

ENGINEERING EXHIBIT

Digital Low Power Television Station Application for Minor Modification of Licensed Facility prepared for

Gray Television Licensee, LLC
W31EP-D Panama City, FL
Facility ID 183928
Ch. 31 11 kW Directional

Gray Television Licensee, LLC (“Gray”) is the licensee of digital Low Power Television station W31EP-D, Channel 31, Facility ID 183928, Panama City FL. W31EP-D is licensed to operate at 0.2 kW effective radiated power (“ERP”) with a directional antenna (file# 0000178762). *Gray* herein seeks a minor modification Construction Permit to relocate W31EP-D and to utilize a different directional antenna pattern at increased power and antenna height.

The proposed facility will employ a new antenna to be side-mounted on the tower structure associated with FCC Antenna Structure Registration number 1282211, located 37.4 km (23.2 miles) from the licensed site. No change to the overall structure height is proposed.

The proposed antenna is a Dielectric model TLP-40 having horizontal polarization. The proposed ERP is 11 kW using a “full service” out of channel emission mask. A plot of the directional antenna’s azimuthal pattern is supplied in Figure 1.

Figure 2 depicts the coverage contour of the proposed facility as well as that of the licensed facility, demonstrating compliance with §73.3572 for a minor change. Since the proposed 51 dBμ contour encompasses that of the licensed facility, no service loss area will be created. Considerable service improvement will result as the population within the 51 dBμ contour increases to 95,685 persons (2010 census), which is 10-fold increase beyond the 9,514 persons within the licensed W31EP-D facility’s 51 dBμ contour.

Interference study per OET Bulletin 69¹ shows that the proposal complies with the FCC's interference protection requirements toward all digital television, television translator, LPTV, and Class A stations. The results, summarized in Table 1, show that any new interference does not exceed the FCC's interference limits (0.5 percent to full power and Class A stations, and 2.0 percent to secondary stations) to any facility.

Human Exposure to Radiofrequency Electromagnetic Field (Environmental)

The proposed facility was evaluated for human exposure to RF energy using the procedures outlined in the FCC's OET Bulletin Number 65. Based on OET-65 equation (10) and 35 percent antenna relative field in downward elevations (pattern data shows 35 percent or less relative field at angles 30 to 90 degrees below the antenna), the calculated power density attributable to the proposed facility at locations near the transmitter site at a height of two meters above ground level is $6.3 \mu\text{W}/\text{cm}^2$, which is 1.6 percent of the general population / uncontrolled maximum permissible exposure limit. This is below the five percent threshold limit described in §1.1307(b) regarding sites with multiple emitters, categorically excluding the applicant from responsibility for taking any corrective action in the areas where the proposal's contribution is less than five percent.

The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC's guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will reduce power or cease operation as necessary to protect persons having access to the site, tower, or antenna from RF electromagnetic field exposure in excess of FCC guidelines. This exhibit is limited to the evaluation of exposure to RF electromagnetic field. No increase in structure height is proposed.

¹FCC Office of Engineering and Technology Bulletin number 69, *Longley-Rice Methodology for Evaluating TV Coverage and Interference*, February 6, 2004 ("OET-69"). This analysis employed the FCC's current "TVStudy" software with the default application processing template settings, 1 km cell size, and 1 km terrain increment. Comparisons of various results of this computer program (run on a Mac processor) to the FCC's implementation of TVStudy show excellent correlation.

