DONALD L. HAES, JR., CHP

Radiation Safety Specialist

PO Box 198, Hampstead, NH 03841 617-680-6262 Email: donald_haes_chp@comcast.net

January 27, 2026

RE: Installation of a proposed Industrial Tower and Wireless personal wireless services facility to be located off Bordoville Road, Enosburgh, VT.

PURPOSE

I have reviewed the information pertinent to the proposed installation at the above location. To determine regulatory compliance, theoretical calculations of maximal radio-frequency (RF) fields have been prepared. The physical conditions are that Industrial Tower and Wireless proposes to install a communication facility including a 120-foot lattice styled tower off Bordoville Road in Enosburgh, VT (for approximate location, see Figure 2). The lattice tower will be designed to allow for Industrial Wireless Technologies, Inc. (IWTI) to mount their Enhanced Specialized Mobile Radio (ESMR) omni-directional "whip" antennas on the top mount, with the collocation of local Public Safety omni-directional antennas. There is room for a Personal Wireless Services (PWS) provider's antennas and associated equipment at centerline height of 102.5 feet above ground level (AGL). Typical PWS installations consist of up to four (4) directional panel antennas mounted each in three (3) "arrays" aimed 120° apart.

This report considers the contributions of ALL proposed IWTI, Public Safety, and a speculative additional PWS provider's transmitters, all operating simultaneously at their FCC-licensed capacities. The calculated values of RF fields are presented as a percentage of current Maximum Permissible Exposures (% MPE) as adopted by the Federal Communications Commission (FCC).[i,ii]

SUMMARY

Theoretical RF field calculations indicate the summation of the proposed IWTI, Public Safety, plus a speculative PWS provider's RF contribution, would be well within the established RF exposure guidelines (See Figures 4a and 4b). This includes all publicly accessible areas, and the neighborhood in general. The results support compliance with the pertinent sections of the FCC's guidelines for RF exposure.

Based on the results of the theoretical RF field calculations, it is my expert opinion that this facility, even if it were to be built to its design capacity, would comply with all regulatory guidelines for RF exposure.

EXPOSURE LIMITS AND GUIDELINES

RF exposure guidelines enforced by the FCC were established by the Institute of Electrical and Electronics Engineers (IEEE)[iii] and the National Council on Radiation Protection and Measurement (NCRP).[iv] The RF exposure guidelines are listed for RF workers and members of the public. The applicable FCC RF exposure guidelines for the public are listed in Table 1 and depicted in Figure 1. All listed values are intended to be averaged over any contiguous 30-minute period. The applicable exposure limits for workers (the "controlled area") are five times higher but averaged over any 6-minute period.

Table 1: Maximum Permissible Exposure (MPE) Values in Public Areas

Frequency Bands	Electric Fields	Magnetic Fields	Equivalent Power Density
0.3 – 1.34 MHz	614 (V/m)	1.63 (A/m)	100 mW/cm^2
1.34 - 30 MHz	824/*f* (V/m)	2.19/*f* (A/m)	100 mW/cm^2
30 - 300 MHz	27.5 (V/m)	0.073 (A/m)	0.2 mW/cm^2
300 - 1500 MHz	--	--	[*f (MHz)* / 1500] mW/cm^2
1500 - 100,000 MHz	--	--	1.0 mW/cm^2

