Exhibit 51

Merrill Weiss Group LLC

227 Central Avenue
Metuchen, NJ 08840-1242
(732) 494-6400 Phone
(732) 494-6401 Fax

Consultants in Electronic Media Technology/Management

Technical Statement for Application for Construction Permit:

WTVE License Company, LLC
WTVE
Channel 25
Reading, PA

Distributed Transmission System (DTS) Operation of Facility Licensed in File No. BLCDT-20081117ADZ

Executive Summary

This Technical Statement supports the application by WTVE License Company, LLC for Distributed Transmission System operation using two transmitters – one each in Reading, PA, and at the Roxborough antenna farm. It has sections providing an Introduction and dealing with Transmitter Sites, Facilities, Service Area, Principal Community Coverage, Interference Analyses to U.S. Stations, Considerations Regarding Class A Stations, Cross-Border Considerations, Environmental Impact / Radio Frequency Radiation, and Notifications & Measurements. This document demonstrates that the proposed facilities are predicted to cause no new interference either to other full-service television stations or to Class A television stations and are predicted to provide the same level of service within the principal community of Reading, PA, as do the currently authorized WTVE transmission facilities.

Introduction

This Technical Statement provides the supplemental technical data and information associated with the FCC Form 301-DTS application of WTVE License Company, LLC (“WTVE”) for a Construction Permit (CP) for digital television (DTV) Distributed

Transmission System (DTS) facilities on Channel 25 in Reading, PA. In particular, it addresses the system design and interference analyses connected with a network of two transmitters proposed for operation by Station WTVE. The instant application requests a new construction permit for modification of the facilities licensed on January 27, 2010, in File Number BLCDT-20081117ADZ. This Technical Statement also addresses the environmental considerations, notification requirements, and similar factors associated with the proposed operation.

The existing license for WTVE provides for operation at a site known as Domino Lane, at the Philadelphia antenna farm in the Roxborough section of Philadelphia, PA, using a directional antenna with 126 kW Effective Radiated Power (ERP) at a Height Above Average Terrain (HAAT) of 378.4 meters. These parameters meet the maximums that are routinely permitted under §73.622(f)(8) of the Commission's rules. The Roxborough facility has been completed, and the application for a license to cover the facility just has been granted.

The instant DTS application adds to the Roxborough transmitter a transmitter at a site at Mt Penn, overlooking the City of Reading, to provide service within the station's authorized service area in a region that otherwise is partially obstructed by the ridge of Mt Penn itself, as was described in the application for the construction permit for the Roxborough transmitter.[1] The principal area to be served by the Reading transmitter is the City of Reading, the station's principal community. Both the Reading and Roxborough transmitters have been in continuous operation since November, 2007, under an Interim DTS Policy Special Temporary Authorization (STA), first granted by the Commission in File Number BSDTS-20060407ACP and subsequently renewed. A further renewal application for the STA, in File Number BESDTS-20080822ABU, filed in 2008, remains pending.

The FCC's rules on DTS operations are contained in new Section 73.626 of Part 73 of the FCC Rules, and in the Report and Order that established them.[2] The new rules include

[1] In File Number BMPCDT-20081027ACR

[2] *Digital Television Distributed Transmission System Technologies*, Report and Order, MB Docket No. 05-312 (FCC 08-256, released November 7, 2008) (the "*DTS R&O*").

provisions that permit multiple transmitters to be located within the Predicted Noise-Limited Contour (PNLC) of the facilities authorized to a station combined with a "Table of Distances" limit, that require coverage of the station's entire replication service area such that every location within that area is within the PNLC of at least one DTS transmitter, that require service to the station's entire community of license with a City Grade (noise limited +7 dB) signal, that limit acceptable new interference to other stations to a maximum of 0.5 percent (the same as for single-transmitter operations), and that permit the contours of the several transmitters in a DTS network to extend beyond the authorized contour by a minimal amount as necessary to provide service within the authorized contour. The DTS R&O also includes provisions for a Table of Distances alternative that allows the hypothetically maximized service area to equal the service area of the largest station in the market, as provided in §73.622(f)(5). Under the new rules, the interference predicted in a study cell to a neighboring station is to be computed using root-sum-squared (RSS) aggregation of the field strengths of the signals from the several transmitters in the DTS network. All of these precepts have been followed in the design and evaluation of the DTS network that has been operated by WTVE for the past several years under STA and part of which is sought to be licensed under the new DTS rules through the current application.

This Technical Statement has sections treating Transmitter Sites, Facilities, Service Area, Principal Community Coverage, Interference Analyses to U.S. Stations, Considerations Regarding Class A Stations, Cross-Border Considerations, Environmental Impact/Radio Frequency Radiation, and Notifications. Some interference tables appear in line with the text; all other tables and figures appear at the end of this document. While the Commission has used the abbreviation DTS to identify Distributed Transmission Systems; the term DTx, as used by the ATSC, also is used herein to discuss various aspects of Distributed Transmission beyond the system per se.

Transmitter Sites

There are two transmitter sites covered by the instant application – the existing site at Mt Penn, overlooking Reading (DTS Site 1), currently operating under the Interim DTS Policy STA issued to the station, and the recently-licensed site in Roxborough (DTS Site

2 on the Form 301 application),. Their locations are shown on the map in Figure 2. The reference point for WTVE remains at the location established in the Appendix B DTV Table of Allotments,[3] at a site known as Fancy Hill North (at coordinates 40-19-52 N, 75-41-41 W), also shown in Figure 2.

The Roxborough site was used for the most powerful transmitter in the DTS network in order to collocate it with an adjacent channel station in the same market, thereby overcoming, to the greatest extent possible, the interference from that adjacent channel neighbor to the service from WTVE. Collocation was required to avoid the loss of about 50 percent of the potential audience of the station to adjacent-channel interference that otherwise would have occurred. Roxborough is the site for which a license to cover recently has been granted for the facilities authorized in the most recent construction permit held by the station.

The Site 1 transmitter location at Reading, on Mt Penn, is the site from which the station has operated throughout its history, starting on Channel 51 with its analog facilities. It does now and will continue to provide service to the principal community of Reading, PA. Until it was just replaced by the newly-licensed facility at Roxborough, WTVE had a licensed, full-service but low-power, DTV facility at the Reading site (in File No. BLCDT-20040323ATZ). That original facility was supplanted by the DTS transmitter placed at the site under the Interim DTS Policy STA.

Facilities

The facilities requested in this application include continued operation at 763 W ERP at 225.4 meters HAAT at Site 1 in Reading and continued operation at 126 kW ERP at a height above average terrain (HAAT) of 378.4 meters at Site 2 in the Roxborough antenna farm. Both sites meet the requirements for maximum allowable facilities specified by §73.622(f)(8)(ii) of the Commission's Rules, as further permitted for DTS operations by the DTS R&O.[4] The basic characteristics of the transmitters proposed for authorization herein are given in Figures 1a and 1b for Sites 1 and 2, respectively, at the

[3] Memorandum Opinion and Order on Reconsideration of the Seventh Report and Order and the Eighth Report and Order *In the Matter of Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service*, MB Docket No. 87-268 (FCC 08-72, released March 6, 2008).
[4] DTS R&O ¶41.

end of this Technical Statement and in the related DTS Engineering portions of the Form 301 application – one for each transmitter.

Two fundamental antenna designs are included in the WTVE DTS network. The Site 1 antenna at Reading is a corporate-fed, cavity-slot design with parasitic radiators. It has a medium cardioid-shaped pattern intended to maximize the service in the Reading region to the north and west of Mt Penn. Because of the need to protect an in-market, adjacent-channel station, an unusual elevation pattern was used for the Reading antenna. It comprises a very narrow main beam near the horizontal (with a small amount of electrical beam tilt) and a pattern below the main beam shaped to result in nearly uniform field strength at locations from those in the peak of the beam to those near the base of the tower, assuming level terrain. The shape of the beam, relative to depression angle, follows that of the cosecant, turned upside down, with respect to relative field, and of the cosecant squared, turned upside down, with respect to power. Thus, the pattern can be described as an inverted cosecant (or cosecant-squared) shape. The shape used makes the field strength, in the region around a transmitter using it, a parameter of the network design, at least in areas where the terrain is level.

The Site 2 antenna at Roxborough is a four-sided, corporate-fed, panel array design with differing numbers of panels (8 and 12, respectively) on pairs of its faces. It has characteristics primarily intended to maximize service within the WTVE authorized service area plus DTS service circle, while constraining its contour to that limit to the extent possible, and originally also was intended to provide interference protection to analog co-channel stations in two adjacent markets and to a Class A station within its own market[5] by reducing field strength in their directions. The array pattern includes different electrical beam tilt values on different faces and notches above the main beams in the elevation patterns on two faces to aid in controlling both the contour location and interference to other stations. As a consequence, the pattern is quite complex and very difficult to describe in text and charts. A more complete description is included in the

[5] Protected stations included WNYE-TV, Channel 25, in New York City; WHAG-TV, Channel 25, in Hagerstown, MD; and W25AW, Channel 25, in Trenton, NJ. With respect to the latter, see the section below on Considerations Regarding Class A Stations.

data supplied with the Form 301 application in the Commission's CDBS Electronic Filing System, as described below.

Since it does not use an elevation pattern that varies with azimuth, the Reading antenna can be characterized by the combination of a single azimuth pattern and a single elevation pattern. Figure 3 contains a plot of the azimuth pattern used at Site 1. The tabulated relative field values used in the preparation of that pattern are given in Figure 4. The elevation pattern used at Reading is part of a family of patterns having the inverted cosecant squared shape and a set of electrical beam tilt angles that can be applied according to network design requirements. The family member used for the Reading DTS Site 1 transmitter has 0.7 degrees depression of the peak of the main beam and is plotted in Figures 5a and 5b, with two levels of detail. A portion of the tabulated data from which the Figure 5 plots were derived is given in Figure 6. (Complete pattern data are not included herein because of their size. But more complete elevation pattern data are included in the file uploaded to the CDBS Electronic Filing System [EFS], and full data are available upon request.) It should be noted that the azimuth pattern in Figures 3 and 4 are normalized to zero degrees and require rotation to the value given in Figure 1a and the Form 301 DTS for Site 1 (i.e., to 302 degrees).

Given its greater complexity, the Roxborough (Site 2) antenna requires more charts to document it. A plot of its relative field azimuthal radiation pattern at the depression angles having maximum radiation in each direction is provided as Figure 7a. Shown in Figure 7b is the relative field azimuthal radiation pattern at a depression angle of 0.8 degrees, which is the depression angle of the main beam from the 8-panel (southwest and northwest) faces. Plotted in Figure 7c is the relative field azimuthal radiation pattern at a depression angle of 3.4 degrees, which is the depression angle of the main beam from the 12-panel (northeast and southeast) faces. The tabulated azimuthal relative field values used in the derivation of Figures 7a, 7b, and 7c appear in Figure 8. The plots and data for the Roxborough antenna all are presented after necessary rotation of the antenna.

Because of the use of different electrical beam tilt values on the four faces, four elevation radiation patterns in relative field values are included as Figures 9a, 9b, 9c, and 9d for the

45-, 135-, 225, and 315-degree azimuths, respectively. The related tabulated elevation relative field values are given in Figure 10. While the elevation patterns are shown herein at bearings radiating directly out from the four faces of the antenna, the elevation patterns generated at azimuths between those bearings are quite complex. Consequently, in the file uploaded to the CDBS Electronic Filing System that characterizes the Roxborough antenna, data are provided for azimuths every 5 degrees around the compass, and even more detailed data (every degree of azimuth and every tenth of a degree of depression angle, throughout the array) can be supplied, if needed.

A plot of the PNLCs[6] of the transmitters is provided in Figure 2. Since the recently-licensed Roxborough transmitter facility (herein DTS Site 2) already covers the entire authorized service area of the station,[7] the provisions of §73.626(f)(1) are met by that facility alone. By virtue of the overlap of the contours of the two transmitters, they are contiguous, thereby meeting the requirements of §73.626(f)(3). Also shown in Figure 2 are the 48 dBu contours (in blue) of both the DTS Site 1 and DTS Site 2 facilities, both of which can be seen to encompass the principal community of Reading, PA. There is a major obstruction in the path over the principal community from Site 2 but not from Site 1; thus, the requirements of §73.626(f)(4) are met by the DTS Site 1 transmitter alone. These factors are discussed in more detail in the section below on Principal Community Coverage. Both transmitters in the proposed DTS network are located within the WTVE authorized service area, consequently meeting the requirements of §73.626(f)(6).

Given the complexity of the Site 2 antenna pattern, a large array of elevation data has been supplied for that antenna, using the complex data filing format specified for the Form 301 DTS application. It has been found in earlier filings for other stations that inclusion of azimuth pattern relative field or rotation data in the Form 301 DTS interferes with the correct determination of the amplitude characteristics and orientation of the pattern in the Commission's processing software. For this reason, the Site 2 Form 301

[6] To account for the dipole correction factor, the PNLCs are plotted at 39.85 dBu, with service statistics of F(50,90).

[7] Per §73.626(b), "For purposes of compliance with this section, a station's 'authorized service area' is defined as the area within its predicted noise-limited service contour determined using the facilities authorized for the station in a license or construction permit for non-DTS, single-transmitter-location operation."

DTS has been marked that the antenna is "Non-Directional." The antenna, however, is directional, with the alternate settings being required to make the Commission's input processing software correctly represent the data that describes the antenna. The actual azimuth rotation for the antenna at DTS Site 2 is provided in Figure 1b below and built into the complex elevation pattern data uploaded to the EFS.

Both of the transmitters used in the WTVE DTS network are Type Verified as per Section 73.1660 of the Commission's Rules. Both transmitters are of solid state designs. They are synchronized using the methods specified in the ATSC Synchronization Standard for Distributed Transmission (A/110B), and they emit the RF Watermark transmitter identification signal defined in the A/110B document.

Service Area

Section 73.622(f)(5) provides that stations may exceed the limits on power and antenna height included in §73.622(f)(6) through (8) "up to that needed to provide the same geographic coverage area as the largest station within their market." The DTS R&O applies the same exception to DTS operations. In ¶35 "Largest Station" Alternative, it states, "As an alternative to the Table of Distances Approach for determining the hypothetically maximized service area, full-power stations may use the 'largest station' provision in section 73.622(f)(5) of the rules."[8]

To implement the provisions of §73.622(f)(5), a method has been followed to determine the radius of a circle that matches the area contained within the contour of the largest station in the same market as that of the applicant. The market has been defined by the Commission as the DMA in which a station is located.[9] WTVE is located in the Philadelphia DMA. As noted in the First DTV Periodic Report and Order, "the geographical coverage determination is based on the area within the DTV station's noise-limited contour, calculated using predicted F(50,90) field strengths as set forth in section

[8] *Digital Television Distributed Transmission System Technologies*, Report and Order, MB Docket No. 05-312 (FCC 08-256, released November 7, 2008) ¶35.

[9] See *Review of the Commission's Rules and Policies Affecting the Conversion to Digital Television*, MM Docket No. 00-39, Report and Order, 16 FCC Rcd 5946, 5973-4, ¶¶73-4 (2001) ("First DTV Periodic Report and Order").

73.622(e) of the rules and the procedure specified in section 73.625(b) of the rules."[10] The largest station in the Philadelphia DMA appears to be KYW-DT, which is licensed on Channel 26 with a non-directional antenna pattern at 790 kW and Height Above Average Terrain (HAAT) of 375 meters. Using the method of §73.625(b) (as implemented in the EDX SignalPro program[11]) and a field strength of 39.95 dBu for the contour, as determined using the dipole factor correction formula found in OET Bulletin No. 69, as referenced in §73.622(e), the PNLC of KYW encloses an area of 34,053.35 km^2. Treating this area as the area of a circle, the radius is found by first dividing by Pi and then taking the square root. The resulting radius is 104.113 km, which is the radius of the circle represented in green in Figure 2 and which is used, in combination with the authorized service area contour, as the outer boundary of the service area for the WTVE network. This circle is termed the "Largest Station Circle" hereinafter.

The various contours and the Largest Station Circle related to the WTVE application are shown in Figure 2. In that figure the Site 1 PNLC is represented by the purple contour. Both the DTS Site 2 PNLC and the authorized service area boundary are represented by a single orange contour, both having been derived from the identical facility. The Largest Station Circle is in green. As required by the DTS R&O and §73.626, all WTVE service contours were determined using the method of §73.625(b) (as implemented in the EDX SignalPro program[12]), with a field strength of 39.85 dBu for the PNLC and authorized service area contours, as determined using the dipole factor correction formula found in OET Bulletin No. 69, as referenced in §73.622(e).

A version of the Commission's TV_Process program, modified for analysis of DTS applications and facilities,[13] was used to analyze the instant application. Among other specialized DTS analysis capabilities, it provides for changing the Table of Distances

---

[10] Id.

[11] The Fortran code in the SignalPro program was evaluated to confirm its conformance with the method defined in §73.625(b) of the rules, including computation of the HAAT from 3.2 – 16.1 km, use of the formula provided in the rule for determination of depression angle, application of the 90-percent field factor in determination of the consequent power value, and use of the Commission's TVFMFS Fortran code for contour distance determination. It was set to evaluate the contour distance on 1-degree-spaced radials, however, rather than at 45-degree-spaced headings.

[12] Do.

[13] See the section below on Interference Analyses to U.S. Stations for information on the version of the TV_Process program used and a description of the modifications.

radius to account for the Largest Station Alternative. In its analysis of the WTVE system, it found numerous locations, at bearings of 102.75 to 176.25 degrees from the station reference point, where the combined service area of the two DTS transmitters exceeded the combination of the Authorized Service Area contour and the Largest Station Circle by amounts mostly under 0.5 km but extending up to 1.116 km. These locations constitute the portion of the DTS Site 2 contour where it and the Authorized Service Area contour exceed the Largest Station Circle.

The differences are explained by the fact that the Authorized Service Area used by the TV_Process program depends on a simple azimuth pattern data set that was synthesized for use in the application for modified construction permit[14] that authorized the now-licensed WTVE facility. Use of such an azimuth pattern representation was necessitated by the inability of the normal CDBS antenna pattern data structure to correctly represent the characteristics of an antenna of the pattern complexity of the WTVE Site 2 antenna. The approach taken was fully disclosed in the Technical Statement that accompanied that earlier application.[15] The CDBS is able to accept data characterizing complex antennas in its DTS input data structure, and the DTS version of the TV_Process program is able to analyze such patterns. Thus, since they both were derived from the identical antenna and power level, the small differences found by the program between the Authorized Service Area boundary and the DTS Site 2 contour cannot exist in reality. Rather, they are artifacts of the process used to synthesize the azimuth pattern filed with the construction permit modification application in comparison with the more precise data model and methods now being applied to DTS applications.

Given these circumstances, the correct answer to Question 8(b) with respect to each transmitter's coverage being contained within either the DTV station's Table of Distances area or its authorized service area is the first choice: "Yes, coverage entirely contained within station's authorized service area." Nevertheless, because of the findings of the TV_Process program and in an abundance of caution, the second answer "Yes, but coverage exceeds station's authorized service area by 'minimal amount'" has been

[14] In File Number BMPCDT-20081027ACR.
[15] In the section on Facilities, in particular, at the bottom of page 5 and top of page 6.

selected. Even if the answer selected were the correct one, coverage outside the authorized service area would be *de minimis*, and there would be no reason for it to preclude approval of the requested facilities. It should be noted, moreover, that the requested facilities at both sites are those that have been in operation at those sites for several years.

Principal Community Coverage

As required by Section 73.625(a)(1) of the FCC rules, the transmitter location must be chosen so as to put a minimum F(50,90) field strength of 48 dBu over the entire principal community to be served. Section 73.625(a)(2) further requires that "The location of the antenna must be so chosen that there is not a major obstruction in the path over the principal community to be served." Moreover, §73.626(f)(4) requires that the coverage from one or more DTS transmitters be shown to provide principal community coverage as required by §73.625(a). As demonstrated by the 48-dBu contour of the Site 1 (Reading) transmitter, shown on the coverage map of Figure 2, the transmitter location chosen, combined with the other characteristics of the transmission system, indeed does deliver the minimum required field strength over the entire principal community to be served – Reading, PA. Thus, the requirements of §73.626(f)(4) are met by a single transmitter.

