

## ***Facilities***

The facilities requested in this application include continued operation at 665 kW ERP at a height above average terrain of 991 meters at the Mt Wilson site, operation at 50 kW ERP at 696.5 meters HAAT at Table Mountain, and operation at 25.1 kW at 588.5 meters HAAT and at 16.74 kW at 568.5 meters HAAT at Oat Mountain. The currently authorized facility at the Mt Wilson site meets the requirements of §73.622(f)(5), as its combination of power and antenna height does not produce a predicted noise-limited contour the area of which exceeds that of the largest such area produced by another station in the same market. The relationships between the parameters in the cases of the gap-filler transmitters result in power/height combinations that meet the requirements for maximum allowable facilities specified by the table in §73.622(f)(8)(i) of the Commission's Rules. The basic characteristics of each of the transmitters proposed in the KNBC DTS network are given in Figures 1a, 1b, 1c, and 1d at the end of this Technical Statement and in the related DTS Engineering portions of the Form 301 application – one for each transmitter.

Three fundamental antenna designs are proposed for use in the KNBC DTS network. The Mt Wilson (DTS Site 1) antenna is a relatively conventional, omnidirectional, center-fed, slotted coaxial design. It has one degree of electrical beam tilt and is installed with one degree of mechanical beam tilt downward toward 215 degrees. It has been in service for KNBC since the station first initiated digital transmission in 1998.

The antenna design at the Table Mountain site (DTS Site 2) will be a panel array, using broadband panels and a corporate feed. It will consist of a total of sixteen panels in two columns of eight each and will have three main lobes in its azimuth pattern. A significant amount of electrical beam tilt will be used, with a substantial notch in the radiation above the main beam. The combination of the electrical beam tilt and the notch will permit the application of mechanical beam tilt to the antenna in such a way that the forward lobes will be oriented to a relatively conventional depression angle (0.7 degrees), while the back lobes will be driven into the ground, with the notch occurring at a depression angle that will permit substantial reduction in power toward a nearby scientific installation. This combination of factors is discussed in more detail below.

The antenna designs at the Oat Mountain site will be relatively simple, single-column arrays of six panels and four panels each for DTS Sites 3 and 4, respectively. Each will have a single main lobe in its azimuth pattern. No electrical beam tilt will be used, with only mechanical beam tilt applied to control the extent of signal projection from the antennas.

A plot of the proposed PNLCs<sup>5</sup> of the four transmitters is provided in Figure 2, where the existing Site 1 contour is in orange, the proposed Site 2 contour is in olive, the proposed Site 3 contour is in green, and the proposed Site 4 contour is in violet. In its current configuration, the main, Mt Wilson transmitter facility authorized by the existing construction permit (herein, DTS Site 1) already covers the entire authorized service area of the station;<sup>6</sup> thus, the requirements of §73.626(f)(1) would be met by that facility alone. By virtue of the overlap of the contours of the transmitters, they are contiguous, thereby meeting the requirements of §73.626(f)(3). Also shown in Figure 2, in blue, is the 48 dBu contour of the DTS Site 1 facility, which can be seen to encompass the entire County of Los Angeles, CA, in which is located the City of Los Angeles, to which KNBC is licensed. All four transmitters in the proposed DTS network are located within the KNBC “Largest Station” Alternative to the Table of Distances area (discussed in detail below), consequently meeting the requirements of §73.626(f)(6).

The characteristics of the DTS Site 1 (Mt Wilson) facility are fully described in Figure 1a. The antenna is installed with 1 degree of mechanical beam tilt downward in the direction of 215 degrees true. The antenna has elliptical polarization, with 16.67 percent of the power applied to the vertical polarization component. Elevation power gain of the antenna is 13.80 (11.38 dBd) in the horizontal polarization component and 2.80 (4.39 dBd) in the vertical polarization component at the vertical beam maximum (1.0 degree below the plane orthogonal to the axis of the antenna and through its radiation center). Azimuth power gain of the antenna in the horizontal polarization component is virtually

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<sup>5</sup> To account for the dipole correction factor, the PNLCs are plotted at 40.9 dBu, with service statistics of F(50,90).

<sup>6</sup> 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.”

nil (1.023 or 0.10 dBd). The mechanical beam tilt causes the gain of the horizontal polarization component to vary in the horizontal plane between 13.80 (11.38 dBd) at 35 degrees azimuth and 8.79 (9.44 dBd) at 215 degrees azimuth.