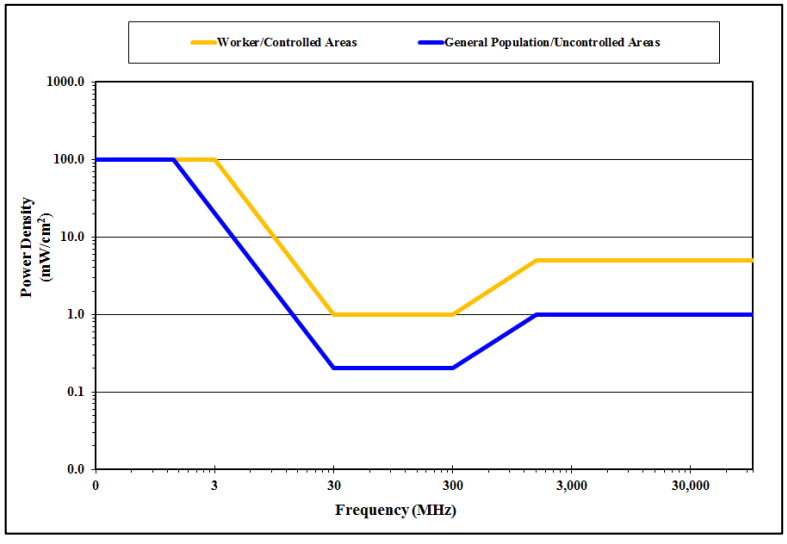


Figure 1: FCC Limits for Maximum Permissible Exposure (MPE)

NOTE: FCC "5% Rule" – When the exposure limits are exceeded in an accessible area due to the emissions from multiple fixed RF sources, actions necessary to bring the area into compliance are the shared responsibility of all licensees whose RF sources produce, at the area in question, levels that exceed 5% of the applicable exposure limit proportional to power. [v]

SITE CONDITIONS

Figure 2a: Location of Proposed PWS Facility
Near Bordoville Road, Enosburgh, VT
(Picture courtesy Google Maps©2026 and may not represent current conditions)

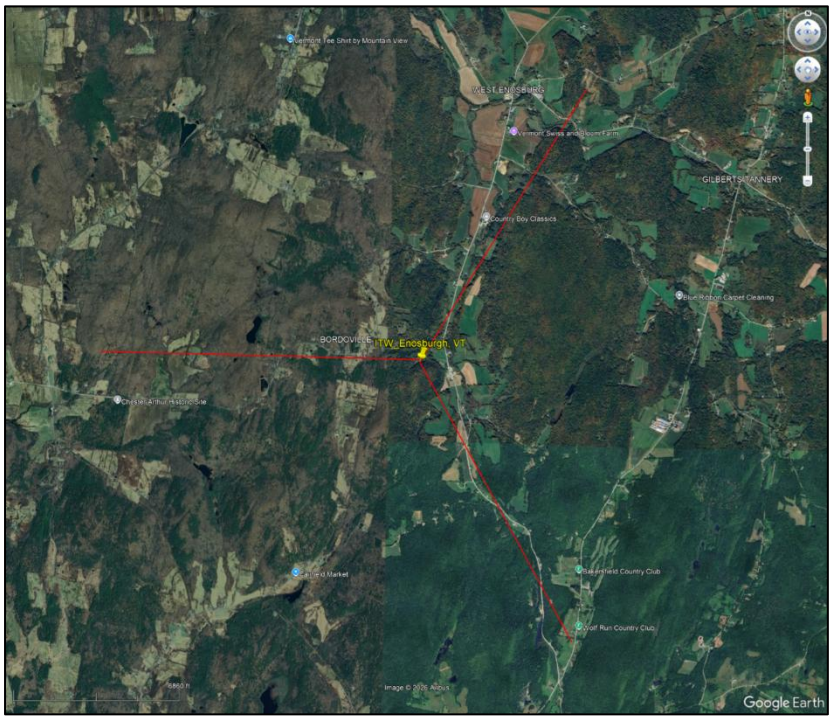


Figure 2b: Typical Sector Azimuths for PWS Facilities
(Alpha 30°, Beta 120°, and Gamm 270°)
Near Bordoville Road, Enosburgh, VT
(Picture courtesy Google Earth©2026 and may not represent current conditions)

PROPOSED SITE; TOPOGRAPHICAL CONDITIONS

A topographical mapping tool was used to exam the elevation profiles along the three typical PWS sector azimuths; Alpha 30°, Beta 150°, and Gamm 270° (See Figures 3b and 3c, respectively). Any deviation in height along the azimuth from the ground elevation was factored mathematically into any calculations involving height above ground.