Engineering Exhibit
Gray Television Licensee, LLC (W31EP-D)
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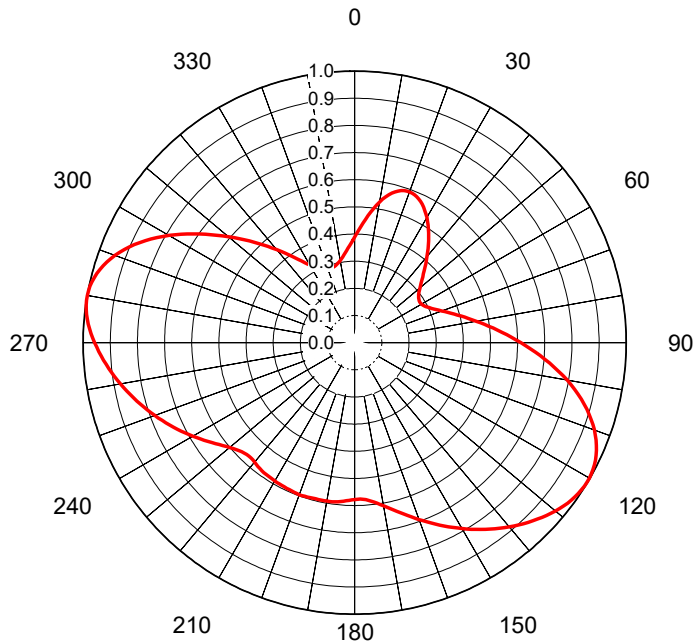


List of Attachments

| | |
|-----------|---|
| Figure 1 | Antenna Azimuthal Pattern |
| Figure 2 | Coverage Contour Comparison |
| Table 1 | TVStudy Analysis of Proposal |
| Form 2100 | Saved Version of Engineering Sections of FCC Form at Time of Upload |

Chesapeake RF Consultants, LLC

| | | |
|-----------------------|--------------------|--------------|
| Joseph M. Davis, P.E. | September 8, 2022 | |
| 207 Old Dominion Road | Yorktown, VA 23692 | 703-650-9600 |



AZIMUTH PATTERN Horizontal Polarization

Proposal No. **20220502jmd**
Date **2-May-22**
Call Letters **W31EP-D**
Channel **31**
Frequency **575 MHz**
Antenna Type **TLP-40**
Gain **2.25 (3.52dB)**
Calculated

