



# NATIONAL RADIO ASTRONOMY OBSERVATORY

POST OFFICE BOX 2

GREEN BANK, WV 24944-0002

NRQZ OFFICE TELEPHONE (304) 456-2107

HTTP://WWW.GB.NRAO.EDU/

FAX (304) 456-2276

NRQZ@NRAO.EDU

January 16, 2018

Page 1 of 2

NRQZ ID: 11128\_28SEP2017

Virginia Broadcasting LLC  
503 East Market Street  
Charlottesville, VA 22902-0769

Application Reason/Purpose	Prior coordination notification
File Number	0000032223 / BLDTT-20110110AAC
Applicant Name	Addressee
Call Sign	W22EX-D
Site Name or Loc	Elliot Knob
Nearest City/State	Staunton, VA
N Latitude	38 09 55.5
W Longitude	79 18 43.1
Ground Elevation (m) / AGL (m)	1280 / 15
Freq. Band (MHz)	518 – 524
Emission Designator	DTV
System Configuration	See attached "Final Engineering"
Previous NRAO Coordination No.	NRQZ ID 6219
Current NRAO Coordination No.	NRQZ ID 11128_28SEP2017

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 Statements: NRAO and Sugar Grove Research Station**

The **National Radio Astronomy Observatory** (NRAO), Green Bank, WV, objects unless the Applicant's license is restricted to an Effective Radiated Power (ERP) of 1415 Watts per 6 MHz unit bandwidth at Azimuth 302.9 degrees True North.

The **Sugar Grove Research Station**, Sugar Grove, WV, objects unless the Applicant's license is restricted to an Effective Radiated Power (ERP) of 5062 Watts per 6 MHz unit bandwidth at Azimuth 4.2 degrees True North.

To meet this Special Condition, the Applicant shall:

1. Use the final engineering submitted by Donald Everist of Cohen, Dippell and Everist Consulting Engineers, 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.



## NATIONAL RADIO ASTRONOMY OBSERVATORY

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

FAX (304) 456-2276  
NRQZ@NRAO.EDU

January 16, 2018

Page 2 of 2

NRQZ ID: 11128\_28SEP2017

### 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).

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:ppw

cc: Donald Everist

file: 11128.docx

Attachments: Final Engineering (2 pages)

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](mailto:nrqz@nrao.edu) or 304-456-2107.

12/8/2017

NRQZ# 11128/6219

Magnetic Declination Correction

8.5 ° West

<http://www.ngdc.noaa.gov/geomagmodels/IGRFWMM.jsp>Location: Elliott Knob, VA  
Virginia Broadcasting

Latitude: 38 09 55.5 (ddmmss.s)  
 Longitude: 79 18 43.1 (ddmmss.s)  
 Ground Elev.: 4200 Feet AMSL  
 Antenna Ht.: 49.2 Feet AGL  
 Frequency: 518-524 MHz

1280.2 meters  
 14.996 meters

Analog \_\_\_\_\_ watts at 302.9 ° True (Φd)  
 DTV Emission limit 1415 watts at 302.9 ° True  
 Scatter \_\_\_\_\_ watts at 302.9 ° True

Sector

Configuration: 6219

Configuration: 11128 GBO

	635-MHz	518 - 524 MHz
a. Antenna Type	TFU-12DSC-R-C180	Alive Telecom ATC-BCSH8C1R-U1 (1° ET) - Side Mounted
b. Maximum Antenna Gain	12.315 dBd	14.4 dBd
c. Antenna Azimuth (° True or "omni")	124 °T	129 °T
Antenna Azimuth (Mag)	132.5 °Mag	137.5 °Mag
d. Az to GBT* on Antenna Pattern	178.9 °	173.9 °
e. Antenna Gain to GBT (b -   f  )	12.32 dB	14.40 dB
f. Antenna Gain to GBT Below Maximum	dB	dB
g. Mechanical Downtilt (Φbt)	°	0 °
h. Loss to GBT Due to Mechanical Downtilt	0 dB	dB
i. Transmitter Output Power	880 watts	1208 watts
j. System Losses: Combiner/Duplexer		0
Lightning Arrestor		0
Main Line		-0.563
RF Filter		0
Misc. connectors, etc.		0
j. System Loss	0.00 dB	(0.56) dB
k. Power to Antenna (ix j)	880.00 watts	1061.13 watts
l. Max ERP of System	15000.00 watts	15000.00 watts
m. **ERPd to GBT (l x (f + h)) or (l x (e - (h + j)))	393.00 watts	184.40 watts

