

ENGINEERING EXHIBIT

Application for Digital Television Construction Permit

prepared for

CBS Broadcasting Inc.
KPIX-DT San Francisco, CA
Facility ID 25452
Ch. 29 950 kW 512 m

CBS Broadcasting Inc. (“*CBS*”) is the licensee of television station KPIX-TV, analog Channel 5 and digital Channel 29, San Francisco, CA. The KPIX-DT digital Channel 29 facility is licensed to operate at 1000 kW effective radiated power (“ERP”) and an antenna height above average terrain (“HAAT”) of 401 meters using a side-mounted antenna (BLCDT-19990301KF). Appendix B of the Seventh Report and Order in MB Docket 87-278 specifies KPIX-DT’s post-transition allotment on Channel 29 with 1000 kW ERP and 506 meters HAAT.

CBS’ plan for KPIX-DT involves installation of a new top-mount antenna for digital Channel 29 in place of the current analog transmitting antennas atop the shared Sutro Tower. The KPIX-DT antenna will be shared with some of the eleven other television stations that operate from Sutro Tower. Installation of the various top-mounted digital transmitting antennas for KPIX-DT and the other stations cannot be accomplished until after analog operations cease in February 2009. Until the antenna reconfiguration is completed, KPIX-DT will continue to operate from its licensed, side-mount antenna. As needed to allow for worker safety during the construction, KPIX-DT will operate from an auxiliary antenna, to be side-mounted at a lower elevation than the currently licensed antenna (a Construction Permit for the auxiliary antenna will be requested separately).

The instant application proposes KPIX-DT operation with the top mount antenna for the post-transition period. An ERP of 950 kW is proposed, with a directional antenna at 512 meters HAAT, to conform closely to but not exceed the Appendix B coverage contour. *CBS* requests that the Appendix B parameters for KPIX-DT be modified to indicate the facility specified herein.

The proposed KPIX-DT antenna system is a Dielectric model TUM-C5SP-14/60H-2-T-R. Elliptical polarization is proposed (20 percent vertical polarization). The maximum horizontally polarized ERP is 950 kW, and the maximum vertically polarized ERP is 190 kW. The vertically polarized component will not exceed the horizontally polarized component at any azimuth. The directional antenna's azimuthal patterns are depicted in **Figures 1** and **1A** for horizontal and vertical polarization, respectively. **Figures 2** and **2A** provide the theoretical vertical plane (elevation) pattern¹.

The antenna will be top-mounted on the existing Sutro Tower candelabra antenna supporting structure (FCC Antenna Structure Registration number 1001289), part of an overall replacement to the present top-mounted analog antennas. No change to the overall structure height will result from this proposal.

A map is supplied as **Figure 3**, which depicts the standard predicted coverage contours. This map includes the boundaries of San Francisco, KPIX-DT'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 map attached as **Figure 4** supplies a comparison of the 41 dBμ digital service contour corresponding to the proposed KPIX-DT facility (950 kW / 512 m) and the Appendix B parameters (1000 kW / 506 m). Since no extension in contour location beyond that of the allotment will result, interference analysis to other television facilities is not required.

The proposed KPIX-DT facility's predicted service population provides a 97.7 percent match of the Appendix B facility, as detailed in the following table.

¹ These patterns are supplied in terms of relative field. In recent years, FCC Staff have not required pattern data in dBk format however such patterns are available upon request.

Post-Transition Population Summary

Population Summary (2000 Census) OET Bulletin 69 method	Appendix B	Proposed
Within Noise Limited Contour	7,829,119	7,740,213
Not affected by terrain losses	7,115,586	6,948,775
Lost to all interference	0	0
Net DTV Service	7,115,586	6,948,775
Match of Appendix B	---	97.66%

The nearest FCC monitoring station is 62 km distant at Livermore, CA. Using the FCC propagation curves, the proposed F(50,90) signal level at the monitoring station is 3.59 mV/m, which is below the 10 mV/m threshold of §73.1030(c) for further analysis. The site is not located within the areas requiring coordination with “quiet” zones specified in §73.1030(a) and (b). There are no AM stations within 3.2 kilometers of the site, based on information contained within the Commission’s database. The site location is beyond the border areas requiring international coordination.

Human Exposure to Radiofrequency Electromagnetic Field (Environmental)

The proposed transmitting antenna and other digital television station antennas will be installed on an existing antenna support structure in place of the existing analog transmitting antenna arrangement. The use of existing transmitting locations has been characterized as being environmentally preferable by the Commission, according to Note 1 of §1.1306 of the FCC Rules.

The proposed 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 10 percent antenna relative field in downward elevations (pattern data shows less than 15 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 $1.4 \mu\text{W}/\text{cm}^2$, 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.

The environmental subjects listed under §1.1307(a) are not considered herein. Section 1.1307(a) matters are covered by the structure owner as certified in the associated FCC Antenna Structure Registration number 1001289.

