

Technical Report 2019 License Renewal Radio Frequency (RF) Protection Study

for

WCVL-FM - Charlottesville, VA

BLH-20170418AAK (Analog)

Facility ID: 74161

WCNR(FM) - Keswick, VA

BMLH-20170407AAB (Analog & Digital)

Facility ID: 52394

WWWV(FM) - Charlottesville, VA

BMLH-19980925KA (Analog)

Facility ID: 19837

W255CT - Charlottesville, VA

BLFT-20151124DQH (Analog)

Facility ID: 18875

W275CL - Charlottesville, VA

BLFT-20170630AAT (Analog)

BPFT-20170703AER (Analog)

Facility ID: 141162

CERTIFICATION OF TECHNICAL CONSULTANT: *I declare, under penalty of perjury, that the contents of this report are true and accurate to the best of my knowledge and belief. I further certify I have over twenty years of experience as a broadcast technical consultant before the Federal Communications Commission ("the FCC"); and am familiar with the Code of Federal Regulations Title 47 ("the Rules") as pertaining to this report and its contents herein. The underlying data utilized in this report was taken directly from FCC databases or indirectly through third party software vendors securing data directly from FCC databases. This firm cannot be held liable for errors or omissions resulting from the underlying data. The information contained herein is believed accurate to the date reported below.*



Justin W. Asher, Technical Consultant
May 13, 2019

May, 2019

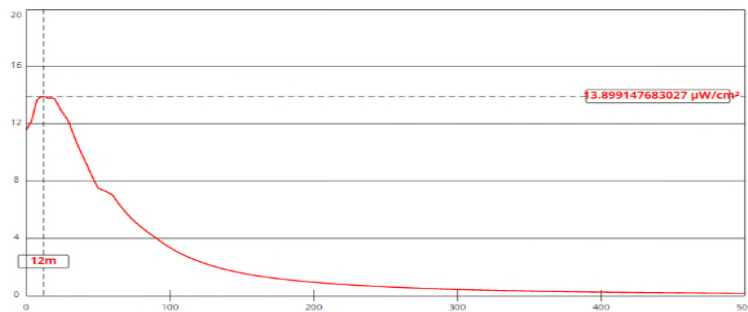
Compliance with Radiofrequency Radiation Guidelines **1**

Explanation of Study The studied facilities comply with the maximum permissible radiofrequency electromagnetic exposure limits for controlled and uncontrolled environments as set forth under §1.1310 of the Commission's rules and the guidelines for RF radiation protection guidelines as set forth in OET Bulletin No. 65 (Edition 97-01), and the accompanying Supplement A, (Edition 97-01). The site is intended to house multiple transmitters of mixed aural and/or visual origin.

Concerning FM contributions, the potential for human exposure to non-ionizing radiofrequency radiation has been evaluated with regard to §1.1310 utilizing the Commission's own FM Model web-based software application. The use and implementation of this FCC sanctioned software is a matter of record before the Commission. To ensure complete protection, each maximum FM contribution has been assumed without regard to any restricted access fencing distance. The maximum permissible uncontrolled limit for FM stations is $200 \mu\text{W}/\text{cm}^2$. The maximum permissible controlled limit is $1000 \mu\text{W}/\text{cm}^2$. Therefore, single contributions of $\leq 200 \mu\text{W}/\text{cm}^2$ remain within the tolerances as allowed by §1.1310 and its governing OET Bulletin No. 65 (Edition 97-01) for the more restrictive of either two protections.

Concerning DTV contributions, Equation 10 of OET Bulletin No. 65 was used to determine the individual contribution of each DTV station. Equation 10 predicts the potential exposure to radiofrequency radiation for human observers on the ground as indicated by total power density expressed in units of $\mu\text{W}/\text{cm}^2$. The maximum permissible uncontrolled and controlled limits as allowed by §1.1310 and its governing OET Bulletin No. 65 (Edition 97-01) for DTV stations is frequency dependent. However, the more restrictive of these two protections has been calculated below.

