

ENGINEERING EXHIBIT

Application for Modification of Digital Television Station Construction Permit

prepared for

Gray Television Licensee, Inc.

WBKO-DT Bowling Green, Kentucky

Facility ID 4692

Ch. 33 490 kW 203 m

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FCC Form 301, Section III-D - DTV Engineering

Exhibit 41

Statement A	Proposed Antenna System, Allocation Considerations
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Figure 2, 2A	Vertical Plane (Elevation) Radiation Pattern
Figure 3	Proposed Coverage Contours
Figure 4	Coverage Contour Comparison

Exhibit 44

Statement B	Environmental Considerations
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This material supplies a "hard copy" of the engineering portions of this application as entered September 27, 2005 for filing electronically. Since the FCC's electronic filing system may be accessed by anyone with the applicant's name and password, and electronic data may otherwise be altered in an unauthorized fashion, we cannot be responsible for changes made subsequent to our entry of this data and related attachments.

SECTION III-D - DTV ENGINEERING DATA	
Complete Questions 1-5 of the Certification Checklist and provide all data and information for the proposed facility, as requested in Technical Specifications, Items 1-13.	
<p>Certification Checklist: A correct answer of "Yes" to all of the questions below will ensure an expeditious grant of a construction permit. However, if the proposed facility is located within the Canadian or Mexican borders, coordination of the proposal under the appropriate treaties may be required prior to grant of the application. An answer of "No" will require additional evaluation of the applicable information in this form before a construction permit can be granted.</p>	
1. The proposed DTV facility complies with 47 C.F.R. Section 73.622 in the following respects:	
(a) It will operate on the DTV channel for this station as established in 47 C.F.R. Section 73.622.	<input checked="" type="radio"/> Yes <input type="radio"/> No
(b) It will operate from a transmitting antenna located within 5.0 km (3.1 miles) of the DTV reference site for this location as established in 47 C.F.R. Section 73.622.	<input checked="" type="radio"/> Yes <input type="radio"/> No
(c) It will operate with an effective radiated power (ERP) and antenna height above average terrain (HAAT) that do not exceed the DTV reference ERP and HAAT for this station as established in 47 C.F.R. Section 73.622.	<input checked="" type="radio"/> Yes <input type="radio"/> No
2. The proposed facility will not have a significant environmental impact, including exposure of workers or the general public to levels of RF radiation exceeding the applicable health and safety guidelines, and therefore will not come within 47 C.F.R. Section 1.1307. Applicant must submit the Exhibit called for in Item 13.	<input checked="" type="radio"/> Yes <input type="radio"/> No
3. Pursuant to 47 C.F.R. Section 73.625, the DTV coverage contour of the proposed facility will encompass the allotted principal community.	<input checked="" type="radio"/> Yes <input type="radio"/> No
4. The requirements of 47 C.F.R. Section 73.1030 regarding notification to radio astronomy installations, radio receiving installations and FCC monitoring stations have either been satisfied or are not applicable.	<input checked="" type="radio"/> Yes <input type="radio"/> No
5. The antenna structure to be used by this facility has been registered by the Commission and will not require registration to support the proposed antenna, OR the FAA has previously determined that the proposed structure will not adversely effect safety in air navigation and this structure qualifies for later registration under the Commission's phased registration plan, OR the proposed installation on this structure does not require notification to the FAA pursuant to 47 C.F.R. Section 17.7.	<input checked="" type="radio"/> Yes <input type="radio"/> No

SECTION III-D - DTV Engineering	
TECHNICAL SPECIFICATIONS	
Ensure that the specifications below are accurate. Contradicting data found elsewhere in this application will be disregarded. All items must be completed. The response "on file" is not acceptable.	
TECH BOX	
1.	Channel Number: DTV 33 Analog TV, if any 13
2.	Zone: <input type="radio"/> I <input checked="" type="radio"/> II <input type="radio"/> III
3.	Antenna Location Coordinates: (NAD 27) Latitude: Degrees 37 Minutes 3 Seconds 49 <input checked="" type="radio"/> North <input type="radio"/> South Longitude: Degrees 86 Minutes 26 Seconds 7 <input checked="" type="radio"/> West <input type="radio"/> East
4.	Antenna Structure Registration Number: 1048806 <input type="checkbox"/> Not Applicable <input type="checkbox"/> Notification filed with FAA
5.	Antenna Location Site Elevation Above Mean Sea Level: 225.6 meters
6.	Overall Tower Height Above Ground Level: 182.3 meters