The DTS R&O expresses concern, however, "that, in cases where DTS stations propose to use multiple transmitters to comply with Section 73.625(a), the interaction between the signals from the different transmitters may make reception difficult or impossible in some part of the overlapping coverage areas." It continues, "Therefore, while we will afford DTS stations the flexibility to satisfy our principal community coverage requirement with multiple transmitters, we will disallow proposals that fail to address this concern." In the case of the two transmitters in the WTVE network included in the instant application, both 48 dBu contours cover the City of Reading. It turns out, though, that signals from the Site 2 transmitter are blocked by Mt Penn and surrounding terrain from reaching Reading. Consequently, Reading is served only by the Site 1 transmitter on Mt Penn, which delivers a dominant signal to Reading, and there is no destructive interference predicted between the two transmitters within the Reading boundary.

Despite the presence of the Site 1 transmitter on Mt Penn and because of terrain within the City of Reading, however, there remains an obstruction in the path over a portion of the city. That obstruction is the extension of Mt Penn in a generally southerly direction from the WTVE transmitter site. The extent of the obstruction is shown on the map of Figure 11. While the obstruction has existed throughout the period of WTVE operation from Mt Penn, it is pointed out here, in an abundance of caution, so that the Commission will have before it all the facts as it considers the current application.

As the Commission noted in its reconsideration of the Fifth DTV Report and Order, "For either NTSC or DTV, there are situations where line-of-sight coverage over the entire community is not possible. In such situations, licensees should avoid obstruction to the extent possible."[16] That is the approach taken here. A search was conducted for other sites from which service to the entirety of Reading could be provided. There were no existing towers that we could locate capable of providing service to all of Reading. One area was identified from which it might have been possible to provide service to virtually all of Reading, but it is an area with no existing towers. Moreover, the identified area has a strip mining operation gradually depleting the formation that provided the possibility for complete coverage of Reading. It was not believed that approval could have been obtained to build at that site in time to meet the Commission deadlines for construction, if such approval ever could have been obtained. Consequently, the Reading distributed transmitter (Site 1) was located at the same site used by WTVE throughout its history to provide service to the City of Reading. It is the location of the station's previously-licensed digital facilities. While, because of the Commission's prior pronouncements on the subject, no waiver of the principal community coverage requirements is believed necessary in this instance, such a waiver is respectfully requested in the event that the Commission determines one to be necessary.

[16] Memorandum Opinion and Order on Reconsideration of the Fifth Report and Order In the Matter of Advanced Television Systems and Their Impact upon the Existing Television Broadcast Service, FCC 98-23, released February 23, 1998, ¶95.

Interference Analyses to U.S. Stations

The interference analysis process for the WTVE application for a DTS construction permit has been a complex and thorough undertaking. In particular, two precepts of the new rules for authorization of DTS systems have been followed rigorously – namely, the requirement that, in each study cell, the field strength be aggregated from the multiple transmitters in the network using the root-sum-square (RSS) method prior to computing the D/U ratio and making a determination whether interference is predicted to that cell and the requirement that no more than 0.5 percent of additional interference be caused to any other station licensed by the Commission.

Interference analyses were conducted using a modified version of the Commission's TV_Process program. The program has been modified to conduct the new interference analyses specified in the DTS rules and is a version of the software currently installed at the Commission for its evaluation of DTS proposals. The edits to the program have been made by its author, William C. Meintel of Meintel, Sgrignoli and Wallace LLC. Aside from the changes being made to the program to meet the provisions of the new DTS rules (as promulgated in §73.626 and the DTS R&O), two additional capabilities have been provided in the program used. One is alteration of the Table of Distances circle radius to permit evaluation of the Largest Station alternative, as described above in the section on Service Area. The other is determination of the depression angle from a transmitting antenna to a receiving antenna in a study cell based on the difference in heights of the two antennas (transmitting and receiving), using the sum of the height of the ground level at each location plus the height of the antenna above ground to obtain the actual height of each antenna. In other words, the height of the radiation center of each antenna above mean sea level (RCAMSL) is used to find the depression angle from the transmitting antenna and the corresponding relative field of the antenna in the direction of the receiver. The ability to use antenna height AMSL to compute the depression angle and relative field for quite some time has been in the code used by the Commission but has not been activated. The edited version of the software provides a setup switch to enable its use when desired.

The importance of using antenna height AMSL correctly to determine the depression angle from transmitter to receiver and the corresponding relative field and transmitted power values was the subject of a filing with the Commission in the DTS docket by a group of engineering firms.[17] The filing pointed out the erroneous results that would be obtained in areas having significant terrain variation without the use of the correct values for antenna height AMSL. A copy of the filing is attached hereto in Annex A. For purposes of this application, the interference analyses were conducted both ways – i.e., without applying the antenna height AMSL but just the height above ground level (AGL) and with the correct application of the antenna height AMSL. The results of both methods with respect to interference to other Commission licensees are reported separately below. Since the new DTS rules require the submission of elevation patterns in addition to azimuth patterns, and since both the CDBS Electronic Filing System and the new TV_Process software make provisions for their analyses, in the analyses reported herein, the submitted elevation patterns were applied to the DTS transmitters.

The interference analysis method applied by the TV_Process program is divided into two stages. In the first stage, all stations having specific channel relationships to the proposed facilities and within defined distances of any of the DTS transmitters are identified for inclusion in the studies. Next, stations among the selected group are studied preliminarily to determine whether there are any study cells to which interference is predicted to be caused by the combined signals of the transmitters in the DTS network, without consideration of masking by interference from other stations. (All evaluations using the combined signals from multiple transmitters in the network use the RSS summation of the field strengths to represent the aggregated signal from the DTS network.) Once stations predicted to receive any amount of unmasked interference are identified, in the second stage, they then are studied in detail to determine the amount of any increase in interference predicted with respect to the interference predicted to be caused by the reference facilities. The reference facilities are those provided for WTVE

[17] See *Reply Comments Of Cavell, Mertz & Associates, Inc.; Chesapeake RF Consultants, LLC; Du Treil, Lundin & Rackley, Inc.; Greg Best Consulting, Inc.; Hatfield & Dawson Consulting Engineers, LLC; Meintel, Sgrignoli, & Wallace, LLC; Merrill Weiss Group LLC; and Smith and Fisher LLC to Petition for Reconsideration of the Association for Maximum Service Television, Inc.*, filed May 8, 2009, in MB Docket 05-312.

in the DTV Table of Allotments in Appendix B to the DTV Reconsideration Order.[18] The amount of interference is based upon population counts of those predicted to receive signals with less than the required ratio between desired and undesired signals as specified in the Commission's rules for the particular channel relationship.

The results of the interference analyses to U.S. stations are shown in Tables 1 and 2. Table 1 provides the results of studies that did not use the corrected evaluation of depression angle, deriving that value only from the height of the transmitting antenna above ground level, as previously implemented in the Commission's software. Conversely, Table 2 provides the results of studies with corrected determination of depression angle, deriving it from the total heights of both the transmitting and receiving antennas AMSL. In these tables, each station that was identified by TV_Process as relevant and its basic identification information are listed in the leftmost four columns. The fifth column indicates which method was used to determine the depression angle from the transmitters to the receiver in each study cell. The five columns on the right side of the tables show the number of scenarios studied for each desired station, the baseline population against which changes are measured, the population predicted to receive interference from the reference facility, the population predicted to receive interference from the proposed facility, and the amount of change, expressed as a percentage.

Two symbols used in Tables 1 and 2 signify certain results reported by the TV_Process program. An asterisk (*) indicates that TV_Process reported that the "Proposed station is beyond the site to nearest cell evaluation distance." A dash (—) denotes that TV_Process reported that the "Proposal causes no interference." In both of these cases, the initial culling pass performed by TV_Process found that there would be no interference predicted to the subject stations. In the case of the asterisks, this resulted because the closest study cells were too far away from all the transmitters for evaluation. In the case

[18] *Memorandum Opinion and Order on Reconsideration of the Seventh Report and Order and Eighth Report and Order in the Matter of Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service*, MB Docket No. 87-268, FCC 08-72, adopted March 3, 2008, and released March 6, 2008 (the "DTV Reconsideration Order").

Table 1 — WTVE DTS Interference Studies to Neighboring Stations Without Antenna Height AMSL Calculation

Chnl	Station	City	Application Reference Number	AMSL Used	# Scen-arios	Baseline Population	Ref IX Population	DTS IX Population	% IX Chg
17	WEBR-CD	Manhattan, NY	BLTTL-19960116JC	No	*	*	*	*	*
24	WPSJ-LP	Hammonton, NJ	BLTTA-20060720ADQ	No	—	—	—	—	—
24	WNYE-TV	New York, NY	BMPEDT-20070124AAX	No	—	—	—	—	—
24	WNYE-TV	New York, NY	DTVPLN-DTVP0882	No	—	—	—	—	—
24	WNYE-TV	New York, NY	BLEDT-20071228ABM	No	—	—	—	—	—
24	W24BB	E. Stroudsburg, PA	BLTTL-19911219JM	No	—	—	—	—	—
24	WNVC	Fairfax, VA	BMPEDT-20080609ACI	No	—	—	—	—	—
24	WNVC	Fairfax, VA	DTVPLN-DTVP0896	No	*	*	*	*	*
25	WZDC-CA	Washington, DC	BDFCDTA-20080804ACV	No	—	—	—	—	—
25	WZDC-CA	Washington, DC	BLTTL-20070309ADR	No	—	—	—	—	—
25	WFXZ-CA	Boston, MA	BDISDTA-20090902ABE	No	*	*	*	*	*
25	W25AW	Trenton, NJ	BLTTA-20030512ABW	No	1	259,122	35,477	100,019	24.9080
25	WGCE-CA	Rochester, NY	BDISDTA-20080804AEV	No	*	*	*	*	*
25	WONS-LP	Olean, NY	BLTTL-19890608IB	No	—	—	—	—	—
25	WCNY-TV	Syracuse, NY	BMLEDT-20040916ABJ	No	4	1,272,446	1,237	553	–0.0538
25	WCNY-TV	Syracuse, NY	DTVPLN-DTVP0919	No	4	1,272,446	1,237	553	–0.0538
25	KDKA-TV	Pittsburgh, PA	BLCDT-20041001ACS	No	—	—	—	—	—
25	KDKA-TV	Pittsburgh, PA	DTVPLN-DTVP0920	No	—	—	—	—	—
25	W25CS	Chesapeake, VA	BLTTL-20021216AAN	No	*	*	*	*	*
25	WTVR-TV	Richmond, VA	BLCDT-20021204ABA	No	2	1,531,168	1,017	958	–0.0039
25	WTVR-TV	Richmond, VA	DTVPLN-DTVP0925	No	2	1,531,168	1,017	958	–0.0039
25	WAZM-CA	Waynesboro, VA	BLTTL-20011107ABW	No	—	—	—	—	—
26	KYW-TV	Philadelphia, PA	BPCDT-20080620ABO	No	48	10,090,119	162,834	131,188	–0.3136
26	KYW-TV	Philadelphia, PA	DTVPLN-DTVP0959	No	48	10,075,624	163,219	131,520	–0.3146
28	WFPA-CA	Philadelphia, PA	BLTTL-20000428ABK	No	720	1,736,948	273,047	273,047	0.0000

Table 2 — WTVE DTS Interference Studies to Neighboring Stations With Antenna Height AMSL Calculation

Chnl	Station	City	Application Reference Number	AMSL Used	# Scen-arios	Baseline Population	Ref IX Population	DTS IX Population	% IX Chg
17	WEBR-CD	Manhattan, NY	BLTTL-19960116JC	Yes	*	*	*	*	*
24	WPSJ-LP	Hammonton, NJ	BLTTA-20060720ADQ	Yes	—	—	—	—	—
24	WNYE-TV	New York, NY	BMPEDT-20070124AAX	Yes	—	—	—	—	—
24	WNYE-TV	New York, NY	DTVPLN-DTVP0882	Yes	—	—	—	—	—
24	WNYE-TV	New York, NY	BLEDT-20071228ABM	Yes	—	—	—	—	—
24	W24BB	E. Stroudsburg, PA	BLTTL-19911219JM	Yes	—	—	—	—	—
24	WNVC	Fairfax, VA	BMPEDT-20080609ACI	Yes	—	—	—	—	—
24	WNVC	Fairfax, VA	DTVPLN-DTVP0896	Yes	*	*	*	*	*
25	WZDC-CA	Washington, DC	BDFCDTA-20080804ACV	Yes	—	—	—	—	—
25	WZDC-CA	Washington, DC	BLTTL-20070309ADR	Yes	—	—	—	—	—
25	WFXZ-CA	Boston, MA	BDISDTA-20090902ABE	Yes	*	*	*	*	*
25	W25AW	Trenton, NJ	BLTTA-20030512ABW	Yes	1	259,122	35,477	132,842	37.5750
25	WGCE-CA	Rochester, NY	BDISDTA-20080804AEV	Yes	*	*	*	*	*
25	WONS-LP	Olean, NY	BLTTL-19890608IB	Yes	—	—	—	—	—
25	WCNY-TV	Syracuse, NY	BMLEDT-20040916ABJ	Yes	4	1,272,446	1,237	553	–0.0538
25	WCNY-TV	Syracuse, NY	DTVPLN-DTVP0919	Yes	4	1,272,446	1,237	553	–0.0538
25	KDKA-TV	Pittsburgh, PA	BLCDT-20041001ACS	Yes	—	—	—	—	—
25	KDKA-TV	Pittsburgh, PA	DTVPLN-DTVP0920	Yes	—	—	—	—	—
25	W25CS	Chesapeake, VA	BLTTL-20021216AAN	Yes	*	*	*	*	*
25	WTVR-TV	Richmond, VA	BLCDT-20021204ABA	Yes	2	1,531,168	1,017	958	–0.0039
25	WTVR-TV	Richmond, VA	DTVPLN-DTVP0925	Yes	2	1,531,168	1,017	958	–0.0039
25	WAZM-CA	Waynesboro, VA	BLTTL-20011107ABW	Yes	—	—	—	—	—
26	KYW-TV	Philadelphia, PA	BPCDT-20080620ABO	Yes	48	10,091,696	161,257	102,126	–0.5859
26	KYW-TV	Philadelphia, PA	DTVPLN-DTVP0959	Yes	48	10,076,346	162,497	105,621	–0.5645
28	WFPA-CA	Philadelphia, PA	BLTTL-20000428ABK	Yes	720	1,736,948	273,047	273,047	0.0000

of the dashes, the result occurred because an initial interference study found, without consideration of masking interference from other stations, that there was no interference predicted to any study cell in the service area of the desired station studied.

A total of 17 stations were studied – all of them in several variations, with the number of variations totaling 25. That is, licensed facilities, construction permit facilities, and DTV Plan facilities all were studied separately. Although the original DTV Plan facilities now generally are meaningless, the rules still require that they be protected, so they are included in the tables herein when they appear in the various TV_Process output files. Of the stations shown in the tables, 11 are Class A stations, which will be discussed in detail in a subsequent section of this Technical Statement.

A total of six full-service stations (WNYE-TV, WNVC, WCNY-TV, KDKA-TV, WTVR-TV, and KYW-TV) in 13 variations were identified by the TV_Process program as requiring study for potential interference from the proposed DTS network. Of these, the program reported that "The proposal causes no interference" or "Proposed station is beyond the site to nearest cell evaluation distance" with respect to three of them (WNYE, WNVC, and KDKA) under all variations and conditions studied. That leaves three stations (WCNY, WTVR, and KYW) in six variations to address. For two of these stations (WCNY and WTVR), there is no difference in the results reported by the two methods, which makes sense since the stations are in different markets and the depression angles to the study cells do not vary much at all with the slight differences in radiation center heights that the two types of studies produce. With respect to the third station (KYW), however, there is a reduction in interference when the actual antenna elevations are taken into account in Table 2 versus the results produced in Table 1. These differences in results comport with reality since the Site 1 antenna is at a high location (atop Mt Penn) and has a very significantly reduced signal level at steep depression angles that is not recognized when only the height above ground level is taken into account, as in Table 1. This result leads to the conclusion that far more attention should be paid to the results in Table 2 and that the results in Table 1 should be discounted, although they have been provided in the interest of consistency with the Commission's past practice.

As shown in Table 2 regarding the six full-service stations listed, the result of the overall network design is that predicted new interference is non-existent with respect to seven variations, is reduced by a minor amount with respect to four variations, and is reduced significantly with respect to two variations of a single station. The seven variations that showed no change did not require full study because of their distances from the DTS network or because they were predicted by the initial culling study to receive no interference. Clearly, with respect to other full-service stations, the design meets the objectives set by the FCC for the management of interference when stations improve their facilities or adopt DTS technology.

Considerations Regarding Class A Stations

The Commission's TV_Process program also was used to locate and evaluate predicted interference to Class A stations. The TV_Process program identified and examined a total of 12 records for 11 Class A stations. Four of these records and stations show that the "proposed station is beyond the site to nearest cell evaluation distance," indicating that the initial culling study done by TV_Process found that there was no need to evaluate them further because of the spacing between both of the DTS sites and the Class A station. Another six records for five stations showed that the "proposal causes no interference," indicating that the initial culling study done by TV_Process found that there was no need to evaluate them further because there was no interference caused to any study cell of the desired stations when interference masking by other stations was not taken into account. For the remaining two Class A stations (W25AW and WFPA-CA), the TV_Process program reported contour overlap with DTS Site 2 (Roxborough).

Section 73.623(c)(5) of the FCC rules specifies the contour overlap method as the principal means for determining protection to Class A stations, but it also provides, in §73.623(c)(5)(iii) that "In support of a request for waiver of the interference protection requirements of this section, an applicant for a DTV broadcast station may make full use of terrain shielding and Longley-Rice terrain dependent propagation methods to demonstrate that the proposed facility would not be likely to cause interference to Class A TV stations." The cited rules section then points to the method of OET Bulletin No. 69 as the means for making the necessary demonstration. The TV_Process program is the

Commission's implementation of the methodology of OET-69. As shown in both Tables 1 and 2, with respect to WFPA-CA, there is no change predicted to the interference to that station. This is the same result obtained when the Commission granted the construction permit now covered by a license for the Roxborough (Site 2) transmitter. Consequently, no further waiver should be required with respect to interference to that station, but one is respectfully requested should the Commission deem such a waiver to be necessary.

This leaves one Class A station – W25AW, on Channel 25 in Trenton, NJ – for which interference is predicted from the Roxborough transmitter, as shown in Tables 1 and 2 and also in contour overlap studies conducted by the TV_Process program. As explained just below, interference did occur to this station, and it filed an informal objection with the Commission. An interference agreement was reached between the parties, and a request for dismissal of the interference complaint, with prejudice, was filed by the licensee of W25AW. [19] The private agreement cited in the Request for Dismissal provides, in part, that WZBN (the licensee of W25AW) may object to modifications of the WTVE facilities with respect only to any WTVE changes predicted, using FCC contour-overlap methods, to result in reduced interference protection to W25AW. No modifications of WTVE facilities are contemplated by the instant application, and, therefore, there will be no reduction in interference protection to W25AW.

By way of background, in the application for the construction permit underlying the recently-licensed WTVE-DT facility, the application for the previously-authorized maximization facility, and the application for the DTS STA under the Interim DTS Policy, W25AW was studied using the contour overlap method, described in §73.623(c)(5) as the primary method for determining protection to Class A stations. In preparing those applications, the same station first was studied using the TV_Process program to determine contour overlap, and it computed D/U ratio values along the Class A station's service contour ranging from 12.18 to 18.27 dB with respect to the WTVE-DT proposal. The TV_Process program's algorithm, however, fails to evaluate the

[19] "Request for Dismissal of Interference Complaint," to Chief, Video Division, Media Bureau, FCC, dated April 10, 2008, and signed by Peter Tannenwald, Counsel for WZBN TV, Inc.

contour overlap of the original facility (e.g., in the case of the maximization CP application, the FCC's DTV Plan facility) to determine whether the proposed facility creates a greater contour overlap. Therefore, separate comparisons were submitted with each of the applications, showing on a map the overlap with the W25AW protected contour of the DTV Plan reference facilities for WTVE-DT and the contour overlap of the then-proposed facilities. Since two CPs and the DTS STA were granted, the method used apparently was acceptable to the Commission.