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.
February 29, 2008

Chesapeake RF Consultants, LLC
11993 Kahns Road
Manassas, VA 20112
703-650-9600

List of Attachments

Figure 1, 1A Antenna Horizontal Plane Pattern
Figure 2, 2A Antenna Vertical Plane (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 February 29, 2008 for filing electronically. Since the FCC's electronic filing system may be accessed by anyone with the applicant's name 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.



Figure 1
Antenna Horizontal Plane
Pattern - Horizontal Polarization

Proposal Number

EM-070924-1

Date

24-Sep-07

Call Letters

KPIX-DT

Channel

29

Location

San Francisco, CA

Customer

Antenna Type

TUM-C5SP-14/60H-2-T-R

AZIMUTH PATTERN

Gain

1.90

(2.79 dB)

Calculated / Measured

Calculated

Frequency

563.00 MHz

Drawing #

TUM-C5SP-5630

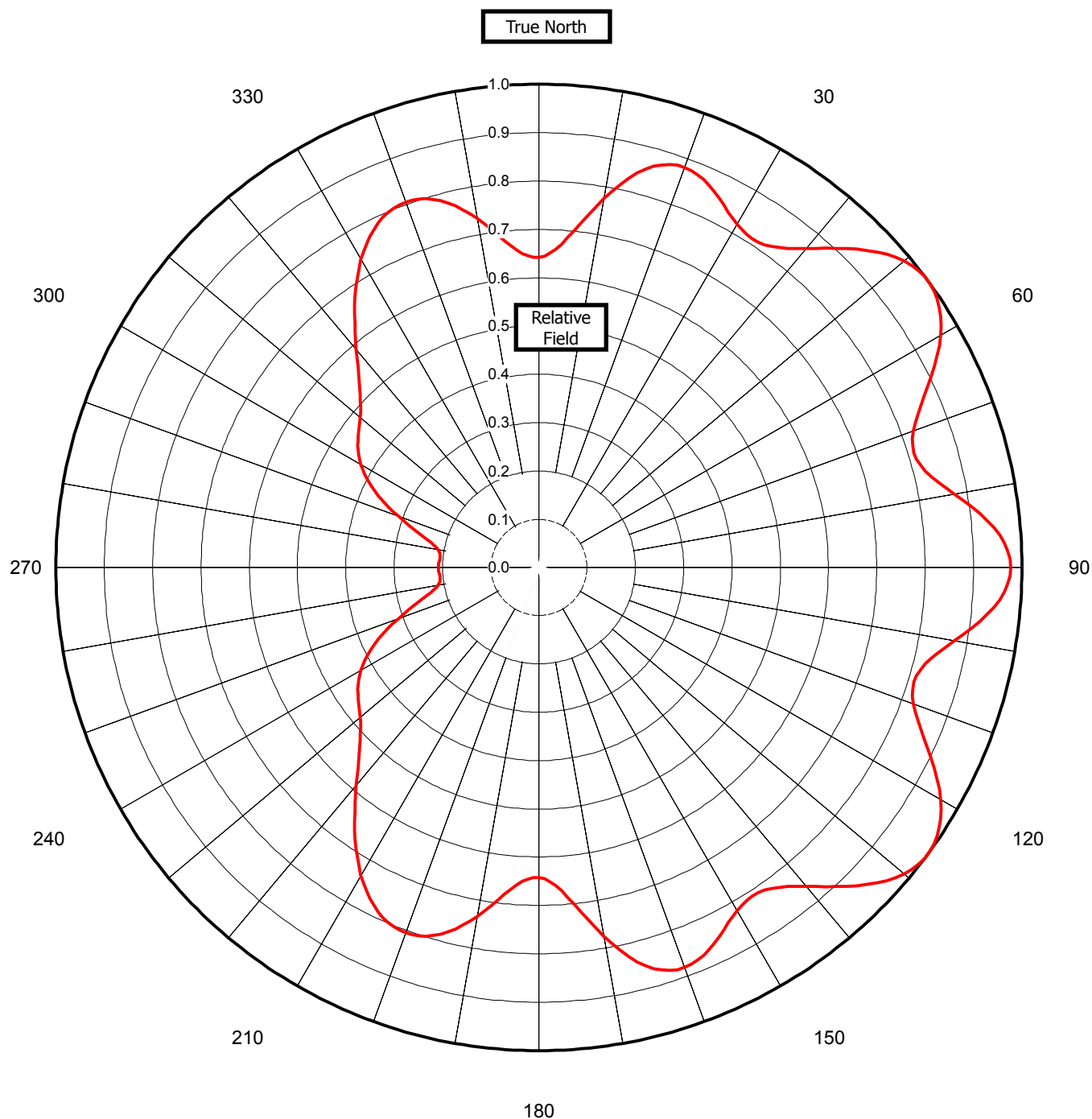




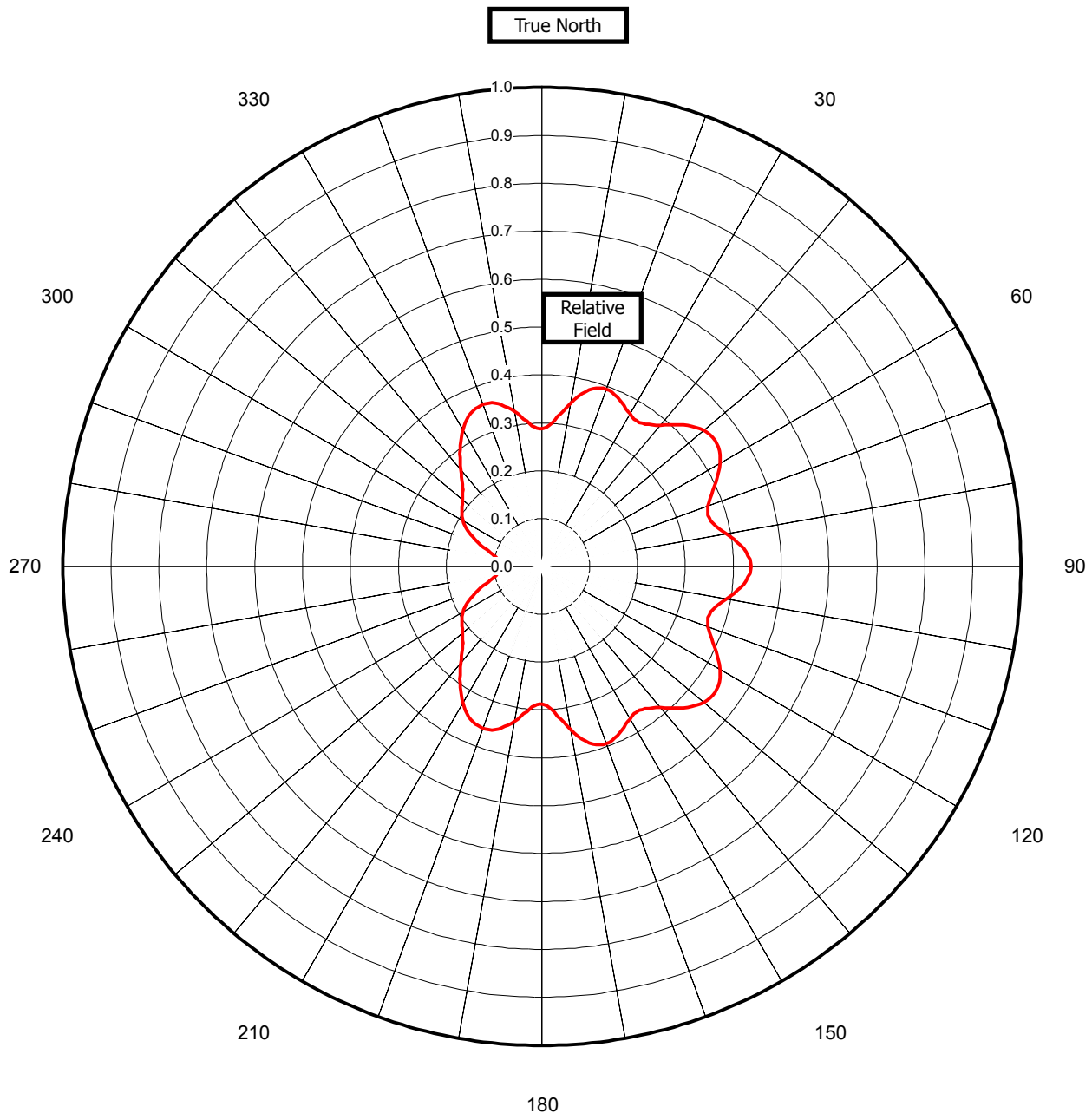
Figure 1A
Antenna Horizontal Plane
Pattern - Vertical Polarization

Proposal Number	EM-070924-1		
Date	24-Sep-07		
Call Letters	KPIX-DT	Channel	29
Location	San Francisco, CA		
Customer			
Antenna Type	TUM-C5SP-14/60H-2-T-R		

AZIMUTH PATTERN/VERTICAL POLARIZATION

Gain	1.90	(2.79 dB)
Calculated / Measured	Calculated	

Frequency	563.00 MHz
Drawing #	TUM-C5SP-5630





Proposal Number **EM-070924-1**
Date **24-Sep-07**
Call Letters **KPIX-DT** Channel **29**
Location **San Francisco, CA**
Customer
Antenna Type **TUM-C5SP-14/60H-2-T-R**

ELEVATION PATTERN

RMS Gain at Main Lobe	25.30 (14.03 dB)	Beam Tilt	0.75 deg
RMS Gain at Horizontal	13.90 (11.43 dB)	Frequency	563.00 MHz
Calculated / Measured	Calculated	Drawing #	14U263075-90