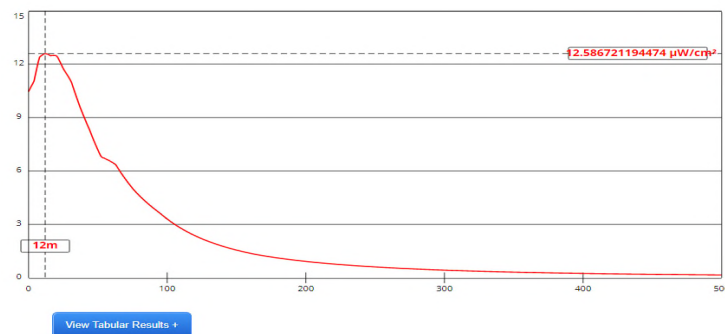
Summary of Stations The licensed WCVL-FM.L - Charlottesville, VA Analog FM Station operates on CH224D (92.7 MHz) with 0.610 kW ERP circular polarization (H&V). This facility operates with an antenna COR mounted 44 meters above ground level (AGL). The facility broadcasts into a one (1) bay, Shively model 6813-1 antenna employing a single EPA Type 1 "Ring and Stub" element as defined by the Commission's own FM Model - Appendix B (issued March 31, 2016). The antenna element is spaced at 1.0 wavelength (λ) apart. This facility does not operate with HD/IBOC facilities at this time.



[View Tabular Results +](#)

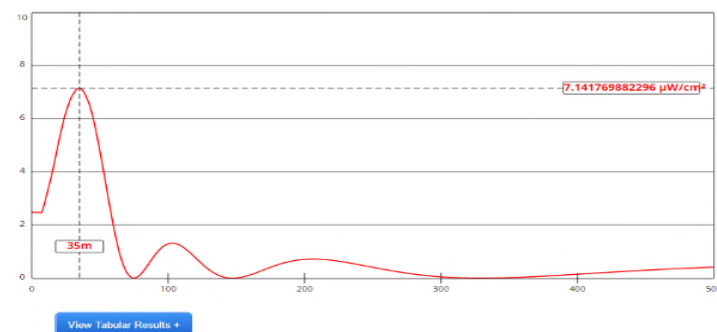
Channel Selection	[Channel 224 (92.7 MHz) v]		
Antenna Type +	[EPA Type 1: Ring-and-Stub or "Other" v]		
Height (m)	<input type="text" value="44"/>	Distance (m)	<input type="text" value="500"/>
ERP-H (W)	<input type="text" value="610"/>	ERP-V (W)	<input type="text" value="610"/>
Num of Elements	<input type="text" value="1"/>	Element Spacing (λ)	<input type="text" value="1"/>
Num of Points	<input type="text" value="500"/>	<input type="button" value="Apply"/>	

Summary of Stations The licensed WCNR(FM).L - Keswick, VA Analog FM Station operates on CH291A (106.1 MHz) with 0.600 kW ERP circular polarization (H&V). This facility operates with an antenna COR mounted 46 meters above ground level (AGL). This facility broadcasts into a one (1) bay, Shively model 6813-1 antenna employing an EPA Type 1 “Ring and Stub” element as defined by the Commission’s own FM Model - Appendix B (issued March 31, 2016). The antenna element is spaced at 1.0 wavelength (λ) apart. WCNR(FM) operates with HD/IBOC facilities as outlined under BDNH-20170407AAC, or identified as -20 dBc power (0.006 kW ERP) circular polarization (H&V) (or $\text{Log}[0.01]*10 = -20 \text{ dBc}$) from the main antenna mounted 46 meters AGL. Therefore, a combined power of 0.606 kW (H&V) has been assumed for this contribution.



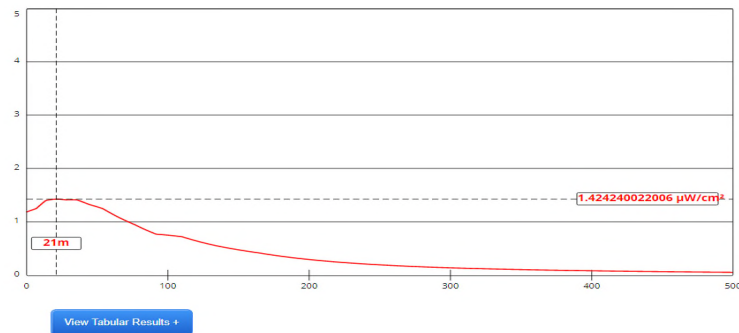
Channel Selection	Channel 291 (106.1 MHz)		
Antenna Type +	EPA Type 1: Ring-and-Stub or "Other"		
Height (m)	46	Distance (m)	500
ERP-H (W)	606	ERP-V (W)	606
Num of Elements	1	Element Spacing (λ)	1
Num of Points	500	Apply	