Given the approach taken in the prior CP applications, the same method was followed in the DTS STA application, the information from which is repeated herein since some of the same facilities are involved. Figure 12 shows the protected contour of W25AW (in red), calculated using the Commission's F(50,50) curves, and the interfering contours of several WTVE-DT facilities studied, calculated using the F(50,10) curves. As can be seen in the figure, the 61.6 dBu contour of the original reference DTV Plan facilities (in cyan) just touches the protected contour of the Class A station. Also visible in the figure is the 61.6 dBu contour of the approved maximization construction permit facilities (in blue), which almost touches the protected contour of the Class A station. Added to these contours from the map in the CP application were two contours from the Roxborough and Mt Airy DTx transmitters (in green). As can be seen in Figure 12, the 61.6 dBu contours were moved a bit away from the service contour of the Class A station, thereby providing more protection than was required. In fact, the contours that are tangent to the Class A service contour are the 55.5 dBu contour from Roxborough (DTS Site 2 in the current application) and the 59.9 dBu contour from Mt Airy (DTS Site 6 in the DTS STA application).

The fact that the interference predicted to W25AW was shown not to be increased did not mean that no interference would be caused to that station. In fact, the Commission's original allotment facilities for WTVE-DT were predicted to cause interference. Using the analysis method prescribed by the rules, the showings provided with the WTVE-DT applications for its CP and for the DTS STA demonstrated that the interference to W25AW would not be increased over that predicted for the allotment facility, using the prescribed analysis methods. In fact, when the Roxborough transmitter was turned on, interference did occur. The owner of W25AW filed an informal objection with the FCC. After several exchanges with the Commission on the matter, by the owner of WTVE-DT and the owner of W25AW, the owner of W25AW withdrew its informal objection, with prejudice, so long as there were no changes in the DTS system that would affect its operations. With respect to the current application, there are no changes proposed to the Roxborough transmitter relative to the facility covered by the withdrawal of the informal objection regarding the WTVE-DT DTS network by the owner of W25AW. Thus, there is no reason that any further consideration of interference to that station is necessary. For reference, a copy of the letter to the Commission, from the attorney for W25AW, withdrawing the interference objection with prejudice, is attached hereto as Annex B.

Cross-Border Considerations

In accordance with provisions of the Exchange of Letters ("EOL") currently in effect regarding DTV coordination between the United States and Canada,[20] changes in stations within 360 km[21] of the U.S.-Canadian border require coordination between the U.S. and Canadian governments as part of the authorization process. At 372.1 km to the nearest point on the Canadian border, the Reading site, the nearest of the two sites in the instant application to that border (and Site 1 of the current application), falls outside the coordination distance. Consequently, it is believed that the current application can be approved by the FCC without the concurrence of Industry Canada. As a result, no data concerning studies of potential interference to Canadian stations is provided herewith. Nevertheless, such studies have been conducted using the OET-69 methods specified in the EOL and showed that no interference is predicted to be caused to any Canadian stations. Information on the relevant interference studies can be supplied upon request.

---

[20] Exchange of Letters between the Federal Communications Commission and Industry Canada: (1) Letter to Mr. Kevin Lindsey, Acting Assistant Deputy Minister, Spectrum, Information Technologies and Telecommunications, Industry Canada, from Kevin J. Martin, Chairman, Federal Communications Commission, dated August 5, 2008. (2) Letter to Kevin J. Martin, Chairman, Federal Communications Commission, from Helen McDonald, Assistant Deputy Minister, Spectrum, Information Technologies and Telecommunications, Industry Canada, dated December 15, 2008. (3) Attached Tables A, B, C, and D.

[21] Letter of response from Helen McDonald, Assistant Deputy Minister, Spectrum, Information Technologies and Telecommunications, Industry Canada, to Kevin J. Martin, Chairman, FCC, dated December 15, 2008, noting that Tables A, B, C, and D "list all agreed assignments and allotments within 360 km of our common border."

Environmental Impact / Radio Frequency Radiation

None of the conditions specified in Section 1.1307 that would require the preparation of an Environmental Assessment pertain with respect to the proposed facilities at any of the sites included in this application. In particular, because they both are existing facilities mounted on towers at existing sites, the operations for which authorization is sought do not implicate many of the causes for further investigation and preparation of further reports.

With respect to Radio Frequency Radiation exposure, OET Bulletin No. 65 provides methods for evaluating the level of exposure for both employees (occupational/controlled situations) and non-employees (general population/uncontrolled situations). The combinations of the antenna radiation patterns, as provided in the manufacturer's technical specifications, with the antenna heights above ground level and the operating power levels indicate that the potential exposure would be less than 5 percent of the Maximum Permissible Exposure (MPE) limit for general population / uncontrolled situations at both sites. Specifically, application of the formulas provided in OET-65 yields values of less than one percent in both cases. Thus, the proposed operations are categorically excluded from having to submit detailed RF exposure analyses of the sites.

Notwithstanding the foregoing, WTVE recognizes its responsibility for the safety and health of employees and contractors when exposed to RF radiation conditions. It will work cooperatively with other users of the sites and will take the steps necessary to assure that personnel working in its facilities and on the towers and antennas are protected from exposure to RF radiation levels exceeding those specified in the Commission's rules. The steps to be taken will include measurements and monitoring as well as power reductions or turning off the transmitters, if necessary to ensure a safe working environment.

Notifications & Measurements

Neither of the proposed sites is in proximity to any of the government radio astronomy installations named in Section 73.1030, nor are they proximate to any of the named radio receiving locations. Furthermore, the nearest FCC monitoring station is over 150 km distant from the closer site (DTS Site 1 – Reading). Thus, none of the notifications mandated or recommended by Section 73.1030 is required in this instance.

The proposed Roxborough site is nearby to (about 0.5 km distant from) a 50 kW AM broadcast station (WNWR) having a three-tower directional array antenna. The site owner, American Tower Corporation, has an agreement with the owner of WNWR to make the necessary measurements covering any construction activity at the site on an annual basis. The agreement between American Tower and WNWR relieves WTVE from the responsibility for making field strength measurements of the AM station as provided in §73.1692(d) of the FCC rules. Moreover, since the antenna to be used under the requested construction permit was installed under the DTS STA several years ago, any measurements necessary under the agreement already will have been made. Thus, no further action should be required with respect to the nearby AM station.

Figure 1a — Technical Specifications — Proposed WTVE DTS Facility Channel 25 — Reading, PA — Site 1: Reading

Frequency

Channel	25
Frequency Band	536 – 542 MHz
Center Frequency	539 MHz

Location

Site	Atop Mt Penn, east of Reading, PA
Geographic Coordinates (NAD27)	40° 21’ 15.57” N 75° 53’ 56.96” W
Tower Registration (FAA Study Number)	1254286 (2006-AEA-2348-OE)

Elevation

Elevation of site above mean sea level	335.2 m
Overall height of tower above site elevation	66.7 m
Overall height of tower above mean sea level	401.9 m
Height of antenna radiation center above site elevation	30.5 m
Elevation of average terrain (45-degree-spaced radials, 3.2-16.1 km)	140.4 m
Height of antenna radiation center above mean sea level	365.7 m
Height of antenna radiation center above average terrain (HAAT)	225.3 m

Antenna

Manufacturer	Radio Frequency Systems
Model	DX32B-07
Description	Side-Mounted, Corporate-Fed, UHF Cavity-Slot
Orientation (rotation around vertical axis)	302 degrees true
Electrical beam tilt	0.70°
Mechanical beam tilt	None
Polarization	Horizontal
Gain (peak of beam – 0.70° depression)	70.96 (18.51 dBd)
Gain (in horizontal plane – 0° depression)	47.64 (16.78 dBd)

Power

Effective radiated power (ERP) (main beam – 0.70° depression)	0.763 kW
Effective radiated power (ERP) (horizontal plane)	0.512 kW

Figure 1b — Technical Specifications — Proposed WTVE DTS Facility Channel 25 — Reading, PA — Site 2: Roxborough

Frequency

Channel	25
Frequency Band	536 – 542 MHz
Center Frequency	539 MHz

Location

Site	Roxborough Antenna Farm, Philadelphia, PA
Geographic Coordinates (NAD27)	40° 02’ 29.56” N 75° 14’ 12.89” W
Tower Registration (FAA Study Number)	1231524 (2008-AEA-3763-OE)

Elevation

Elevation of site above mean sea level	89.0 m
Overall height of tower above site elevation	383.1 m
Overall height of tower above mean sea level	472.1 m
Height of antenna radiation center above site elevation	354.6 m
Elevation of average terrain (45-degree-spaced radials, 3.2-16.1 km)	65.2 m
Height of antenna radiation center above mean sea level	443.6 m
Height of antenna radiation center above average terrain (HAAT)	378.4 m

Antenna

Manufacturer	Radio Frequency Systems
Model	PHP-40T
Description	Top-Mounted, Corporate-Fed, UHF Panel Array
Orientation (rotation around vertical axis)	225° true
Electrical beam tilt	Varies: 0.8 – 3.5°
Mechanical beam tilt	None
Polarization	Horizontal
Gain (peak of beam – 135° azimuth, 3.4° depression)	17.378 (12.40 dBd)
Gain (in horizontal plane – 221° azimuth, 0° depression)	14.588 (11.64 dBd)

Power

Effective radiated power (ERP) (peak of beam– 135 az., 3.4° depression)	126.0 kW
Effective radiated power (ERP) (maximum in horizontal plane)	105.8 kW

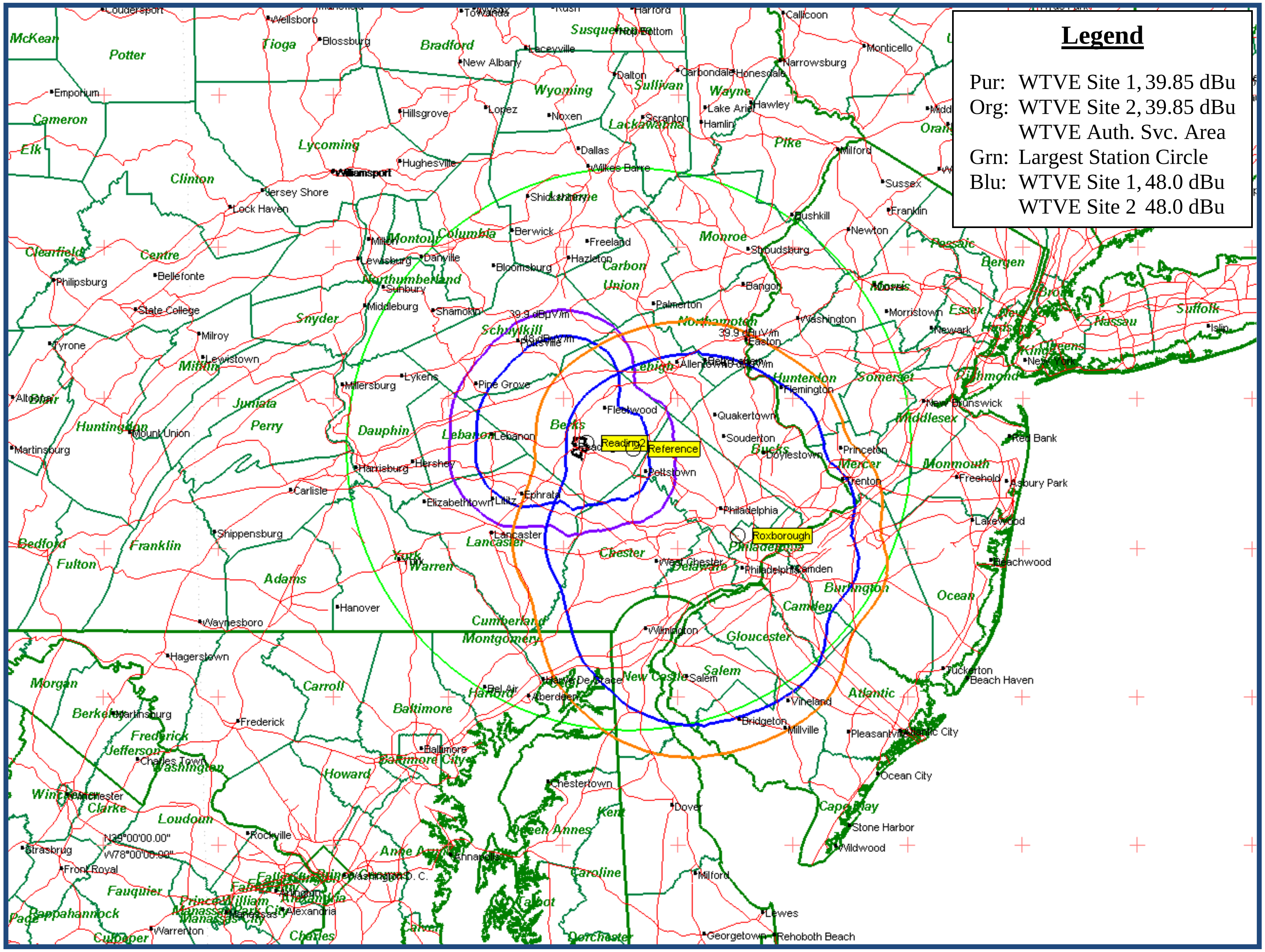

Figure 2 — WTVE DTS Sites 1 & 2 Predicted Contours + Largest Station Circle

RFS DX32B–25

Field at Depression Angle of Maximum Radiation

Pattern Normalized to Zero Degree Orientation

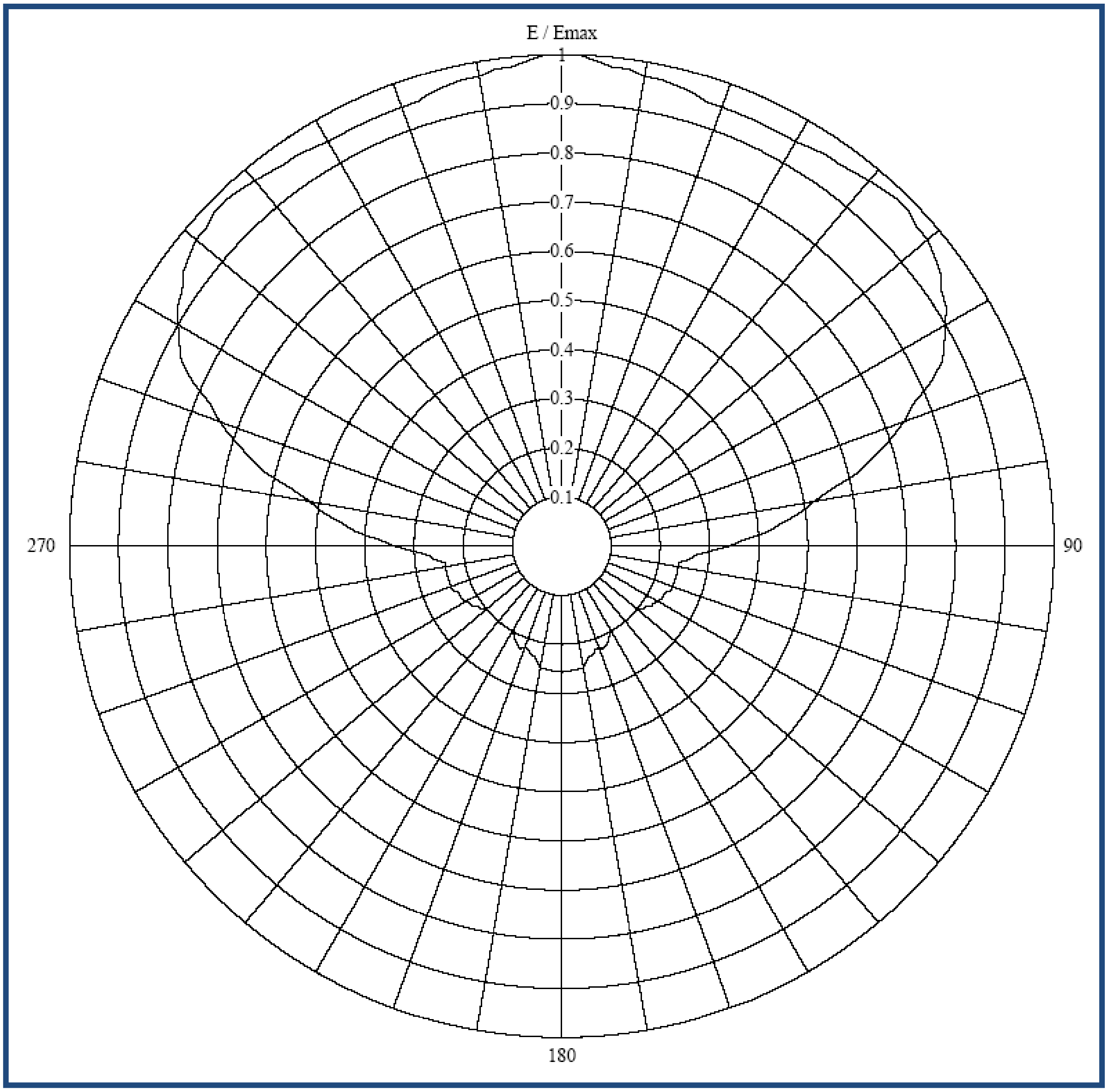

Figure 3 — WTVE Site 1 Azimuth Pattern in Relative Field Values

Figure 4 — Tabulated Data for RFS DX Azimuth Relative Field Pattern Type B – Normalized to Zero Degrees