A plot of the azimuthal radiation pattern of the DTS Site 1 antenna in relative field values of the horizontal polarization component, prior to the application of mechanical beam tilt, (i.e., 1 degree below the plane orthogonal to the axis of the antenna and through its radiation center) is included as Figure 3. The azimuthal radiation pattern in relative field values of the horizontal polarization component in the horizontal plane, after application of mechanical beam tilt, is included as Figure 4.<sup>7</sup> The azimuthal power pattern of the horizontal polarization component, expressed in decibels relative to 1 kW (dBk), prior to the application of mechanical beam tilt, (i.e., 1 degree below the plane orthogonal to the axis of the antenna and through its radiation center) is included as Figure 5. The azimuthal power pattern of the horizontal polarization component, expressed in decibels relative to 1 kW (dBk) in the horizontal plane, is plotted in Figure 6. Tabulated azimuthal field and power values of the horizontal polarization component derived from the data arrays used to generate Figures 3 through 6 are given in Figure 7. The elevation radiation pattern in relative field values of the horizontal polarization component along the axis of the antenna is included as Figure 8. The elevation power pattern of the horizontal polarization component, expressed in decibels relative to 1 kW (dBk) along the axis of the antenna, is plotted in Figure 9. Tabulated elevation field and power values of the horizontal polarization component derived from the data arrays used to generate Figures 8 & 9 are given in Figure 10.

Because of the mechanical beam tilt applied to the Site 1 antenna, its elevation pattern varies with azimuth, and its azimuth pattern varies with depression angle. Therefore, complete pattern data for the antenna for DTS Site 1 is being supplied through a complex elevation pattern data file uploaded to the CDBS Electronic Filing System. In that file, depression angle values are included in the first column, and azimuth values are included

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<sup>7</sup> Figures 4 & 6, which include the effects of mechanical beam tilt on the pattern in the horizontal plane, are included for purposes of comparison with earlier filings with respect to the Mt Wilson facility. The full set of data with mechanical beam tilt applied is included only in the complex elevation pattern uploaded to the CDBS Electronic Filing System as part of the Form 301 DTS application.

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in the first row. The azimuth and elevation pattern plots and tabular data supplied in this Technical Statement are for reference only and are intended to help in visualization of the characteristics of the antenna. Full specification of the antenna pattern is contained wholly and only within the elevation pattern data file uploaded with the Form 301 application.

It should be noted that, due to limitations in the Form 301 DTS Engineering pages in the CDBS Electronic Filing System (EFS) and because the values in the azimuth pattern relative field data input there are multiplied by the data in the elevation pattern data file in the Commission's processing software, it is not possible to enter data into the azimuth pattern input fields that are representative of the horizontal plane pattern subsequent to inclusion of the effects of mechanical beam tilt. Doing so would result in distortion of the actual pattern data and lead to incorrect analyses of the predicted interference from or to a station under study. Moreover, since the Commission's processing software does not have the ability to apply mechanical beam tilt to more than one antenna in a study and does not currently apply mechanical tilt in a non-distorting way to an antenna pattern, it is necessary to put data representing the radiation pattern of each antenna subsequent to application of mechanical tilt into the corresponding uploaded elevation pattern data file, which is the only available mechanism that has sufficient data representation capacity to carry the required amount of data. As a result of all of this, it is necessary either to set the check box related to the azimuth pattern input fields to "N/A," which parenthetically also indicates "Non-Directional," or not to check the "N/A" box but to put values of 1.000 in all of the azimuth pattern data fields. The latter approach at least indicates that the antenna is directional and therefore was taken in the instant application for each of the DTS Sites and their antenna patterns.

The proposed DTS Site 2 (Table Mountain) antenna will have columns of panels facing 62 and 327 degrees true, with resulting major azimuth lobes at 15, 61, and 328 degrees true. It will have an elevation pattern with its main lobe 3 degrees below the plane orthogonal to the axis of the antenna and through its radiation center. The elevation pattern also will contain a notch above the main lobe at 0.2 degree above the plane orthogonal to the axis of the antenna and through its radiation center. Mechanical beam

tilt of 2.3 degrees downward will be applied to the antenna at a bearing of 204 degrees true. This will result in the main beam being lifted to a depression angle of 0.7 degrees toward a bearing of 24 degrees true and being pushed down to a depression angle of 5.3 degrees at the 204-degree bearing. It also will result in the notch above the main beam being pushed down to a depression angle of 2.1 degrees at the 204-degree bearing.

