

## **ENGINEERING EXHIBIT**

### **Application for Digital Television Station Construction Permit**

prepared for

#### **Yellowstone LicenseCo LLC**

KSTF(DT) Scottsbluff, NE  
Facility ID 63182  
Ch. 29 3.5 kW 187 m

*Yellowstone LicenseCo LLC* (“*Yellowstone*”) is the licensee of television station KSTF(DT), Channel 29, Scottsbluff, NE. KSTF is licensed to operate at 2.7 kW effective radiated power (“ERP”) with a directional antenna having a height above average terrain (“HAAT”) of 210 meters (BLC DT-20130809ACT). *Yellowstone* herein seeks a Construction Permit to authorize an increase in effective radiated power (“ERP”) and a commensurate decrease in antenna height above average terrain (“HAAT”), brought about by the need to replace the KSTF tower structure. No change in the antenna and tower location is proposed.

The KSTF tower was constructed in 1957. It has been determined that the existing KSTF tower structure requires substantial reinforcement and reconfiguration in order to meet pertinent standards. According to a structural engineer’s recent report, in some scenarios the modifications are so significant that such extensive work is not recommended for a tower of its size, age, and capacity. Thus, *Yellowstone* proposes to demolish the KSTF tower and construct a replacement tower at the same location.

The existing tower’s height is 183 meters (600 feet) above ground level (“AGL”), with a top-mounted Channel 10 antenna extending to an overall height AGL of 206 meters (676 feet). The Channel 10 antenna, no longer in use, was utilized by KSTF’s analog facility until the digital transition in 2009. KSTF’s present operation is on digital Channel 29 and employs an antenna side-mounted at 168 meters (550 feet) AGL.

The replacement tower's proposed overall height AGL is 152.4 meters (500 feet), and represents a reduction in overall height AGL of 54 meters (176 feet). The KSTF antenna will be centered at 145 meters (475 feet) AGL, which is 187 meters HAAT. This is a 23 meter reduction from the current antenna HAAT of 210 meters. The ERP will be raised to 3.5 kW (from the licensed 2.7 kW) in order to maintain location of the noise limited service contour ("NLSC"). Notification to the FAA of the reduction in tower height will be made and the corresponding FCC Antenna Structure Registration (number 1025886) will be modified upon approval from the FAA.

As specified herein, KSTF will operate with a directional antenna having the same azimuthal pattern as the presently licensed facility. The proposed antenna is a circularly polarized ERI model ALP16L2-CSOC-29. 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 Scottsbluff, KSTF'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 proposed KSTF facility's predicted service population provides a 69 percent match of the MB Docket 87-268 Seventh Report and Order Appendix B facility, as detailed in the following table.

**Digital Television Population Summary**

Population Summary (2000 Census) OET Bulletin 69 method	Appendix B	Proposed
Within Noise Limited Contour	76,631	51,488
Not affected by terrain losses	75,036	51,172
Lost to all interference	843	54
Net DTV Service	<b>74,193</b>	<b>51,118</b>
Match of Appendix B	---	<b>69%</b>

The proposed 69 percent match is the same as the licensed (BLCDDT-20130809ACT) facility's 69 percent match of the Appendix B service population and exceeds the 68 percent

match of the previously licensed facility (BLCDT-20110315ABF).<sup>1</sup> The underlying construction permit application (BMPCDT-20080618ADK) provided detailed exhibits regarding the prior 68 percent match of Appendix B.

The proposed KSTF facility complies with the FCC's "freeze" Public Notice<sup>2</sup> of April 5, 2013 (DA 13-618), which imposed limitations on the filing and processing of full power station applications that propose an expansion in their authorized NLSC. No changes in the KSTF antenna location or directional pattern will occur. The proposal specifies a reduction in antenna height and a commensurate increase in ERP to maintain NLSC location. As shown in Figure 4, the proposed 3.5 kW / 187 m HAAT facility's NLSC (41 dBμ) does not extend beyond that of the licensed facility (2.7 kW / 210 m).

### **Interference and Other Allocation Factors**

Since the proposed facility correction does not expand the KSTF service contour beyond that established by Appendix B values, interference analysis to other television facilities is not required.

The nearest FCC monitoring station is 454 km distant at Grand Island, NE. 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 3 kilometers of the site. The site is not within a border area requiring international coordination.

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

The proposed KSTF operation was evaluated for human exposure to RF energy using the procedures outlined in the Commission's OET Bulletin Number 65. Based on OET-65 equation (10) and considering the worst-case of 100 percent antenna relative field in downward

---

<sup>1</sup>A geographic coordinate correction was applied in 2013.

<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.

elevations, the calculated signal density near the tower at two meters above ground level attributable to the proposed facility is  $11.4 \mu\text{W}/\text{cm}^2$  which is 3.0 percent of the general population/uncontrolled maximum permitted exposure limit. 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 calculated signal density will be even lower when the antenna's elevation pattern is considered.

The general public will not be exposed to RF levels attributable to KSTF 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.

As to other environmental factors, NEPA screening is not required for the proposed replacement tower because it will be at the same location as the existing tower with no construction or excavation more than 30 feet beyond the tower property. The overall tower height will decrease. Additionally, nighttime tower lighting will change to a more preferred lighting, from the current red flashing and red steady obstruction lighting to medium intensity flashing white obstruction lighting.