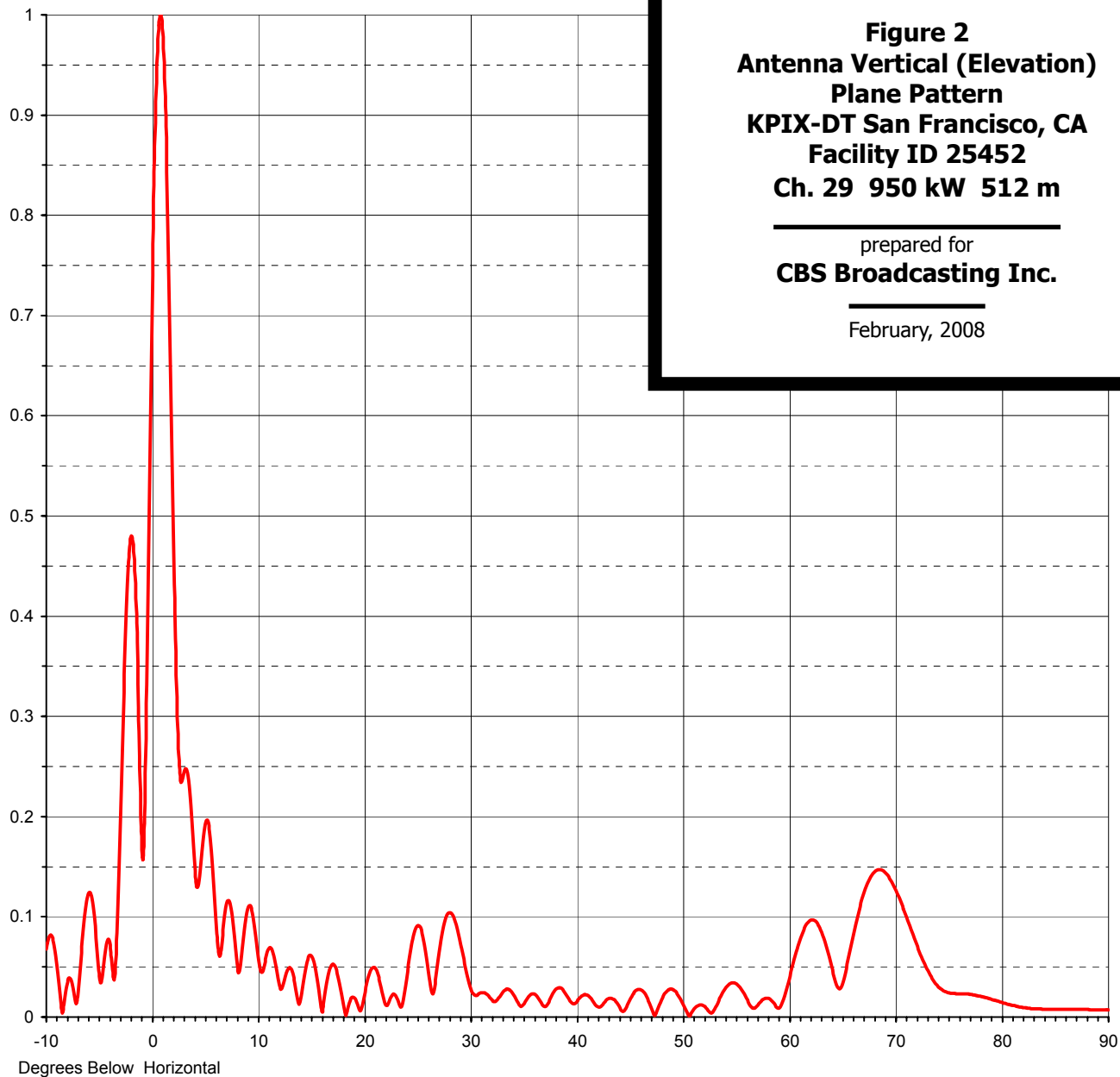


Figure 2
Antenna Vertical (Elevation)
Plane Pattern
KPIX-DT San Francisco, CA
Facility ID 25452
Ch. 29 950 kW 512 m

prepared for
CBS Broadcasting Inc.

