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: 10736_13MAR2017

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	Prior coordination notification
File Number	Shall be provided by applicant
Applicant Name	Addressee
Call Sign	WHSV-TV-DRT1
Site Name or Loc	**Massanutten – Channel 34**
Nearest City/State	Harrisonburg, VA
N Latitude	38 23 34.8
W Longitude	78 46 11.9
Ground Elevation (m) / AGL (m)	890.6 / 22.6
Freq. Band (MHz)	590 – 596
Emission Designator	DTV
System Configuration	See attached “Final Engineering”
Previous NRAO Coordination No.	NRQZ ID None Listed
Current NRAO Coordination No.	NRQZ ID 10736 REV1_13MAR2017

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 4.3 Watts at Azimuth 273.1 degrees True North.

To meet this Special Condition, the Applicant shall:

1. Use the final engineering submitted by Joseph Davis, Chesapeake RF Consultants, 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.

Reference Copy / Approved with Special Conditions

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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 Woody

Digitally signed by Paulette Woody
Date: 2018.08.29 10:43:00 -04'00'

Paulette W. Woody
NRQZ Office Administrator
PWW:pww

file: 10736 WHSV-TV-DRT1 Massanutten Channel 34.docx

Attachments: Final Engineering

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.

7/9/2018 DATE

NRQZ# 10736 REV1

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

Magnetic Declination Correction 9.7 ° West

9° 41' W ± 0° 21' changing by 0° 1' W per year

Location: WHSV-TV-DRT1 Massanutten (shared antenna with WSVF-CD)

Latitude:	38 23 34.8 (ddmmss.s)		
Longitude:	78 46 11.9 (ddmmss.s)		
Ground Elev.:	890.6 Meters	2921.9 Ft	
Antenna Ht.:	22.6 Meters	74.1 Ft	
Frequency:	590 - 596 MHz	*Channel 34*	

NRAO AERP (watts)	4.3	watts at	273.1 ° True (Φd)
	Scatter	watts at	273.1 ° True
		watts at	273.1 ° True

	Sector Name or Indicator	1	
a.	Antenna Type	Kathrein UTV-016/16(4x4)	
b.	Maximum Antenna Gain	10.86	dBd
c.	Antenna Azimuth (° True or "omni")	95	°T
	Antenna Azimuth (Mag)	104.7	°Mag
d.	Az to GBT on Antenna Pattern	273.1	°
e.	Antenna Gain to GBT (b - | f |)	-35.04	dB
f.	Antenna Gain to GBT Below Maximum	-45.90	dB
g.	Mechanical Downtilt (Φbt)		°
h.	Loss to GBT Due to Mechanical Downtilt		dB
i.	Transmitter Output Power	1687	watts
j.	System Losses: Combiner/Duplexer		dB
	Lightning Arrestor		dB
	Main Line	-0.62	dB
	RF Filter (combiner)	-0.75	dB
	Misc. connectors, etc.		dB
j.	System Loss	(1.37)	dB
k.	Power to Antenna (ix j)	1230.59	watts
l.	Main Beam Power (k x b)	15000.82	watts
m.	ERPd to GBT (l x (f + h)) or (l x (e - (h + j)))	0.39	watts

Antenna azimuth patterns supplied are already rotated to the desired orientation

Power at output of duplexer 1419.43

1687.00



Enter 1st Obstacle Information provided by NRQZ office

Θd = Angle to 1st Obstacle

42.21 km to 1st Obstacle

A = Distance to 1st Obstacle in Feet 138484

2996.06 TX AMSL (ft)

B = Ant Ht AMSL minus Ht of 1st Obs -1051.077008

4047.14 AMSL 1st Obstacle

Θd = arctan(B/A) = -0.43 °

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

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