### **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.  
August 1, 2014

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

### List of Attachments

Figure 1	Antenna Azimuthal Pattern
Figure 2, 2A	Antenna Elevation Pattern
Figure 3	Proposed Coverage Contours
Figure 4	Coverage Contour Comparison
Form 301	Saved Version of Engineering Sections from FCC Form at Time of Upload

*This material was entered August 1, 2014 for filing electronically. Since the FCC's electronic filing system may be accessed by anyone with the applicant's account number and password, and electronic data may otherwise be altered in an unauthorized fashion, we cannot be responsible for changes made subsequent to our entry of this data and related attachments.*

**AZIMUTH PATTERN**

Type: ALP-OC

Numeric	dBd
1.70	2.30

Directivity: 1.70 2.30

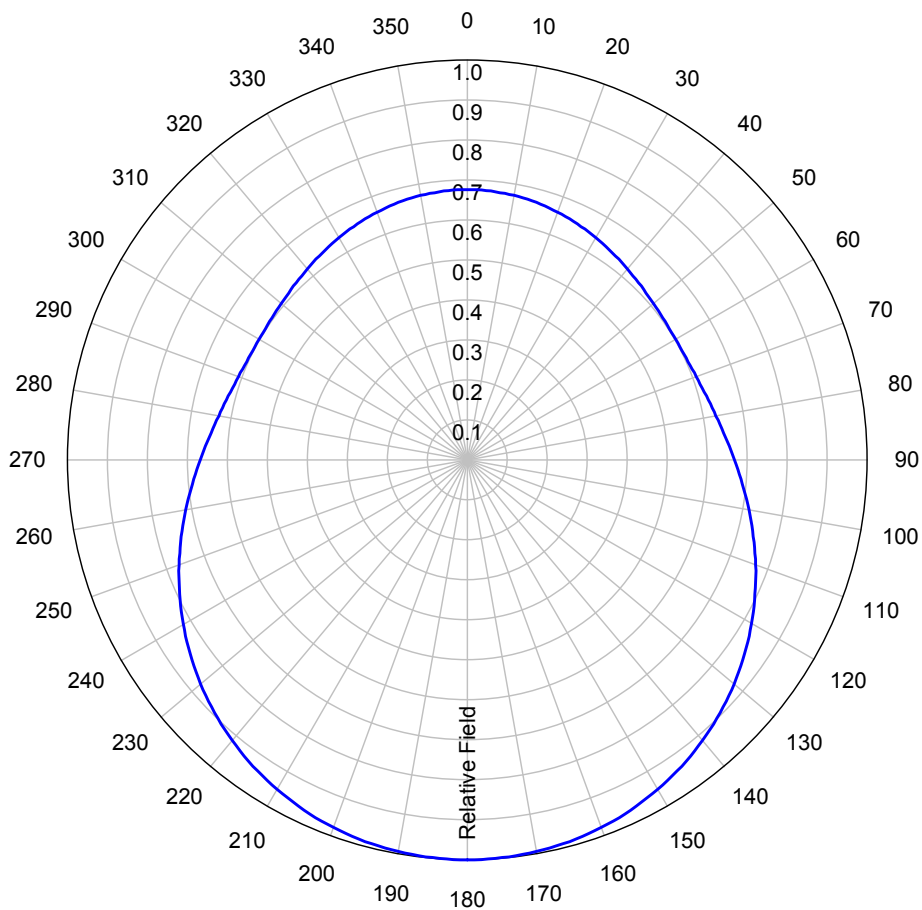
Peak(s) at:                     

Channel: 29

Location: Scottsbluff NE

Polarization: Horizontal

Note: Pattern shape and directivity may vary with channel and mouting configuration.



Preliminary, subject to final design and review.

**ELECTRONICS RESEARCH, INC. ERI**

**Figure 1**  
**Antenna Azimuthal Pattern**  
**KSTF(DT) Scottsbluff, NE**  
**Facility ID 63182**  
**Ch. 29 3.5 kW 187 m**