Pattern Number **TLP-O-31 Hpol**

| Deg | Value | Deg | Value | Deg | Value | Deg | Value | Deg | Value | Deg | Value | Deg | Value | Deg | Value | Deg | Value |
|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|
| 0 | 0.389 | 36 | 0.463 | 72 | 0.360 | 108 | 0.916 | 144 | 0.849 | 180 | 0.578 | 216 | 0.582 | 252 | 0.802 | 288 | 0.960 |
| 1 | 0.401 | 37 | 0.451 | 73 | 0.370 | 109 | 0.928 | 145 | 0.839 | 181 | 0.579 | 217 | 0.580 | 253 | 0.812 | 289 | 0.950 |
| 2 | 0.414 | 38 | 0.439 | 74 | 0.381 | 110 | 0.939 | 146 | 0.830 | 182 | 0.581 | 218 | 0.578 | 254 | 0.821 | 290 | 0.939 |
| 3 | 0.427 | 39 | 0.427 | 75 | 0.392 | 111 | 0.949 | 147 | 0.820 | 183 | 0.583 | 219 | 0.576 | 255 | 0.830 | 291 | 0.928 |
| 4 | 0.441 | 40 | 0.415 | 76 | 0.404 | 112 | 0.959 | 148 | 0.810 | 184 | 0.586 | 220 | 0.574 | 256 | 0.839 | 292 | 0.915 |
| 5 | 0.455 | 41 | 0.403 | 77 | 0.416 | 113 | 0.967 | 149 | 0.800 | 185 | 0.588 | 221 | 0.572 | 257 | 0.849 | 293 | 0.902 |
| 6 | 0.470 | 42 | 0.391 | 78 | 0.428 | 114 | 0.975 | 150 | 0.791 | 186 | 0.589 | 222 | 0.571 | 258 | 0.858 | 294 | 0.888 |
| 7 | 0.484 | 43 | 0.380 | 79 | 0.441 | 115 | 0.981 | 151 | 0.781 | 187 | 0.591 | 223 | 0.571 | 259 | 0.867 | 295 | 0.873 |
| 8 | 0.499 | 44 | 0.369 | 80 | 0.455 | 116 | 0.986 | 152 | 0.771 | 188 | 0.592 | 224 | 0.573 | 260 | 0.876 | 296 | 0.858 |
| 9 | 0.512 | 45 | 0.358 | 81 | 0.469 | 117 | 0.991 | 153 | 0.761 | 189 | 0.592 | 225 | 0.575 | 261 | 0.885 | 297 | 0.841 |
| 10 | 0.526 | 46 | 0.348 | 82 | 0.483 | 118 | 0.994 | 154 | 0.751 | 190 | 0.592 | 226 | 0.579 | 262 | 0.893 | 298 | 0.825 |
| 11 | 0.538 | 47 | 0.339 | 83 | 0.498 | 119 | 0.996 | 155 | 0.741 | 191 | 0.593 | 227 | 0.583 | 263 | 0.902 | 299 | 0.807 |
| 12 | 0.549 | 48 | 0.330 | 84 | 0.513 | 120 | 0.998 | 156 | 0.731 | 192 | 0.593 | 228 | 0.588 | 264 | 0.910 | 300 | 0.790 |
| 13 | 0.559 | 49 | 0.321 | 85 | 0.528 | 121 | 0.998 | 157 | 0.722 | 193 | 0.593 | 229 | 0.594 | 265 | 0.919 | 301 | 0.772 |
| 14 | 0.568 | 50 | 0.314 | 86 | 0.544 | 122 | 0.997 | 158 | 0.712 | 194 | 0.593 | 230 | 0.601 | 266 | 0.927 | 302 | 0.754 |
| 15 | 0.575 | 51 | 0.307 | 87 | 0.561 | 123 | 0.996 | 159 | 0.702 | 195 | 0.593 | 231 | 0.608 | 267 | 0.935 | 303 | 0.735 |
| 16 | 0.581 | 52 | 0.301 | 88 | 0.577 | 124 | 0.994 | 160 | 0.693 | 196 | 0.594 | 232 | 0.616 | 268 | 0.943 | 304 | 0.716 |