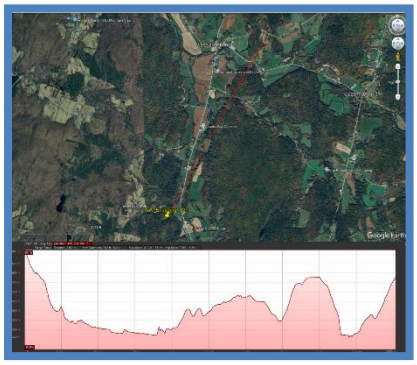


Figure 3a: USGS Elevation Along Typical PWS Azimuth 30°
(Picture courtesy Google Earth©2026 and may not represent current conditions)

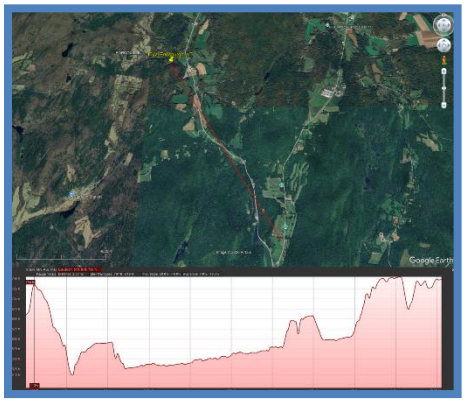


Figure 3b: USGS Elevation Along Typical PWS Azimuth 150°
(Picture courtesy Google Earth©2026 and may not represent current conditions)

Figure 3c: USGS Elevation Along Typical PWS Azimuth 270°
(Picture courtesy Google Earth©2026 and may not represent current conditions)

THEORETICAL RF FIELD CALCULATIONS - GROUND LEVELS METHODOLOGY

These calculations are based on what are called "worst-case" estimates. That is, the estimates assume 100% use of all transmitters simultaneously. Additionally, the calculations make the assumption that the surrounding area is a flat plane; that is, the curvature of the earth has been neglected. The resultant values are thus conservative in that they over-predict actual resultant power densities.

The calculations are based on the following information (See Table 2 data):

1. Effective Radiated Power (ERP).[1]
2. Antenna height (centerline, AGL).
3. Antenna vertical energy patterns ; the source of the negative gain (G) values. "Directional" antennas are designed to focus the RF signal, resulting in "patterns" of signal loss and gain (see antenna pattern, Appendix A). Antenna energy patterns display the loss of signal strength relative to the direction of propagation due to elevation angle changes. The gain is expressed as "G^{E}".

   Note: "G" is a unitless factor usually expressed in decibels (dB); where $G = 10^{(dB/10)}$
   For example: for an antenna *gain* of 3 dB, the net factor (G) = $10^{(3/10)} = 2$
   For an antenna *loss* of -3 dB, the net factor (G) = $10^{(-3/10)} = 0.5$

To determine the magnitude of the RF field, the power density (S) from an isotropic RF source is calculated, making use of the power density formula as outlined in FCC's OET Bulletin 65, Edition 97-01: [vi]

$$S = \frac{P \cdot G}{4 \cdot \pi \cdot R^2}$$

Where:
- $P \rightarrow$ Power to antenna (watts)
- $G \rightarrow$ Gain of antenna
- $R \rightarrow$ Distance (range) from antenna source to point of intersection with the ground (feet)
- $R^2 = (\text{Height})^2 + (\text{Horizontal distance})^2$

Since: $P \cdot G$ = EIRP (Effective Isotropic Radiated Power) for broadcast antennas, the equation can be presented in the following form:

$$S = \frac{EIRP}{4 \cdot \pi \cdot R^2}$$

[1] For the Public Safety information, data was selected using an FCC online search tool https://wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp See Appendix B data.

In the situation of off-axis power density calculations, apply the negative elevation gain (G^E) value from the vertical energy patterns with the following formula:

$$S = \frac{EIRP \cdot G^E}{4 \cdot \pi \cdot R^2}$$

Ground reflections may add in-phase with the direct wave, and essentially double the electric field intensity. Because power density is proportional to the *square* of the electric field, the power density may quadruple, that is, increase by a factor of four (4). Since ERP is routinely used, it is necessary to convert ERP into EIRP by multiplying by the factor of 1.64 (the gain of a half-wave dipole relative to an isotropic radiator). Therefore, downrange power density estimates can be calculated by using the formula:

$$S = \frac{4 \cdot (ERP \cdot 1.64) \cdot G^E}{4 \cdot \pi \cdot R^2} = \frac{ERP \cdot 1.64 \cdot G^E}{\pi \cdot R^2} = \frac{0.522 \cdot ERP \cdot G^E}{R^2}$$

To calculate the % MPE, use the formula:

$$\%\ MPE = \frac{S}{MPE} \cdot 100$$

The results of the calculations for the potential RF emissions resulting from the summation of the proposed IWTI, Public Safety, and a speculative PWS provider's RF contributions are depicted in Figures 4a and 4b as plotted against linear distance from the base of the proposed lattice tower. Note that the values have been calculated for a height of six (6) feet AGL in accordance with regulatory rationale.