Summary of Stations The licensed WWWV(FM).L - Charlottesville, VA analog FM Station operates on CH248B (97.5 MHz) with 8.9 kW ERP circular polarization (H&V). This facility operates with an antenna COR mounted 87 meters above ground level (AGL). This facility broadcast into a four (4) bay, ERI “Rototiller” (LP-4E or equivalent) antenna employing EPA Type 3 “Opposed U Dipole” elements as defined by the Commission’s own FM Model - Appendix B (issued March 31, 2016). The antenna elements are spaced 1.0 wavelength (λ) apart. This facility does not operate with HD/IBOC facilities at this time.



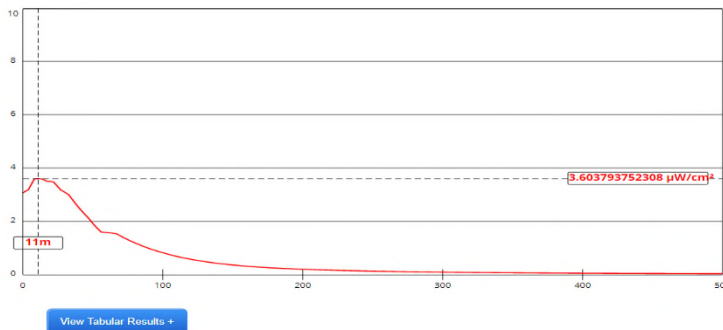
Channel Selection	Channel 248 (97.5 MHz)		
Antenna Type +	EPA Type 3: Opposed U Dipole		
Height (m)	87	Distance (m)	500
ERP-H (W)	8900	ERP-V (W)	8900
Num of Elements	4	Element Spacing (λ)	1
Num of Points	500	Apply	

Summary of Stations The non-co-owned, but collocated licensed WCHV-FM.L - Charlottesville, VA analog FM Station (BLH-19960112KD; Facility ID 61716) operates on CH298A (107.5 MHz) with 0.210 kW ERP circular polarization (H&V). This facility operates with an antenna COR mounted 79 meters above ground level (AGL). For purposes of this RF Compliance Study, a worst-case one bay, EPA Type 1 element as defined by the Commission's own FM Model - Appendix B (issued March 31, 2016) has been assumed. This facility does not operate with HD/IBOC facilities at this time.



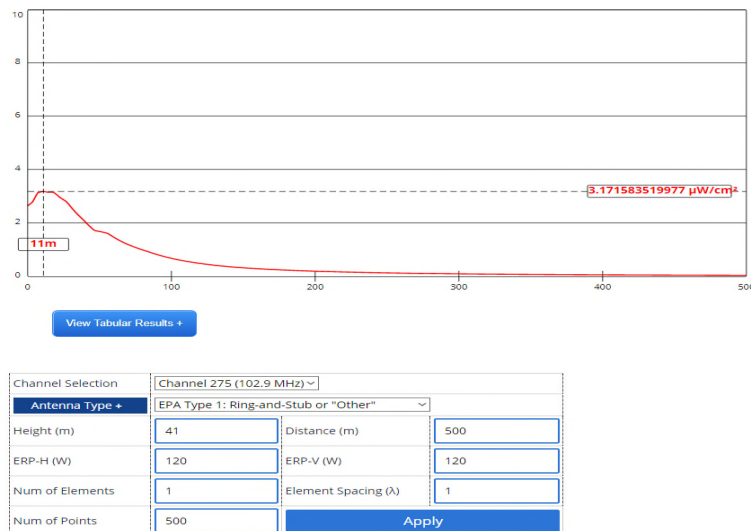
Channel Selection	Channel 298 (107.5 MHz)		
Antenna Type +	EPA Type 1: Ring-and-Stub or "Other"		
Height (m)	79	Distance (m)	500
ERP-H (W)	210	ERP-V (W)	210
Num of Elements	1	Element Spacing (λ)	1
Num of Points	500	Apply	

Summary of Stations The licensed W255CT.L - Charlottesville, VA, Analog FM Translator operates on CH255D (98.9 MHz) with 0.250 kW ERP vertical only polarization (V). The facility operates from an antenna COR mounted 49 meters above ground level (AGL). This facility broadcasts into a one (1) bay, Nicom model BKY3/P-1DA(V) antenna employing an EPA Type 1 "Yagi" element as defined by the Commission's own FM Model - Appendix B (issued March 31, 2016). The antenna element is spaced at 1.0 wavelength (λ) apart. This facility does not operate with HD/IBOC facilities at this time.