Az.	B Pattern	Az.	B Pattern	Az	B Pattern	Az.	B Pattern	Az.	B Pattern	Az	B Pattern	Az.	B Pattern	Az.	B Pattern	Az	B Pattern
0	1.0000	40	0.9700	80	0.5200	120	0.2250	160	0.2200	200	0.2200	240	0.2250	280	0.5200	320	0.9700
1	1.0000	41	0.9725	81	0.5050	121	0.2225	161	0.2200	201	0.2225	241	0.2275	281	0.5400	321	0.9675
2	1.0000	42	0.9750	82	0.4900	122	0.2200	162	0.2200	202	0.2250	242	0.2300	282	0.5600	322	0.9650
3	0.9950	43	0.9775	83	0.4700	123	0.2200	163	0.2250	203	0.2225	243	0.2300	283	0.5900	323	0.9625
4	0.9900	44	0.9800	84	0.4500	124	0.2200	164	0.2300	204	0.2200	244	0.2300	284	0.6200	324	0.9600
5	0.9850	45	0.9800	85	0.4350	125	0.2150	165	0.2300	205	0.2175	245	0.2300	285	0.6400	325	0.9600
6	0.9800	46	0.9800	86	0.4200	126	0.2100	166	0.2300	206	0.2150	246	0.2300	286	0.6600	326	0.9600
7	0.9800	47	0.9750	87	0.3950	127	0.2100	167	0.2350	207	0.2100	247	0.2350	287	0.6800	327	0.9575
8	0.9800	48	0.9700	88	0.3700	128	0.2100	168	0.2400	208	0.2050	248	0.2400	288	0.7000	328	0.9550
9	0.9750	49	0.9700	89	0.3550	129	0.2050	169	0.2455	209	0.2025	249	0.2400	289	0.7200	329	0.9525
10	0.9700	50	0.9700	90	0.3400	130	0.2000	170	0.2510	210	0.2000	250	0.2400	290	0.7400	330	0.9500
11	0.9700	51	0.9650	91	0.3200	131	0.2000	171	0.2515	211	0.2000	251	0.2400	291	0.7550	331	0.9500
12	0.9700	52	0.9600	92	0.3000	132	0.2000	172	0.2520	212	0.2000	252	0.2400	292	0.7700	332	0.9500
13	0.9675	53	0.9550	93	0.2850	133	0.2000	173	0.2525	213	0.2000	253	0.2400	293	0.7950	333	0.9500
14	0.9650	54	0.9500	94	0.2700	134	0.2000	174	0.2530	214	0.2000	254	0.2400	294	0.8200	334	0.9500
15	0.9625	55	0.9400	95	0.2650	135	0.2000	175	0.2535	215	0.2000	255	0.2400	295	0.8400	335	0.9500
16	0.9600	56	0.9300	96	0.2600	136	0.2000	176	0.2540	216	0.2000	256	0.2400	296	0.8600	336	0.9500
17	0.9550	57	0.9250	97	0.2500	137	0.2000	177	0.2545	217	0.2000	257	0.2400	297	0.8700	337	0.9500
18	0.9500	58	0.9200	98	0.2400	138	0.2000	178	0.2550	218	0.2000	258	0.2400	298	0.8800	338	0.9500
19	0.9500	59	0.9100	99	0.2400	139	0.2000	179	0.2555	219	0.2000	259	0.2400	299	0.8900	339	0.9500
20	0.9500	60	0.9000	100	0.2400	140	0.2000	180	0.2560	220	0.2000	260	0.2400	300	0.9000	340	0.9500
21	0.9500	61	0.8900	101	0.2400	141	0.2000	181	0.2555	221	0.2000	261	0.2400	301	0.9100	341	0.9500
22	0.9500	62	0.8800	102	0.2400	142	0.2000	182	0.2550	222	0.2000	262	0.2400	302	0.9200	342	0.9500
23	0.9500	63	0.8700	103	0.2400	143	0.2000	183	0.2545	223	0.2000	263	0.2500	303	0.9250	343	0.9550
24	0.9500	64	0.8600	104	0.2400	144	0.2000	184	0.2540	224	0.2000	264	0.2600	304	0.9300	344	0.9600
25	0.9500	65	0.8400	105	0.2400	145	0.2000	185	0.2535	225	0.2000	265	0.2650	305	0.9400	345	0.9625
26	0.9500	66	0.8200	106	0.2400	146	0.2000	186	0.2530	226	0.2000	266	0.2700	306	0.9500	346	0.9650
27	0.9500	67	0.7950	107	0.2400	147	0.2000	187	0.2525	227	0.2000	267	0.2850	307	0.9550	347	0.9675
28	0.9500	68	0.7700	108	0.2400	148	0.2000	188	0.2520	228	0.2000	268	0.3000	308	0.9600	348	0.9700
29	0.9500	69	0.7550	109	0.2400	149	0.2000	189	0.2515	229	0.2000	269	0.3200	309	0.9650	349	0.9700
30	0.9500	70	0.7400	110	0.2400	150	0.2000	190	0.2510	230	0.2000	270	0.3400	310	0.9700	350	0.9700
31	0.9525	71	0.7200	111	0.2400	151	0.2025	191	0.2455	231	0.2050	271	0.3550	311	0.9700	351	0.9750
32	0.9550	72	0.7000	112	0.2400	152	0.2050	192	0.2400	232	0.2100	272	0.3700	312	0.9700	352	0.9800
33	0.9575	73	0.6800	113	0.2350	153	0.2100	193	0.2350	233	0.2100	273	0.3950	313	0.9750	353	0.9800
34	0.9600	74	0.6600	114	0.2300	154	0.2150	194	0.2300	234	0.2100	274	0.4200	314	0.9800	354	0.9800
35	0.9600	75	0.6400	115	0.2300	155	0.2175	195	0.2300	235	0.2150	275	0.4350	315	0.9800	355	0.9850
36	0.9600	76	0.6200	116	0.2300	156	0.2200	196	0.2300	236	0.2200	276	0.4500	316	0.9800	356	0.9900
37	0.9625	77	0.5900	117	0.2300	157	0.2225	197	0.2250	237	0.2200	277	0.4700	317	0.9775	357	0.9950
38	0.9650	78	0.5600	118	0.2300	158	0.2250	198	0.2200	238	0.2200	278	0.4900	318	0.9750	358	1.0000
39	0.9675	79	0.5400	119	0.2275	159	0.2225	199	0.2200	239	0.2225	279	0.5050	319	0.9725	359	1.0000

RFS DX32 — All Types — 0.7 Degree Depression

Field at Azimuth of Maximum Radiation

-90 to +90 degrees Depression Angle

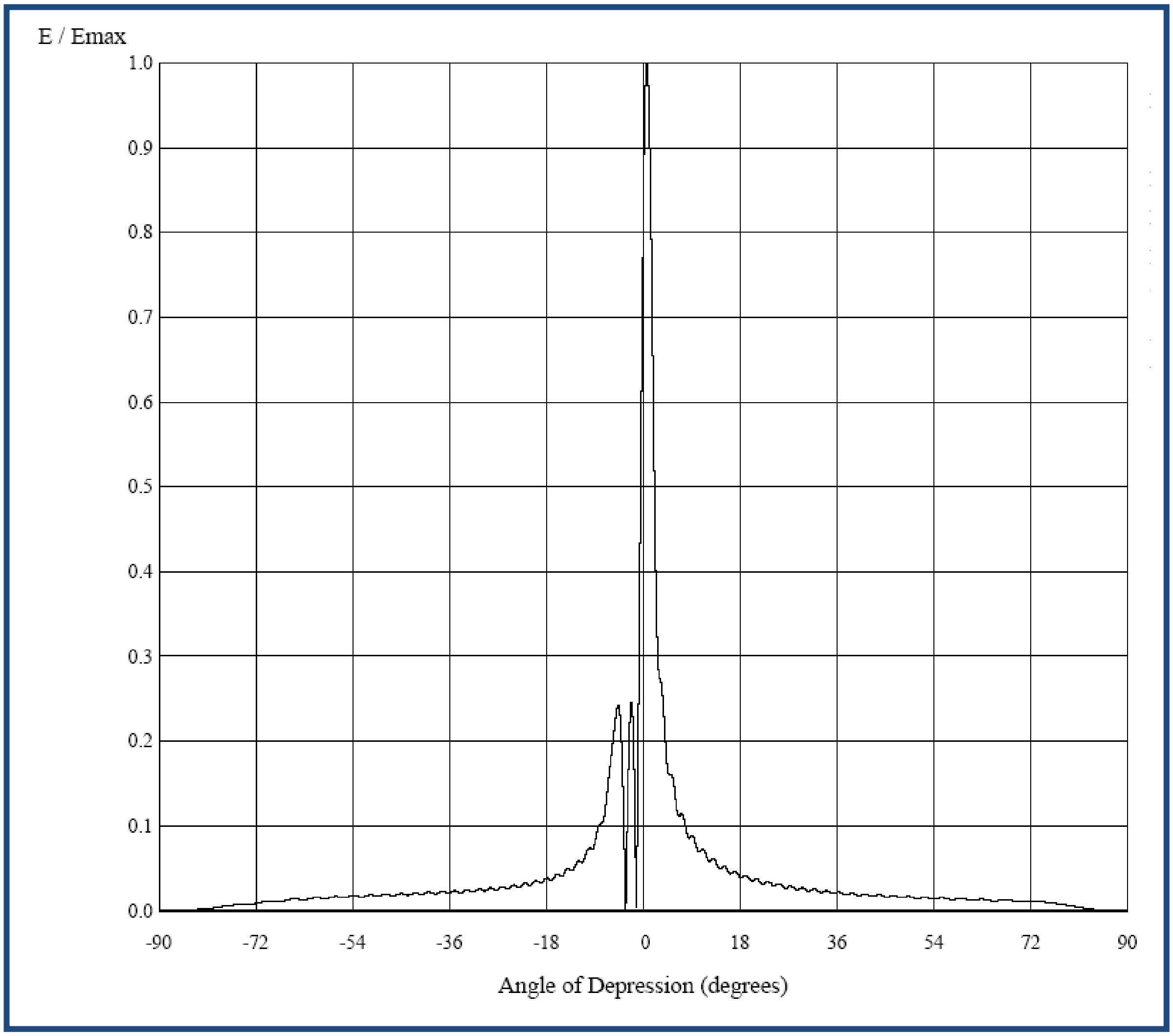

Figure 5a — Inverted Cosecant Elevation Relative Field Pattern

RFS DX32 — All Types — 0.7 Degree Depression

Field at Azimuth of Maximum Radiation

-10 to +20 degrees Depression Angle

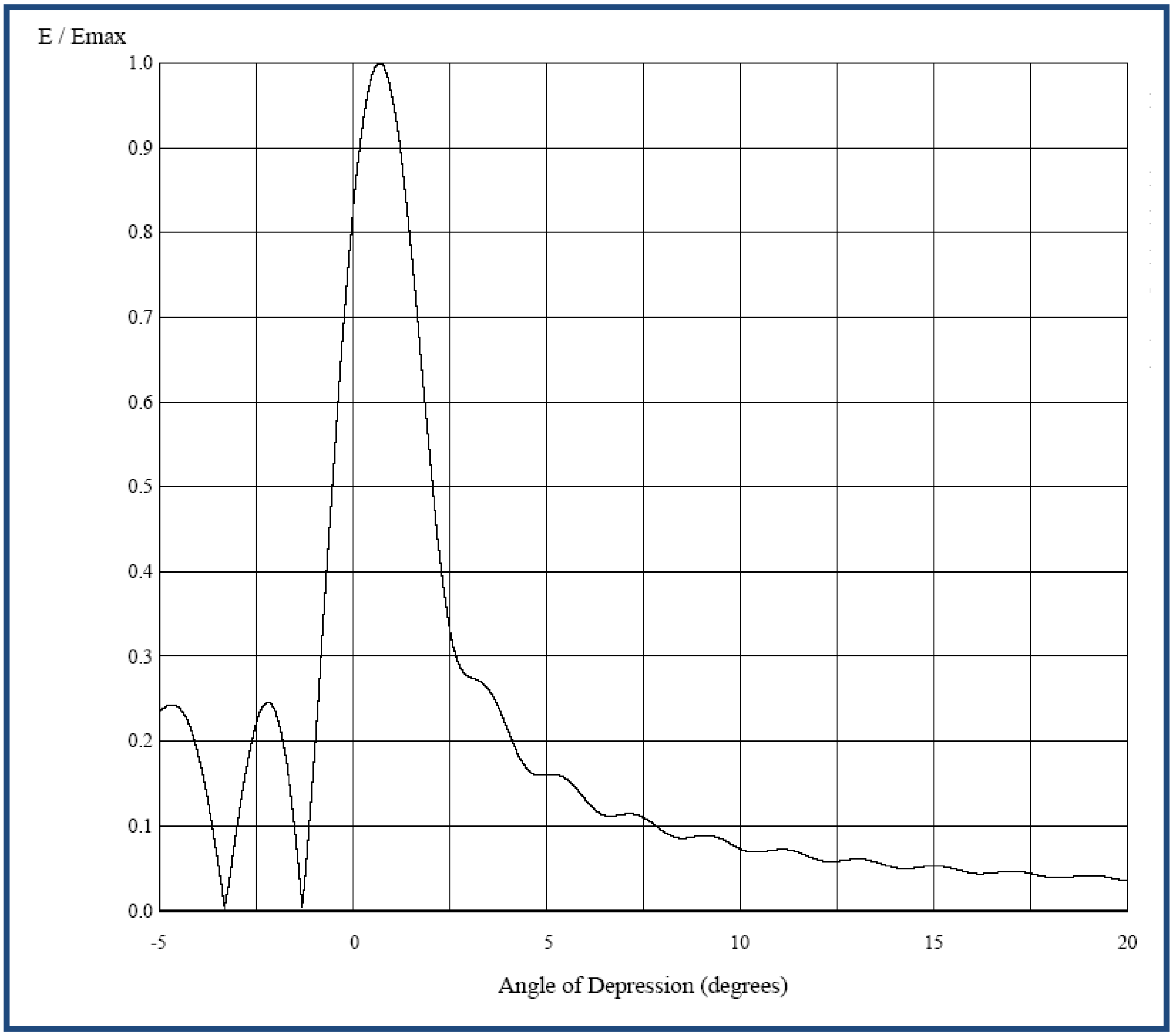

Figure 5b — Inverted Cosecant Elevation Relative Field Pattern

Figure 6 — Tabulated Data for RFS DX32 Elevation Relative Field Patterns – 0.7 Degree Depression

Dprsn	0.7 dg	Dprsn	0.7 dg	Dprsn	0.7 dg	Dprsn	0.7 dg	Dprsn	0.7 dg	Dprsn	0.7 dg	Dprsn	0.7 dg	Dprsn	0.7 dg	Dprsn	0.7 dg	Dprsn	0.7 dg	Dprsn	0.7 dg
-5.0	0.2338	-1.7	0.1744	1.6	0.7372	4.9	0.1601	8.2	0.0888	11.5	0.0691	22.0	0.0330	38.5	0.0212	55.0	0.0155	71.5	0.0112	88.0	0.0032
-4.9	0.2382	-1.6	0.1410	1.7	0.6865	5.0	0.1606	8.3	0.0870	11.6	0.0674	22.5	0.0329	39.0	0.0212	55.5	0.0158	72.0	0.0113	88.5	0.0032
-4.8	0.2415	-1.5	0.1014	1.8	0.6347	5.1	0.1611	8.4	0.0859	11.7	0.0655	23.0	0.0349	39.5	0.0197	56.0	0.0154	72.5	0.0114	89.0	0.0032
-4.7	0.2433	-1.4	0.0560	1.9	0.5829	5.2	0.1612	8.5	0.0855	11.8	0.0636	23.5	0.0340	40.0	0.0186	56.5	0.0145	73.0	0.0114	89.5	0.0032
-4.6	0.2431	-1.3	0.0053	2.0	0.5322	5.3	0.1605	8.6	0.0857	11.9	0.0618	24.0	0.0307	40.5	0.0192	57.0	0.0138	73.5	0.0112	90.0	0.0032
-4.5	0.2408	-1.2	0.0504	2.1	0.4837	5.4	0.1588	8.7	0.0863	12.0	0.0603	24.5	0.0300	41.0	0.0202	57.5	0.0137	74.0	0.0110		
-4.4	0.2359	-1.1	0.1103	2.2	0.4386	5.5	0.1562	8.8	0.0871	12.1	0.0591	25.0	0.0319	41.5	0.0201	58.0	0.0142	74.5	0.0107		
-4.3	0.2284	-1.0	0.1737	2.3	0.3979	5.6	0.1526	8.9	0.0880	12.2	0.0583	25.5	0.0317	42.0	0.0187	58.5	0.0148	75.0	0.0103		
-4.2	0.2180	-0.9	0.2400	2.4	0.3628	5.7	0.1481	9.0	0.0886	12.3	0.0580	26.0	0.0287	42.5	0.0176	59.0	0.0150	75.5	0.0099		
-4.1	0.2046	-0.8	0.3082	2.5	0.3338	5.8	0.1429	9.1	0.0888	12.4	0.0581	26.5	0.0273	43.0	0.0180	59.5	0.0147	76.0	0.0095		
-4.0	0.1883	-0.7	0.3776	2.6	0.3115	5.9	0.1373	9.2	0.0886	12.5	0.0585	27.0	0.0290	43.5	0.0191	60.0	0.0139	76.5	0.0091		
-3.9	0.1690	-0.6	0.4472	2.7	0.2955	6.0	0.1317	9.3	0.0879	12.6	0.0591	27.5	0.0297	44.0	0.0192	60.5	0.0132	77.0	0.0086		
-3.8	0.1468	-0.5	0.5161	2.8	0.2851	6.1	0.1263	9.4	0.0867	12.7	0.0598	28.0	0.0275	44.5	0.0181	61.0	0.0129	77.5	0.0082		
-3.7	0.1220	-0.4	0.5834	2.9	0.2791	6.2	0.1215	9.5	0.0850	12.8	0.0604	28.5	0.0255	45.0	0.0168	61.5	0.0131	78.0	0.0077		
-3.6	0.0949	-0.3	0.6482	3.0	0.2759	6.3	0.1175	9.6	0.0829	12.9	0.0609	29.0	0.0265	45.5	0.0169	62.0	0.0136	78.5	0.0073		
-3.5	0.0658	-0.2	0.7096	3.1	0.2742	6.4	0.1146	9.7	0.0805	13.0	0.0612	29.5	0.0278	46.0	0.0179	62.5	0.0140	79.0	0.0067		
-3.4	0.0351	-0.1	0.7669	3.2	0.2728	6.5	0.1127	9.8	0.0781	13.5	0.0586	30.0	0.0265	46.5	0.0184	63.0	0.0140	79.5	0.0062		
-3.3	0.0034	0.0	0.8192	3.3	0.2706	6.6	0.1119	9.9	0.0756	14.0	0.0518	30.5	0.0242	47.0	0.0178	63.5	0.0137	80.0	0.0056		
-3.2	0.0290	0.1	0.8658	3.4	0.2671	6.7	0.1119	10.0	0.0734	14.5	0.0515	31.0	0.0241	47.5	0.0166	64.0	0.0130	80.5	0.0051		
-3.1	0.0613	0.2	0.9061	3.5	0.2620	6.8	0.1125	10.1	0.0716	15.0	0.0540	31.5	0.0257	48.0	0.0159	64.5	0.0124	81.0	0.0045		
-3.0	0.0930	0.3	0.9397	3.6	0.2551	6.9	0.1133	10.2	0.0702	15.5	0.0507	32.0	0.0256	48.5	0.0165	65.0	0.0120	81.5	0.0040		
-2.9	0.1233	0.4	0.9661	3.7	0.2465	7.0	0.1141	10.3	0.0695	16.0	0.0451	32.5	0.0235	49.0	0.0173	65.5	0.0121	82.0	0.0035		
-2.8	0.1517	0.5	0.9850	3.8	0.2365	7.1	0.1146	10.4	0.0692	16.5	0.0454	33.0	0.0221	49.5	0.0174	66.0	0.0124	82.5	0.0032		
-2.7	0.1776	0.6	0.9963	3.9	0.2255	7.2	0.1146	10.5	0.0694	17.0	0.0476	33.5	0.0232	50.0	0.0165	66.5	0.0128	83.0	0.0032		
-2.6	0.2001	0.7	1.0000	4.0	0.2140	7.3	0.1139	10.6	0.0700	17.5	0.0447	34.0	0.0242	50.5	0.0154	67.0	0.0130	83.5	0.0032		
-2.5	0.2189	0.8	0.9961	4.1	0.2025	7.4	0.1126	10.7	0.0708	18.0	0.0401	34.5	0.0233	51.0	0.0150	67.5	0.0130	84.0	0.0032		
-2.4	0.2332	0.9	0.9847	4.2	0.1916	7.5	0.1106	10.8	0.0716	18.5	0.0406	35.0	0.0213	51.5	0.0157	68.0	0.0127	84.5	0.0032		
-2.3	0.2425	1.0	0.9662	4.3	0.1819	7.6	0.1079	10.9	0.0723	19.0	0.0428	35.5	0.0210	52.0	0.0164	68.5	0.0122	85.0	0.0032		
-2.2	0.2464	1.1	0.9411	4.4	0.1737	7.7	0.1048	11.0	0.0727	19.5	0.0404	36.0	0.0223	52.5	0.0165	69.0	0.0117	85.5	0.0032		
-2.1	0.2446	1.2	0.9097	4.5	0.1675	7.8	0.1014	11.1	0.0728	20.0	0.0361	36.5	0.0227	53.0	0.0158	69.5	0.0112	86.0	0.0032		
-2.0	0.2366	1.3	0.8729	4.6	0.1633	7.9	0.0978	11.2	0.0724	20.5	0.0363	37.0	0.0212	53.5	0.0148	70.0	0.0109	86.5	0.0032		
-1.9	0.2223	1.4	0.8313	4.7	0.1609	8.0	0.0944	11.3	0.0717	21.0	0.0384	37.5	0.0197	54.0	0.0143	70.5	0.0109	87.0	0.0032		
-1.8	0.2016	1.5	0.7858	4.8	0.1600	8.1	0.0913	11.4	0.0706	21.5	0.0368	38.0	0.0200	54.5	0.0147	71.0	0.0110	87.5	0.0032		