| 17 | 0.586 | 53 | 0.296 | 89 | 0.595 | 125 | 0.990 | 161 | 0.684 | 197 | 0.594 | 233 | 0.624 | 269 | 0.950 | 305 | 0.698 |
| 18 | 0.589 | 54 | 0.291 | 90 | 0.612 | 126 | 0.987 | 162 | 0.675 | 198 | 0.595 | 234 | 0.633 | 270 | 0.958 | 306 | 0.679 |
| 19 | 0.591 | 55 | 0.288 | 91 | 0.630 | 127 | 0.982 | 163 | 0.666 | 199 | 0.596 | 235 | 0.642 | 271 | 0.965 | 307 | 0.661 |
| 20 | 0.591 | 56 | 0.285 | 92 | 0.648 | 128 | 0.977 | 164 | 0.657 | 200 | 0.596 | 236 | 0.651 | 272 | 0.972 | 308 | 0.643 |
| 21 | 0.590 | 57 | 0.283 | 93 | 0.666 | 129 | 0.971 | 165 | 0.648 | 201 | 0.595 | 237 | 0.660 | 273 | 0.978 | 309 | 0.625 |
| 22 | 0.588 | 58 | 0.283 | 94 | 0.685 | 130 | 0.965 | 166 | 0.640 | 202 | 0.594 | 238 | 0.670 | 274 | 0.983 | 310 | 0.607 |
| 23 | 0.584 | 59 | 0.283 | 95 | 0.703 | 131 | 0.958 | 167 | 0.632 | 203 | 0.594 | 239 | 0.679 | 275 | 0.988 | 311 | 0.589 |
| 24 | 0.579 | 60 | 0.284 | 96 | 0.722 | 132 | 0.951 | 168 | 0.624 | 204 | 0.593 | 240 | 0.689 | 276 | 0.993 | 312 | 0.572 |
| 25 | 0.574 | 61 | 0.286 | 97 | 0.740 | 133 | 0.944 | 169 | 0.617 | 205 | 0.592 | 241 | 0.698 | 277 | 0.996 | 313 | 0.555 |
| 26 | 0.567 | 62 | 0.289 | 98 | 0.759 | 134 | 0.936 | 170 | 0.610 | 206 | 0.591 | 242 | 0.708 | 278 | 0.998 | 314 | 0.539 |
| 27 | 0.559 | 63 | 0.293 | 99 | 0.777 | 135 | 0.928 | 171 | 0.603 | 207 | 0.590 | 243 | 0.717 | 279 | 1.000 | 315 | 0.523 |
| 28 | 0.551 | 64 | 0.298 | 100 | 0.794 | 136 | 0.920 | 172 | 0.597 | 208 | 0.590 | 244 | 0.727 | 280 | 1.000 | 316 | 0.507 |
| 29 | 0.541 | 65 | 0.304 | 101 | 0.811 | 137 | 0.911 | 173 | 0.592 | 209 | 0.589 | 245 | 0.736 | 281 | 0.999 | 317 | 0.491 |
| 30 | 0.532 | 66 | 0.310 | 102 | 0.828 | 138 | 0.903 | 174 | 0.587 | 210 | 0.588 | 246 | 0.746 | 282 | 0.997 | 318 | 0.476 |
| 31 | 0.521 | 67 | 0.317 | 103 | 0.845 | 139 | 0.894 | 175 | 0.583 | 211 | 0.587 | 247 | 0.755 | 283 | 0.993 | 319 | 0.462 |
| 32 | 0.510 | 68 | 0.325 | 104 | 0.860 | 140 | 0.885 | 176 | 0.580 | 212 | 0.587 | 248 | 0.765 | 284 | 0.989 | 320 | 0.447 |
| 33 | 0.499 | 69 | 0.333 | 105 | 0.875 | 141 | 0.876 | 177 | 0.578 | 213 | 0.586 | 249 | 0.774 | 285 | 0.983 | 321 | 0.433 |
| 34 | 0.487 | 70 | 0.341 | 106 | 0.890 | 142 | 0.867 | 178 | 0.577 | 214 | 0.585 | 250 | 0.784 | 286 | 0.976 | 322 | 0.420 |
| 35 | 0.476 | 71 | 0.351 | 107 | 0.903 | 143 | 0.858 | 179 | 0.577 | 215 | 0.584 | 251 | 0.793 | 287 | 0.969 | 323 | 0.406 |