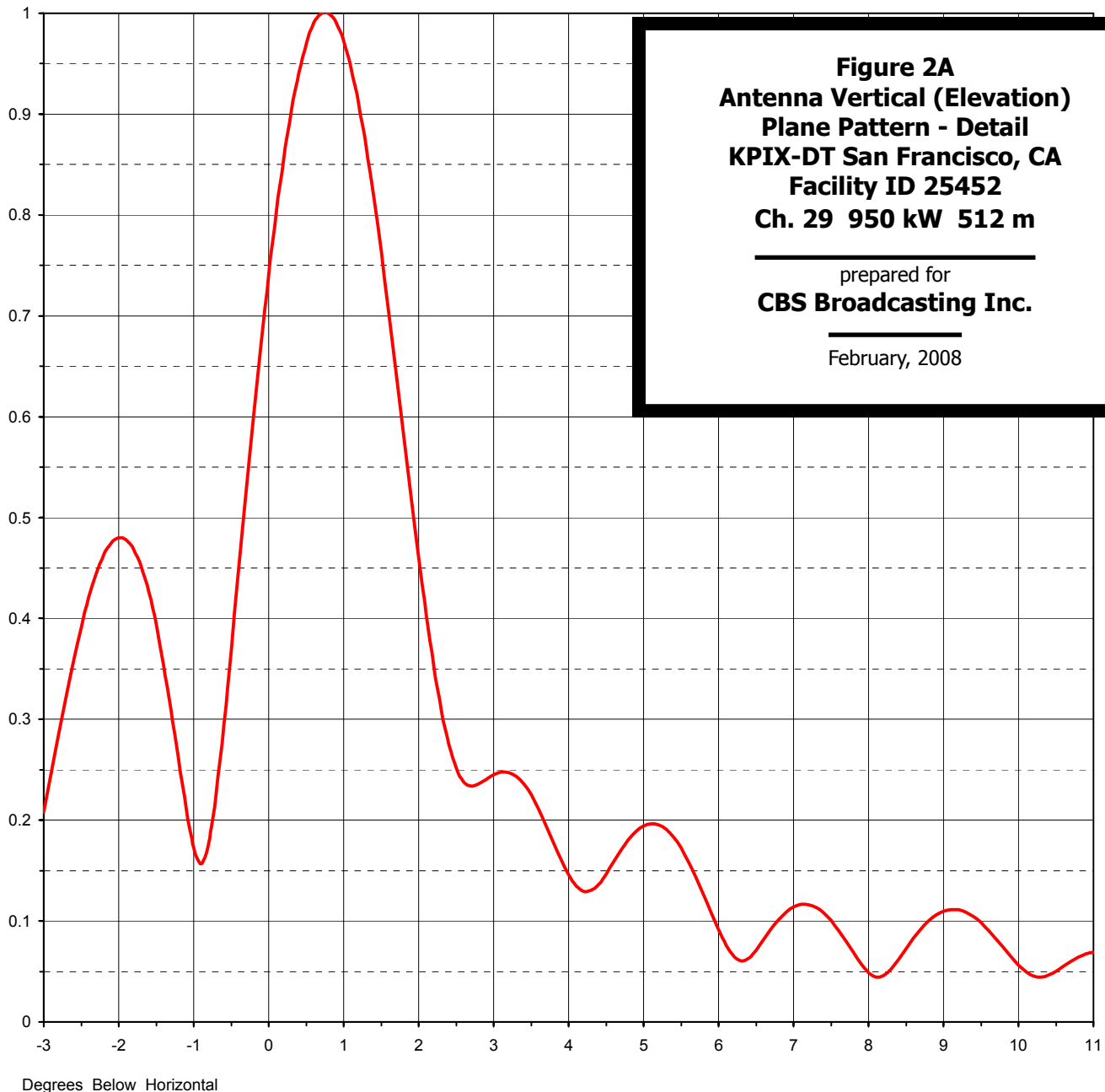
February, 2008



Proposal Number **EM-070924-1**
Date **24-Sep-07**
Call Letters **KPIX-DT** Channel **29**
Location **San Francisco, CA**
Customer
Antenna Type **TUM-C5SP-14/60H-2-T-R**

ELEVATION PATTERN

RMS Gain at Main Lobe	25.30 (14.03 dB)	Beam Tilt	0.75 deg
RMS Gain at Horizontal	13.90 (11.43 dB)	Frequency	563.00 MHz
Calculated / Measured	Calculated	Drawing #	14U263075