RFS PHP-40T

Peak Field at Any Depression Angle at Each Azimuth

Pattern Rotated to Actual Orientation

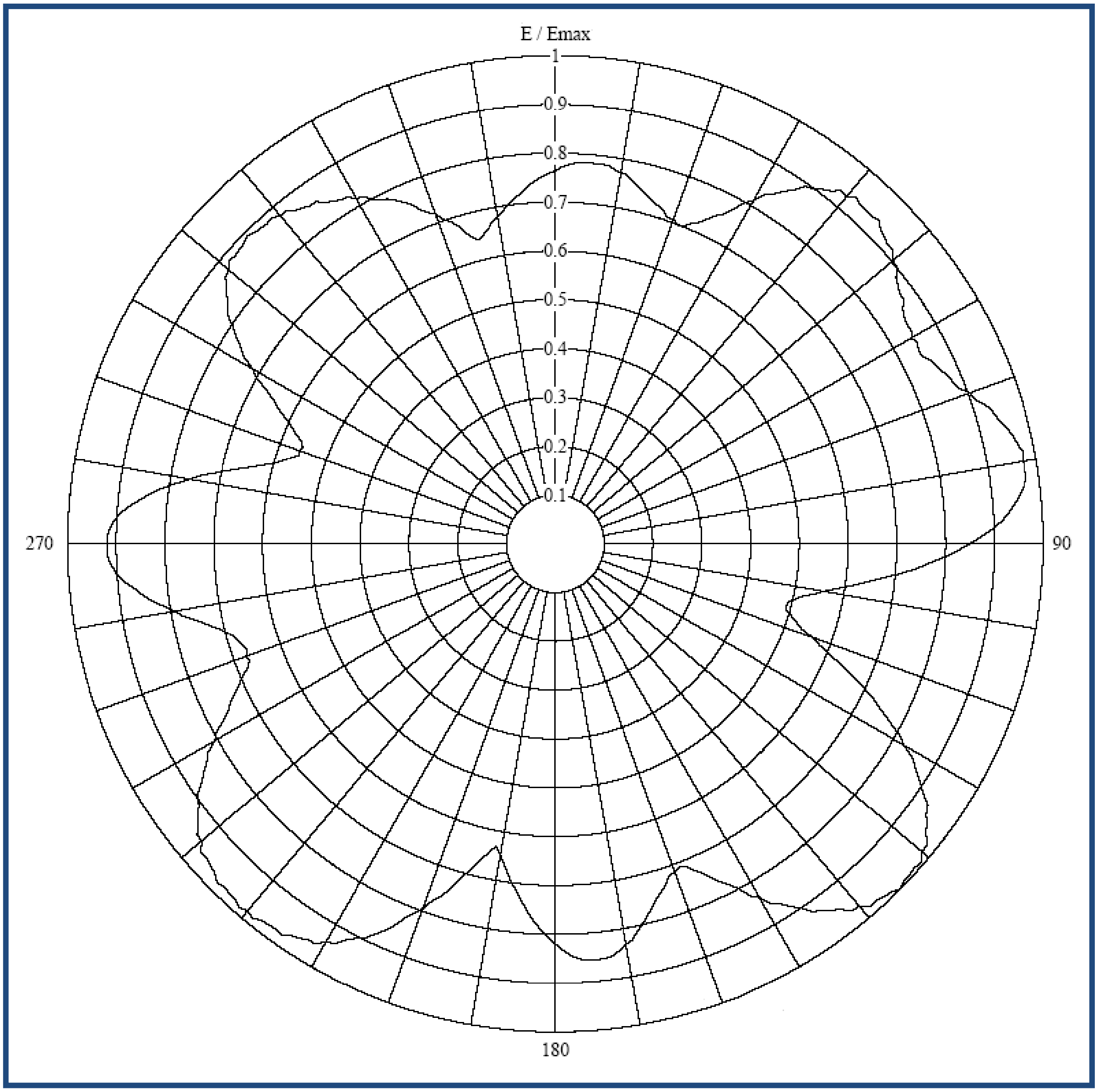

Figure 7a — Roxborough Azimuth Relative Field Pattern

RFS PHP-40T

Relative Field at 0.8 degrees Depression Angle

Pattern Rotated to Actual Orientation

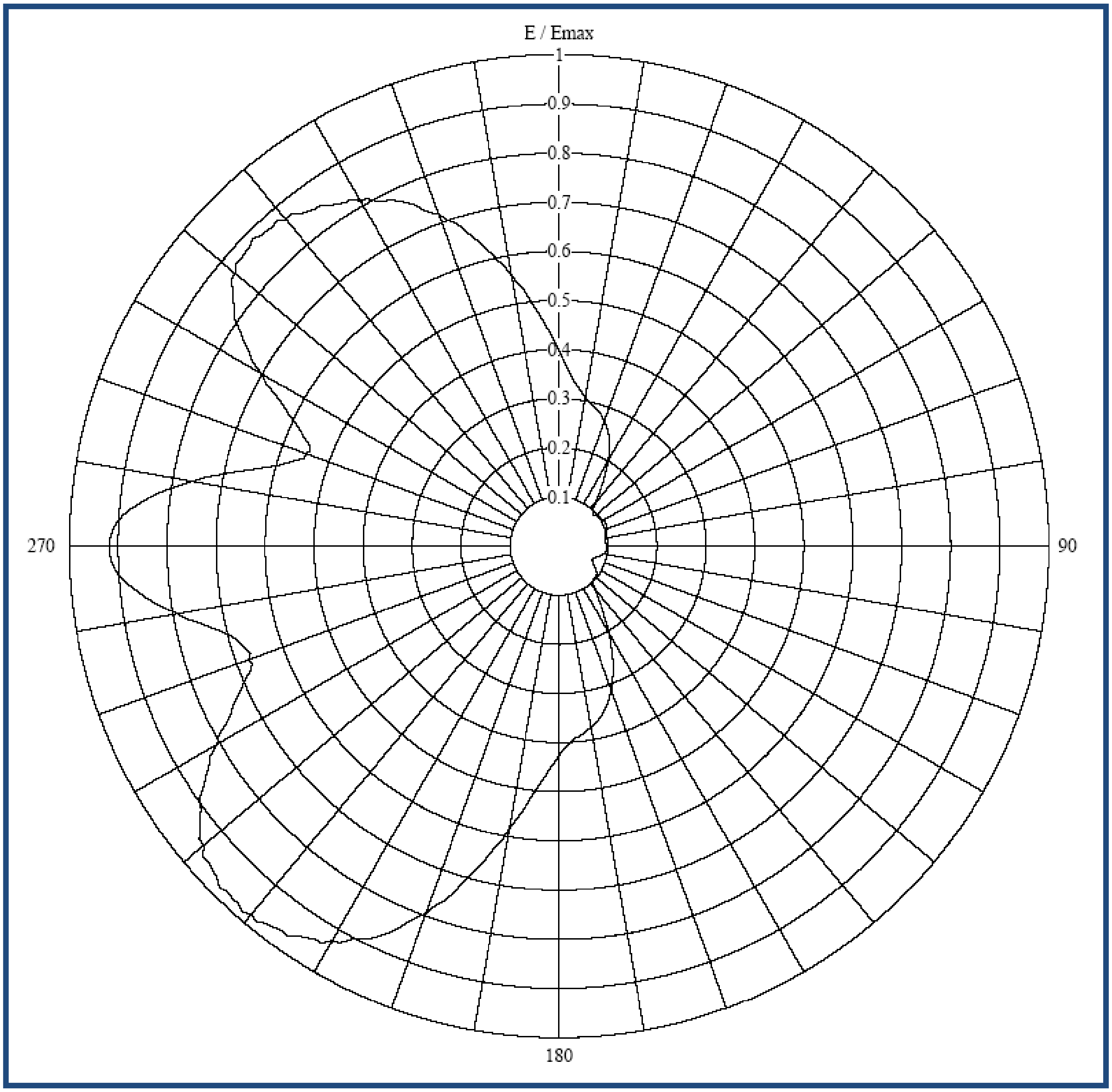

Figure 7b — Roxborough Azimuth Relative Field Pattern

RFS PHP-40T

Relative Field at 3.4 degrees Depression Angle

Pattern Rotated to Actual Orientation

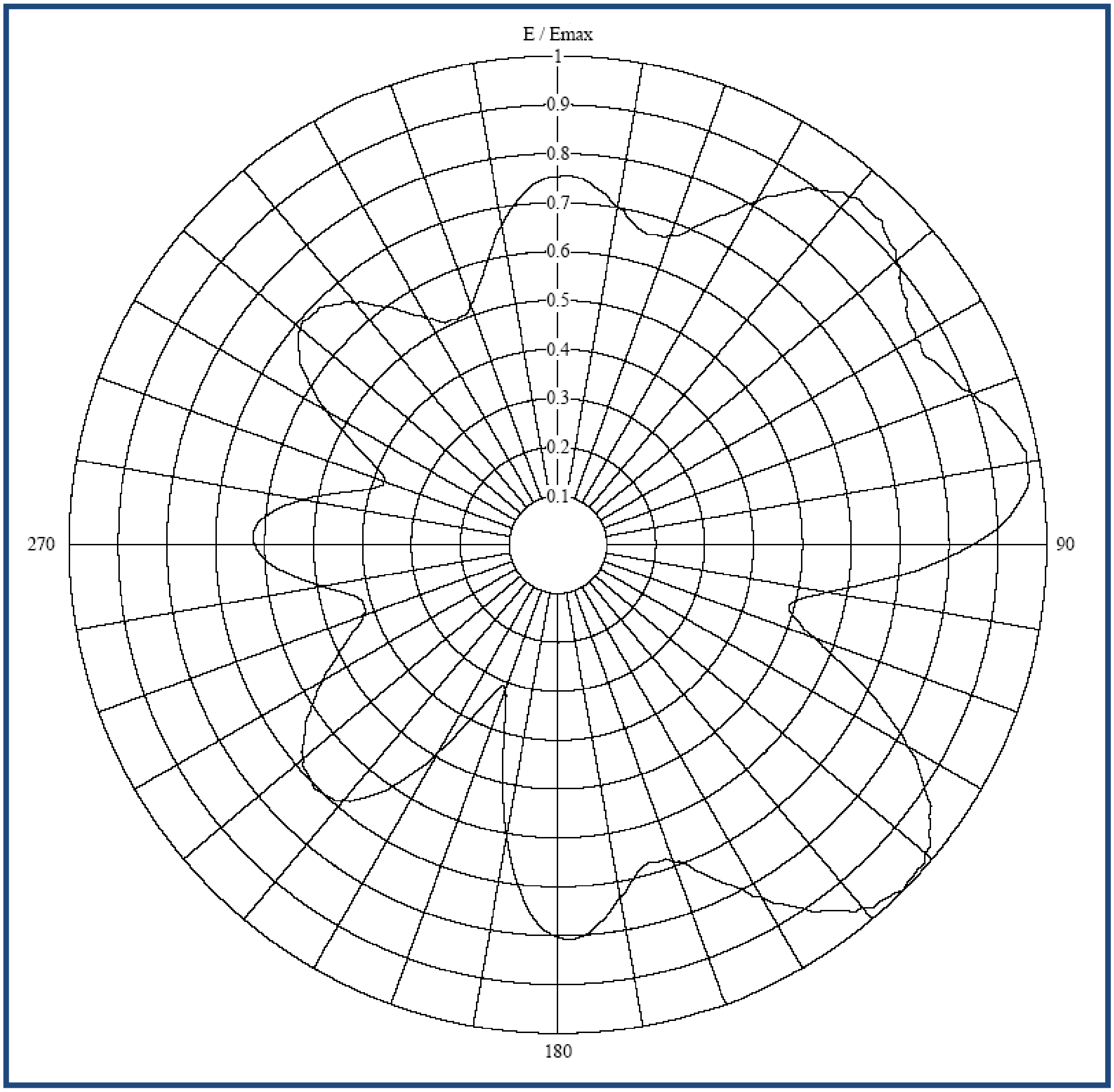

Figure 7c — Roxborough Azimuth Relative Field Pattern

Figure 8 — Tabulated Data for RFS PHP-40T Azimuth Relative Field Patterns – Roxborough

Azimuth	Peak	0.8 deg	3.4 deg	Azimuth	Peak	0.8 deg	3.4 deg	Azimuth	Peak	0.8 deg	3.4 deg	Azimuth	Peak	0.8 deg	3.4 deg
0	0.7638	0.3965	0.7532	45	0.9370	0.0977	0.9370	90	0.8486	0.0972	0.8479	135	1.0000	0.0990	1.0000
1	0.7718	0.3830	0.7558	46	0.9264	0.0956	0.9264	91	0.8241	0.0977	0.8234	136	0.9909	0.0995	0.9909
2	0.7770	0.3723	0.7552	47	0.9215	0.0949	0.9215	92	0.7963	0.0979	0.7958	137	0.9873	0.1017	0.9873
3	0.7809	0.3608	0.7525	48	0.9156	0.0948	0.9156	93	0.7667	0.0980	0.7663	138	0.9824	0.1043	0.9824
4	0.7835	0.3496	0.7496	49	0.9165	0.0957	0.9165	94	0.7397	0.0984	0.7396	139	0.9832	0.1084	0.9832
5	0.7835	0.3388	0.7433	50	0.9021	0.0957	0.9021	95	0.7076	0.0980	0.7076	140	0.9684	0.1130	0.9681
6	0.7827	0.3326	0.7340	51	0.9019	0.0977	0.9019	96	0.6713	0.0970	0.6713	141	0.9668	0.1195	0.9660
7	0.7833	0.3253	0.7284	52	0.8867	0.0977	0.8867	97	0.6418	0.0965	0.6418	142	0.9502	0.1252	0.9490
8	0.7817	0.3185	0.7211	53	0.8794	0.0991	0.8794	98	0.6132	0.0957	0.6132	143	0.9388	0.1336	0.9372
9	0.7754	0.3121	0.7099	54	0.8724	0.0999	0.8724	99	0.5842	0.0944	0.5842	144	0.9270	0.1414	0.9250
10	0.7713	0.3071	0.7014	55	0.8717	0.1019	0.8717	100	0.5580	0.0930	0.5580	145	0.9208	0.1514	0.9184
11	0.7698	0.3026	0.6969	56	0.8589	0.1019	0.8589	101	0.5395	0.0917	0.5393	146	0.8996	0.1604	0.8969
12	0.7596	0.2990	0.6846	57	0.8528	0.1027	0.8528	102	0.5168	0.0895	0.5163	147	0.8853	0.1698	0.8824
13	0.7526	0.2951	0.6772	58	0.8488	0.1036	0.8488	103	0.5032	0.0876	0.5024	148	0.8695	0.1808	0.8664
14	0.7444	0.2930	0.6695	59	0.8512	0.1049	0.8512	104	0.4924	0.0853	0.4915	149	0.8595	0.1925	0.8562
15	0.7362	0.2896	0.6645	60	0.8433	0.1048	0.8433	105	0.4900	0.0832	0.4889	150	0.8360	0.2034	0.8327
16	0.7279	0.2865	0.6612	61	0.8491	0.1062	0.8491	106	0.4931	0.0811	0.4921	151	0.8250	0.2151	0.8221
17	0.7238	0.2841	0.6643	62	0.8429	0.1056	0.8429	107	0.5063	0.0793	0.5055	152	0.8006	0.2254	0.7982
18	0.7169	0.2804	0.6656	63	0.8448	0.1057	0.8448	108	0.5204	0.0773	0.5198	153	0.7828	0.2371	0.7810
19	0.7066	0.2758	0.6638	64	0.8568	0.1067	0.8568	109	0.5332	0.0755	0.5328	154	0.7707	0.2496	0.7699
20	0.7074	0.2722	0.6749	65	0.8621	0.1066	0.8621	110	0.5602	0.0748	0.5601	155	0.7535	0.2608	0.7535
21	0.6994	0.2668	0.6762	66	0.8681	0.1063	0.8681	111	0.5793	0.0730	0.5793	156	0.7383	0.2716	0.7383
22	0.7018	0.2613	0.6866	67	0.8766	0.1061	0.8766	112	0.6056	0.0728	0.6056	157	0.7259	0.2823	0.7241
23	0.7127	0.2562	0.7043	68	0.8790	0.1049	0.8790	113	0.6389	0.0737	0.6389	158	0.7120	0.2920	0.7055
24	0.7206	0.2500	0.7170	69	0.8873	0.1040	0.8873	114	0.6678	0.0743	0.6678	159	0.7083	0.3019	0.6943
25	0.7330	0.2432	0.7319	70	0.9040	0.1041	0.9040	115	0.6961	0.0753	0.6961	160	0.7163	0.3120	0.6912
26	0.7477	0.2359	0.7477	71	0.9092	0.1027	0.9092	116	0.7249	0.0766	0.7249	161	0.7182	0.3204	0.6795
27	0.7579	0.2271	0.7579	72	0.9246	0.1023	0.9246	117	0.7484	0.0776	0.7484	162	0.7326	0.3295	0.6807
28	0.7758	0.2185	0.7751	73	0.9352	0.1014	0.9352	118	0.7751	0.0798	0.7751	163	0.7450	0.3375	0.6796
29	0.8000	0.2105	0.7985	74	0.9405	0.0999	0.9405	119	0.8070	0.0827	0.8070	164	0.7547	0.3438	0.6765
30	0.8113	0.2011	0.8093	75	0.9497	0.0990	0.9497	120	0.8253	0.0840	0.8253	165	0.7692	0.3505	0.6807
31	0.8354	0.1923	0.8330	76	0.9579	0.0981	0.9579	121	0.8556	0.0870	0.8556	166	0.7837	0.3566	0.6871
32	0.8450	0.1821	0.8423	77	0.9648	0.0972	0.9648	122	0.8705	0.0884	0.8705	167	0.7984	0.3609	0.6973
33	0.8606	0.1724	0.8578	78	0.9701	0.0966	0.9701	123	0.8910	0.0904	0.8910	168	0.8114	0.3663	0.7077
34	0.8745	0.1636	0.8718	79	0.9773	0.0964	0.9773	124	0.9083	0.0919	0.9083	169	0.8267	0.3705	0.7239
35	0.8940	0.1551	0.8914	80	0.9740	0.0954	0.9740	125	0.9320	0.0943	0.9320	170	0.8331	0.3746	0.7319
36	0.8987	0.1454	0.8963	81	0.9731	0.0949	0.9728	126	0.9397	0.0945	0.9397	171	0.8419	0.3784	0.7451
37	0.9088	0.1375	0.9065	82	0.9738	0.0953	0.9734	127	0.9527	0.0956	0.9527	172	0.8511	0.3825	0.7603
38	0.9171	0.1291	0.9151	83	0.9680	0.0953	0.9674	128	0.9645	0.0961	0.9645	173	0.8550	0.3863	0.7717
39	0.9303	0.1225	0.9287	84	0.9573	0.0951	0.9567	129	0.9802	0.0973	0.9802	174	0.8556	0.3901	0.7808
40	0.9287	0.1155	0.9273	85	0.9455	0.0952	0.9447	130	0.9811	0.0964	0.9811	175	0.8559	0.3916	0.7929
41	0.9392	0.1101	0.9383	86	0.9325	0.0959	0.9316	131	0.9942	0.0973	0.9942	176	0.8543	0.3978	0.8008
42	0.9338	0.1052	0.9331	87	0.9174	0.0965	0.9165	132	0.9912	0.0967	0.9912	177	0.8491	0.4041	0.8049
43	0.9337	0.1018	0.9334	88	0.8982	0.0969	0.8973	133	0.9932	0.0967	0.9932	178	0.8423	0.4103	0.8077
44	0.9322	0.0988	0.9321	89	0.8742	0.0971	0.8734	134	0.9938	0.0973	0.9938	179	0.8313	0.4159	0.8068

Figure 8 – cont'd.— Tabulated Data for RFS PHP-40T Azimuth Relative Field Patterns – Roxborough