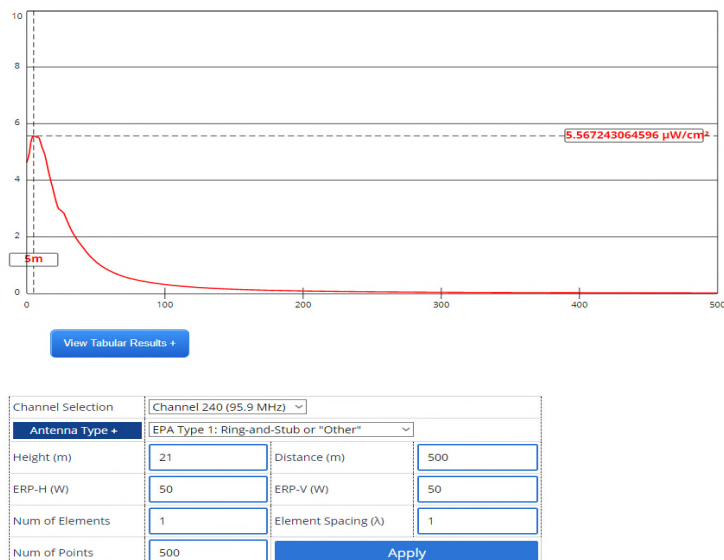


Channel Selection	Channel 255 (98.9 MHz)		
Antenna Type +	EPA Type 1: Ring-and-Stub or "Other"		
Height (m)	49	Distance (m)	500
ERP-H (W)	0	ERP-V (W)	250
Num of Elements	1	Element Spacing (λ)	1
Num of Points	500	Apply	

Summary of Stations The licensed W275CL.L - Charlottesville, VA, Analog FM Translator operates on CH275D (102.9 MHz) with 0.120 kW ERP Circular Polarization(H&V). The facility operates from an antenna COR mounted 41 meters above ground level (AGL). This facility broadcasts into a one (1) bay, Scala model CL-FM-1DA antenna employing an EPA Type 1 "Log Periodic" element as defined by the Commission's own FM Model - Appendix B (issued March 31, 2016). The antenna element is spaced at 1.0 wavelength (λ) apart. This facility does not operate with HD/IBOC facilities at this time. *W275CL also holds unbuild Construction Permit BPFT-20170703AER. However, this unbuild CP may be ignored in lieu of the operational W275CL license.*



Summary of Stations The non-co-owned, but collocated licensed W240AF.L - Charlottesville, VA, Analog FM Translator (BLFT-19960730TE; Facility ID 5147) operates on CH240D (95.9 MHz) with 0.050 kW ERP circular polarization (H&V). The facility broadcasts from an antenna COR mounted 21 meters above ground level (AGL). For purposes of this RF Compliance Study, a worst-case one bay, EPA Type 1 element as defined by the Commission's own FM Model - Appendix B (issued March 31, 2016) has been assumed. This facility does not operate with HD/IBOC facilities at this time.



Summary of Stations The non-co-owned, but collocated licensed WVAW-LD(DTV) - Charlottesville, VA digital TV facility BLDL-20090218AEG (Facility ID: 4687) specifies digital primary operation on TV Channel 16DT (482-488 MHz) with a maximum effective radiated power (ERP) of 15.0 kW horizontal only polarization with a COR mounted 41 meters AGL. The operational antenna is listed as an Electronics Research Inc. (ERI), model AL12N-16PL antenna with 1.25 degrees of Electrical Beam Tilt. A relative field of 0.175 has been assumed. In this instance, Equation 10 of OET Bulletin No. 65 has been used to predict the potential exposure to radiofrequency radiation with regard to this DTV contribution. Protection has been based on a human observer on the ground without regard for distance from the tower. The contribution has been calculated by total power density expressed in $\mu\text{W}/\text{cm}^2$.