A logarithmic scale was used to plot the calculated theoretical % MPE values in Figure 4a and compared with the MPE of 100%. The same values were also plotted on a linear plot in Figure 4b. The curve is variable due to the application of vertical energy patterns. See Appendix A for proposed IWTI and typical PWS vertical energy patterns.

ANTENNA INVENTORY

Table 2: Proposed and *Possible* Antenna Inventory 120' Lattice tower off Bordoville Road, Enosburgh, VT			
Antenna Centerline (AGL)	**FCC Licensee** Antenna Manufacture / Model Number (See Appendix A)	Parameters: ERP & Transmitter Centerline Frequencies (See Appendix B)	FCC-Licensed Technology
126.5'	**IWTI /** Celwave PD-10017-1 Omni-Directional Antennas; 5 Tx Vertical, 1 Rx Inverted	2000 watts @ 925-960 MHz	ESMR
126.5'	**Public Safety WQKF790 /** PD458 Omni	2 X 100 watts @ 153.815 MHz	Fixed Base 2-Way
126.5'	**Public Safety WNZN974 /** PD458 Omni	110 watts 153.815 MHz	Fixed Base 2-Way
102.5'	**Major Personal Wireless Services Provider /** PWS Panel Antenna "Arrays;" 3 Sectors Up To 4 Panels Each	5743 watts @ 1930 MHz 2749 watts @ 860 MHz 5479 watts @ 700 MHz 9445 watts @ 2150 MHz 24439 watts @ 3550 MHz	PCS CDMA LTE AWS CBRS (5G)

Table Notes:
AWS: Advanced Wireless Systems
CBRS: Citizens Broadband Radio Service: 3.5 GHz band
CDMA: Code Division Multiple Access ("cellular voice")
ESMR: Enhanced Specialized Mobile Radio
LTE : Long Term Evolution (aka "4G")
PCS: Personal Communication System

OBSERVATIONS IN CONSIDERATION WITH FCC RULES §1.1307(B) & §1.1310

Will it be physically possible to stand next to or touch any omnidirectional antenna and/or stand in front of a directional antenna?

NO; access to the lattice tower will be restricted within a locked fenced compound, and the site will adhere to RF safety guidelines regarding the transmitting antennas, including appropriate signage.