Azimuth	Peak	0.8 deg	3.4 deg	Azimuth	Peak	0.8 deg	3.4 deg	Azimuth	Peak	0.8 deg	3.4 deg	Azimuth	Peak	0.8 deg	3.4 deg
180	0.8193	0.4248	0.8025	225	0.9815	0.9815	0.7060	270	0.9185	0.9174	0.6204	315	0.8930	0.8847	0.6879
181	0.8074	0.4370	0.7975	226	0.9710	0.9710	0.7002	271	0.9179	0.9169	0.6244	316	0.8862	0.8780	0.6781
182	0.7938	0.4483	0.7897	227	0.9665	0.9665	0.6966	272	0.9138	0.9129	0.6251	317	0.8848	0.8765	0.6707
183	0.7780	0.4616	0.7768	228	0.9614	0.9614	0.6922	273	0.9049	0.9040	0.6219	318	0.8824	0.8740	0.6630
184	0.7620	0.4764	0.7620	229	0.9624	0.9624	0.6916	274	0.8937	0.8929	0.6168	319	0.8857	0.8772	0.6601
185	0.7425	0.4924	0.7418	230	0.9470	0.9470	0.6789	275	0.8771	0.8764	0.6075	320	0.8756	0.8672	0.6448
186	0.7230	0.5074	0.7186	231	0.9451	0.9451	0.6751	276	0.8568	0.8561	0.5952	321	0.8770	0.8688	0.6398
187	0.7055	0.5278	0.6952	232	0.9282	0.9282	0.6608	277	0.8373	0.8367	0.5832	322	0.8668	0.8584	0.6235
188	0.6870	0.5472	0.6684	233	0.9162	0.9162	0.6494	278	0.8147	0.8140	0.5681	323	0.8609	0.8530	0.6118
189	0.6663	0.5629	0.6374	234	0.9040	0.9040	0.6388	279	0.7877	0.7870	0.5485	324	0.8556	0.8478	0.6014
190	0.6476	0.5837	0.6057	235	0.8968	0.8968	0.6303	280	0.7609	0.7600	0.5294	325	0.8556	0.8481	0.5934
191	0.6314	0.6098	0.5744	236	0.8750	0.8750	0.6129	281	0.7366	0.7355	0.5114	326	0.8433	0.8363	0.5773
192	0.6426	0.6264	0.5378	237	0.8598	0.8598	0.5996	282	0.7046	0.7034	0.4879	327	0.8370	0.8304	0.5658
193	0.6599	0.6481	0.5024	238	0.8427	0.8427	0.5846	283	0.6763	0.6748	0.4665	328	0.8301	0.8242	0.5543
194	0.6779	0.6699	0.4655	239	0.8315	0.8315	0.5741	284	0.6470	0.6452	0.4446	329	0.8288	0.8233	0.5474
195	0.6960	0.6911	0.4313	240	0.8064	0.8064	0.5543	285	0.6219	0.6194	0.4252	330	0.8155	0.8106	0.5331
196	0.7145	0.7121	0.3990	241	0.7948	0.7948	0.5431	286	0.5996	0.5962	0.4078	331	0.8132	0.8091	0.5289
197	0.7392	0.7383	0.3713	242	0.7699	0.7699	0.5239	287	0.5842	0.5798	0.3958	332	0.7991	0.7958	0.5166
198	0.7585	0.7585	0.3467	243	0.7514	0.7514	0.5081	288	0.5704	0.5644	0.3857	333	0.7901	0.7877	0.5092
199	0.7717	0.7717	0.3253	244	0.7404	0.7404	0.4964	289	0.5571	0.5498	0.3768	334	0.7861	0.7842	0.5100
200	0.7966	0.7962	0.3158	245	0.7240	0.7240	0.4818	290	0.5583	0.5491	0.3789	335	0.7762	0.7750	0.5074
201	0.8099	0.8083	0.3072	246	0.7091	0.7091	0.4677	291	0.5544	0.5434	0.3787	336	0.7660	0.7654	0.5057
202	0.8274	0.8247	0.3116	247	0.6966	0.6966	0.4547	292	0.5616	0.5492	0.3880	337	0.7544	0.7544	0.5078
203	0.8511	0.8466	0.3256	248	0.6799	0.6799	0.4393	293	0.5783	0.5644	0.4046	338	0.7382	0.7382	0.5068
204	0.8679	0.8616	0.3408	249	0.6714	0.6713	0.4293	294	0.5929	0.5780	0.4198	339	0.7267	0.7267	0.5107
205	0.8840	0.8758	0.3614	250	0.6735	0.6734	0.4246	295	0.6110	0.5953	0.4387	340	0.7192	0.7192	0.5223
206	0.8992	0.8891	0.3856	251	0.6670	0.6668	0.4157	296	0.6313	0.6153	0.4596	341	0.7018	0.7013	0.5285
207	0.9069	0.8951	0.4089	252	0.6743	0.6740	0.4158	297	0.6481	0.6321	0.4782	342	0.6937	0.6925	0.5420
208	0.9191	0.9060	0.4363	253	0.6803	0.6799	0.4158	298	0.6710	0.6553	0.5007	343	0.6803	0.6782	0.5549
209	0.9363	0.9226	0.4684	254	0.6858	0.6852	0.4160	299	0.6991	0.6841	0.5282	344	0.6615	0.6584	0.5665
210	0.9404	0.9261	0.4911	255	0.6984	0.6977	0.4220	300	0.7163	0.7017	0.5458	345	0.6478	0.6429	0.5817
211	0.9559	0.9415	0.5224	256	0.7138	0.7129	0.4307	301	0.7448	0.7309	0.5721	346	0.6424	0.6267	0.5975
212	0.9560	0.9422	0.5434	257	0.7333	0.7323	0.4436	302	0.7599	0.7469	0.5875	347	0.6513	0.6100	0.6150
213	0.9623	0.9493	0.5680	258	0.7523	0.7512	0.4574	303	0.7802	0.7679	0.6068	348	0.6609	0.5931	0.6317
214	0.9676	0.9559	0.5895	259	0.7765	0.7754	0.4754	304	0.7977	0.7860	0.6237	349	0.6727	0.5803	0.6502
215	0.9778	0.9678	0.6149	260	0.7928	0.7916	0.4891	305	0.8204	0.8095	0.6439	350	0.6797	0.5587	0.6634
216	0.9745	0.9660	0.6285	261	0.8132	0.8119	0.5066	306	0.8297	0.8192	0.6522	351	0.6894	0.5414	0.6784
217	0.9766	0.9700	0.6446	262	0.8352	0.8338	0.5244	307	0.8424	0.8326	0.6637	352	0.7006	0.5279	0.6935
218	0.9786	0.9733	0.6593	263	0.8529	0.8515	0.5410	308	0.8550	0.8454	0.6726	353	0.7094	0.5104	0.7059
219	0.9860	0.9826	0.6762	264	0.8681	0.8667	0.5567	309	0.8697	0.8606	0.6849	354	0.7182	0.4910	0.7168
220	0.9805	0.9779	0.6814	265	0.8862	0.8848	0.5739	310	0.8719	0.8629	0.6852	355	0.7280	0.4760	0.7280
221	0.9876	0.9860	0.6947	266	0.9000	0.8987	0.5882	311	0.8845	0.8757	0.6937	356	0.7380	0.4589	0.7380
222	0.9799	0.9789	0.6955	267	0.9087	0.9074	0.5991	312	0.8822	0.8738	0.6897	357	0.7458	0.4425	0.7446
223	0.9791	0.9785	0.6990	268	0.9161	0.9148	0.6090	313	0.8849	0.8766	0.6890	358	0.7531	0.4268	0.7500
224	0.9768	0.9766	0.7013	269	0.9193	0.9181	0.6160	314	0.8863	0.8781	0.6868	359	0.7592	0.4121	0.7524

RFS PHP-40T

Relative Field at 45 degrees Azimuth Heading

Pattern Rotated to Actual Orientation

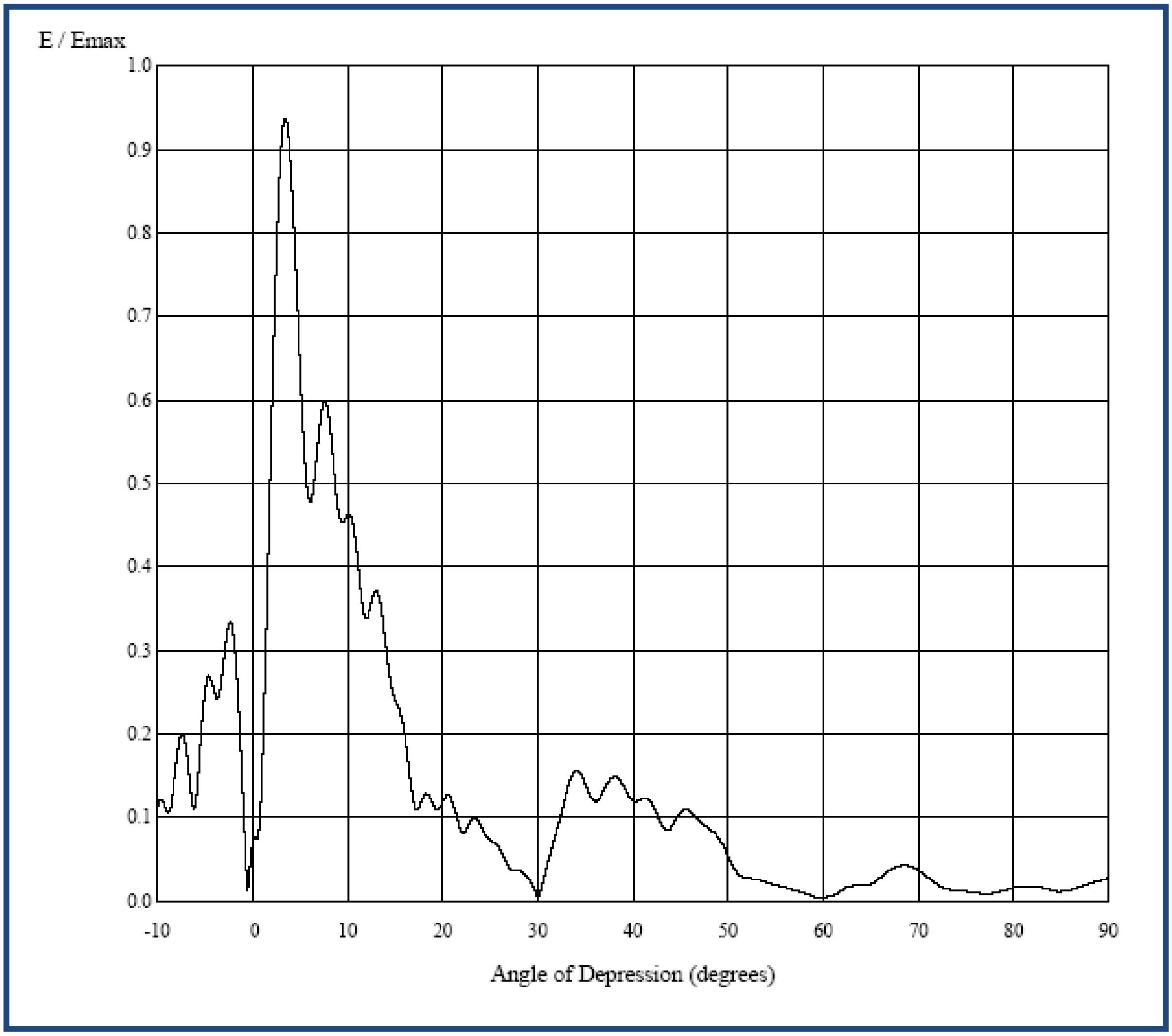

Figure 9a — Roxborough Elevation Relative Field Pattern

RFS PHP-40T

Relative Field at 135 degrees Azimuth Heading

Pattern Rotated to Actual Orientation

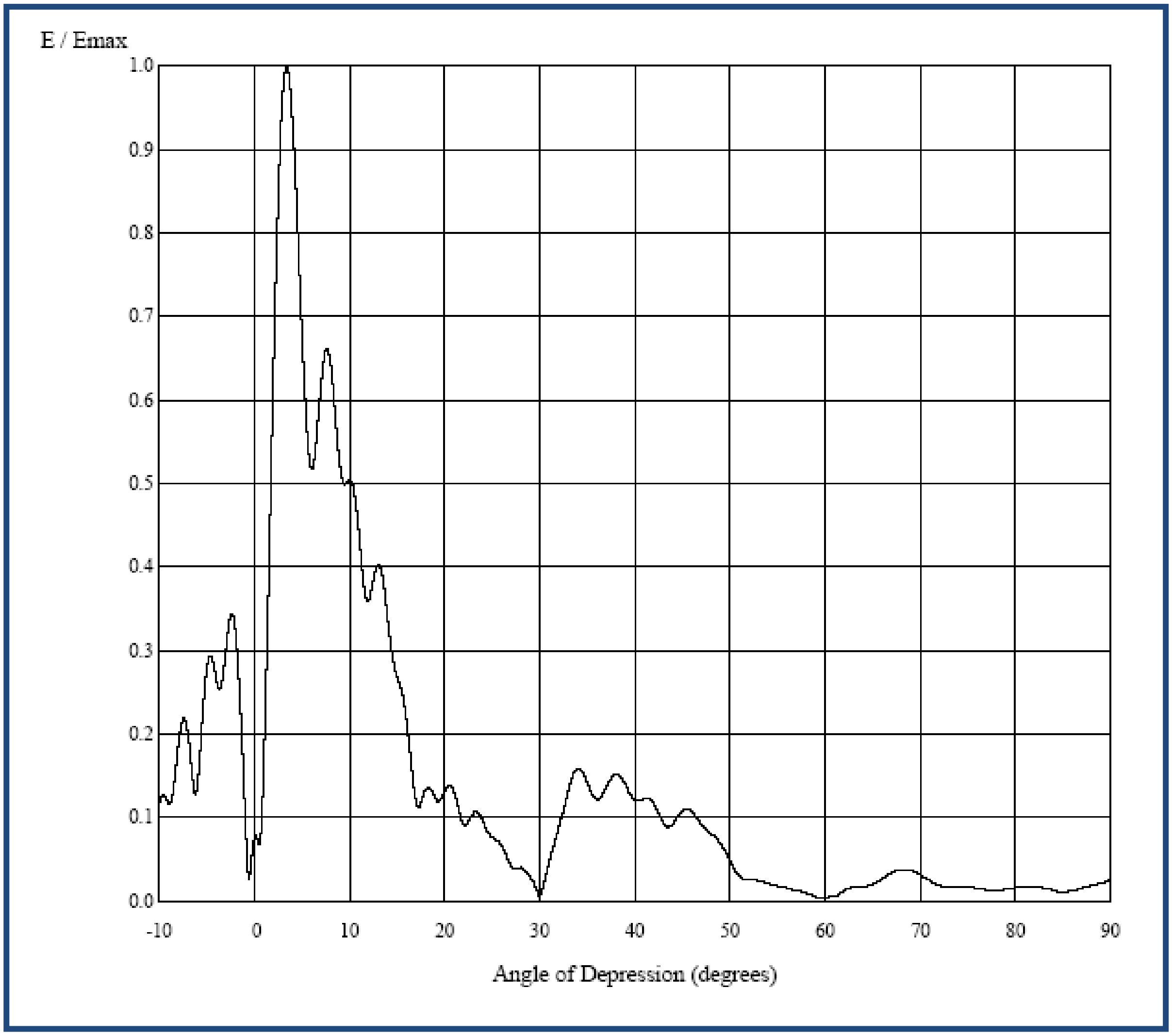

Figure 9b — Roxborough Elevation Relative Field Pattern

RFS PHP-40T

Relative Field at 225 degrees Azimuth Heading

Pattern Rotated to Actual Orientation

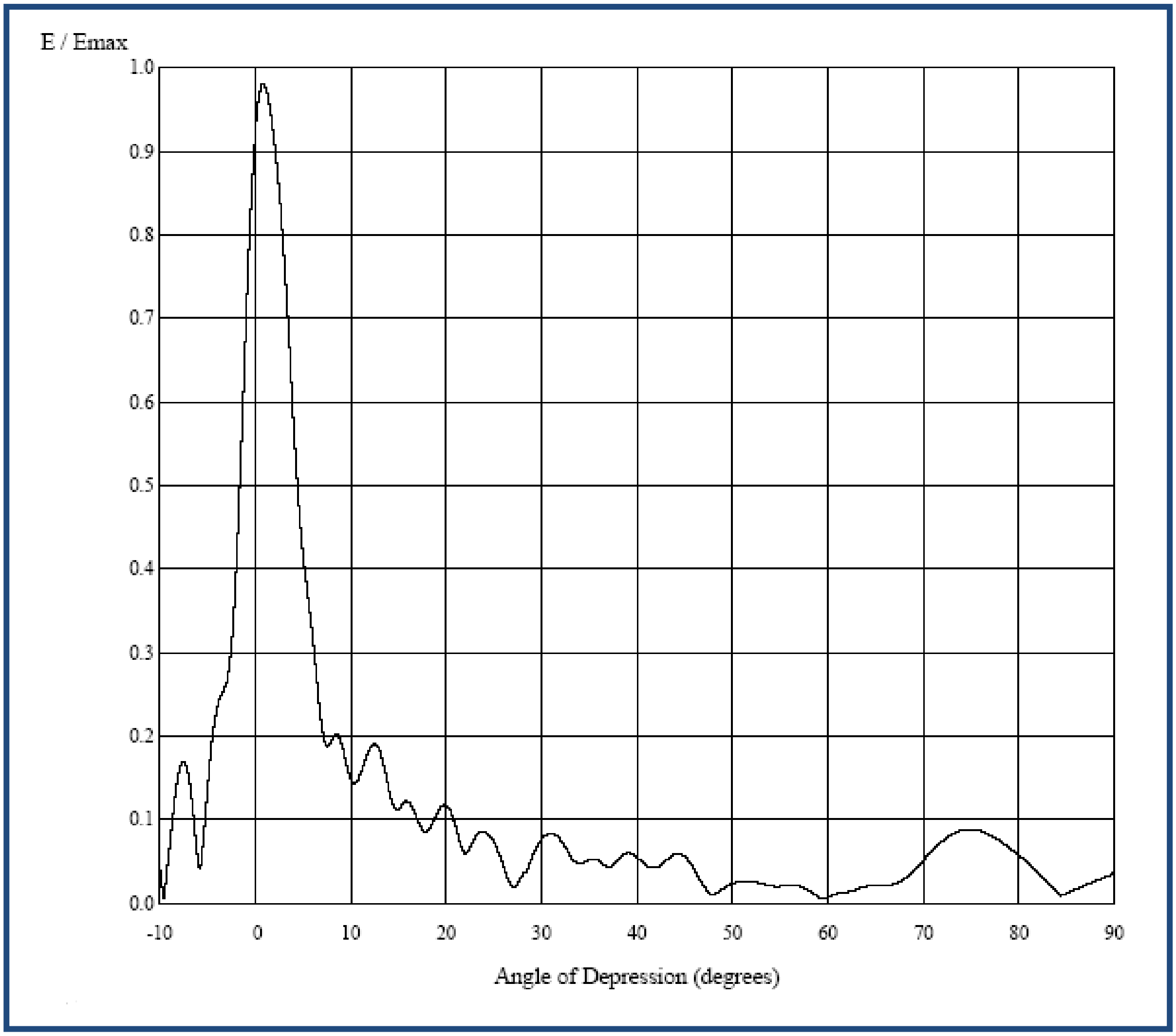

Figure 9c — Roxborough Elevation Relative Field Pattern

RFS PHP-40T

Relative Field at 315 degrees Azimuth Heading

Pattern Rotated to Actual Orientation

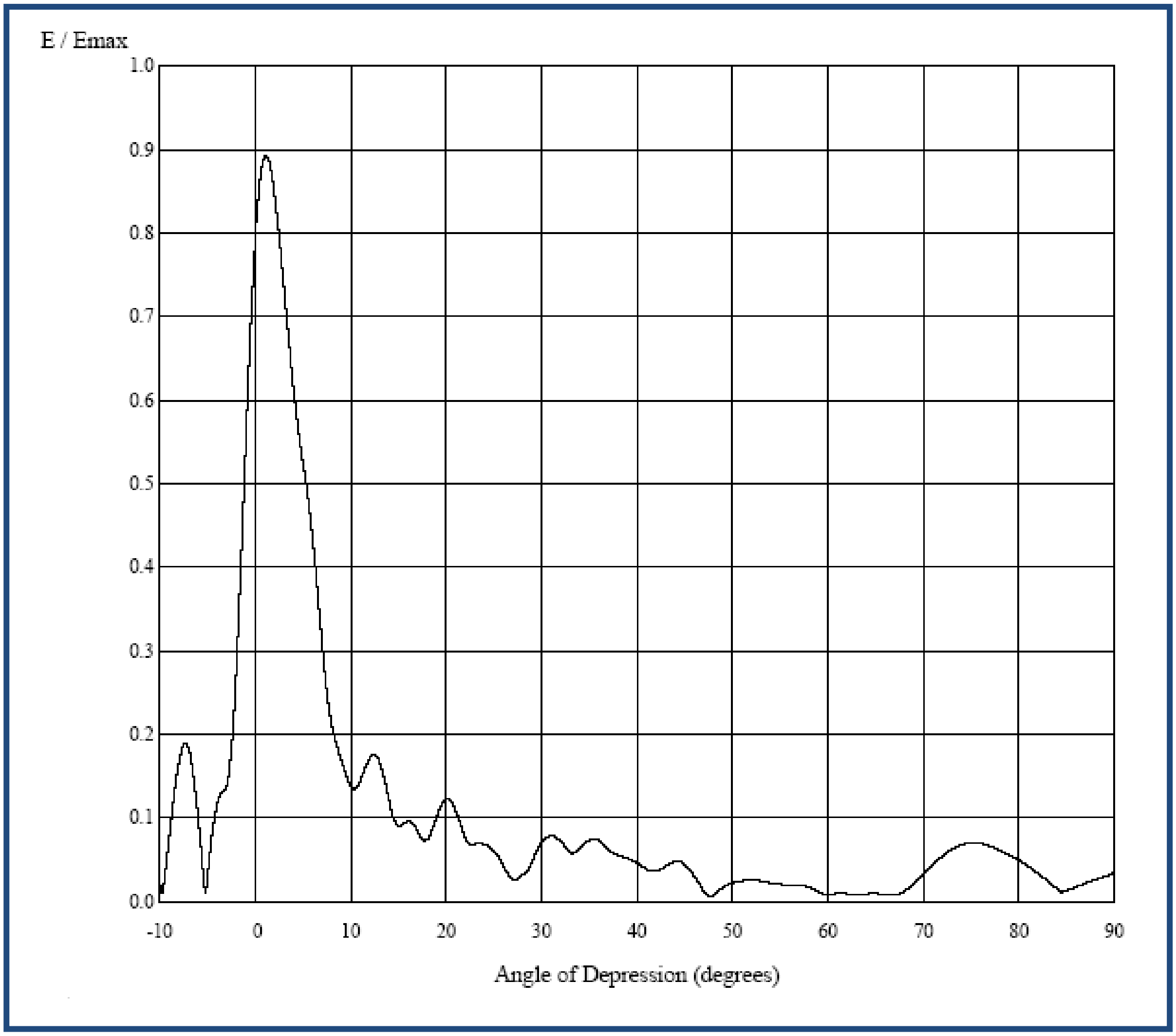

Figure 9d — Roxborough Elevation Relative Field Pattern

Figure 10 — Tabulated Data for RFS PHP-40T Elevation Relative Field Patterns – Roxborough