Figure 1
Antenna Azimuthal Pattern
W31EP-D Panama City, FL
Facility ID 183928
Ch. 31 11 kW Directional

prepared for
Gray Television Licensee, LLC

September, 2022



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

Figure 2
Coverage Contour Comparison
W31EP-D Panama City, FL
Facility ID 183928
Ch. 31 11 kW Directional

prepared for
Gray Television Licensee, LLC

September, 2022

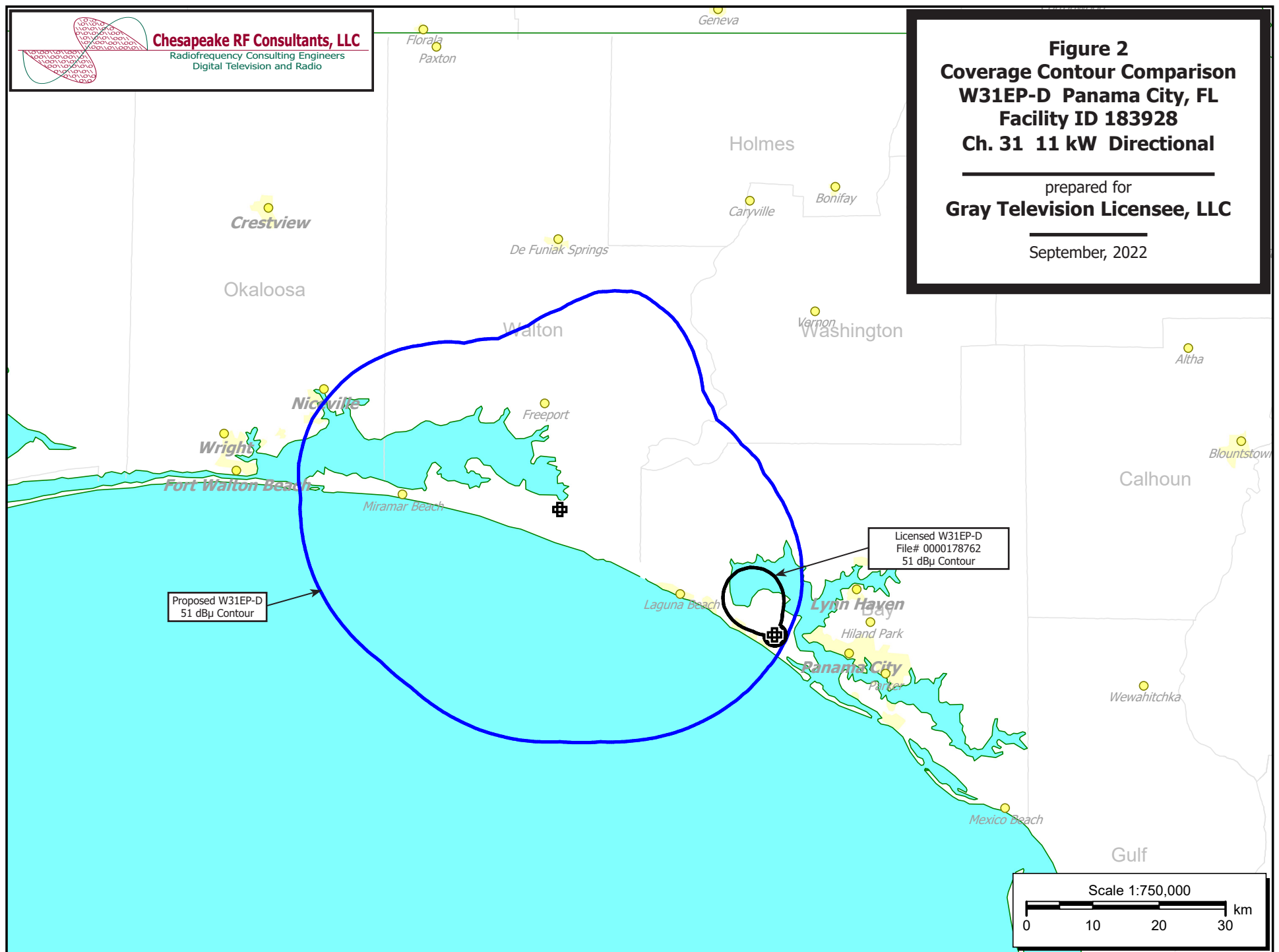


Table 1 W31EP-D TVStudy Analysis of Proposal (page 1 of 2)



tvstudy v2.2.5 (4uoc83)
Database: localhost, Study: W31EP-D 1282211_TLP-40, Model: Longley-Rice
Start: 2022.09.08 13:47:26

Study created: 2022.09.08 13:47:26

Study build station data: LMS TV 2022-09-08

Proposal: W31EP-D D31 LD APP PANAMA CITY, FL
File number: W31EP-D 1282211 TLP-40
Facility ID: 183928
Station data: User record
Record ID: 4649
Country: U.S.

Build options:
Protect pre-transition records not on baseline channel

Search options:
Baseline record excluded if station has CP

Individual records excluded:
0000123144 DW45DJ-D D30 LD APP PANAMA CITY, FL BLANK0000123144