RESULTS OF THEORETICAL RF FIELD CALCULATIONS

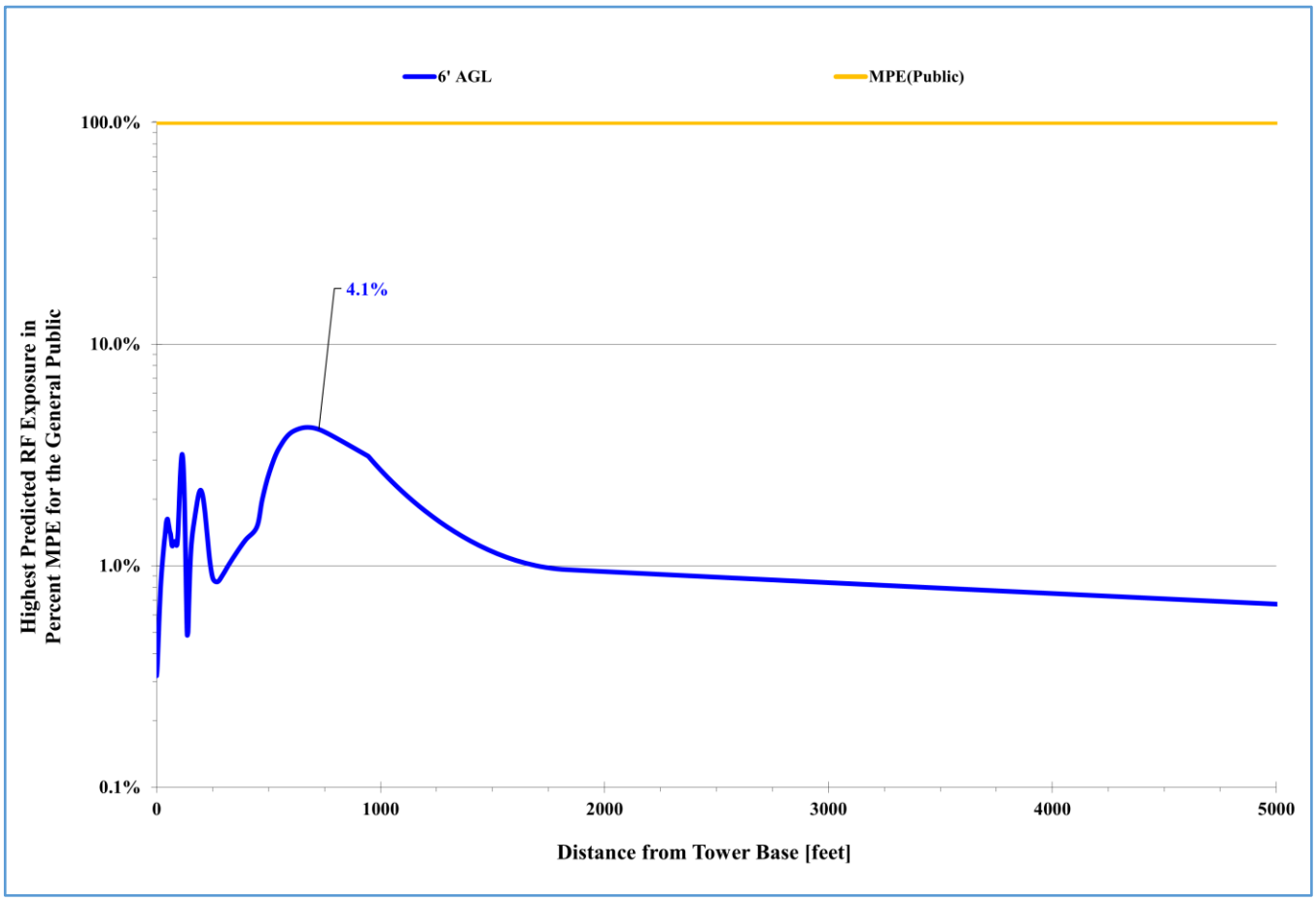


Figure 3: Theoretical Cumulative Maximum Percent MPE - vs. – Distance; Log-Linear Scale (Summation of Proposed IWTI, Public Safety, and a Speculative PWS provider's RF Contributions)