Depression	45 Az	135 Az	225 Az	315 Az	Depression	45 Az	135 Az	225 Az	315 Az	Depression	45 Az	135 Az	225 Az	315 Az
-5.0	0.2670	0.2772	0.1367	0.0305	1.4	0.3127	0.3277	0.9808	0.9951	6.8	0.5748	0.5888	0.2345	0.3782
-4.8	0.2819	0.2901	0.1634	0.0556	1.5	0.3593	0.3766	0.9756	0.9919	7.0	0.6002	0.6170	0.2156	0.3490
-4.6	0.2878	0.2937	0.1873	0.0789	1.6	0.4073	0.4253	0.9666	0.9850	7.2	0.6212	0.6388	0.2011	0.3205
-4.4	0.2855	0.2891	0.2077	0.0992	1.8	0.5059	0.5254	0.9496	0.9704	7.4	0.6354	0.6545	0.1932	0.2947
-4.2	0.2773	0.2785	0.2244	0.1159	2.0	0.6041	0.6248	0.9318	0.9533	7.5	0.6394	0.6602	0.1919	0.2833
-4.0	0.2670	0.2659	0.2372	0.1286	2.2	0.6974	0.7162	0.9089	0.9308	7.6	0.6409	0.6611	0.1913	0.2721
-3.8	0.2593	0.2560	0.2465	0.1375	2.4	0.7825	0.7994	0.8849	0.9072	7.8	0.6370	0.6581	0.1938	0.2532
-3.6	0.2588	0.2536	0.2530	0.1431	2.5	0.8212	0.8380	0.8732	0.8957	8.0	0.6242	0.6467	0.1987	0.2381
-3.4	0.2677	0.2612	0.2577	0.1463	2.6	0.8563	0.8704	0.8581	0.8816	8.2	0.6035	0.6252	0.2029	0.2256
-3.2	0.2852	0.2777	0.2622	0.1492	2.8	0.9161	0.9269	0.8283	0.8548	8.4	0.5778	0.5992	0.2057	0.2156
-3.0	0.3073	0.2989	0.2688	0.1547	3.0	0.9607	0.9693	0.7963	0.8280	8.5	0.5640	0.5862	0.2064	0.2115
-2.8	0.3293	0.3198	0.2798	0.1658	3.2	0.9885	0.9919	0.7587	0.7987	8.6	0.5500	0.5710	0.2057	0.2071
-2.6	0.3467	0.3358	0.2976	0.1856	3.4	1.000	1.000	0.7193	0.7705	8.8	0.5239	0.5442	0.2026	0.1991
-2.4	0.3559	0.3436	0.3239	0.2152	3.5	1.000	1.000	0.6999	0.7574	9.0	0.5029	0.5231	0.1968	0.1913
-2.2	0.3545	0.3407	0.3593	0.2545	3.6	0.9958	0.9928	0.6778	0.7427	9.2	0.4892	0.5072	0.1881	0.1829
-2.0	0.3415	0.3261	0.4032	0.3022	3.8	0.9773	0.9720	0.6352	0.7159	9.4	0.4835	0.5000	0.1782	0.1746
-1.8	0.3166	0.3000	0.4545	0.3567	4.0	0.9464	0.9411	0.5938	0.6913	9.5	0.4834	0.4998	0.1734	0.1707
-1.6	0.2809	0.2634	0.5113	0.4163	4.2	0.9048	0.8975	0.5523	0.6669	9.6	0.4844	0.4991	0.1681	0.1666
-1.4	0.2361	0.2183	0.5717	0.4794	4.4	0.8557	0.8487	0.5147	0.6452	9.8	0.4888	0.5015	0.1588	0.1596
-1.2	0.1849	0.1677	0.6337	0.5441	4.5	0.8292	0.8239	0.4982	0.6358	10.0	0.4933	0.5046	0.1518	0.1544
-1.0	0.1305	0.1150	0.6952	0.6090	4.6	0.8013	0.7954	0.4812	0.6253	10.2	0.4945	0.5027	0.1472	0.1510
-0.8	0.0766	0.0647	0.7543	0.6725	4.8	0.7444	0.7401	0.4522	0.6070	10.4	0.4903	0.4961	0.1459	0.1503
-0.6	0.0282	0.0276	0.8094	0.7331	5.0	0.6879	0.6867	0.4282	0.5902	10.5	0.4859	0.4913	0.1466	0.1511
-0.4	0.0229	0.0373	0.8589	0.7895	5.2	0.6342	0.6340	0.4062	0.5723	10.6	0.4796	0.4830	0.1475	0.1522
-0.2	0.0534	0.0614	0.9017	0.8405	5.4	0.5867	0.5886	0.3869	0.5544	10.8	0.4626	0.4637	0.1514	0.1561
0.0	0.0738	0.0758	0.9385	0.8863	5.5	0.5664	0.5702	0.3782	0.5456	11.0	0.4408	0.4405	0.1571	0.1619
0.2	0.0819	0.0772	0.9644	0.9230	5.6	0.5486	0.5524	0.3682	0.5352	11.2	0.4165	0.4137	0.1632	0.1683
0.4	0.0809	0.0699	0.9837	0.9532	5.8	0.5226	0.5281	0.3488	0.5140	11.4	0.3933	0.3894	0.1698	0.1751
0.5	0.0800	0.0672	0.992	0.9666	6.0	0.5108	0.5187	0.3284	0.4912	11.5	0.3833	0.3797	0.1734	0.1787
0.6	0.0819	0.0692	0.9954	0.9759	6.2	0.5128	0.5214	0.3053	0.4649	11.6	0.3747	0.3705	0.1764	0.1817
0.8	0.1042	0.0990	1.000	0.9910	6.4	0.5268	0.5370	0.2814	0.4372	11.8	0.3635	0.3600	0.1824	0.1876
1.0	0.1548	0.1588	1.000	0.9988	6.5	0.5372	0.5492	0.2697	0.4233	12.0	0.3609	0.3594	0.1878	0.1925
1.2	0.2267	0.2371	0.9917	1.000	6.6	0.5489	0.5610	0.2572	0.4080	12.2	0.3657	0.3656	0.1913	0.1954

Figure 10 – cont'd. — Tabulated Data for RFS PHP-40T Elevation Relative Field Patterns – Roxborough

Depression	45° Az	135° Az	225° Az	315° Az	Depression	45° Az	135° Az	225° Az	315° Az	Depression	45° Az	135° Az	225° Az	315° Az
12.4	0.3750	0.3770	0.1936	0.1968	17.8	0.1287	0.1269	0.0878	0.0816	23.4	0.1066	0.1071	0.0861	0.0776
12.5	0.3803	0.3839	0.1942	0.1970	18.0	0.1341	0.1331	0.0885	0.0828	23.5	0.1062	0.1066	0.0870	0.0776
12.6	0.3853	0.3892	0.1938	0.1961	18.2	0.1368	0.1360	0.0907	0.0861	23.6	0.1052	0.1052	0.0874	0.0774
12.8	0.3933	0.3988	0.1918	0.1933	18.4	0.1365	0.1360	0.0943	0.0914	23.8	0.1019	0.1015	0.0879	0.0771
13.0	0.3967	0.4041	0.1877	0.1884	18.5	0.1352	0.1352	0.0966	0.0947	24.0	0.0974	0.0968	0.0876	0.0765
13.2	0.3938	0.4016	0.1808	0.1810	18.6	0.1332	0.1332	0.0987	0.0980	24.2	0.0921	0.0912	0.0863	0.0755
13.4	0.3846	0.3934	0.1721	0.1718	18.8	0.1281	0.1286	0.1036	0.1054	24.4	0.0870	0.0859	0.0844	0.0742
13.5	0.3778	0.3877	0.1673	0.1669	19.0	0.1225	0.1240	0.1087	0.1130	24.5	0.0847	0.0837	0.0834	0.0735
13.6	0.3696	0.3793	0.1618	0.1612	19.2	0.1181	0.1202	0.1129	0.1200	24.6	0.0826	0.0815	0.0819	0.0725
13.8	0.3504	0.3610	0.1505	0.1494	19.4	0.1162	0.1193	0.1166	0.1263	24.8	0.0793	0.0782	0.0787	0.0704
14.0	0.3291	0.3411	0.1395	0.1375	19.5	0.1165	0.1202	0.1182	0.1292	25.0	0.0771	0.0762	0.0749	0.0679
14.2	0.3077	0.3201	0.1292	0.1258	19.6	0.1175	0.1213	0.1191	0.1315	25.2	0.0756	0.0747	0.0703	0.0648
14.4	0.2887	0.3018	0.1212	0.1156	19.8	0.1214	0.1257	0.1203	0.1352	25.4	0.0744	0.0735	0.0651	0.0612
14.5	0.2807	0.2945	0.1184	0.1114	20.0	0.1266	0.1312	0.1201	0.1374	25.5	0.0736	0.0729	0.0624	0.0593
14.6	0.2737	0.2871	0.1160	0.1076	20.2	0.1315	0.1358	0.1178	0.1376	25.6	0.0727	0.0719	0.0594	0.0572
14.8	0.2632	0.2763	0.1141	0.1025	20.4	0.1348	0.1388	0.1139	0.1361	25.8	0.0702	0.0695	0.0531	0.0527
15.0	0.2563	0.2690	0.1149	0.1004	20.5	0.1356	0.1396	0.1115	0.1349	26.0	0.0668	0.0662	0.0465	0.0481
15.2	0.2512	0.2621	0.1172	0.1005	20.6	0.1356	0.1392	0.1084	0.1329	26.2	0.0622	0.0617	0.0396	0.0432
15.4	0.2458	0.2550	0.1201	0.1022	20.8	0.1333	0.1365	0.1015	0.1282	26.4	0.0570	0.0566	0.0328	0.0385
15.5	0.2425	0.2511	0.1217	0.1035	21.0	0.1281	0.1312	0.0935	0.1223	26.5	0.0542	0.0540	0.0296	0.0364
15.6	0.2384	0.2456	0.1227	0.1046	21.2	0.1204	0.1230	0.0848	0.1151	26.6	0.0514	0.0513	0.0266	0.0343
15.8	0.2276	0.2328	0.1241	0.1067	21.4	0.1112	0.1136	0.0763	0.1074	26.8	0.0462	0.0463	0.0217	0.0310
16.0	0.2131	0.2166	0.1242	0.1079	21.5	0.1064	0.1090	0.0725	0.1037	27.0	0.0420	0.0424	0.0191	0.0290
16.2	0.1951	0.1963	0.1221	0.1077	21.6	0.1018	0.1042	0.0688	0.0997	27.2	0.0393	0.0398	0.0194	0.0284
16.4	0.1750	0.1743	0.1186	0.1061	21.8	0.0937	0.0963	0.0634	0.0925	27.4	0.0383	0.0388	0.0222	0.0292
16.5	0.1647	0.1634	0.1166	0.1050	22.0	0.0886	0.0914	0.0609	0.0862	27.5	0.0383	0.0389	0.0241	0.0301
16.6	0.1545	0.1522	0.1138	0.1032	22.2	0.0872	0.0900	0.0614	0.0812	27.6	0.0385	0.0390	0.0261	0.0311
16.8	0.1362	0.1327	0.1082	0.0993	22.4	0.0894	0.0921	0.0646	0.0779	27.8	0.0394	0.0396	0.0303	0.0335
17.0	0.1229	0.1190	0.1025	0.0947	22.5	0.0915	0.0942	0.0669	0.0770	28.0	0.0402	0.0402	0.0343	0.0362
17.2	0.1166	0.1126	0.0967	0.0899	22.6	0.0938	0.0962	0.0694	0.0763	28.2	0.0395	0.0392	0.0368	0.0375
17.4	0.1171	0.1138	0.0921	0.0857	22.8	0.0989	0.1009	0.0747	0.0761	28.4	0.0369	0.0364	0.0391	0.0383
17.5	0.1193	0.1166	0.0905	0.0841	23.0	0.1033	0.1049	0.0800	0.0769	28.5	0.0357	0.0353	0.0412	0.0399
17.6	0.1222	0.1197	0.0890	0.0827	23.2	0.1060	0.1069	0.0838	0.0776	28.6	0.0346	0.0340	0.0436	0.0418

Figure 10 – cont'd. — Tabulated Data for RFS PHP-40T Elevation Relative Field Patterns – Roxborough

Depression	45° Az	135° Az	225° Az	315° Az	Depression	45° Az	135° Az	225° Az	315° Az	Depression	45° Az	135° Az	225° Az	315° Az
28.8	0.0324	0.0317	0.0493	0.047	41.0	0.1307	0.1227	0.0463	0.0434	57.5	0.0124	0.0114	0.0186	0.021
29.0	0.0297	0.029	0.0553	0.053	41.5	0.1308	0.1228	0.0436	0.0408	58.0	0.0104	0.0095	0.0154	0.019
29.2	0.0264	0.0255	0.061	0.0591	42.0	0.1242	0.1169	0.0436	0.0405	58.5	0.0079	0.0073	0.0116	0.0161
29.4	0.022	0.0211	0.0663	0.0649	42.5	0.1114	0.1057	0.0466	0.0428	59.0	0.0055	0.005	0.0079	0.013
29.5	0.0194	0.0185	0.0688	0.0677	43.0	0.0975	0.0939	0.0516	0.0471	59.5	0.004	0.0036	0.0058	0.0102
29.6	0.0165	0.0157	0.0709	0.0703	43.5	0.0904	0.0886	0.0568	0.0513	60.0	0.0043	0.0039	0.007	0.0089
29.8	0.0101	0.0096	0.0748	0.075	44.0	0.0943	0.0927	0.0601	0.0538	60.5	0.0057	0.005	0.0097	0.0096
30.0	0.0046	0.0058	0.0782	0.079	44.5	0.1043	0.1016	0.0604	0.0534	61.0	0.0073	0.0063	0.0123	0.0114
30.2	0.0089	0.0105	0.0806	0.0822	45.0	0.1132	0.1087	0.057	0.0496	61.5	0.0103	0.0088	0.0132	0.0115
30.4	0.0176	0.0189	0.0825	0.0846	45.5	0.1167	0.1106	0.0502	0.0428	62.0	0.0145	0.0124	0.0138	0.0099
30.5	0.0223	0.0235	0.0834	0.0857	46.0	0.1144	0.1069	0.041	0.0338	62.5	0.0175	0.0151	0.0152	0.0089
30.6	0.0271	0.028	0.0839	0.0864	46.5	0.1084	0.0997	0.0307	0.0238	63.0	0.0193	0.0167	0.017	0.0088
30.8	0.0368	0.0373	0.0846	0.0874	47.0	0.1018	0.0919	0.0207	0.0139	63.5	0.0199	0.0174	0.019	0.0094
31.0	0.0464	0.0466	0.085	0.0879	47.5	0.0965	0.0857	0.0132	0.0065	64.0	0.0199	0.0177	0.0205	0.0102
31.5	0.0692	0.068	0.0831	0.0859	48.0	0.0924	0.0809	0.011	0.0081	64.5	0.0204	0.0183	0.0216	0.0107
32.0	0.0909	0.0881	0.0775	0.0805	48.5	0.0875	0.0758	0.014	0.0139	65.0	0.0221	0.02	0.0221	0.0107
32.5	0.1136	0.1093	0.0686	0.0731	49.0	0.0801	0.0689	0.018	0.019	65.5	0.0255	0.0229	0.0222	0.0101
33.0	0.1377	0.1322	0.0577	0.0657	49.5	0.0697	0.0594	0.0214	0.0227	66.0	0.0301	0.0266	0.0222	0.0091
33.5	0.1583	0.1515	0.0507	0.0656	50.0	0.0573	0.0483	0.0239	0.0251	66.5	0.035	0.0305	0.0226	0.0082
34.0	0.1662	0.1587	0.048	0.0703	50.5	0.045	0.0375	0.0255	0.0266	67.0	0.0394	0.0339	0.0238	0.0083
34.5	0.1617	0.1541	0.0497	0.0768	51.0	0.0355	0.0295	0.0266	0.0275	67.5	0.0429	0.0365	0.0262	0.0102
35.0	0.1488	0.1417	0.053	0.0822	51.5	0.0304	0.0258	0.0274	0.0284	68.0	0.045	0.0378	0.0299	0.0138
35.5	0.1348	0.1283	0.0542	0.0841	52.0	0.029	0.0252	0.0271	0.0287	68.5	0.0456	0.0379	0.0346	0.0185
36.0	0.1276	0.1215	0.0516	0.0819	52.5	0.0287	0.0253	0.0259	0.0283	69.0	0.0446	0.0368	0.0402	0.024
36.5	0.1315	0.1253	0.047	0.0764	53.0	0.0278	0.0245	0.0242	0.0274	69.5	0.0423	0.0345	0.0463	0.03
37.0	0.1427	0.1362	0.0445	0.0699	53.5	0.0259	0.0228	0.0225	0.0262	70.0	0.0388	0.0315	0.0526	0.0364
37.5	0.1538	0.1471	0.0474	0.0648	54.0	0.0237	0.0208	0.0212	0.025	70.5	0.0346	0.0279	0.0589	0.0428
38.0	0.1591	0.1522	0.0536	0.0619	54.5	0.0218	0.0192	0.0206	0.0238	71.0	0.0299	0.0243	0.065	0.0492
38.5	0.1561	0.1494	0.0592	0.0602	55.0	0.0204	0.018	0.0207	0.023	71.5	0.0253	0.0211	0.0708	0.0553
39.0	0.1465	0.1399	0.0614	0.0583	55.5	0.019	0.0169	0.0212	0.0224	72.0	0.0211	0.0186	0.076	0.061
39.5	0.1351	0.1285	0.06	0.0553	56.0	0.0171	0.0154	0.0216	0.0219	72.5	0.0177	0.0172	0.0805	0.066
40.0	0.128	0.121	0.0559	0.0514	56.5	0.0152	0.0139	0.0217	0.022	73.0	0.0153	0.0166	0.0843	0.0703
40.5	0.1277	0.1202	0.0508	0.0472	57.0	0.0139	0.0128	0.0208	0.0221	73.5	0.014	0.0167	0.0872	0.0737

Figure 10 – cont'd. — Tabulated Data for RFS PHP-40T Elevation Relative Field Patterns – Roxborough