The characteristics and parameters of DTS Site 2 are fully described in Figure 1b. The DTS Site 2 antenna will have circular polarization, with equal power applied to both the horizontal and vertical polarization components; thus the effective radiated power of each individual component is based on half the power input to the antenna. Elevation power gain of the antenna design for DTS Site 2, at the azimuth of beam maximum (61 degrees) and in each of the horizontal and vertical polarization components, is 12.90 (11.12 dBd) at the beam maximum (3.0 degrees below the plane orthogonal to the axis of the antenna and through its radiation center) and just over 0.0029 (–25.36 dBd) at the null above the main beam (0.2 degrees above the plane orthogonal to the axis of the antenna and through its radiation center). The azimuth power gain, at the depression angle of beam maximum (3.0 degrees below the plane orthogonal to the axis of the antenna and through its radiation center) and in each of the horizontal and vertical polarization components is 2.90 (4.62 dB). The total power gain in each of the horizontal and vertical polarization components in the main beam is 37.41 (15.73 dBd). The mechanical beam tilt causes the gain of each of the horizontal and vertical polarization components to vary in the horizontal plane between 23.61 (13.73 dBd) at 53 degrees azimuth and 0.000002647 (–55.77 dBd) at 194 degrees azimuth.

A plot of the DTS Site 2 antenna azimuthal radiation pattern in relative field values, at the depression angle having maximum field (3.0 degrees below the plane orthogonal to the axis of the antenna and through its radiation center), is included as Figure 11. The azimuthal power pattern expressed in decibels relative to 1 kW (dBk), at the depression angle having maximum power (also 3.0 degrees below the plane orthogonal to the axis of the antenna and through its radiation center), is plotted in Figure 12. The tabulated azimuthal field and power values are given in Figure 13. The elevation radiation pattern in relative field values along the axis of the antenna, in the azimuthal direction having

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maximum field (61 degrees), is included as Figure 14. The elevation power pattern expressed in decibels relative to 1 kW (dBk) along the axis of the antenna, in the azimuthal direction having maximum power (also 61 degrees), is plotted in Figure 15. The tabulated elevation field and power values are given in Figure 16.

Because of the mechanical beam tilt applied to the DTS Site 2 antenna, its elevation pattern varies with azimuth, and its azimuth pattern varies with depression angle. Therefore, complete pattern data for the antenna for DTS Site 2 are being supplied through a complex elevation pattern data file uploaded to the CDBS Electronic Filing System. In that file, depression angle values are included in the first column, and azimuth values are included in the first row. The azimuth and elevation pattern plots and tabular data supplied in this Technical Statement are for reference only and are intended to help in visualization of the characteristics of the antenna. Full specification of the antenna pattern is contained wholly and only within the elevation pattern data file uploaded with the Form 301 application. It should be noted that the limitations of the CDBS EFS Form 301 DTS Engineering web page regarding inclusion of azimuth pattern relative field values and the related check box, described above with respect to the DTS Site 1 antenna, apply equally with respect to the DTS Site 2 antenna and that the same approach taken for Site 1 has been followed for Site 2.

The proposed DTS Sites 3 and 4 antennas (both of which will be at Oat Mountain) will be composed of single columns of panels – 6 for DTS Site 3 and 4 for DTS Site 4. There will be no electrical beam tilt applied to the elevation pattern of either antenna; only mechanical beam tilt will be applied to each of them. The DTS Site 3 antenna will be oriented with its main beam toward an azimuth of 255 degrees true and 1.5 degrees below the horizontal at the same heading. The DTS Site 4 antenna will be mounted 20 meters below the DTS Site 3 antenna on the same tower. It will be oriented with its main beam toward an azimuth of 15 degrees and 2.0 degrees below the horizontal at the same heading.