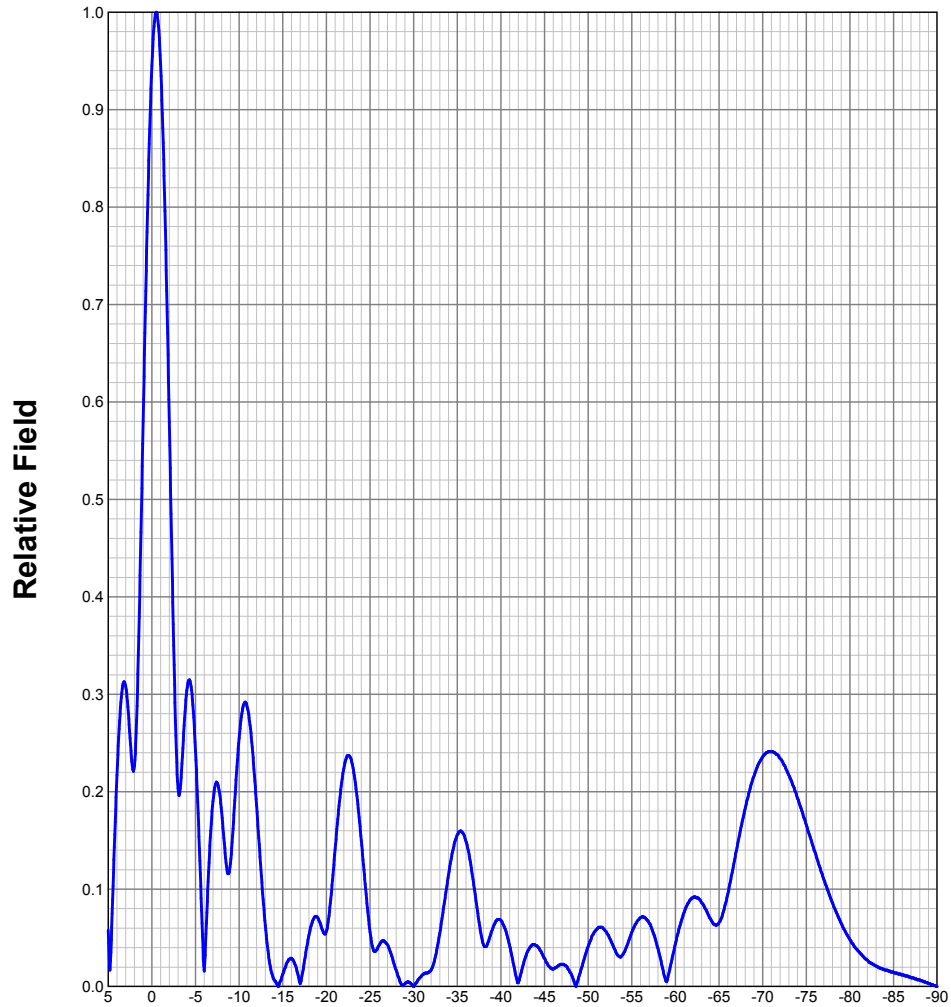
prepared for  
**Yellowstone LicenseCo LLC**

August, 2014



**ELEVATION PATTERN**

Type:	ALP16L2		Channel:	29
Directivity:	Numeric	dBd	Location:	Scottsbluff NE
Main Lobe:	16.59	12.20	Beam Tilt:	-0.50
Horizontal:	14.82	11.71	Polarization:	Horizontal



Preliminary, subject to final design and review.

ELECTRONICS RESEARCH, INC. **ERI**



**Figure 2**  
**Antenna Elevation Pattern**  
**KSTF(DT) Scottsbluff, NE**  
**Facility ID 63182**  
**Ch. 29 3.5 kW 187 m**

prepared for  
**Yellowstone LicenseCo LLC**

August, 2014

**ELEVATION PATTERN**

Type:

ALP16L2

Channel:

29

Directivity:

Numeric

dBd

Location:

Scottsbluff NE

Main Lobe:

16.59

12.20

Beam Tilt:

-0.50

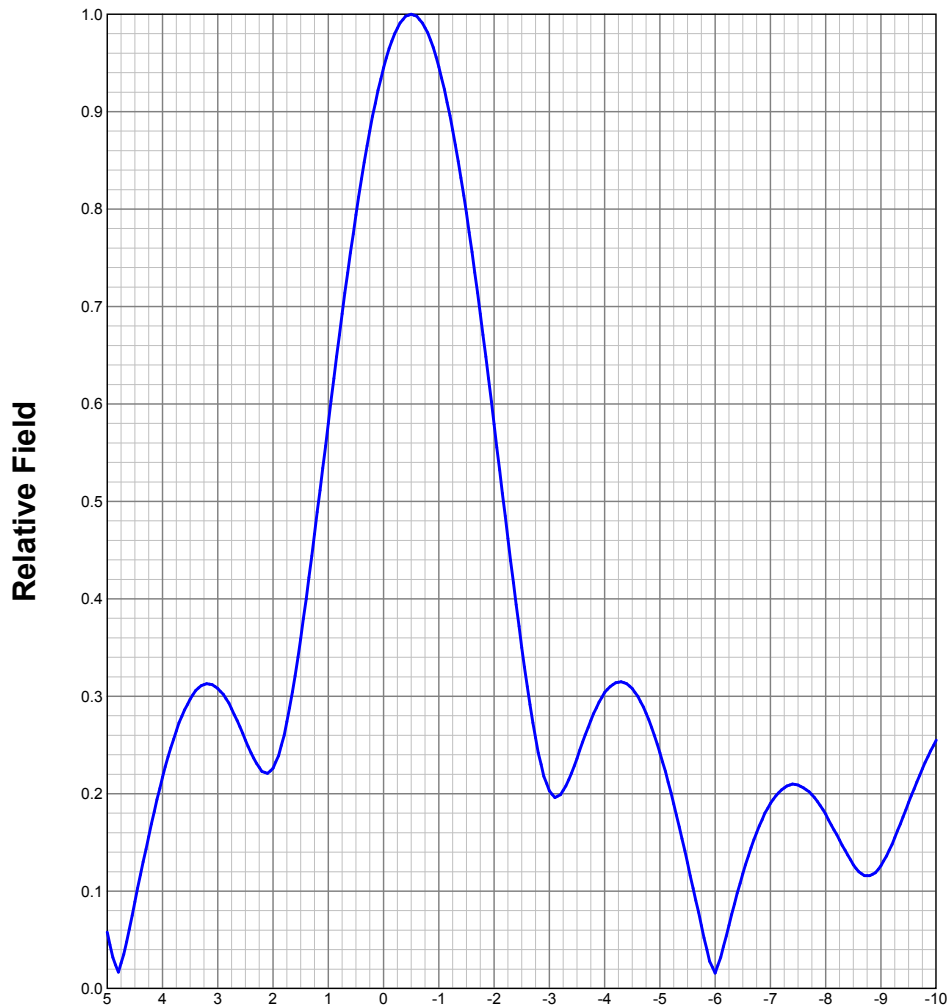
Horizontal:

14.82

11.71

Polarization:

Horizontal



Preliminary, subject to final design and review.

