01	

Stations Potentially Affected by Proposed Station

Chan	Call	City/State	Dist(km)	Status	Application	Ref. No.
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%%%

Analysis of Interference to Affected Station 1

Analysis of current record

Channel	Call	City/State	Application	Ref. No.
29	KMTF	HELENA MT	USERRECORD-01	

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application	Ref. No.
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Total scenarios = 1

Result key: 1  
 Scenario 1 Affected station 1  
 Before Analysis

Results for: 29A MT HELENA USERRECORD01 APP

HAAT	647.0 m, ATV ERP	43.4 kW		
			POPULATION	AREA (sq km)
			144972	18049.8
			136825	13382.5
			0	0.0
			0	0.0
			0	0.0
			0	0.0

Potential Interfering Stations Included in above Scenario 1

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FINISHED FINISHED FINISHED FINISHED FINISHED FINISHED

**Channel and Facility Information**

Section	Question	Response
<b>Proposed Community of License</b>	Facility ID	68717
	State	Montana
	City	HELENA
	DTV Channel	29
<b>Facility Type</b>	Facility Type	Commercial
	Station Type	Main
<b>Zone</b>	Zone	2

**Antenna Location Data**

Section	Question	Response
<b>Antenna Structure Registration</b>	Do you have an FCC Antenna Structure Registration (ASR) Number?	No
	ASR Number	
<b>Coordinates (NAD83)</b>	Latitude	46° 49' 29.4" N+
	Longitude	111° 42' 15.6" W-
	Structure Type	GTOWER-Guyed Structure Used for Communication Purposes
	Overall Structure Height	44.5 meters
	Support Structure Height	44.5 meters
	Ground Elevation (AMSL)	2357 meters
<b>Antenna Data</b>	Height of Radiation Center Above Ground Level	12.2 meters
	Height of Radiation Center Above Average Terrain	646.1 meters
	Height of Radiation Center Above Mean Sea Level	2369.2 meters
	Effective Radiated Power	43.4 kW

**Antenna  
Technical Data**

Section	Question	Response
<b>Antenna Type</b>	Antenna Type	Directional Custom
	Do you have an Antenna ID?	Yes
	Antenna ID	68037
<b>Antenna Manufacturer and Model</b>	Manufacturer:	RFS
	Model	LPR8DM-2540
	Electrical Beam Tilt	Not Applicable
	Mechanical Beam Tilt	Not Applicable
	toward azimuth	
	Polarization	Horizontal
<b>DTV and DTS: Elevation Pattern</b>	Does the proposed antenna propose elevation radiation patterns that vary with azimuth for reasons other than the use of mechanical beam tilt?	No
	Rotation	23.0 degrees
	Uploaded file for elevation antenna (or radiation) pattern data	

**Directional Antenna Relative Field Values (Pre-rotated Pattern)**

Degree	V <sub>A</sub> (Authorized Value)						
0	1	90	0.26	180	0.25	270	0.26
10	0.95	100	0.26	190	0.25	280	0.26
20	0.8	110	0.25	200	0.25	290	0.23
30	0.5	120	0.23	210	0.23	300	0.2
40	0.28	130	0.22	220	0.22	310	0.22
50	0.22	140	0.22	230	0.22	320	0.28
60	0.2	150	0.23	240	0.23	330	0.5
70	0.23	160	0.25	250	0.25	340	0.8
80	0.26	170	0.25	260	0.26	350	0.95

**Additional Azimuths**

Degree	V <sub>A</sub>
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