Depression	45° Az	135° Az	225° Az	315° Az
74.0	0.0133	0.0169	0.0891	0.0762
74.5	0.0129	0.0170	0.0902	0.0778
75.0	0.0123	0.0167	0.0903	0.0785
75.5	0.0116	0.0161	0.0896	0.0784
76.0	0.0107	0.0152	0.0881	0.0776
76.5	0.0098	0.0142	0.0859	0.0761
77.0	0.0093	0.0133	0.0831	0.0740
77.5	0.0095	0.0128	0.0798	0.0716
78.0	0.0105	0.0128	0.0761	0.0687
78.5	0.0120	0.0132	0.0720	0.0655
79.0	0.0137	0.0141	0.0677	0.0621
79.5	0.0154	0.0152	0.0632	0.0586
80.0	0.0169	0.0161	0.0585	0.0550
80.5	0.0180	0.0169	0.0535	0.0511
81.0	0.0187	0.0174	0.0483	0.0469
81.5	0.0190	0.0175	0.0428	0.0424
82.0	0.0187	0.0172	0.0371	0.0376
82.5	0.0180	0.0166	0.0314	0.0326
83.0	0.0169	0.0156	0.0255	0.0274
83.5	0.0155	0.0143	0.0197	0.0220
84.0	0.0139	0.0127	0.0139	0.0166
84.5	0.0124	0.0113	0.0097	0.0127
85.0	0.0122	0.0110	0.0120	0.0149
85.5	0.0130	0.0115	0.0146	0.0172
86.0	0.0145	0.0126	0.0173	0.0197
86.5	0.0164	0.0140	0.0199	0.0222
87.0	0.0183	0.0156	0.0224	0.0246
87.5	0.0203	0.0172	0.0249	0.0270
88.0	0.0223	0.0187	0.0273	0.0292
88.5	0.0241	0.0202	0.0295	0.0314
89.0	0.0258	0.0216	0.0316	0.0335
89.5	0.0276	0.0231	0.0340	0.0358
90.0	0.0303	0.0254	0.0379	0.0400

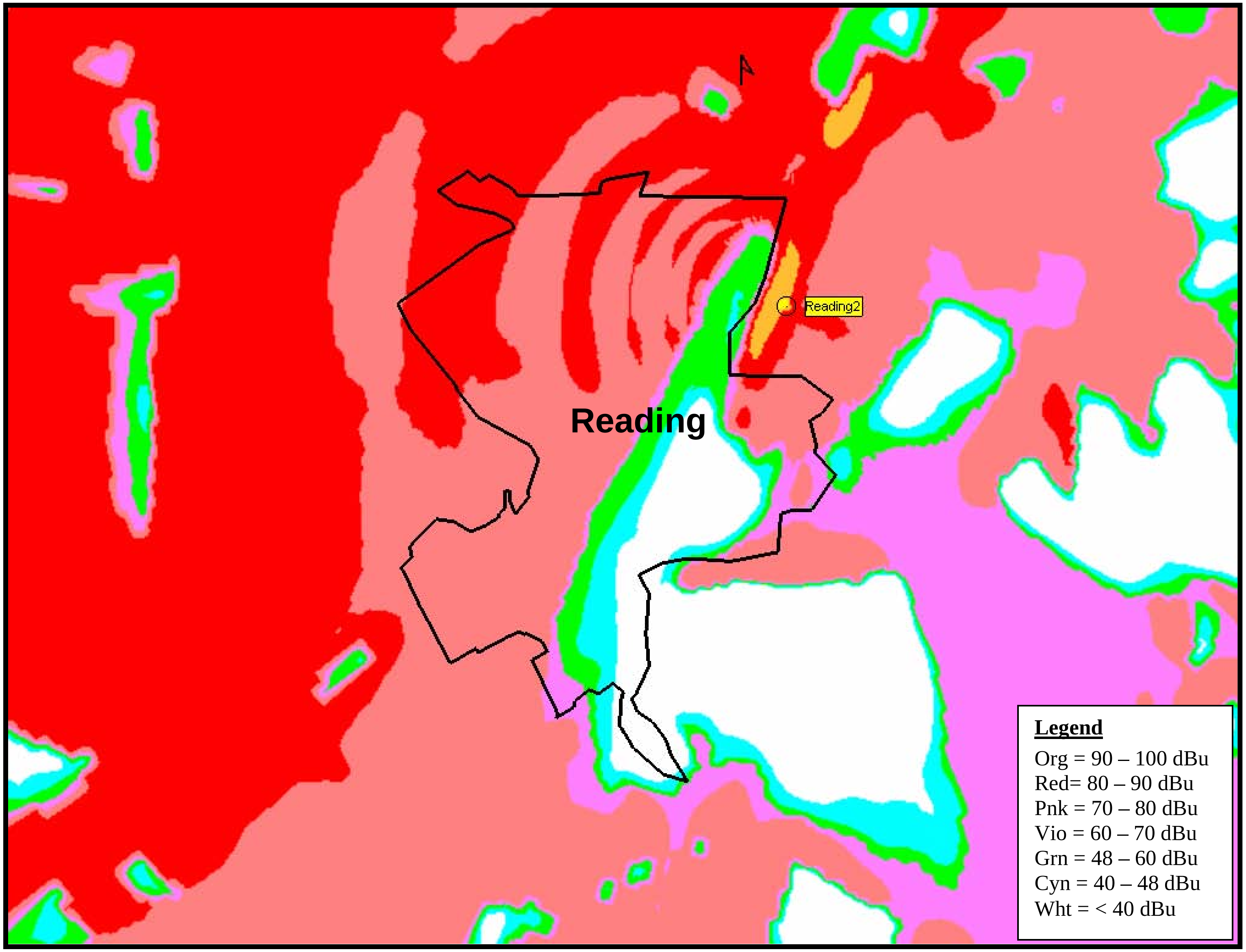

Figure 11 — Detailed Coverage Map of Principal Community – Reading, PA

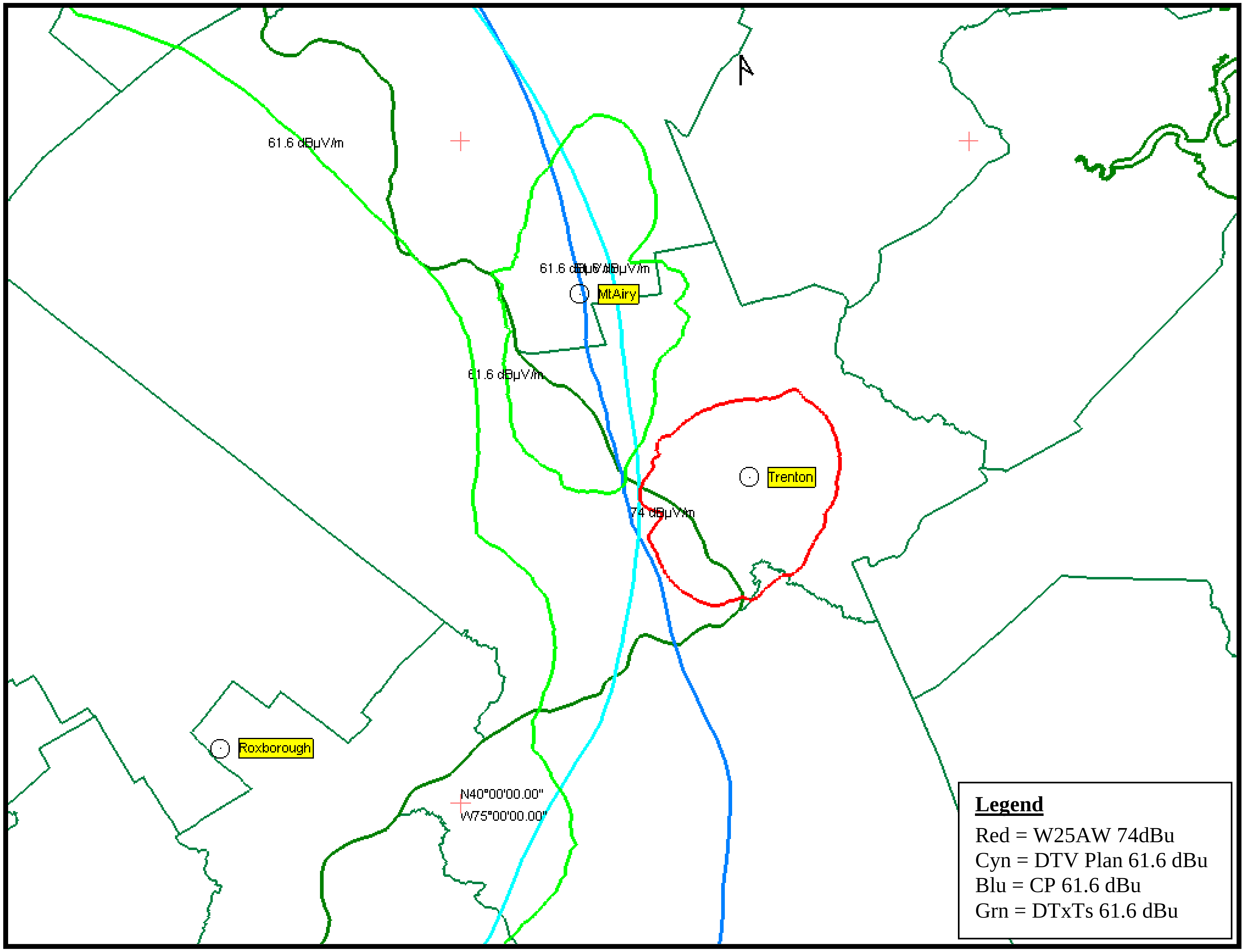

Figure 12 — Detailed Contour Analysis of W25AW – Trenton, NJ

Annex A

Reply Comments
in
MB Docket #05-312
by
Group of Engineering Firms

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Digital Television Distributed Transmission System Technologies	)	MB Docket No. 05-312
	)	
	)	

REPLY COMMENTS OF CAVELL, MERTZ & ASSOCIATES, INC.; CHESAPEAKE RF CONSULTANTS, LLC; DU TREIL, LUNDIN & RACKLEY, INC.; GREG BEST CONSULTING, INC.; HATFIELD & DAWSON CONSULTING ENGINEERS, LLC; MEINTEL, SGRIGNOLI, & WALLACE, LLC; MERRILL WEISS GROUP LLC; and SMITH and FISHER LLC
TO PETITION FOR RECONSIDERATION OF THE ASSOCIATION FOR MAXIMUM SERVICE TELEVISION, INC.

The firms Cavell, Mertz & Associates, Inc.; Chesapeake RF Consultants, LLC; du Treil, Lundin & Rackley, Inc.; Greg Best Consulting, Inc.; Hatfield & Dawson Consulting Engineers, LLC; Meintel, Sgrignoli, & Wallace, LLC; Merrill Weiss Group LLC; and Smith and Fisher LLC (hereinafter, the "Engineering Firms") jointly file these comments in response to the Petition for Reconsideration of the Association for Maximum Service Television, Inc. (MSTV) in the above-captioned proceeding. The FCC released its Report and Order on Distributed Transmission System Technologies, FCC 08-256 (the "DTS R&O"), on November 7, 2008. MSTV filed its petition on December 31, 2008, and the Engineering Firms have waited since that time for notice of the petition to appear in the Federal Register. Since the petition has not yet been published in the Federal Register, the Engineering Firms now file these Reply Comments with the intention that they will be of assistance to the Commission staff as they proceed with implementation of the processing methodology for DTS systems.

As does MSTV, the Engineering Firms applaud the adoption by the Federal Communications Commission of rules for the routine licensing of digital television broadcast stations utilizing Distributed Transmission Systems (DTS) technology. As engineering and technical consultants who design transmission systems for licensed television stations and who prepare technical filings for those stations, we strongly recommend that the Commission adopt an interference evaluation regime for DTS that will yield the most accurate results that can be obtained within the general methodological approach of OET Bulletin No. 69.

In this regard, we support the request of MSTV that stations be required to submit and use the actual elevation patterns of their DTS antennas instead of the OET-69 standard pattern to more accurately evaluate the interference impact of the DTS transmitters. We find the MSTV suggestion that actual antenna elevation patterns should be applied to all stations involved in interference analyses to be the correct approach. We also find, however, that the MSTV request did not specify all important aspects of the issues surrounding use of elevation patterns in conducting the necessary interference analyses. These comments are filed to bring to the attention of the Commission at least one other factor that must be included in the adoption of the use of elevation patterns and to respectfully request its adoption upon reconsideration of the DTS Report and Order or its inclusion in a revision of OET-69 and its supporting software, as appropriate.

When both the azimuth and elevation patterns of transmitting antennas are to be taken into account in the analysis of interference between two or more stations, it is necessary to determine the received signal levels from all relevant stations at each geographic point to be studied for the presence of interference. To correctly compute the received signal levels, the relevant launch angles from the transmitting antennas must be determined to either the receiving antenna itself or to appropriate representations of any obstacles that obstruct the paths to that receiving antenna. Those launch angles comprise combinations of the azimuthal directions from the transmitting to receiving antennas and the depression angles from the transmitting antennas either to the receiving antennas or to any obstacles in the paths to those receiving antennas. From the launch angle information, the relative field values from the transmitting antennas can be determined for the relevant paths.

To determine the depression angle from a transmitting antenna, it is necessary to calculate the difference in heights of the transmitting and receiving antennas (or the transmitting antenna and any obstacle in the path) and the distance between them. The depression angle then is the arc-tangent of the ratio of the distance divided by the height difference. For improved precision, the height difference should be compensated for the curvature of the earth.

The difference in heights of the transmitting and receiving antennas (or obstacles) is found by adding the height above ground level (AGL) of each antenna to the height of the terrain above mean sea level (AMSL) at the antenna location to obtain the total height of each antenna AMSL. Of course, for obstacles in the path, the height is just the height of the obstacle as it is represented in the propagation model in use. The difference in heights then is just the difference in the two total height values.

Unfortunately, the mathematical process currently embodied in the Commission's software implementing the Longley-Rice propagation model according to OET Bulletin No. 69 leaves out an important step in the calculation of the difference in heights of the two antennas (or of the transmitting antenna and of any obstacle). It does not add the height of the terrain at the antenna location to the antenna height AGL. Rather it skips the step of adding the height of the terrain at the antenna location and uses only the height AGL in making the depression angle calculation.

Such a shortcut approach will be reasonably accurate in locations where the terrain is flat; this might be the case in some locations in the Midwest or the Great Plains, for example. But it clearly leads to serious errors in the computation of depression angle in markets with significant terrain variation, which is the case in much of the United States. Modern antenna design software permits both azimuth and elevation patterns to be achieved that were not previously possible. This enables obtaining results such as uniform field strengths over large areas around an antenna, with no "hot spots" in the region near the antenna itself, or placing sharp nulls in patterns – both in azimuth and elevation. The former of these techniques is valuable for providing protection to adjacent-channel stations in the same market, while the latter technique is useful for providing protection to stations in neighboring markets. Both of these methods have been applied in DTS networks designed to date; indeed, they both have been applied in the design of a single such network.

The principal objective in the design of a television transmission system is to obtain the best possible service to viewers of each station while minimizing interference to neighboring stations. This maximizes the efficiency of spectrum utilization. There is no economic method for accurately determining the actual interference results in the field, so the Commission's methodology is predicated on limiting actual interference by limiting predicted interference and assuming the prediction to be reasonably accurate. It therefore is important that the model used reflect the real world as much as possible within the context of the general methodology applied. Given the foregoing discussion, we make the following recommendation for the process the FCC uses in collecting data and analyzing interference:

- Correct the methodology applied in the software associated with OET Bulletin No. 69 to include computation of the total antenna height AMSL for both transmitting and receiving antennas before determination of the depression angle from the transmitting antenna and the corresponding relative field of the emission toward the studied receiving location.

Please note that our recommendation does not deal with the issue of the launch angle toward any obstruction(s) that may be in the path from transmitter to receiver. That issue is rather complex, and the solution to it is not as readily apparent as is the case with unobstructed paths. Thus, we are not making a recommendation at this time for its solution, but we do strongly recommend that the actual height of the transmitting antenna AMSL be used in all calculations, as it resolves with the simplest of solutions the most serious of the problems in the Commission's software regarding the use of elevation patterns.

We are gratified that the collection of information on the elevation patterns at least of the antennas of DTS facilities already has been provided for in the new Form 301 that recently was approved by the Office of Management and Budget. Given that, it is our belief that our suggestion can be implemented through changes that we expect to be required in OET Bulletin No. 69 and in the software that supports interference analysis using the methodology of OET-69. Since that document and software already will be in revision, now is an opportune time to make a change that long has been pointed out by members of the engineering community as being necessary to improve the accuracy of the Commission's prediction of interference. The alternative is that DTS transmitter facilities will be designed to achieve the best predicted interference performance, but those predictions will not be correctly reflected in the real world.

Respectfully submitted,

Garrison C. Cavell
Cavell, Mertz & Associates, Inc.

Joseph M. Davis, P.E.
Chesapeake RF Consultants, LLC

Louis R. du Treil, Jr., P.E.
du Treil, Lundin & Rackley, Inc.

Gregory L. Best, P.E.
Greg Best Consulting, Inc.

Benjamin F. Dawson III, P.E.
Hatfield & Dawson Consulting Engineers, LLC

Dennis Wallace
Meintel, Sgrignoli & Wallace, LLC

S. Merrill Weiss
Merrill Weiss Group LLC

Kevin Fisher
Smith and Fisher LLC

Annex B

Request for Dismissal
of Interference Complaint
with Prejudice

by
WZBN TV, Inc.

Date Stamped
April 10, 2008

PLEASE STAMP AND RETURN THIS COPY TO FLETCHER, HEALD & HILDRETH

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In re Authorization Granted to Reading Broadcasting, Inc., D.I.P. **(WTVE**(TV), Facility ID **55305)** For Special Temporary Authority To Operate A Distributed Transmission System on Channel 25 at Reading, PA	))))))))	**File No. BSDTS-20060407ACP**

RECEIVED - FCC
APR 10 2008
Federal Communications Commission
Bureau / Office

To: Chief, Video Division, Media Bureau

REQUEST FOR DISMISSAL OF INTERFERENCE COMPLAINT

1. On December 31, 2007, WZBN TV, Inc. ("WZBN"), licensee of Class A television station W25AW, Facility ID 74464, Trenton, NJ, filed an "Interference Complaint and Request for Immediate Order Requiring Cessation of Operation of DTS Transmitter" ("Interference Complaint"), asking the Commission to require Reading Broadcasting, Inc., D.I.P. ("RBI") licensee of Station WTVE(TV), Reading PA, to shut down one or more Distributed Transmission System ("DTS") transmitters that are causing co-channel interference to W25AW.

2. WZBN hereby withdraws the Interference Complaint and requests that the Interference Complaint be dismissed with prejudice. WZBN has reached a private settlement with the current licensee and proposed assignee of the WTVE license pursuant to which those parties will finance delivery of the W25AW signal to a cable television head-end by optical fiber and will reimburse part of the legal and engineering expenses incurred by WZBN in this matter.

Fletcher, Heald & Hildreth, PLC
1300 N. 17th St., 11th Floor
Arlington, VA 22209-3801
Fax 703-812-0486

April 10, 2008

Respectfully submitted,

Peter Tannenwald[1]

Counsel for WZBN TV, Inc.

[1] Not admitted in Virginia. Admitted only in the District of Columbia.

CERTIFICATE OF SERVICE

I, Evelyn Thompson, do hereby certify that I have, this 10th day of April, 2008, caused copies of the foregoing "Request for Dismissal of Interference Complaint" to be sent by first class United States mail, postage prepaid, to the following:

John D. Poutasse, Esq.
Leventhal Senter & Lerman, PLLC
2000 K St., N.W., Suite 600
Washington, DC 20006-1809
Counsel for George L. Miller, Chapter 11 Trustee, Reading Broadcasting, Inc.

Chris G. Tygh, Esq.
Covington & Burling
1201 Pennsylvania Ave., N.W.
Washington, DC 20004-2401
Counsel for WRNN-TV Associates Limited Partnership

In addition, on the 11th day of April, I will send a copy of the foregoing by electronic mail to:

Clay Pendarvis, Associate Division Chief
Video Division, Media Bureau
Federal Communications Commission
Washington, DC 20554

Hossein Hashemzadeh, Associate Division Chief
Video Division, Media Bureau
Federal Communications Commission
Washington, DC 20554

Evelyn Thompson

Evelyn Thompson