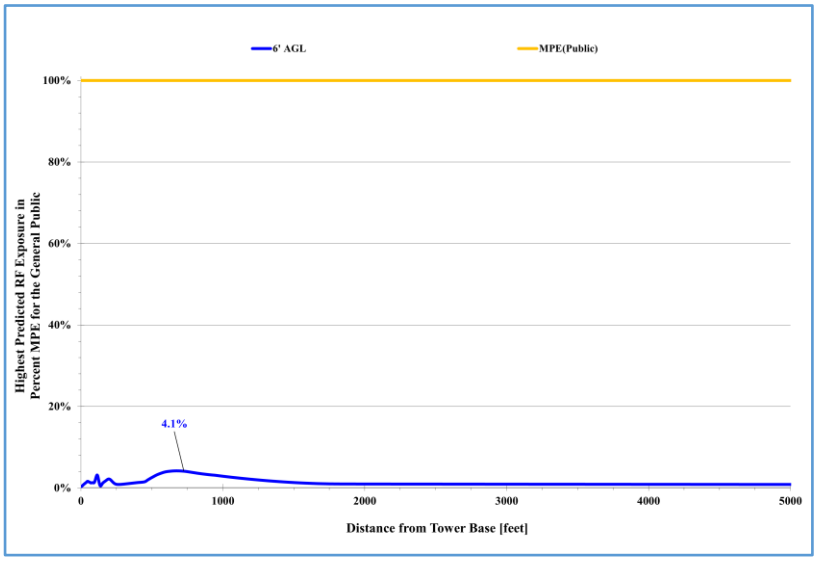


Figure 4: Same Data as Figure 4a, Linear-Linear Scale

CONCLUSION

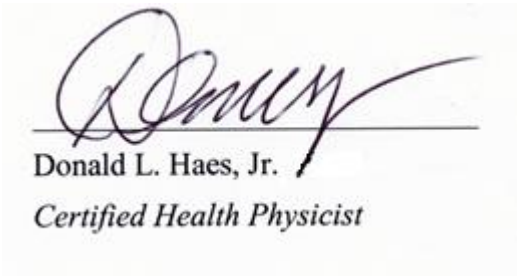
Theoretical RF field calculations indicate the summation of the proposed IWTI, Public Safety, plus a speculative PWS provider's RF contribution, would be well within the established RF exposure guidelines (See Figures 4a and 4b). This includes all publicly accessible areas, and the neighborhood in general. The results support compliance with the pertinent sections of the FCC's guidelines for RF exposure.

The number and duration of calls passing through PWS facilities cannot be accurately predicted. Thus, in order to estimate the highest RF fields possible from operation of these installations, the maximal amount of usage was considered. Even in this so-called "worst-case," the resultant increase in RF field levels is far below established levels considered safe.

Based on the results of the theoretical RF field calculations, it is my expert opinion that this facility, even if it were to be built to its design capacity, would comply with all regulatory guidelines for RF exposure.

Feel free to contact me if you have any questions.

Sincerely,



Donald L. Haes, Jr.
Certified Health Physicist

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Radiation Safety Specialist

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STATEMENT OF CERTIFICATION

1. I certify to the best of my knowledge and belief that the statements of fact contained in this report are true and correct.

2. The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are personal, unbiased professional analyses, opinions, and conclusions.

3. I have no present or prospective interest in the property that is the subject of this report, and I have no personal interest or bias with respect to the parties involved.

4. My compensation is not contingent upon the reporting of a predetermined energy level or direction in energy level that favors the client, the amount of energy level estimate, the attainment of a stipulated result, or the occurrence of a subsequent event.

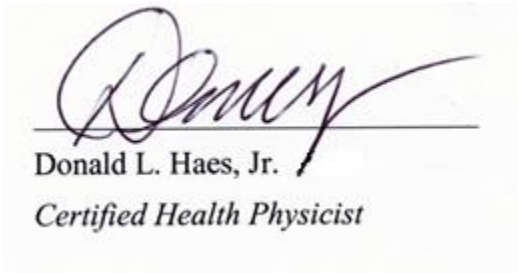
5. This assignment was not based on a requested minimum environmental energy level or specific power density.

6. My compensation is not contingent on an action or event resulting from the analyses, opinions, or conclusions in, or the use of, this report.

7. The consultant has accepted this assessment assignment having the knowledge and experience necessary to complete the assignment competently.

8. My analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the *American Board of Health Physics* (ABHP) statements of standards of professional responsibility for Certified Health Physicists.

Date: January 27, 2026



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SUMMARY OF QUALIFICATIONS

- **Academic Training -**
  - Graduated from Chelmsford High School, Chelmsford, MA; June 1973.
  - Completed Naval Nuclear Power School, 6-12/1976.
  - Completed Naval Nuclear Reactor Plant Mechanical Operator and Engineering Laboratory Technician (ELT) schools and qualifications, Prototype Training Unit, Knolls Atomic Power Laboratory, Windsor, Connecticut, 1-9/1977.
  - Graduated Magna Cum Laude from University of Lowell with a Bachelor of Science Degree in *Radiological Health Physics*; 5/1987.
  - Graduated from University of Lowell with a Master of Science Degree in *Radiological Sciences and Protection*; 5/1988.