ELECTRONICS RESEARCH, INC. **ERI**

**Figure 2A - Detail**  
**Antenna Elevation Pattern**  
**KSTF(DT) Scottsbluff, NE**  
**Facility ID 63182**  
**Ch. 29 3.5 kW 187 m**

prepared for  
**Yellowstone LicenseCo LLC**

August, 2014



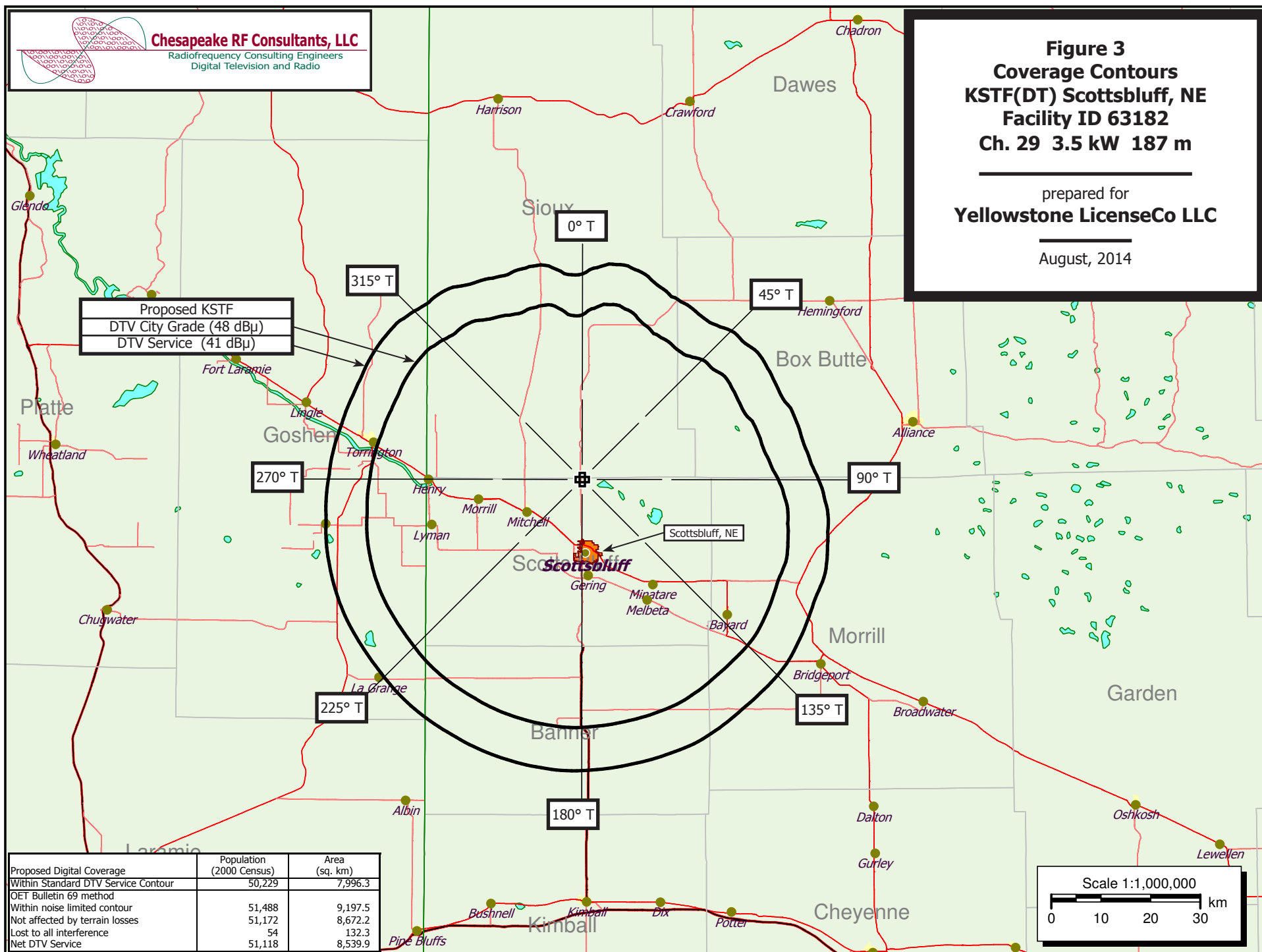


**Chesapeake RF Consultants, LLC**  
Radiofrequency Consulting Engineers  
Digital Television and Radio

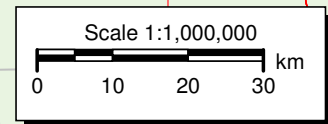
**Figure 3**  
**Coverage Contours**  
**KSTF(DT) Scottsbluff, NE**  
**Facility ID 63182**  
**Ch. 29 3.5 kW 187 m**