6219: RELATIVE FIELD AT 303 DEGREES = 0.162

\*\*ERP to GBT = (0.162<sup>2</sup>)\*15,000 = 393 Watts

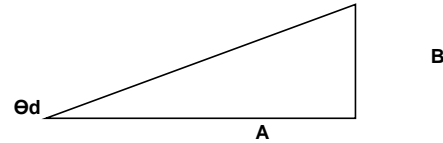
11128: Relative field at 302 degrees is 0.111

\*\*ERP to GBT = 0.111e2\*15,000 = 184.4 Watts

Power at input to hardline: 880.00  
 Power at bottom jumper: 880.00

1208.00  
 1208.00

\* GBT = the Robert C. Byrd Green Bank Telescope



Enter 1st Obstacle Information:

0.19 km to 1st Obstacle  
 4249.2 TX AMSL  
 4455.54 AMSL 1st Obstacle

Θd = Angle to 1st Obstacle

A = Distance to 1st Obstacle in Feet

B = Ant Ht AMSL minus Ht of 1st Obs

Θd = arctan(B/A) = -18.32 °

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

A + Θd value indicates 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 °

Definitions:

Φd = Azimuth to GBT

Φbt = Azimuth of mechanical beam tilt

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&lt;0, then add 360}

Effective elevation on vertical pattern = Θd - Θbt cos(Φd - Φbt) {If ELEV&lt;0, then add 360}

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

11128 Elliot Knob

GBO Compliance

Final Engineering Worksheet

12/8/2017

NRQZ# 11128/6219

Magnetic Declination Correction

8.5 ° West

Location: Elliott Knob, VA  
Virginia Broadcasting<http://www.ngdc.noaa.gov/geomagmodels/IGRFWMM.jsp>

Latitude: 38 09 55.5 (ddmmss.s)

Longitude: 79 18 43.1 (ddmmss.s)

Ground Elev.: 4200 Feet AMSL

1280.2 meters

Antenna Ht.: 49.2 Feet AGL

14.996 meters

Frequency: 518-524 MHz

DTV Emission limit 5062

watts at 4.2 ° True (Φd)

watts at 4.2 ° True

watts at 4.2 ° True

Sector

518 - 524 MHz

Alive Telecom ATC-BCSH8C1R-U1 (1° ET) - Side Mounted

a. Antenna Type

b. Maximum Antenna Gain

c. Antenna Azimuth (° True or "omni")

Antenna Azimuth (Mag)

d. Az to GBT\* on Antenna Pattern

e. Antenna Gain to GBT (b - | f |)

f. Antenna Gain to GBT Below Maximum

g. Mechanical Downtilt (Φbt)

h. Loss to GBT Due to Mechanical Downtilt

i. Transmitter Output Power

j. System Losses: Combiner/Duplexer

Lightning Arrestor

Main Line

RF Filter

Misc. connectors, etc.

j. System Loss

k. Power to Antenna (ix j)

l. Max ERP of System

m. \*\*ERPd to GBT (l x (f + h)) or (l x (e - (h + j)))

14.4 dBd

129 °T

137.5 °Mag

235.2 °

-4.67 dB

-19.07 dB

0 °

dB

1208 watts

0

0

-0.563

0

0

(0.56) dB

1061.13 watts

15000.00 watts

4537.50 watts

Relative field at 4.2 degrees is 0.550

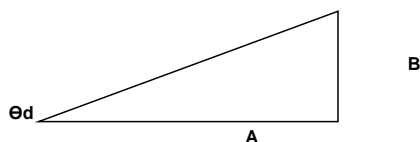
\*\*ERP to SGRS = 0.550e2\*15,000 = 4537.5 Watts

1208.00

1208.00

Power at input to hardline:

Power at bottom jumper:



Enter 1st Obstacle Information:

21.6 km to 1st Obstacle

4249.2 TX AMSL

3994.4 AMSL 1st Obstacle

Θd = Angle to 1st Obstacle

A = Distance to 1st Obstacle in Feet

B = Ant Ht AMSL minus Ht of 1st Obs

Θd = arctan(B/A) = 4.20 °

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

A +Θd value indicates that the first obstacle is below the horizon

70866

254.8

Effective mechanical downtilt adjustment:

Effective Elevation = Θd - Θbt cos(Φd - Φbt) =

0.0

0.0

0.0

Effective Elevation Adjustment =

0 °

0 °

0 °

Definitions:

Φd = Azimuth to GBT

Φbt = Azimuth of mechanical beam tilt

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&lt;0, then add 360}

Effective elevation on vertical pattern = Θd - Θbt cos(Φd - Φbt) {If ELEV&lt;0, then add 360}

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

11128 Elliott Knob  
Sugar Grove Compliance

FEW - Final Engineering Worksheet