The characteristics and parameters of DTS Sites 3 and 4 are fully described in Figures 1c and 1d, respectively. Their antennas will have circular polarization, with equal power

applied to both the horizontal and vertical polarization components; thus, the effective radiated power of each individual component is based on half the power input to its respective antenna. Elevation power gain of the antenna design for DTS Site 3, at the azimuth of beam maximum (255 degrees) and in each of the horizontal and vertical polarization components, is 14.24 (11.54 dBd) at the beam maximum (in the plane orthogonal to the axis of the antenna and through its radiation center). The azimuth power gain, at the depression angle of beam maximum (in the plane orthogonal to the axis of the antenna and through its radiation center) and in each of the horizontal and vertical polarization components is 5.63 (7.51 dB). The total power gain in each of the horizontal and vertical polarization components in the main beam is 80.17 (19.04 dBd). The mechanical beam tilt causes the gain of each of the horizontal and vertical polarization components to vary in the horizontal plane between 53.80 (17.31 dBd) at 255 degrees azimuth and 0.27878 (-5.55 dBd) at both 43 and 107 degrees azimuth.

Elevation power gain of the antenna design for DTS Site 4, at the azimuth of beam maximum (15 degrees) and in each of the horizontal and vertical polarization components, is 9.50 (9.78 dBd) at the beam maximum (in the plane orthogonal to the axis of the antenna and through its radiation center). The azimuth power gain, at the depression angle of beam maximum (in the plane orthogonal to the axis of the antenna and through its radiation center) and in each of the horizontal and vertical polarization components is 5.63 (7.51 dB). The total power gain in each of the horizontal and vertical polarization components in the main beam is 53.49 (17.28 dBd). The mechanical beam tilt causes the gain of each of the horizontal and vertical polarization components to vary in the horizontal plane between 38.83 (15.89 dBd) at 15 degrees azimuth and 0.1965 (-7.07 dBd) at both 163 and 227 degrees azimuth.

Plots of the azimuthal radiation patterns of the DTS Sites 3 & 4 antennas in relative field values, at the depression angles having maximum field (in the planes orthogonal to the axes of the antennas and through their radiation centers), are included as Figures 17a and 17b. The azimuthal power patterns expressed in decibels relative to 1 kW (dBk), at the depression angles having maximum power (also in the planes orthogonal to the axes of the antennas and through their radiation centers), are plotted in Figures 18a and 18b. The

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tabulated azimuthal field and power values for the DTS Sites 3 & 4 antennas are given in Figure 19. The elevation radiation patterns in relative field values along the axes of the antennas, in the azimuthal directions having maximum field (255 and 15 degrees for DTS Sites 3 & 4, respectively), are included as Figures 20a and 20b. The elevation power patterns expressed in decibels relative to 1 kW (dBk) along the axes of the antennas, in the azimuthal directions having maximum power (also 255 and 15 degrees for DTS Sites 3 & 4, respectively), are plotted in Figures 21a and 21b. The tabulated elevation field and power values are given in Figure 22.

Because of the mechanical beam tilt applied to the DTS Sites 3 & 4 antennas, their elevation patterns vary with azimuth, and their azimuth patterns vary with depression angle. Therefore, complete pattern data for the antennas for DTS Sites 3 & 4 are being supplied through complex elevation pattern data files uploaded to the CDBS Electronic Filing System. In those files, depression angle values are included in the first columns, and azimuth values are included in the first rows. The azimuth and elevation pattern plots and tabular data supplied in this Technical Statement are for reference only and are intended to help in visualization of the characteristics of the antennas. Full specifications of the antenna patterns are contained wholly and only within the elevation pattern data files uploaded with the Form 301 application. It should be noted that the limitations of the CDBS EFS Form 301 DTS Engineering web pages regarding inclusion of azimuth pattern relative field values and the related check boxes, described above with respect to the DTS Site 1 antenna, apply equally with respect to the DTS Sites 3 & 4 antennas and that the same approach taken for Site 1 has been followed for Sites 3 & 4.

All of the transmitters to be used in the KNBC DTS network will be Type Verified as per §73.1660 of the Commission's Rules. All transmitters will be synchronized, emitting identical symbols on precisely the same frequency; they will transmit the RF Watermark transmitter identification signal defined in the ATSC A/110 transmitter synchronization standard.