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

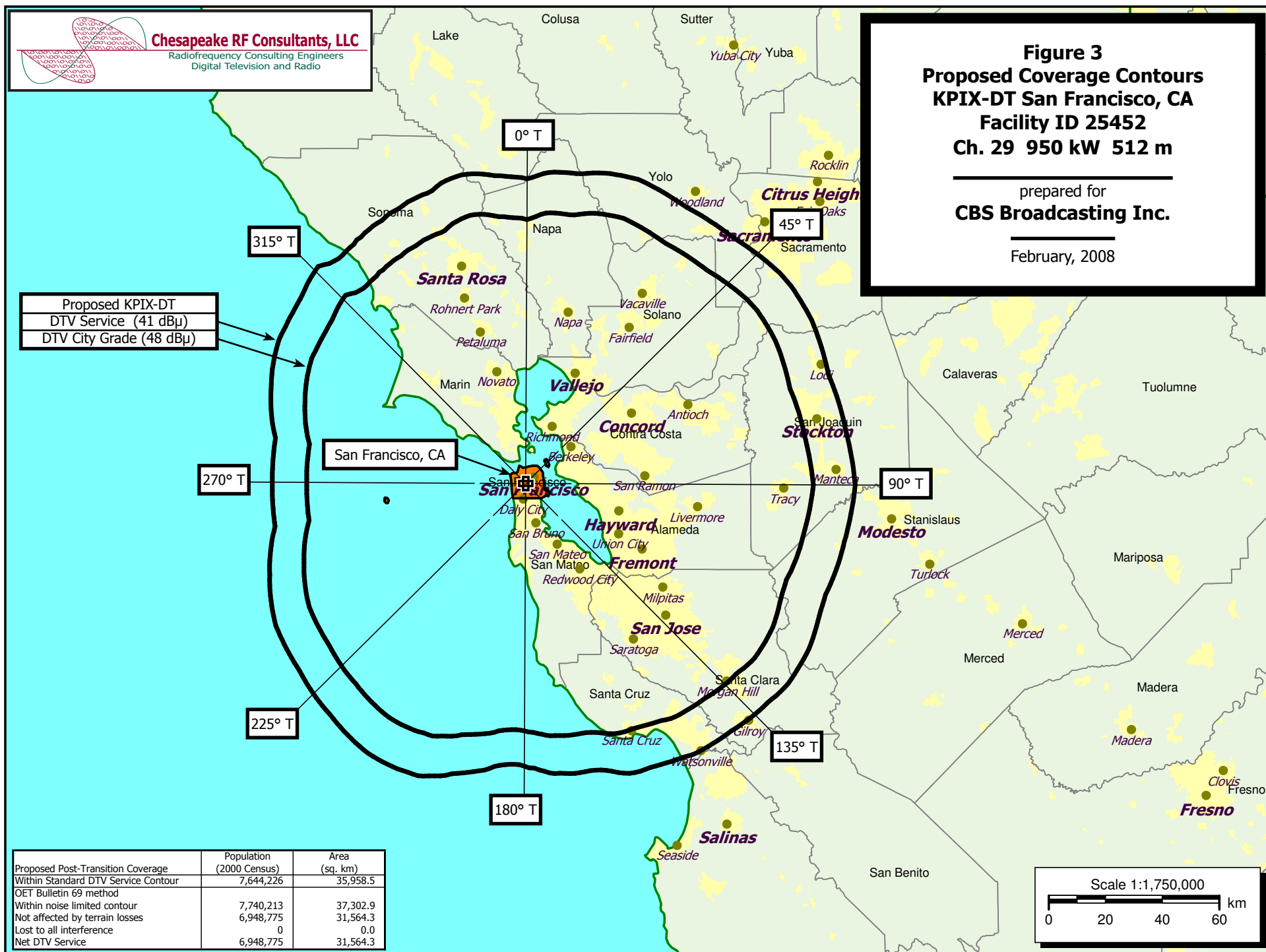
Figure 3
Proposed Coverage Contours
KPIX-DT San Francisco, CA
Facility ID 25452
Ch. 29 950 kW 512 m

prepared for
CBS Broadcasting Inc.

February, 2008

Proposed KPIX-DT
DTV Service (41 dBμ)
DTV City Grade (48 dBμ)

Proposed Post-Transition Coverage	Population (2000 Census)	Area (sq. km)
Within Standard DTV Service Contour	7,644,226	35,958.5
OET Bulletin 69 method		
Within noise limited contour	7,740,213	37,302.9
Not affected by terrain losses	6,948,775	31,564.3
Lost to all interference	0	0.0
Net DTV Service	6,948,775	31,564.3