7.	Height of Radiation Center Above Ground Level:	147.7 meters																																																																																																																								
8.	Height of Radiation Center Above Average Terrain :	202.6 meters																																																																																																																								
9.	Maximum Effective Radiated Power :	490 kW																																																																																																																								
10.	<p>Antenna Specifications:</p> <p>a. Manufacturer ERI Model ALP32M3-HSM-33</p> <p>b. Electrical Beam Tilt: 0.75 degrees <input type="checkbox"/> Not Applicable</p> <p>c. Mechanical Beam Tilt: degrees toward azimuth degrees True <input checked="" type="checkbox"/> Not Applicable</p> <p style="text-align: right;">[Exhibit 40]</p> <p>Attach as an Exhibit all data specified in 47 C.F.R. Section 73.685.</p> <p>d. Polarization: <input checked="" type="radio"/> Horizontal <input type="radio"/> Circular <input type="radio"/> Elliptical</p> <p>e. Directional Antenna Relative Field Values: <input type="checkbox"/> Not applicable (Nondirectional)</p> <p>[For a composite directional (not off-the-shelf) antenna, press the following button to fill in the relative field values subform.] [Relative Field Values]</p> <div style="text-align: center; padding: 10px;"> <p>10e. Directional Antenna Relative Field Values</p> <p>[Fill in this subform for a composite directional (not off-the-shelf) antenna, only.]</p> </div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="12">e. Directional Antenna Relative Field Values:</td> </tr> <tr> <td colspan="12">Rotation (Degrees): <input checked="" type="checkbox"/> No Rotation</td> </tr> <tr> <td>Degrees</td><td>Value</td><td>Degrees</td><td>Value</td><td>Degrees</td><td>Value</td><td>Degrees</td><td>Value</td><td>Degrees</td><td>Value</td><td>Degrees</td><td>Value</td> </tr> <tr> <td>0</td><td>0.322</td><td>10</td><td>0.305</td><td>20</td><td>0.261</td><td>30</td><td>0.215</td><td>40</td><td>0.203</td><td>50</td><td>0.246</td> </tr> <tr> <td>60</td><td>0.327</td><td>70</td><td>0.414</td><td>80</td><td>0.488</td><td>90</td><td>0.553</td><td>100</td><td>0.612</td><td>110</td><td>0.667</td> </tr> <tr> <td>120</td><td>0.723</td><td>130</td><td>0.784</td><td>140</td><td>0.848</td><td>150</td><td>0.907</td><td>160</td><td>0.954</td><td>170</td><td>0.988</td> </tr> <tr> <td>180</td><td>1.000</td><td>190</td><td>0.988</td><td>200</td><td>0.954</td><td>210</td><td>0.907</td><td>220</td><td>0.848</td><td>230</td><td>0.784</td> </tr> <tr> <td>240</td><td>0.723</td><td>250</td><td>0.667</td><td>260</td><td>0.612</td><td>270</td><td>0.553</td><td>280</td><td>0.488</td><td>290</td><td>0.414</td> </tr> <tr> <td>300</td><td>0.327</td><td>310</td><td>0.246</td><td>320</td><td>0.203</td><td>330</td><td>0.215</td><td>340</td><td>0.261</td><td>350</td><td>0.305</td> </tr> <tr> <td colspan="2">Additional Azimuths</td><td colspan="10"></td> </tr> </table> <div style="text-align: center; padding: 10px;"> <p><u>Relative Field Polar Plot</u></p> </div> <p>If a directional antenna is proposed, the requirements of 47 C.F.R. Sections 73.625(c) must be satisfied. Exhibit required. [Exhibit 41]</p>		e. Directional Antenna Relative Field Values:												Rotation (Degrees): <input checked="" type="checkbox"/> No Rotation												Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	0	0.322	10	0.305	20	0.261	30	0.215	40	0.203	50	0.246	60	0.327	70	0.414	80	0.488	90	0.553	100	0.612	110	0.667	120	0.723	130	0.784	140	0.848	150	0.907	160	0.954	170	0.988	180	1.000	190	0.988	200	0.954	210	0.907	220	0.848	230	0.784	240	0.723	250	0.667	260	0.612	270	0.553	280	0.488	290	0.414	300	0.327	310	0.246	320	0.203	330	0.215	340	0.261	350	0.305	Additional Azimuths											
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11.	<p>Does the proposed facility satisfy the interference protection provisions of 47 C.F.R. Section 73.623(a)? (Applicable only if Certification Checklist items 1(a), (b), or (c) are answered "No".)</p> <p style="text-align: right;"><input type="radio"/> Yes <input type="radio"/> No</p> <p>If No, attach as an Exhibit justification therefore, including a summary of any previously granted waivers. [Exhibit 42]</p>																																																																																																																									