**Figure 1b — Technical Specifications — Proposed KNBC DTS Facility  
Channel 36 — Los Angeles, CA — Site 2: Table Mountain**

**Frequency**

Channel	36
Frequency Band	602 – 608 MHz
Center Frequency	605 MHz

**Location**

Site	Table Mountain, Llano, CA
Geographic Coordinates (NAD27)	34° 22' 58.80" N 117° 39' 50.60" W
Tower Registration (FAA Study Number)	N/A (2008-AWP-7139-OE)

**Elevation**

Elevation of site above mean sea level	2274.8 m
Overall height of tower above site elevation	39.3 m
Overall height of tower above mean sea level	2314.1 m
Height of antenna radiation center above site elevation	33.5 m
Elevation of average terrain (45-degree-spaced radials, 3.2-16.1 km)	1606.8 m
Height of antenna radiation center above mean sea level	2308.3 m
Height of antenna radiation center above average terrain (HAAT)	701.5 m

**Antenna**

Manufacturer	Radio Frequency Systems
Model	PCP16B-2 (50H:50V)
Description	Top-Mounted UHF Panel
Orientation (axis of symmetry)	14.5° true
Electrical beam tilt	3.0°
Mechanical beam tilt	2.3° down toward 204° true
Polarization	Circular
Gain (peak of beam – 61° azimuth, 0.7° depression)	18.80 (12.74 dBd)
Gain (in horizontal plane – 53° azimuth, 0° depression)	11.86 (10.74 dBd)

**Power**

Effective radiated power (ERP) (main beam – 0.7° depression at 61° az.)	50.0 kW
Effective radiated power (ERP) (maximum in horizontal plane – 53° az.)	31.55 kW