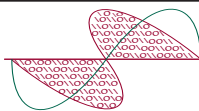
prepared for  
**Yellowstone LicenseCo LLC**

August, 2014



Proposed Digital Coverage	Population (2000 Census)	Area (sq. km)
Within Standard DTV Service Contour	50,229	7,996.3
OET Bulletin 69 method		
Within noise limited contour	51,488	9,197.5
Not affected by terrain losses	51,172	8,672.2
Lost to all interference	54	132.3
Net DTV Service	51,118	8,539.9





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

**Figure 4**  
**Coverage Contour Comparison**  
**KSTF(DT) Scottsbluff, NE**  
**Facility ID 63182**  
**Ch. 29 3.5 kW 187 m**

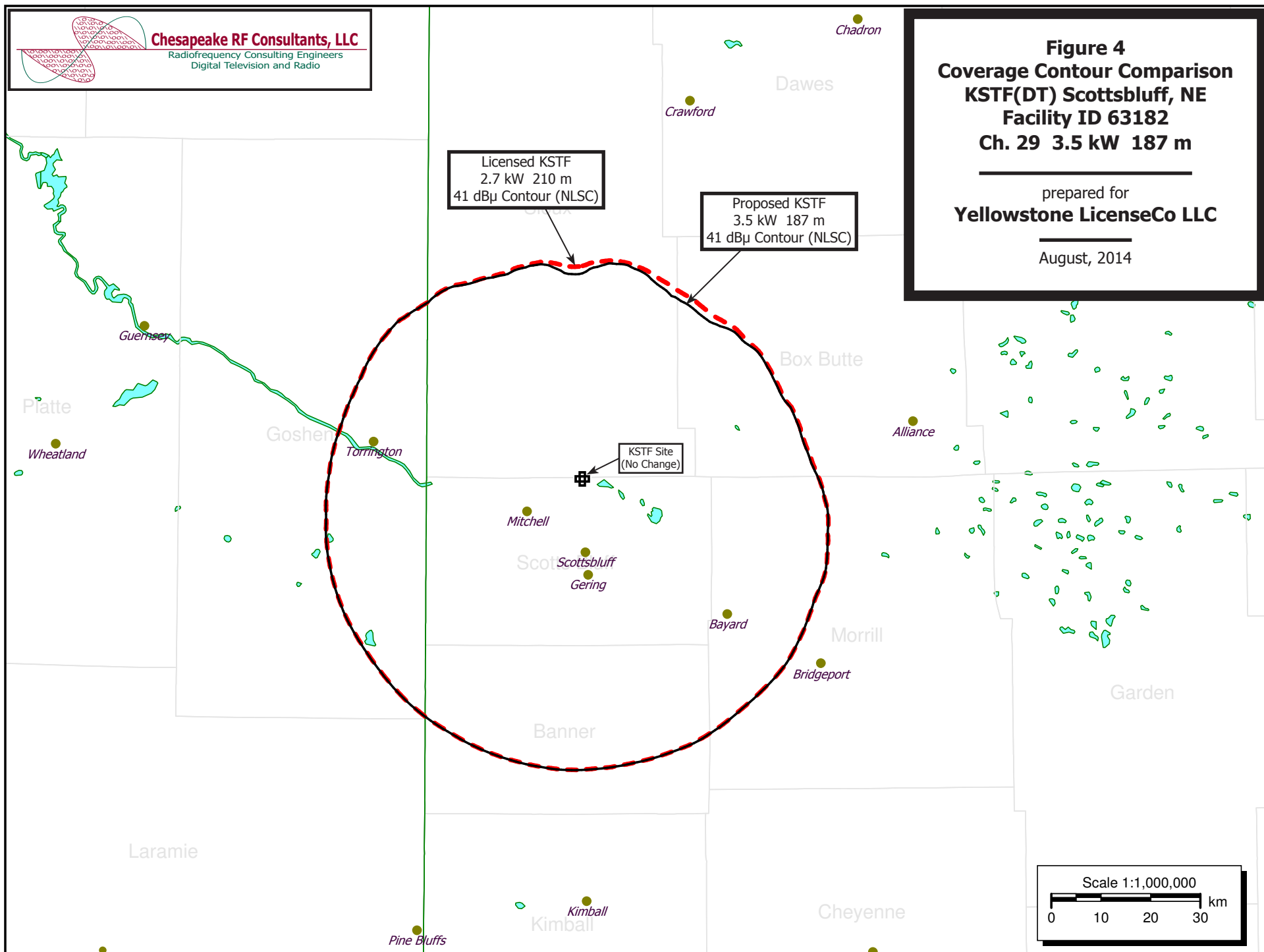
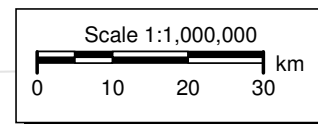
prepared for  
**Yellowstone LicenseCo LLC**

August, 2014

Licensed KSTF  
2.7 kW 210 m  
41 dBμ Contour (NLSC)

Proposed KSTF  
3.5 kW 187 m  
41 dBμ Contour (NLSC)

KSTF Site  
(No Change)