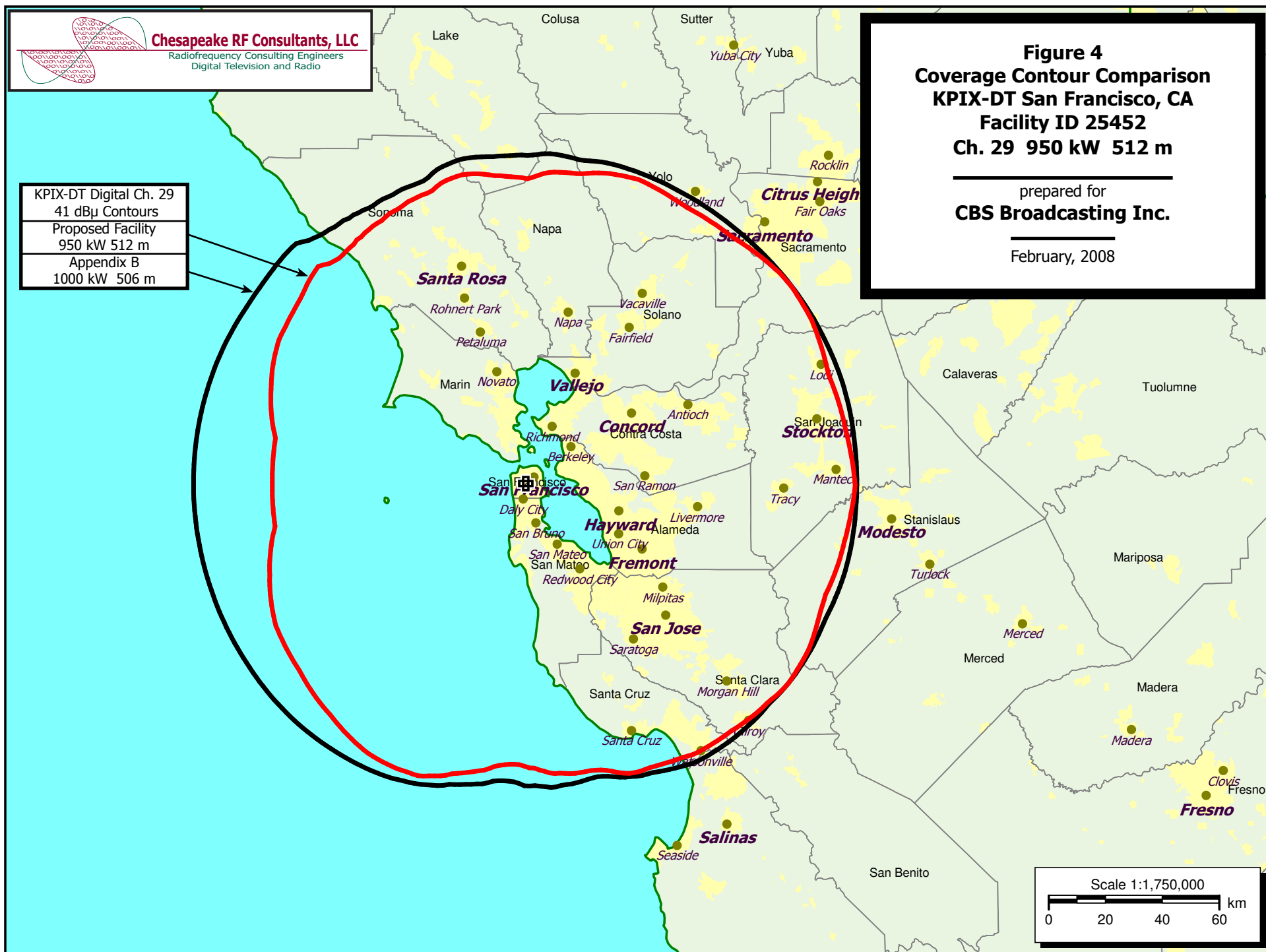
Chesapeake RF Consultants, LLC
Radiofrequency Consulting Engineers
Digital Television and Radio

Figure 4
Coverage Contour Comparison
KPIX-DT San Francisco, CA
Facility ID 25452
Ch. 29 950 kW 512 m

prepared for
CBS Broadcasting Inc.

February, 2008

KPIX-DT Digital Ch. 29
41 dBu Contours
Proposed Facility
950 kW 512 m
Appendix B
1000 kW 506 m



SECTION III-D - DTV Engineering**Complete Questions 1-5, and provide all data and information for the proposed facility, as requested in Technical Specifications, Items 1-13.**

Pre-Transition Certification Checklist: 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.

Post-Transition Expedited Processing. 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.

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 checked="" type="radio"/> Yes <input 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 submit the Exhibit 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**TECHNICAL SPECIFICATIONS**

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.

TECH BOX

1.	Channel Number: DTV 29 Analog TV, if any 5
2.	Zone: <input type="radio"/> I <input checked="" type="radio"/> II <input type="radio"/> III
3.	Antenna Location Coordinates: (NAD 27) Latitude: Degrees 37 Minutes 45 Seconds 19 <input checked="" type="radio"/> North <input type="radio"/> South Longitude: Degrees 122 Minutes 27 Seconds 06 <input checked="" type="radio"/> West <input type="radio"/> East
4.	Antenna Structure Registration Number: 1001289 <input type="checkbox"/> Not Applicable <input type="checkbox"/> Notification filed with FAA
5.	Antenna Location Site Elevation Above Mean Sea Level: 254.2 meters
6.	Overall Tower Height Above Ground Level: 297.7 meters
7.	Height of Radiation Center Above Ground Level: 288.4 meters
8.	Height of Radiation Center Above Average Terrain : 511.7 meters