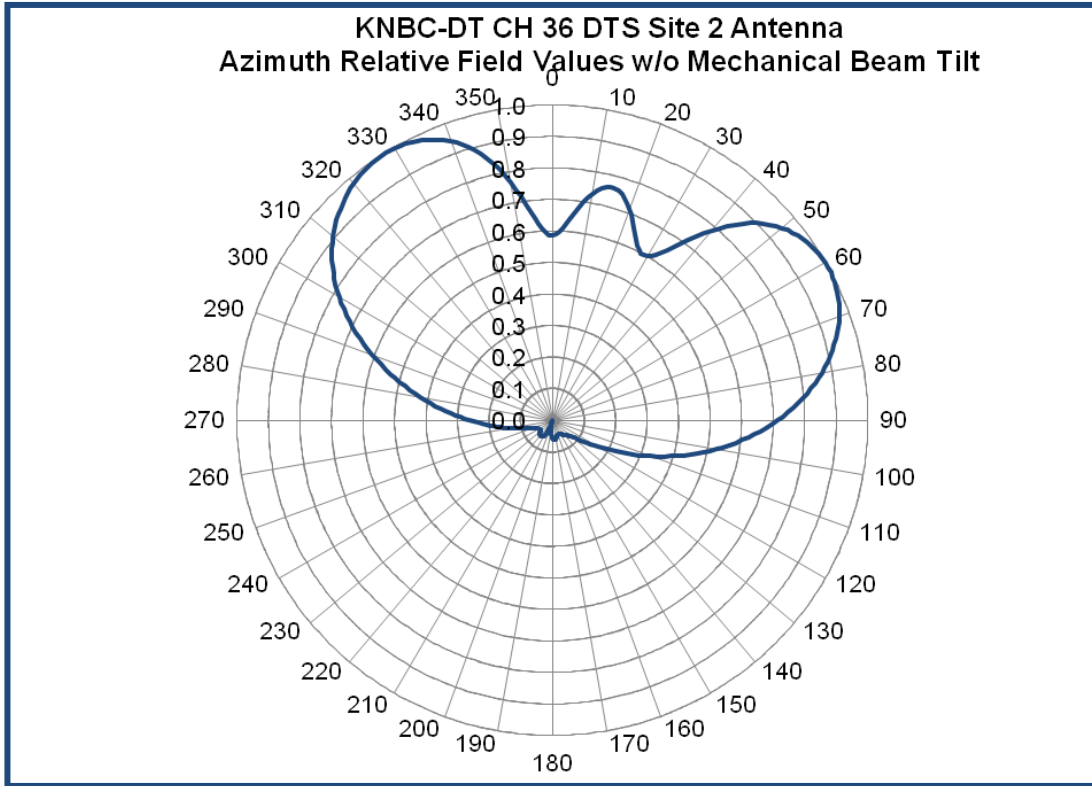


Figure 11 — KNBC DTS Site 2 Antenna Azimuth Relative Field Values

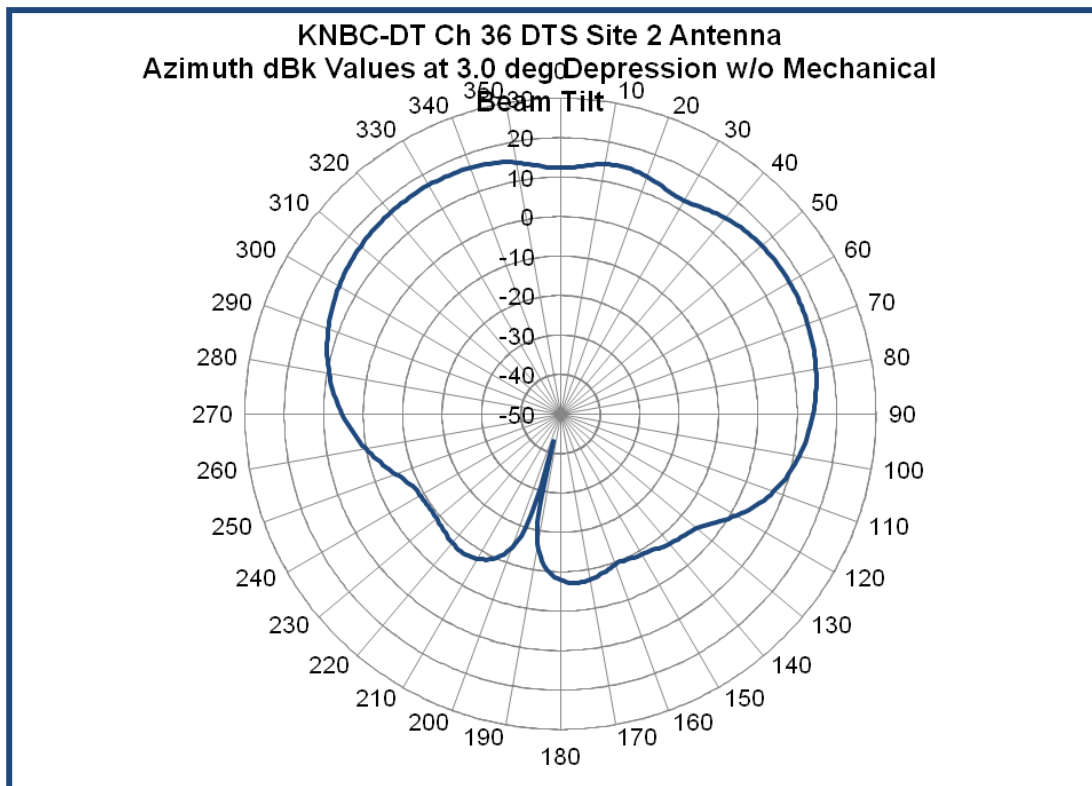


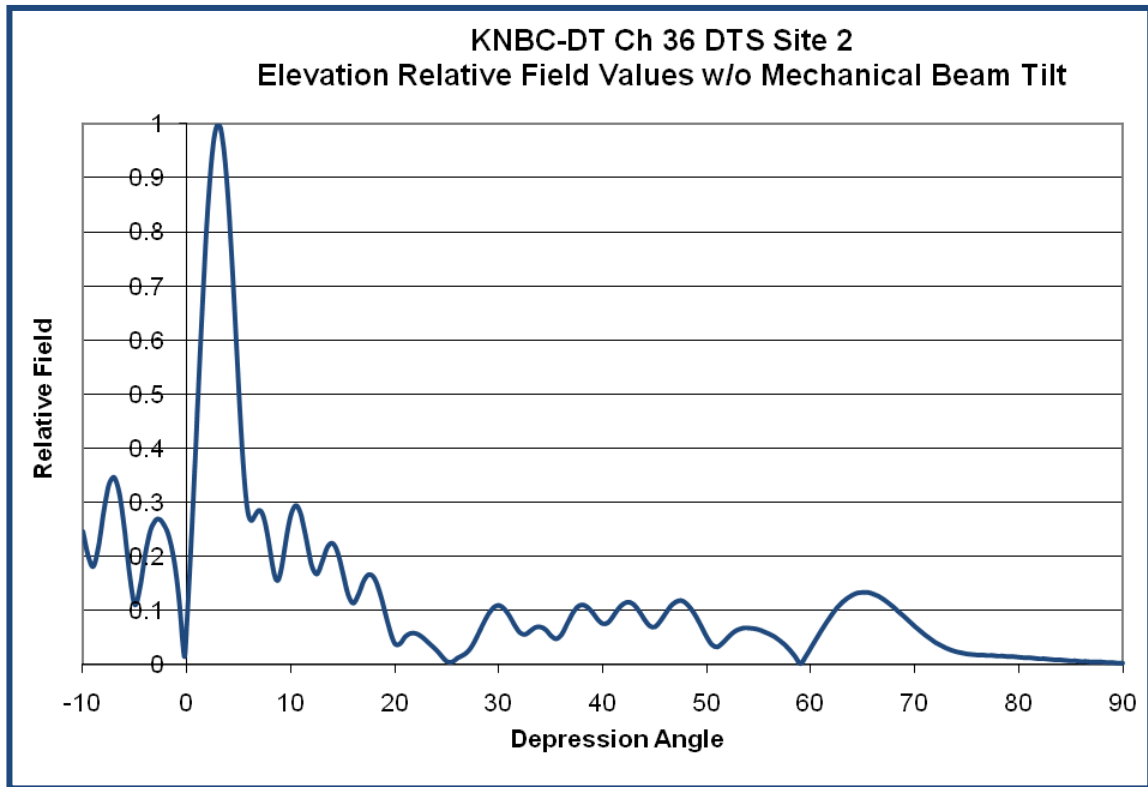
Figure 12 — DTS Site 2 Antenna Azimuth dBk Values — without Effects of Mechanical Beam Tilt