Equation 10:

$$S = \frac{33.4 (F^2) \text{ERP}}{R^2}$$

where: S = Total Power Density in units of $\mu\text{W}/\text{cm}^2$

F = Relative Field of Pattern

ERP = Effective Radiated Power in Watts

R = Distance in Meters

Digital Channel:	16DT
Frequency Range:	482 MHz - 488 MHz
Center Frequency:	485 MHz
Antenna COR AGL:	41 meters
ERP(Horizontal):	15 kW
Antenna Manufacturer:	Electronics Research Inc.
Antenna Model:	AL12N-16PL
Antenna Relative Field (worst case):	0.175
Uncontrolled Limit:	323 $\mu\text{W}/\text{cm}^2$
Equation 10 Contribution:	10.0875 $\mu\text{W}/\text{cm}^2$
% Contribution of Uncontrolled Limit:	3.1199%

Summary of Stations The non-co-owned, but collocated WCAV(DTV) - Charlottesville, VA digital TV facility BLCDT-20090522ADB (Facility ID: 363) specifies digital primary operation on TV Channel 19DT (500-506 MHz) with a maximum effective radiated power (ERP) of 155.0 kW horizontal only polarization with a COR mounted 50 meters AGL. The operational antenna is listed as an Electronics Research Inc. (ERI), model ATW18H4-HTCX-19H antenna with 1.0 degrees of Electrical Beam Tilt. A relative field of 0.175 has been assumed. In this instance, Equation 10 of OET Bulletin No. 65 has been used to predict the potential exposure to radiofrequency radiation with regard to this DTV contribution. Protection has been based on a human observer on the ground without regard for distance from the tower. The contribution has been calculated by total power density expressed in $\mu\text{W}/\text{cm}^2$.

Equation 10:

$$S = \frac{33.4 (F^2) \text{ERP}}{R^2}$$

where: S = Total Power Density in units of $\mu\text{W}/\text{cm}^2$

F = Relative Field of Pattern

ERP = Effective Radiated Power in Watts

R = Distance in Meters

Digital Channel:	19DT
Frequency Range:	500 MHz - 506 MHz
Center Frequency:	503 MHz
Antenna COR AGL:	50 meters
ERP(Horizontal):	155 kW
Antenna Manufacturer:	Electronics Research Inc.
Antenna Model:	ATW18H4-HTCX-19H
Antenna Relative Field (worst case):	0.175
Uncontrolled Limit:	335 $\mu\text{W}/\text{cm}^2$
Equation 10 Contribution:	68.8132 $\mu\text{W}/\text{cm}^2$
% Contribution of Uncontrolled Limit:	20.5208%

Summary of Stations The WVIR-(D)TV - Charlottesville, VA digital TV facility BLCDT-20040908AAE (Facility ID: 70309) specifies digital primary operation on TV Channel 34DT (578-584 MHz) with a maximum effective radiated power (ERP) of 1000 kW horizontal only polarization with a COR mounted 87 meters AGL. The operational antenna is listed as a Dielectric (DIE), model TFU-26GTH-R-04SP antenna with 1.0 degrees of Electrical Beam Tilt. A worst-case relative field of 0.175 has been assumed. In this instance, Equation 10 of OET Bulletin No. 65 has been used to predict the potential exposure to radiofrequency radiation with regard to this DTV contribution. Protection has been based on a human observer on the ground without regard for distance from the tower. The contribution has been calculated by total power density expressed in $\mu\text{W}/\text{cm}^2$.

Equation 10:

$$S = \frac{33.4 (F^2) \text{ERP}}{R^2}$$

where: S = Total Power Density in units of $\mu\text{W}/\text{cm}^2$

F = Relative Field of Pattern

ERP = Effective Radiated Power in Watts

R = Distance in Meters

Digital Channel:	32DT
Frequency Range:	578 MHz - 584 MHz
Center Frequency:	581 MHz
Antenna COR AGL:	87 meters
ERP(Horizontal):	1000 kW
Antenna Manufacturer:	Dielectric
Antenna Model:	TFU-26GTH-R-04SP
Antenna Relative Field (worst case):	0.175
Uncontrolled Limit:	387 $\mu\text{W}/\text{cm}^2$
Equation 10 Contribution:	141.5744 $\mu\text{W}/\text{cm}^2$
% Contribution of Uncontrolled Limit:	36.5510%