Stations potentially affected by proposal:

| IX | Call | Chan | Svc | Status | City, State | File Number | Distance |
|----|---------|------|-----|--------|--------------------|-------------------|----------|
| No | WGIQ | D30 | DT | LIC | LOUISVILLE, AL | BLANK0000067031 | 164.8 km |
| No | WEIQ | D30 | DT | LIC | MOBILE, AL | BLANK0000111746 | 173.8 |
| No | K30QJ-D | D30 | LD | CP | CHATTAHOOCHIE, FL | BNPDTL20090825AHT | 120.9 |
| No | WVUP-CD | D30 | DC | LIC | TALLAHASSEE, FL | BLANK0000120620 | 184.6 |
| No | WAXC-LD | D31 | LD | LIC | ALEXANDER CITY, AL | BLDTL20110329ABN | 288.6 |
| No | WSFG-LD | D31 | LD | LIC | BERRY, AL | BLANK0000176885 | 395.0 |
| No | WNCF | D31 | DT | LIC | MONTGOMERY, AL | BLANK0000001319 | 209.4 |
| No | K31PL-D | D31 | LD | CP | MADISON, FL | BNPDTL20090825AHL | 245.2 |
| No | WOGX | D31 | DT | LIC | OCALA, FL | BLCDT20020730ABS | 381.1 |
| No | WPCH-TV | D31 | DT | LIC | ATLANTA, GA | BLANK0000152274 | 418.6 |
| No | W31EU-D | D31 | LD | LIC | COLUMBUS, GA | BLANK0000177389 | 263.9 |
| No | WSWG | D31 | DT | LIC | VALDOSTA, GA | BLANK0000063722 | 277.6 |
| No | WSWG | D31 | DT | APP | VALDOSTA, GA | BLANK0000149841 | 277.6 |
| No | WMUB-LD | D31 | LD | LIC | WARNER ROBINS, GA | BLANK0000135124 | 360.9 |
| No | WMBP-LD | D31 | LD | CP | EASTABUTCHIE, MS | BLANK0000199259 | 165.7 |
| No | WMBP-LD | D31 | LD | LIC | EASTABUTCHIE, MS | BLANK0000158644 | 166.9 |
| No | WGBC | D31 | DT | CP | MERIDIAN, MS | BLANK0000035926 | 328.8 |
| No | WGBC | D31 | DT | LIC | MERIDIAN, MS | BLCDT20071024AAK | 328.8 |
| No | WGUD-LD | D31 | LD | LIC | PASCAGOULA, MS | BLANK0000190566 | 234.1 |
| No | WAAO-LD | D32 | LD | LIC | ANDALUSIA, AL | BLANK0000155416 | 114.8 |
| No | WFSU-TV | D32 | DT | LIC | TALLAHASSEE, FL | BLCDT20030730ACW | 144.0 |

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D31
Mask: Full Service
Latitude: 30 21 14.30 N (NAD83)
Longitude: 86 6 43.50 W
Height AMSL: 93.0 m
HAAT: 0.0 m
Peak ERP: 11.0 kW
Antenna: DIE TLP-O 200.0 deg
Elev Pattn: Generic
Elec Tilt: 0.50

50.4 dBu contour:

| Azimuth | ERP | HAAT | Distance |
|---------|---------|--------|----------|
| 0.0 deg | 1.66 kW | 88.2 m | 30.9 km |
| 45.0 | 1.46 | 89.0 | 30.4 |
| 90.0 | 4.12 | 81.6 | 34.6 |
| 135.0 | 9.41 | 87.4 | 39.5 |
| 180.0 | 3.67 | 92.0 | 35.4 |

Table 1 W31EP-D TVStudy Analysis of Proposal
(page 2 of 2)



| | | | |
|-------|------|------|------|
| 225.0 | 3.80 | 92.5 | 35.7 |
| 270.0 | 10.1 | 84.9 | 39.5 |
| 315.0 | 3.06 | 92.9 | 34.6 |

Database HAAT does not agree with computed HAAT
Database HAAT: 0 m Computed HAAT: 89 m

Distance to Canadian border: 1295.5 km

Distance to Mexican border: 1165.2 km

Conditions at FCC monitoring station: Powder Springs GA
Bearing: 18.2 degrees Distance: 411.3 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:
Bearing: 307.3 degrees Distance: 2039.9 km