**Figure 13— KNBC Site 2 Azimuthal Radiation Pattern Tabulated Values**

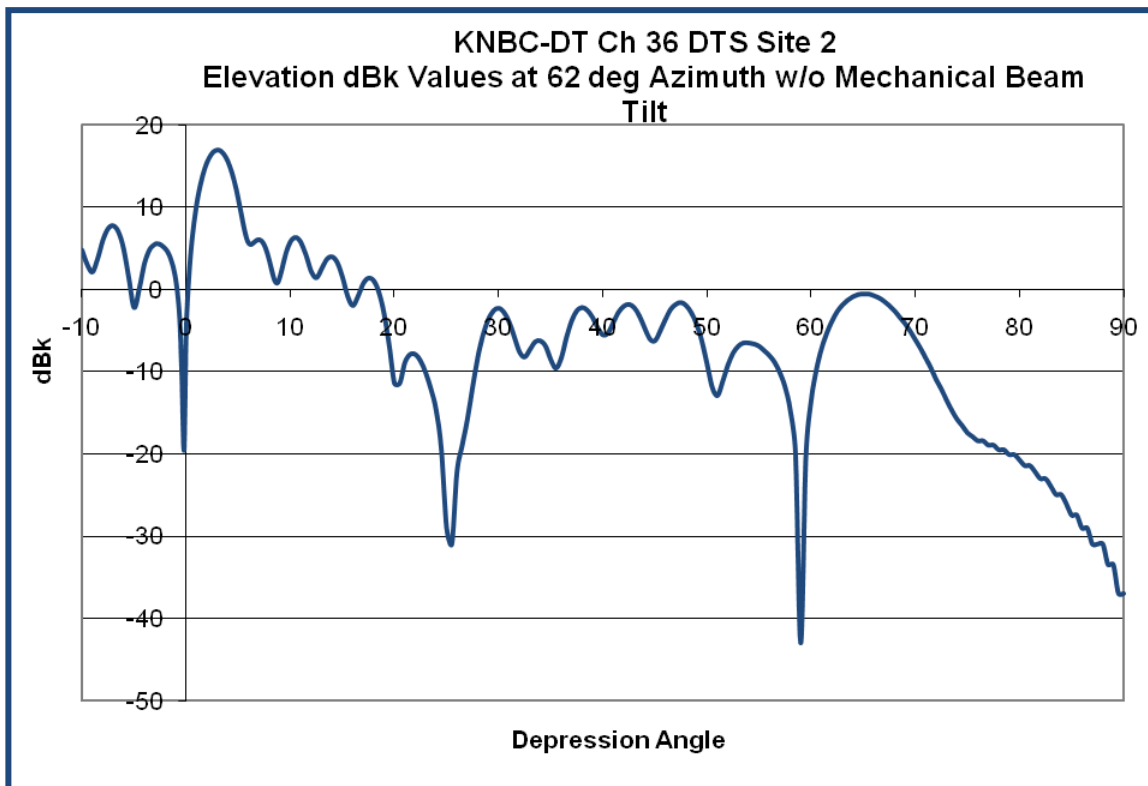
Azimuth	Relative Field	Effective Radiated Power (dBk)	Azimuth	Relative Field	Effective Radiated Power (dBk)
min 0	0.586	12.348	190	0.021	-16.566
10	0.730	14.256	min 194	0.001	-43.010
max 15	0.763	14.640	200	0.028	-14.067
20	0.714	14.064	210	0.059	-7.593
min 30	0.601	12.567	max 215	0.063	-7.023
40	0.786	14.898	220	0.061	-7.304
50	0.949	16.535	230	0.050	-9.031
max 60	1.000	16.990	min 233	0.049	-9.206
70	0.968	16.707	240	0.051	-8.859
80	0.868	15.760	250	0.075	-5.509
90	0.714	14.064	260	0.145	0.217
100	0.527	11.426	270	0.263	5.389
110	0.333	7.439	280	0.425	9.557
120	0.168	1.496	290	0.609	12.682
130	0.081	-4.841	300	0.780	14.832
140	0.063	-7.023	310	0.908	16.151
150	0.050	-9.031	320	0.980	16.814
min 157	0.047	-26.558	max 328	0.999	16.981
160	0.048	-9.385	330	0.998	16.972
170	0.061	-7.304	340	0.943	16.480
max 175	0.063	-7.023	350	0.767	14.686
180	0.057	-7.893			

