# NATIONAL RADIO ASTRONOMY OBSERVATORY

POST OFFICE BOX 2
GREEN BANK, WV 24944-0002
NRQZ OFFICE TELEPHONE (304) 456-2107 FAX (304) 456-2276
HTTP://WWW.GB.NRAO.EDU/ NRQZ@NRAO.EDU



NRQZ ID: 11040 Elliot Knob-Lower_12JUL2017

Gray Television Licensee LLC
207 Old Dominion Road
Yorktown, VA 23692

| | |
|---|---|
| Application Reason/Purpose | Prior coordination notification |
| File Number | 0000029912 |
| Applicant Name | Addressee |
| Call Sign | WHSV |
| Site Name or Loc | Elliot Knob - Lower |
| Nearest City/State | Harrisonburg, VA |
| N Latitude | 38 09 55.5 |
| W Longitude | 79 18 43.1 |
| Ground Elevation (m) / AGL (m) | 1279.6 / 15 |
| Freq. Band (MHz) | Channel 20 operating on 509 MHz |
| Emission Designator | DTV |
| Requested ERPd (W) / Orientation | 287 kW / 85° True |
| Antenna type | Dielectric TUA-C2-06/12U-T (15.5 dBd) |
| Antenna configuration | Directional |
| System Configuration | Final Engineering is attached |
| Previous NRAO Coordination No. | NRQZ ID None |
| Current NRAO Coordination No. | NRQZ ID 11040 Elliot Knob Lower_12JUL2017 |

Dear Applicant:

The National Radio Quiet Zone (NRQZ) has evaluated these facilities to determine the interference impact on our highly sensitive radio astronomy operations.

***Special Condition*:**
The National Radio Astronomy Observatory (NRAO), Green Bank, WV, objects unless the Applicant's license is restricted to an Effective Radiated Power (ERP) of 1367 Watts at Azimuth 302.9° True.

To meet this Special Condition, the Applicant shall:

1. Use the final engineering submitted by Joseph M. Davis, RF Consultants indicating that all facilities meet the ERP restriction.
2. Arrange for a site inspection to verify the implementation of this Special Condition.
3. Post a copy of this document and associated attachments at the Transmit facility.

Regulatory

The NRQZ Office requests that:

1. The FCC places the Special Condition on the Station License.
2. This Letter of Concurrence be attached to the FCC application.
3. The applicant provides the NRQZ Office with notice of its official filing with the FCC per section 47CFR1.924 (a) (2).

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The National Radio Astronomy Observatory (NRAO) site located at Green Bank, Pocahontas County, WV, has no objection to this frequency assignment provided the special conditions are met.

The Sugar Grove Research Station, the former Naval Radio Research Observatory (NRRO), located at Sugar Grove, Pendleton County, WV has no objections to this frequency assignment.

This letter constitutes coordination of assignment in the National Radio Quiet Zone as required by the FCC Rules and Regulations 47CFR1.924.

If I may be of assistance, please feel free to contact me.

Sincerest regards,

Paulette Woody

Digitally signed by Paulette Woody
Date: 2017.10.27 10:18:28 -04'00'

Paulette W. Woody
NRQZ Office Administrator
PWW:pww

cc: Joseph David, RF Consultants

file: 11040 Elliot Knob Lower.docx

Attachments: 11040 Elliot Knob Lower JMD-10-15-2017.xlsx

This concurrence remains valid provided the data contained within is consistent with the applicant's filing at the Commission. Any discrepancy in system parameters, such as geographical coordinates (Latitude, Longitude, AMSL), antenna height above ground level (AGL), antenna gains or directivity (orientation), channel (operating frequency or frequency bands), emission type, and power requires re-coordination. If the Commission has questions regarding the validity of this or any concurrence, please direct inquiries to nrqz@nrao.edu or 304-456-2107.