SECTION III-D - DTV Engineering	
<b>Complete Questions 1-5, and provide all data and information for the proposed facility, as requested in Technical Specifications, Items 1-13.</b>	
<p><b>Pre-Transition Certification Checklist:</b> An application concerning a pre-transition channel must complete questions 1(a)-(c), and 2-5. A correct answer of "Yes" to all of the questions will ensure an expeditious grant of a construction permit application to change pre-transition facilities. However, if the proposed facility is located within the Canadian or Mexican borders, coordination of the proposal under the appropriate treaties may be required prior to grant of the application. An answer of "No" will require additional evaluation of the applicable information in this form before a construction permit can be granted.</p> <p><b>Post-Transition Expedited Processing.</b> An application concerning a post-transition channel must complete questions 1(a), (d)-(e), and 2-5. A station applying for a construction permit to build its post-transition channel will receive expedited processing if its application (1) does not seek to expand the noise-limited service contour in any direction beyond that established by Appendix B of the Seventh Report and Order in MB Docket No. 87-268 establishing the new DTV Table of Allotments in 47 C.F.R. § 73.622(i) ("new DTV Table Appendix B"); (2) specifies facilities that match or closely approximate those defined in the new DTV Table Appendix B facilities; and (3) is filed within 45 days of the effective date of Section 73.616 of the rules adopted in the Report and Order in the Third DTV Periodic Review proceeding, MB Docket No. 07-91.</p>	
1. The proposed DTV facility complies with 47 C.F.R. Section 73.622 in the following respects:	
(a) It will operate on the DTV channel for this station as established in 47 C.F.R. Section 73.622.	<input checked="" type="radio"/> Yes <input type="radio"/> No
(b) It will operate a pre-transition facility from a transmitting antenna located within 5.0 km (3.1 miles) of the DTV reference site for this station as established in 47 C.F.R. Section 73.622.	<input type="radio"/> Yes <input type="radio"/> No
(c) It will operate a pre-transition facility with an effective radiated power (ERP) and antenna height above average terrain (HAAT) that do not exceed the DTV reference ERP and HAAT for this station as established in 47 C.F.R. Section 73.622.	<input type="radio"/> Yes <input type="radio"/> No
(d) It will operate at post-transition facilities that do not expand the noise-limited service contour in any direction beyond that established by Appendix B of the Seventh Report and Order in MB Docket No. 87-268 establishing the new DTV Table of Allotments in 47 C.F.R. § 73.622(i) ("new DTV Table Appendix B").	<input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A
(e) It will operate at post-transition facilities that match or reduce by no more than five percent with respect to predicted population from those defined in the new DTV Table Appendix B.	<input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> N/A
2. The proposed facility will not have a significant environmental impact, including exposure of workers or the general public to levels of RF radiation exceeding the applicable health and safety guidelines, and therefore will not come within 47 C.F.R. Section 1.1307. Applicant must <b>submit the Exhibit</b> called for in Item 13.	<input checked="" type="radio"/> Yes <input type="radio"/> No
3. Pursuant to 47 C.F.R. Section 73.625, the DTV coverage contour of the proposed facility will encompass the allotted principal community.	<input checked="" type="radio"/> Yes <input type="radio"/> No
4. The requirements of 47 C.F.R. Section 73.1030 regarding notification to radio astronomy installations, radio receiving installations and FCC monitoring stations have either been satisfied or are not applicable.	<input checked="" type="radio"/> Yes <input type="radio"/> No
5. The antenna structure to be used by this facility has been registered by the Commission and will not require registration to support the proposed antenna, OR the FAA has previously determined that the proposed structure will not adversely effect 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.	<input checked="" type="radio"/> Yes <input type="radio"/> No

SECTION III-D - DTV Engineering	
<b>TECHNICAL SPECIFICATIONS</b>	
Ensure that the specifications below are accurate. Contradicting data found elsewhere in this application will be disregarded. All items must be completed. The response "on file" is not acceptable.	
<b>TECH BOX</b>	
1.	Channel Number: DTV 29 Analog TV, if any
2.	Zone: <input type="radio"/> I <input checked="" type="radio"/> II <input type="radio"/> III
3.	Antenna Location Coordinates: (NAD 27) Latitude: Degrees 41 Minutes 59 Seconds 59 <input checked="" type="radio"/> North <input type="radio"/> South  Longitude: Degrees 103 Minutes 40 Seconds 30 <input checked="" type="radio"/> West <input type="radio"/> East
4.	Antenna Structure Registration Number: 1025886 <input type="checkbox"/> Not Applicable <input type="checkbox"/> Notification filed with FAA
5.	Antenna Location Site Elevation Above Mean Sea Level: 1340 meters
6.	Overall Tower Height Above Ground Level: 152 meters
7.	Height of Radiation Center Above Ground Level: 145 meters

