# 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


December 2, 2021

NRQZ ID: 13156_26JUL2021

Gray Television Licensee, LLC
c/o Joseph M. Davis, P.E.
Chesapeake RF Consultants LLC
207 Old Dominion Road
Yorktown, VA 23692

| | |
|---|---|
| Application Reason/Purpose | Pre-Coordination of WHSV-TV |
| FCC ULS File Number | Shall be provided by applicant or technical representative |
| Call Sign | WHSV |
| Site Name or Loc | Great North Mountain |
| Nearest City/State | Bayse, VA |
| N Latitude | 38 51 53.4 |
| W Longitude | 78 47 59.2 |
| NRAO System Configuration | See attached" NRAO FEW" |
| SGRS System Configuration | See attached "CH 25 Summary" |
| **SGRS AERPd limit (W) (Special Condition)** | **None** |
| **NRAO AERPd limit (W) (Special Condition)** | **Yes: 10.5 Watts** |
| Current NRAO NRQZ Case ID / Date | 13156_26JUL2021 |

Dear Applicant:

The National Radio Quiet Zone (NRQZ) office has evaluated this facility to determine the interference impact on the highly sensitive NRAO Green Bank Observatory radio astronomy operations.

**National Radio Astronomy Observatory (NRAO) Special Condition Statement:**

The National Radio Astronomy Observatory (NRAO), Green Bank, WV, objects unless the Applicant's license is restricted to an Effective Radiated Power (ERP) of 10.5 Watts at Azimuth 242.4 degrees True North.

To meet these Special Conditions, the Applicant shall:

1. Use the final engineering submitted by Joe Davis, Chesapeake RF Consultants, on 13SEP2021 indicating that all facilities meet the ERP restriction.
2. Arrange for the requested site inspection to verify the implementation of this Special Condition.
3. Post a copy of this document and associated attachments at the Transmit facility.
4. Provide a Construction Notification as defined by the FCC for your specific radio service.

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 W. Woody
NRQZ Office Administrator
PWW:pww

cc: Joe Davis, Chesapeake RF Consultants, LLC

file: 13156.docx

Attachments: NRAO FEW – Final Engineering Worksheet

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.

NRQZ# 13156 / 12598-07

9/13/2021 DATE

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

Magnetic Declination Correction 9.7 ° West
(Value only)

Location: WHSV-TV-DRT3
Great North Mtn Lower site-B

| | | |
|---|---|---|
| Latitude: | 38 51 53.4 (ddmmss.s) | |
| Longitude: | 78 47 59.2 (ddmmss.s) | |
| Ground Elev.: | 847.3 Meters | 2779.8 Ft |
| Antenna Ht.: | 47.2 Meters | 154.9 Ft |
| Frequency: | 539 MHz | TV Channel 25 |

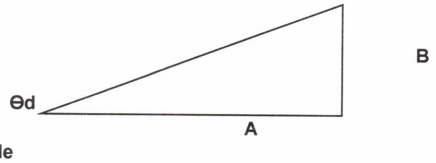
NRAO AERP (watts) 10.5 watts at 242.4 ° True (Φd)
watts at 242.4 ° True
watts at 242.4 ° True

| | Sector Name or Indicator | 1 - Hpol | 2 - Vpol |
|---|---|---|---|
| a. | Antenna Type | ERI ETU4U5-ESP2C-25 | ERI ETU4U5-ESP2C-25 |
| b. | Maximum Antenna Gain | 13.02 dBd | 7.79 dBd |
| c. | Antenna Azimuth (° True or "omni") | 115 °T | 115 °T |
| | Antenna Azimuth (Mag) | 124.7 °Mag | 124.7 °Mag |
| d. | Az to GBT on Antenna Pattern | 242.4 ° | 242.4 ° |
| e. | Antenna Gain to GBT (b - \| f \|) | -40.65 dB | -39.90 dB |
| f. | Antenna Gain to GBT Below Maximum | -53.67 dB | -47.69 dB |
| g. | Mechanical Downtilt (Φbt) | 0 ° | 0 ° |
| h. | Loss to GBT Due to Mechanical Downtilt | 0 dB | 0 dB |
| i. | Transmitter Output Power | 888 watts | 888 watts |
| j. | System Losses: Combiner/Duplexer | dB | dB |
| | Lightning Arrestor | dB | dB |
| | Main Line | -0.745 dB | -0.745 dB |
| | RF Filter (combiner) | dB | dB |
| | Misc. connectors, etc. | dB | dB |
| j. | System Loss | (0.75) dB | (0.75) dB |
| k. | Power to Antenna (ix j) | 748.02 watts | 748.02 watts |
| l. | Main Beam Power (k x b) | 14993.84 watts | 4496.90 watts |
| m. | ERPd to GBT (l x (f + h)) or (l x (e - (h + j))) | 0.064 watts | 0.077 watts |

Antenna azimuth pattern supplied is already rotated to the desired orientation
Pattern is centered at 115°T

Total ERPd Hpol plus Vpol at 242°T
0.141 Watts Total to GBT

Power at output of duplexer 888.00
888.00




Enter 1st Obstacle Information provided by NRQZ office

0.36 km to 1st Obstacle
2934.71 TX AMSL (ft)
3016.76 AMSL 1st Obstacle

Θd = Angle to 1st Obstacle
A = Distance to 1st Obstacle in Feet 1181
B = Ant Ht AMSL minus Ht of 1st Obs -82.04871392
Θd = arctan(B/A) = -3.97 °

*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

ERI Antenna Model:
ETU4U5-ESP2C-25

ERI Specification Number
20201204-906-4r2

| H-pol | V-pol | Power H-Pol+V-Pol |
|---|---|---|
| Green Bank Telescope: 242.4°T at an elevation angle 3.97 degrees above the horizontal<br>Angle 242 ERP dBk -41.9 ERP ( Watts) 0.0646 | Angle 242 ERP dBk -41.3 ERP (Watts) 0.0741 | Tot. ERP H-Pol+V-Pol (Watts) at 3.97° El. 0.1387 |
| Sugar Grove: 227.2°T at an elevation angle 2.4 degrees above the horizontal<br>Angle 227 ERP dBk -27.4 ERP ( Watts) 1.8197 | Angle 227 ERP dBk -26.7 ERP (Watts) 2.1380 | Tot ERP H-Pol+V-Pol (Watts) at 2.4° El. 3.9577 |

| | Obtained dBk | Requested dBk | Vertical Axial Ratio |
|---|---|---|---|
| ERP H Max (Elevation 1.5°) | 11.8 | 11.76 | 0.288403 |
| ERP V Max (Elevation 1.4°) | 6.4 | 6.53 | |