12.	If the proposed facility will not satisfy the coverage requirement of 47 C.F.R. Section 73.625, attach as an Exhibit justification therefore. (Applicable only if Certification Checklist item 3 is answered "No.")	[Exhibit 43]
13.	<p>Environmental Protection Act. Submit in an Exhibit the following:</p> <p>If Certification Checklist Item 2 is answered "Yes," a brief explanation of why an Environmental Assessment is not required. Also describe in the Exhibit the steps that will be taken to limit RF radiation exposure to the public and to persons authorized access to the tower site.</p> <p>By checking "Yes" to Certification Checklist Item 2, the applicant also certifies that it, in coordination with other users of the site, will reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic exposure in excess of FCC guidelines.</p> <p>If Certification Checklist Item 2 is answered "No," an Environmental Assessment as required by 47 C.F.R Section 1.1311.</p>	[Exhibit 44]
PREPARERS CERTIFICATION ON SECTION III MUST BE COMPLETED AND SIGNED.		

SECTION III - PREPARER'S CERTIFICATION

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

Name ROBERT J. CLINTON		Relationship to Applicant (e.g., Consulting Engineer) CONSULTANT	
Signature		Date 9/27/2005	
Mailing Address CAVELL, MERTZ & DAVIS, INC. 7839 ASHTON AVENUE			
City MANASSAS	State or Country (if foreign address) VA	Zip Code 20109 -2883	
Telephone Number (include area code) 7033929090		E-Mail Address (if available) 7033929559	

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

Exhibits

Exhibit 41

Description: EXHIBIT 41 - STATEMENT A

EXHIBIT 41 - STATEMENT A - PROPOSED ANTENNA SYSTEM, ALLOCATION CONSIDERATIONS

Attachment 41

Description
EXHIBIT 41 - STATEMENT A

Exhibit 44**Description:** EXHIBIT 44 - STATEMENT BEXHIBIT 44 - STATEMENT B - ENVIRONMENTAL CONCERNS

Attachment 44

Description
EXHIBIT 44 - STATEMENT B

Exhibit 44 - Statement B
ENVIRONMENTAL CONSIDERATIONS
prepared for
Gray Television Licensee, Inc.
WBKO-DT Bowling Green, Kentucky
Facility ID 4692
Ch. 33 490 kW 203 m

The instant proposal is not believed to have a significant environmental impact as defined under Section 1.1306 of the Commission's Rules. Consequently, preparation of an Environmental Assessment is not required.

Nature of The Proposal

Gray Television Licensee, Inc. ("Gray") is the permittee of WBKO-DT, Channel 33, Bowling Green, Kentucky and licensee of the paired analog WBKO-TV Channel 13 facility. WBKO-DT is authorized to operate with an effective radiated power ("ERP") of 905 kW and an antenna height above average terrain ("HAAT") of 226 meters. Under the instant application, *Gray* seeks to modify the WBKO-DT CP to specify a reduction in ERP and HAAT and use of a directional antenna.

The proposed WBKO-DT antenna will be side-mounted on the existing WBKO-DT antenna support structure, below the height of the authorized WBKO-DT antenna. The use of existing transmitting locations has been characterized as being environmentally preferable by the Commission, according to Note 1 of §1.1306 of the Commission's Rules. No increase in overall structure height is proposed, thus no change in structure lighting or marking is anticipated. Thus, it is believed that this application may be categorically excluded from environmental processing pursuant to §1.1306 of the Commission's Rules.

Human Exposure to Radiofrequency Electromagnetic Field

The proposed operation was evaluated for human exposure to radiofrequency (RF) energy using the procedures outlined in the Commission's OET Bulletin No. 65 ("OET 65"). The proposed Channel 33 DTV antenna will be situated such that its center of radiation is 147.7 meters above ground. An ERP of 490 kilowatts, horizontally polarized, will be employed utilizing an ERI model

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ENVIRONMENTAL CONSIDERATIONS
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ALP32M3-HSM-33 antenna. The transmitting antenna has a relative field of 30 percent or less from 5 to 90 degrees below the horizontal plane (*i.e.*, below the antenna), according to data provided by the manufacturer. Thus, a conservative value of 30 percent relative field is used for this calculation. The “uncontrolled/general population” limit specified in §1.1310 for Channel 33 (center frequency 587 MHz) is 391.3 $\mu\text{W}/\text{cm}^2$.