Summary of Stations The WAHU-CD(DTV) - Charlottesville, VA digital TV facility BLDTA-20101223ABU (Facility ID: 47705) specifies digital primary operation on TV Channel 40DT (626-632 MHz) with a maximum effective radiated power (ERP) of 15.0 kW horizontal only polarization with a COR mounted 41 meters AGL. The operational antenna is listed as a Systems With Reliability Inc. (SWR) model SWEDL1201/40 antenna with 0.75 degrees of Electrical Beam Tilt. A relative field of 0.175 has been assumed. In this instance, Equation 10 of OET Bulletin No. 65 has been used to predict the potential exposure to radiofrequency radiation with regard to this DTV contribution. Protection has been based on a human observer on the ground without regard for distance from the tower. The contribution has been calculated by total power density expressed in $\mu\text{W}/\text{cm}^2$.

Equation 10:

$$S = \frac{33.4 (F^2) \text{ERP}}{R^2}$$

where: S = Total Power Density in units of $\mu\text{W}/\text{cm}^2$

F = Relative Field of Pattern

ERP = Effective Radiated Power in Watts

R = Distance in Meters

Digital Channel:	40DT
Frequency Range:	626 MHz - 632 MHz
Center Frequency:	629 MHz
Antenna COR AGL:	41 meters
ERP(Horizontal):	15 kW
Antenna Manufacturer:	System With Reliability, Inc.
Antenna Model:	SWEDL1201/40
Antenna Relative Field (worst case):	0.175
Uncontrolled Limit:	419 $\mu\text{W}/\text{cm}^2$
Equation 10 Contribution:	10.0875 $\mu\text{W}/\text{cm}^2$
% Contribution of Uncontrolled Limit:	2.4056%

Results of Study The sum of each individual contribution as a percentage of its each maximum permissible uncontrolled limit has been provided below. As the resulting contribution(s) as a whole is less than 100%, the combined exposure has been calculated to be within the guidelines of OET Bulletin No. 65 (Edition 97-01) for the more restrictive uncontrolled environment as defined by locations accessible by the general public. As stated before, protection of the uncontrolled environment implies protection of the controlled environment. There are no other broadcast sources of radiofrequency non-ionizing radiation present at this site.

Contributing Station	Individual Contribution	Individual Uncontrolled Limit	Percent of Uncontrolled Limit
WCVL-FM.L (analog)	13.899 $\mu\text{W}/\text{cm}^2$	200 $\mu\text{W}/\text{cm}^2$	6.95%
WCNR(FM).L (analog & HD)	12.587 $\mu\text{W}/\text{cm}^2$	200 $\mu\text{W}/\text{cm}^2$	6.29%
WWVW(FM).L (analog)	7.142 $\mu\text{W}/\text{cm}^2$	200 $\mu\text{W}/\text{cm}^2$	3.57%
WCHV-FM.L (analog)	1.424 $\mu\text{W}/\text{cm}^2$	200 $\mu\text{W}/\text{cm}^2$	0.71%
W255CT.L (analog)	3.604 $\mu\text{W}/\text{cm}^2$	200 $\mu\text{W}/\text{cm}^2$	1.80%
W275CL.L (analog)	3.172 $\mu\text{W}/\text{cm}^2$	200 $\mu\text{W}/\text{cm}^2$	1.59%
W240AF.L (analog)	5.567 $\mu\text{W}/\text{cm}^2$	200 $\mu\text{W}/\text{cm}^2$	2.78%
WVAW-LD(DTV) (digital)	10.088 $\mu\text{W}/\text{cm}^2$	323 $\mu\text{W}/\text{cm}^2$	3.12%
WCAV(DTV) (digital)	68.813 $\mu\text{W}/\text{cm}^2$	335 $\mu\text{W}/\text{cm}^2$	20.54%
WVIR-(D)TV (digital)	141.574 $\mu\text{W}/\text{cm}^2$	387 $\mu\text{W}/\text{cm}^2$	36.58%
WAHU-CD(DTV) (digital)	10.088 $\mu\text{W}/\text{cm}^2$	419 $\mu\text{W}/\text{cm}^2$	2.41%
Total of Uncontrolled Limit:			86.35%

The facility is, or will be, properly marked with signs. Entry is, or will be, restricted by means of fencing with locked doors or gates. Furthermore, coordination with other users of the site will be secured to reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic fields in excess of FCC guidelines.