8.	Height of Radiation Center Above Average Terrain :	187 meters																																																																																																
9.	Maximum Effective Radiated Power (average power):	3.5 kW																																																																																																
10.	<p>Antenna Specifications:</p> <p>a. Manufacturer ERI    Model ALP16L2-CSOC-29</p> <p>b. Electrical Beam Tilt: 0.5 degrees    <input type="checkbox"/> Not Applicable</p> <p>c. Mechanical Beam Tilt: degrees toward azimuth degrees True    <input checked="" type="checkbox"/> Not Applicable</p> <p style="text-align: right;">[Exhibit 46]</p> <p>Attach as an Exhibit all data specified in 47 C.F.R. Section 73.625(c).</p> <p>d. Polarization: <input type="radio"/> Horizontal    <input checked="" type="radio"/> Circular    <input type="radio"/> Elliptical</p> <p>e. Directional Antenna Relative Field Values:    <input type="checkbox"/> Not applicable (Nondirectional)</p> <p>[For a composite directional (not off-the-shelf) antenna, press the following button to fill in the relative field values subform.] [Relative Field Values]</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p style="text-align: center;"><b>10e. Directional Antenna Relative Field Values</b></p> <p style="text-align: center;">[Fill in this subform for a composite directional (not off-the-shelf) antenna, only.]</p> <p>e. Directional Antenna Relative Field Values:</p> <p>Rotation (Degrees): <input checked="" type="checkbox"/> No Rotation</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Degrees</th><th>Value</th><th>Degrees</th><th>Value</th><th>Degrees</th><th>Value</th><th>Degrees</th><th>Value</th><th>Degrees</th><th>Value</th><th>Degrees</th><th>Value</th></tr> </thead> <tbody> <tr><td>0</td><td>0.676</td><td>10</td><td>0.672</td><td>20</td><td>0.659</td><td>30</td><td>0.642</td><td>40</td><td>0.623</td><td>50</td><td>0.608</td></tr> <tr><td>60</td><td>0.602</td><td>70</td><td>0.609</td><td>80</td><td>0.631</td><td>90</td><td>0.668</td><td>100</td><td>0.715</td><td>110</td><td>0.767</td></tr> <tr><td>120</td><td>0.82</td><td>130</td><td>0.871</td><td>140</td><td>0.915</td><td>150</td><td>0.951</td><td>160</td><td>0.978</td><td>170</td><td>0.994</td></tr> <tr><td>180</td><td>1</td><td>190</td><td>0.994</td><td>200</td><td>0.978</td><td>210</td><td>0.951</td><td>220</td><td>0.915</td><td>230</td><td>0.871</td></tr> <tr><td>240</td><td>0.82</td><td>250</td><td>0.767</td><td>260</td><td>0.715</td><td>270</td><td>0.668</td><td>280</td><td>0.631</td><td>290</td><td>0.609</td></tr> <tr><td>300</td><td>0.602</td><td>310</td><td>0.608</td><td>320</td><td>0.623</td><td>330</td><td>0.642</td><td>340</td><td>0.659</td><td>350</td><td>0.672</td></tr> <tr> <td colspan="2">Additional Azimuths</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> <p style="text-align: center; color: red;"><u>Relative Field Polar Plot</u></p> </div> <p>If a directional antenna is proposed, the requirements of 47 C.F.R. Sections 73.625(c) must be satisfied. <b>Exhibit required.</b>    [Exhibit 47]</p>		Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	0	0.676	10	0.672	20	0.659	30	0.642	40	0.623	50	0.608	60	0.602	70	0.609	80	0.631	90	0.668	100	0.715	110	0.767	120	0.82	130	0.871	140	0.915	150	0.951	160	0.978	170	0.994	180	1	190	0.994	200	0.978	210	0.951	220	0.915	230	0.871	240	0.82	250	0.767	260	0.715	270	0.668	280	0.631	290	0.609	300	0.602	310	0.608	320	0.623	330	0.642	340	0.659	350	0.672	Additional Azimuths											
Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value																																																																																							
0	0.676	10	0.672	20	0.659	30	0.642	40	0.623	50	0.608																																																																																							
60	0.602	70	0.609	80	0.631	90	0.668	100	0.715	110	0.767																																																																																							
120	0.82	130	0.871	140	0.915	150	0.951	160	0.978	170	0.994																																																																																							
180	1	190	0.994	200	0.978	210	0.951	220	0.915	230	0.871																																																																																							
240	0.82	250	0.767	260	0.715	270	0.668	280	0.631	290	0.609																																																																																							
300	0.602	310	0.608	320	0.623	330	0.642	340	0.659	350	0.672																																																																																							
Additional Azimuths																																																																																																		
11.	<p>Does the proposed facility satisfy the pre-transition interference protection provisions of 47 C.F.R. Section 73.623(a) (Applicable only if <b>Certification Checklist</b> Items 1(a), (b), or (c) are answered "No.") and/or the post-transition interference protection provisions of 47 C.F.R. Section 73.616?    <input type="radio"/> Yes    <input type="radio"/> No</p> <p style="text-align: right;">[Exhibit 48]</p> <p>If "No," attach as an Exhibit justification therefor, including a summary of any related previously granted waivers.</p>																																																																																																	
12.	<p>If the proposed facility will not satisfy the coverage requirement of 47 C.F.R. Section 73.625, attach as an Exhibit justification therefore. (Applicable only if <b>Certification Checklist</b> item 3 is answered "No.")    [Exhibit 49]</p>																																																																																																	
13.	<p><b>Environmental Protection Act. Submit in an Exhibit</b> the following:    [Exhibit 50]</p> <p>If <b>Certification Checklist</b> Item 2 is answered "Yes," a brief explanation of why an Environmental Assessment is not required. Also describe in the Exhibit the steps that will be taken to limit RF radiation exposure to the public and to persons authorized access to the tower site.</p> <p>By checking "Yes" to <b>Certification Checklist</b> Item 2, the applicant also certifies that it, in coordination with other users of the site, will reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic exposure in excess of FCC guidelines.</p> <p>If <b>Certification Checklist</b> Item 2 is answered "No," an Environmental Assessment as required by 47 C.F.R Section 1.1311.</p>																																																																																																	