8/15/2016 DATE

NRQZ# L4 Elliott Knob (Lower)

http://www.ngdc.noaa.gov/geomag-web/#declination

Magnetic Declination Correction 9.3 ° West

9° 17' W ± 0° 21' changing by 0° 2' W per year

| | | | |
|---|---|---|---|
| Location: | WHSV-TV Main Site Elliott | Latitude: | 38 09 55.5 (ddmmss.s) |
| | | Longitude: | 79 18 43.1 (ddmmss.s) |
| | | Ground Elev.: | 1279.6 Meters 4198.1 Ft |
| | | Antenna Ht.: | 15 Meters 49.2 Ft |
| | | Frequency: | 509 MHz |

| | | | | |
|---|---|---|---|---|
| NRAO AERP (watts) | 1367 | watts at | 302.9 | ° True (Φd) |
| | Scatter | watts at | 302.9 | ° True |
| | | watts at | 302.9 | ° True |

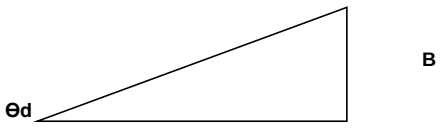
Reference Copy / Approved with Special Conditions

| | | | |
|---|---|---|---|
| | Sector Name or Indicator | 1 | |
| a. | Antenna Type | Dielectric TUA-C2-06/12U-T | |
| b. | Maximum Antenna Gain | 15.5 | dBd |
| c. | Antenna Azimuth (° True or "omni") | 85 | °T |
| | Antenna Azimuth (Mag) | 94.3 | °Mag |
| d. | Az to GBT on Antenna Pattern | 217.9 | ° |
| e. | Antenna Gain to GBT (b - \| f \|) | -14.40 | dB |
| f. | Antenna Gain to GBT Below Maximum | -29.90 | dB |
| g. | Mechanical Downtilt (Φbt) | | ° |
| h. | Loss to GBT Due to Mechanical Downtilt | | dB |
| i. | Transmitter Output Power | 8900 | watts |
| j. | System Losses: Combiner/Duplexer | | dB |
| | Lightning Arrestor | | dB |
| | Main Line | -0.4 | dB |
| | RF Filter | | dB |
| | Misc. connectors, etc. | | dB |
| j. | System Loss | (0.40) | dB |
| k. | Power to Antenna (ix j) | 8116.90 | watts |
| l. | Main Beam Power (k x b) | 287998.35 | watts |
| m. | ERPd to GBT (l x (f + h)) or (l x (e - (h + j))) | 294.91 | watts |

Relative field value at 302.9 degrees True = 0.032

Power at output of duplexer 8900.00

8900.00




Enter 1st Obstacle Information provided by NRQZ office

Θd = Angle to 1st Obstacle

0.19 km to 1st Obstacle

A = Distance to 1st Obstacle in Feet 623

4247.38 TX AMSL (ft)

B = Ant Ht AMSL minus Ht of 1st Obs -208.1646719

4455.54 AMSL 1st Obstacle

Θd = arctan(B/A) = -18.47 °

*A -Θd value indicates that the first obstacle is above the horizon*

*A +Θd value indicaes that the first obstacle is below the horizon*

Effective mechanical downtilt adjustment:

| | | | |
|---|---|---|---|
| Effective Elevation = Θd - Θbt cos(Φd - Φbt) = | 0.0 | 0.0 | 0.0 |
| Effective Elevation Adjustment = | 0.0 ° | 0.0 ° | 0.0 ° |

Definitions:

Φd = Azimuth to GBT

Φbt = Azimuth of mechanical beam tilt (verticle)

Θd = Elevation to 1st obstacle (negative above horizon)

Θbt = Elevation of antenna mechanical beam tilt (neg. above horizon)

Note: No adjustments for electrical beam tilt are required because the pattern data already accounts for this

Effective azimuth on horizontal pattern = Φd - Antenna Azimuth (True) {If AZ<0, then add 360}

Effective elevation on vertical pattern = Θd - Θbt cos(Φd - Φbt) {IF ELEV<0, then add 360}

Antenna Gain = HPAT(Eff AZ) + VPAT(Eff ELEV) + Max Gain