OET-65’s formula for television transmitting antennas is based on the NTSC transmission standards, where the average power is normally much less than the peak power. For DTV facilities, the peak-to-average ratio is different than the NTSC ratio. The DTV ERP figure herein refers to the *average* power level. The formula used for calculating DTV signal density in this analysis is essentially the same as equation (9) in OET-65.

$$S = [(33.4098) (F)^2 (ERP)] / D^2$$

Where:

<i>S</i>	=	power density in microwatts/cm ²
<i>ERP</i>	=	total (average) ERP in Watts
<i>F</i>	=	relative field factor
<i>D</i>	=	distance in meters

Using this formula and the assumptions above, the proposed facility would contribute a power density of 69.4 $\mu\text{W}/\text{cm}^2$ at two meters above ground level near antenna support structure, or 17.7 percent of the general population/uncontrolled limit. At ground level locations away from the base of the tower, the calculated RF power density is even lower, due to the increasing distance from the transmitting antenna.

Impact of Other Facilities

For completeness, a summary of total calculated RF electromagnetic field from all stations co-located with WBKO-DT is provided herein. The calculated RF electromagnetic field contribution at a point near the tower base two meters above ground level from each station is summarized in the table below.

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Summary of Radiofrequency Radiation Calculations - Co-Located TV Stations

Station	Channel	ERP (kW)	Polarization	Field	Height (meters)	S - Calculated ($\mu\text{W}/\text{cm}^2$)	S - Limit ($\mu\text{W}/\text{cm}^2$)	% of Limit
WBKO(TV)	13	316	H	0.3	171.4	16.6	200	8.3
WBKO-DT (proposed)	33	490	H	0.3	147.7	69.4	391.3	17.7
WKYU-TV	24	398	H	0.5	142.4	84.3	355.3	23.7
WKYU-DT	18	61	H	0.50	122.0	35.4	331.3	10.7
<i>Total Calculated Signal Density:</i>								<i>60.4</i>

ERP: Effective Radiated Power
Polarization: C - Circular; H - Horizontal
Field: Vertical Plane Field Value (from antenna manufacturer's data)⁵
Height: Height of radiation center above ground level
S-Calculated: Calculated value of signal density at two meters above ground level
(from formulae in OET-65)
S-Limit: §1.1310 uncontrolled/general population limit for signal density

As summarized above, the total calculated RF electromagnetic field at any publicly accessible location is 60.4 percent of the uncontrolled / general population MPE limit.

No other authorized AM, FM, or television facility is located within 2 km of the WBKO-DT transmitter site, according to data extracted from the FCC's CDBS.

Safety of Tower Workers and the General Public

As demonstrated herein, excessive levels of RF energy attributable to the instant proposal are not caused at publicly accessible areas at ground level near the antenna supporting structure. Consequently, members of the general public are not exposed to RF levels in excess of the

⁵According to manufacturer data, the WBKO antennas are less than 30 percent relative field from 15 to 90 degrees below the horizontal. However, for WKYU facilities, a conservative value of 50 percent relative field was assumed for the calculation. The use of actual relative field values will result in lower calculated RF levels.

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ENVIRONMENTAL CONSIDERATIONS
(Page 4 of 4)

Commission's guidelines. Nevertheless, tower access will continue to be restricted and controlled through the use of a locked fence. Additionally, appropriate RF exposure warning signs will continue to be posted. With respect to worker safety, it is believed that based on the preceding analysis, excessive exposure does not occur in areas at ground level. A site exposure policy will continue to be employed protecting maintenance workers from excessive exposure when work must be performed on the tower in areas where high RF levels may be present. Such protective measures may include, but will not be limited to, restriction of access to areas where levels in excess of the guidelines may be expected, power reduction, or the complete shutdown of facilities when work or inspections must be performed in areas where the exposure guidelines will be exceeded. On-site RF exposure measurements may also be undertaken to establish the bounds of safe working areas. The applicant will coordinate exposure procedures with any pertinent stations.

Conclusion

Based on the preceding, it is believed that the instant proposal may be categorically excluded from environmental processing under Section 1.1306 of the Rules, hence preparation of an Environmental Assessment is not required.