Notes: Derived from data supplied by manufacturer. Complete data set available upon request.

Values taken from slice through three-dimensional pattern at 1.4 degrees depression. Does not show the effects of variation of the elevation pattern with azimuth, which are included only in the file uploaded within Form 301 on FCC Electronic Filing System.



**Figure 14 — KNBC DTS Site 2 Antenna Elevation Relative Field Values**



**Figure 15 — KNBC DTS Site 2 Antenna Elevation dBk Values— without Effects of Mechanical Beam Tilt**

**Figure 16 — KNBC DTS Site 2 Elevation Radiation Pattern Tabulated Values**

Depression Angle	Relative Field	Effective Radiated Power (dBk)	Depression Angle	Relative Field	Effective Radiated Power (dBk)
-5.0	0.110	-2.182	9.5	0.226	4.060
-4.5	0.143	0.096	10.0	0.276	5.808
-4.0	0.204	3.182	10.5	0.293	6.327
-3.5	0.248	4.879	11.0	0.275	5.776
-3.0	0.267	5.520	11.5	0.230	4.224
-2.5	0.266	5.487	12.0	0.183	2.239
-2.0	0.251	4.983	12.5	0.167	1.444
-1.5	0.219	3.772	13.0	0.189	2.519
-1.0	0.162	1.180	13.5	0.216	3.679
-0.5	0.064	-7.545	14.0	0.224	3.995
0.0	0.077	-5.280	14.5	0.207	3.309
0.5	0.259	5.256	15.0	0.169	1.547
1.0	0.464	10.320	15.5	0.129	-0.799
1.5	0.666	13.438	16.0	0.113	-1.949
2.0	0.840	15.475	16.5	0.129	-0.799
2.5	0.956	16.593	17.0	0.154	0.740
3.0	1.000	16.990	17.5	0.166	1.392
3.5	0.961	16.643	18.0	0.160	1.072
4.0	0.852	15.598	18.5	0.136	-0.340
4.5	0.688	13.730	19.0	0.101	-2.924
5.0	0.505	11.056	19.5	0.064	-6.887
5.5	0.350	7.849	20.0	0.038	-11.415
6.0	0.271	5.649	20.5	0.038	-11.415
6.5	0.274	5.728	21.0	0.051	-8.859
7.0	0.285	6.087	21.5	0.057	-7.893
7.5	0.263	5.385	22.0	0.057	-7.893
8.0	0.211	3.475	22.5	0.052	-8.690
8.5	0.162	1.148	23.0	0.044	-10.141
9.0	0.169	1.547	23.5	0.035	-12.129

Notes: Derived from data supplied by manufacturer. Complete data set available upon request.

Values taken from slice through three-dimensional pattern at 149 degrees azimuth. Does not show the effects of variation of the elevation pattern with azimuth, which are included only in the file uploaded within Form 301 on FCC Electronic Filing System.