**PREPARERS CERTIFICATION ON SECTION III MUST BE COMPLETED AND SIGNED.**

---

### SECTION III - PREPARER'S CERTIFICATION

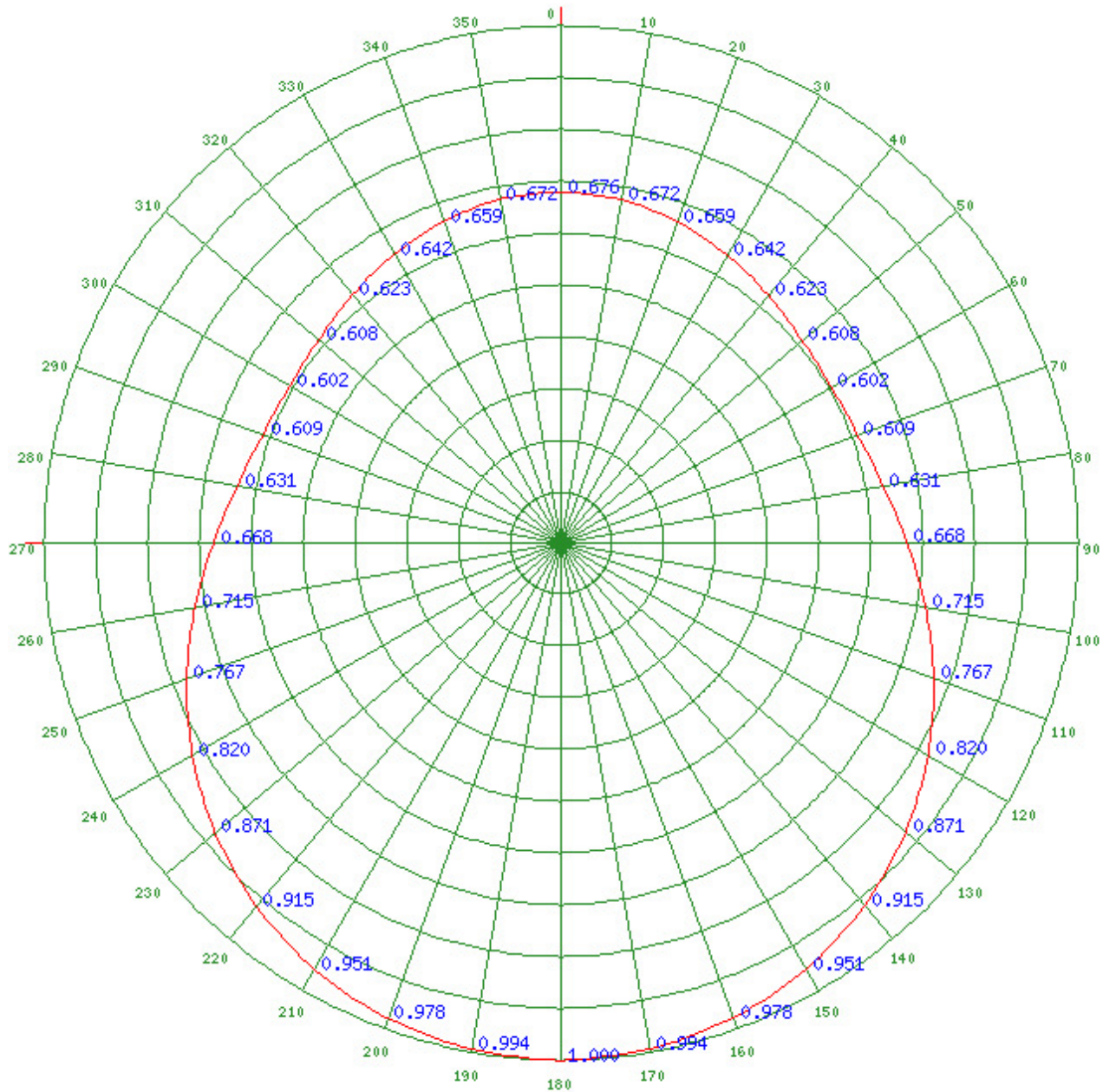
I certify that I have prepared Section III (Engineering Data) on behalf of the applicant, and that after such preparation, I have examined and found it to be accurate and true to the best of my knowledge and belief.

Name JOSEPH M. DAVIS, P.E.	Relationship to Applicant (e.g., Consulting Engineer) CONSULTING ENGINEER	
Signature	Date 8/1/2014	
Mailing Address CHESAPEAKE RF CONSULTANTS, LLC 207 OLD DOMINION ROAD		
City YORKTOWN	State or Country (if foreign address) VA	Zip Code 23692 -
Telephone Number (include area code) 7036509600	E-Mail Address (if available) JOSEPH.DAVIS@RF-CONSULTANTS.COM	

Any specified rotation has already been applied to the plotted pattern.

Field strength values shown on a rotated pattern may differ from the listed values because intermediate azimuths are interpolated between entered azimuths.

Close Window



[FM Query](#) [FCC](#) [TV Query](#)