Study cell size: 1.00 km
Profile point spacing: 1.00 km

Maximum new IX to full-service and Class A: 0.50%
Maximum new IX to LPTV: 2.00%

Interference to proposal scenario 1

| | Call | Chan | Svc | Status | City, State | File Number | Distance |
|-------------|--------------|-----------------|--------|---------|------------------|------------------------|----------|
| Desired: | W31EP-D | D31 | LD | APP | PANAMA CITY, FL | W31EP-D 1282211 TLP-40 | |
| Undesireds: | WSWG | D31 | DT | LIC | VALDOSTA, GA | BLANK0000063722 | 277.6 km |
| | WMBP-LD | D31 | LD | CP | EASTABUTCHIE, MS | BLANK0000199259 | 165.7 |
| | WGBC | D31 | DT | CP | MERIDIAN, MS | BLANK0000035926 | 328.8 |
| | | | | | | | |
| | Service area | Terrain-limited | | IX-free | Percent IX | | |
| 3951.2 | 99,940 | 3949.2 | 99,940 | 3949.2 | 99,940 | 0.00 0.00 | |

**Channel and
Facility
Information**

| Section | Question | Response |
|-------------|-------------|----------|
| Facility ID | 183928 | |
| State | Florida | |
| City | PANAMA CITY | |
| LPD Channel | 31 | |

Antenna Location
Data

| Section | Question | Response |
|--------------------------------|---|---------------------------------------|
| Antenna Structure Registration | Do you have an FCC Antenna Structure Registration (ASR) Number? | Yes |
| | ASR Number | 1282211 |
| Coordinates (NAD83) | Latitude | 30° 21' 14.3" N+ |
| | Longitude | 086° 06' 43.5" W- |
| | Structure Type | TOWER-A free standing or guyed struct |
| | Overall Structure Height | 99.0 meters |
| | Support Structure Height | 91.4 meters |
| | Ground Elevation (AMSL) | 6.4 meters |
| Antenna Data | Height of Radiation Center Above Ground Level | 86.6 meters |
| | Height of Radiation Center Above Mean Sea Level | 93.0 meters |
| | Effective Radiated Power | 11 kW |

Antenna
Technical Data

| Section | Question | Response |
|--------------------------------|---|--------------------|
| Antenna Type | Antenna Type | Directional Custom |
| | Do you have an Antenna ID? | No |
| | Antenna ID | |
| Antenna Manufacturer and Model | Manufacturer: | Dielectric |
| | Model | TLP-4O |
| | Rotation | 200 degrees |
| | Electrical Beam Tilt | 0.5 |
| | Mechanical Beam Tilt | Not Applicable |
| | toward azimuth | |
| | Polarization | Horizontal |
| Elevation Radiation Pattern | Does the proposed antenna propose elevation radiation patterns that vary with azimuth for reasons other than the use of mechanical beam tilt? | No |
| | Uploaded file for elevation antenna (or radiation) pattern data | |
| | Out-of-Channel Emission Mask: | Full Service |

Directional Antenna Relative Field Values (Pre-rotated Pattern)

| Degree | Value | Degree | Value | Degree | Value | Degree | Value |
|--------|-------|--------|-------|--------|-------|--------|-------|
| 0 | 0.596 | 90 | 0.939 | 180 | 0.591 | 270 | 0.939 |
| 10 | 0.588 | 100 | 0.790 | 190 | 0.532 | 280 | 0.998 |
| 20 | 0.574 | 110 | 0.607 | 200 | 0.415 | 290 | 0.965 |
| 30 | 0.601 | 120 | 0.447 | 210 | 0.314 | 300 | 0.885 |
| 40 | 0.689 | 130 | 0.329 | 220 | 0.284 | 310 | 0.791 |
| 50 | 0.784 | 140 | 0.288 | 230 | 0.341 | 320 | 0.693 |
| 60 | 0.876 | 150 | 0.307 | 240 | 0.455 | 330 | 0.610 |
| 70 | 0.958 | 160 | 0.389 | 250 | 0.612 | 340 | 0.578 |
| 80 | 1.000 | 170 | 0.525 | 260 | 0.794 | 350 | 0.592 |

Additional Azimuths

| Degree | V _A |
|--------|----------------|
|--------|----------------|