9.	Maximum Effective Radiated Power (average power):	950 kW																																																																																																
10.	<div>Antenna Specifications:</div> <div>a. Manufacturer DIE Model TUM-C5SP-14/60H-2-T-R</div> <div>b. Electrical Beam Tilt: 0.75 degrees <input type="checkbox"/> Not Applicable</div> <div>c. Mechanical Beam Tilt: degrees toward azimuth degrees True <input checked="" type="checkbox"/> Not Applicable</div> <div style="text-align: right;">[Exhibit 42]</div> <div>Attach as an Exhibit all data specified in 47 C.F.R. Section 73.625(c).</div> <div>d. Polarization: <input type="radio"/> Horizontal <input type="radio"/> Circular <input checked="" type="radio"/> Elliptical</div> <div>e. Directional Antenna Relative Field Values: <input type="checkbox"/> Not applicable (Nondirectional)</div> <div>[For a composite directional (not off-the-shelf) antenna, press the following button to fill in the relative field values subform.]</div> <div>[Relative Field Values]</div> <div style="text-align: center; padding: 10px;">10e. Directional Antenna Relative Field Values [Fill in this subform for a composite directional (not off-the-shelf) antenna, only.]</div> <div style="border: 1px solid black; padding: 5px;"><div>e. Directional Antenna Relative Field Values:</div><div>Rotation (Degrees): <input checked="" type="checkbox"/> No Rotation</div><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>0.641</td><td>10</td><td>0.775</td><td>20</td><td>0.881</td><td>30</td><td>0.82</td><td>40</td><td>0.861</td><td>50</td><td>0.987</td></tr><tr><td>60</td><td>0.96</td><td>70</td><td>0.825</td><td>80</td><td>0.874</td><td>90</td><td>0.976</td><td>100</td><td>0.874</td><td>110</td><td>0.825</td></tr><tr><td>120</td><td>0.96</td><td>130</td><td>0.987</td><td>140</td><td>0.861</td><td>150</td><td>0.82</td><td>160</td><td>0.881</td><td>170</td><td>0.775</td></tr><tr><td>180</td><td>0.641</td><td>190</td><td>0.732</td><td>200</td><td>0.805</td><td>210</td><td>0.736</td><td>220</td><td>0.588</td><td>230</td><td>0.483</td></tr><tr><td>240</td><td>0.426</td><td>250</td><td>0.31</td><td>260</td><td>0.212</td><td>270</td><td>0.208</td><td>280</td><td>0.212</td><td>290</td><td>0.31</td></tr><tr><td>300</td><td>0.426</td><td>310</td><td>0.483</td><td>320</td><td>0.588</td><td>330</td><td>0.736</td><td>340</td><td>0.805</td><td>350</td><td>0.732</td></tr><tr><td colspan="2">Additional Azimuths</td><td>53</td><td>1</td><td>127</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr></tbody></table><div style="text-align: center; color: red; font-weight: bold;">Relative Field Polar Plot</div></div> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"><div>If a directional antenna is proposed, the requirements of 47 C.F.R. Sections 73.625(c) must be satisfied. Exhibit required. [Exhibit 43]</div></div>		Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	0	0.641	10	0.775	20	0.881	30	0.82	40	0.861	50	0.987	60	0.96	70	0.825	80	0.874	90	0.976	100	0.874	110	0.825	120	0.96	130	0.987	140	0.861	150	0.82	160	0.881	170	0.775	180	0.641	190	0.732	200	0.805	210	0.736	220	0.588	230	0.483	240	0.426	250	0.31	260	0.212	270	0.208	280	0.212	290	0.31	300	0.426	310	0.483	320	0.588	330	0.736	340	0.805	350	0.732	Additional Azimuths		53	1	127	1						
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11.	<div>Does the proposed facility satisfy the pre-transition interference protection provisions of 47 C.F.R. Section 73.623(a) (Applicable only if Certification Checklist 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 checked="" type="radio"/> Yes <input type="radio"/> No</div> <div style="text-align: right;">[Exhibit 44]</div> <div>If "No," attach as an Exhibit justification therefor, including a summary of any related previously granted waivers.</div>																																																																																																	
12.	<div>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 Certification Checklist item 3 is answered "No.") [Exhibit 45]</div>																																																																																																	
13.	<div>Environmental Protection Act. Submit in an Exhibit the following: [Exhibit 46]</div> <div>If Certification Checklist 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.</div> <div>By checking "Yes" to Certification Checklist 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.</div> <div>If Certification Checklist Item 2 is answered "No," an Environmental Assessment as required by 47 C.F.R Section 1.1311.</div>																																																																																																	
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 02/29/2008	
Mailing Address CHESAPEAKE RF CONSULTANTS, LLC 11993 KAHNS ROAD		
City MANASSAS	State or Country (if foreign address) VA	Zip Code 20112 -
Telephone Number (include area code) 7036509600	E-Mail Address (if available) JOSEPH.DAVIS@RF-CONSULTANTS.COM	

WILLFUL FALSE STATEMENTS ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION PERMIT (U.S. CODE, TITLE 47, SECTION 312(a)(1)), AND/OR FORFEITURE (U.S. CODE, TITLE 47, SECTION 503).

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.