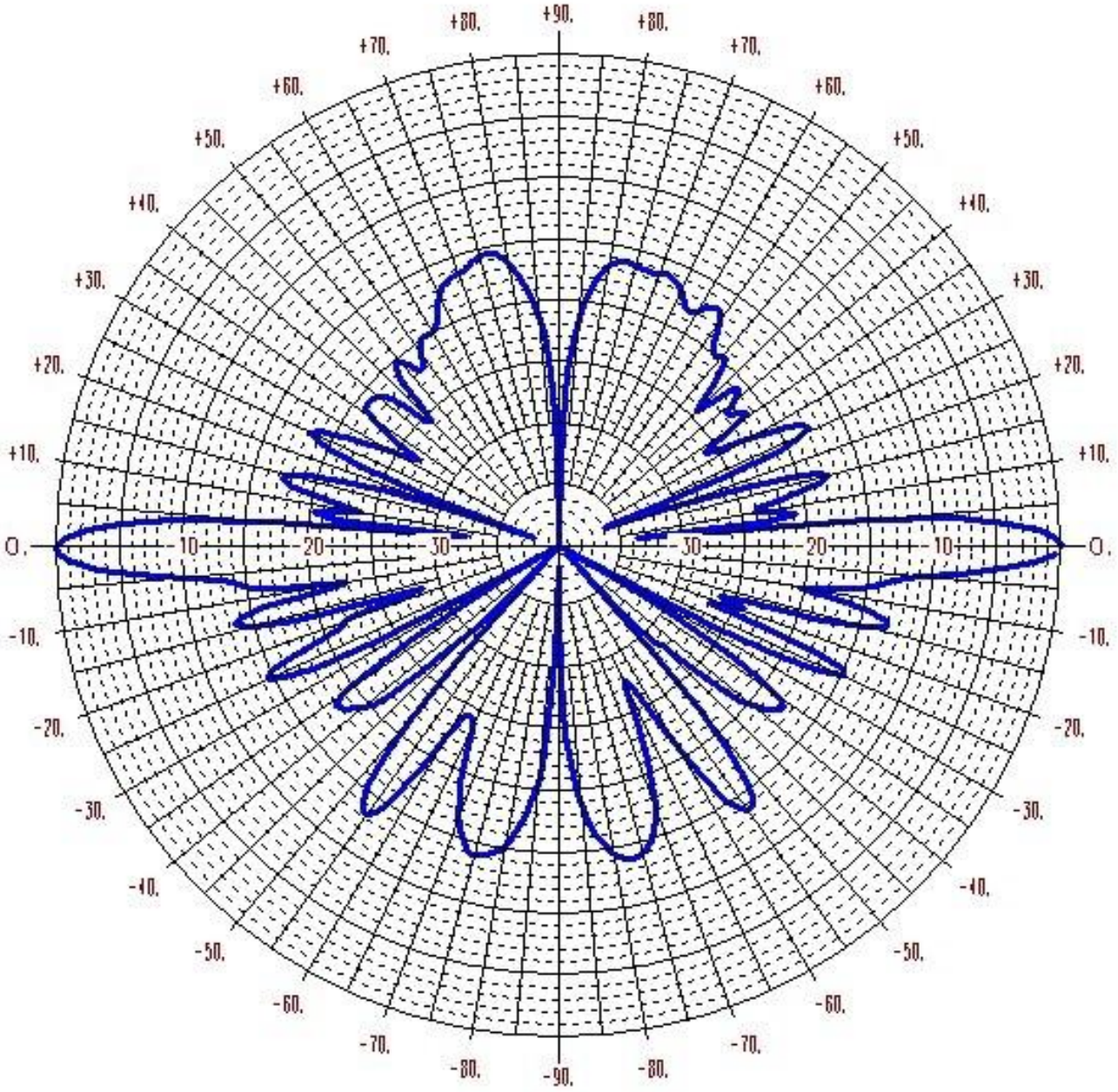
- **Certification -**
  - Board Certified by the American Board of Health Physics 1994; renewed 1998, 2002, 2006, 2010, 2014, 2018, and 2022. Expiration 12/31/2026.
  - Board Certified by the Board of Laser Safety 2008; renewed 2011, 2014, 2017, 2020, 2023. Expiration 12/31/2026.

- **Employment History -**
  - Consulting Health Physicist; Ionizing/Nonionizing Radiation, 1988 - present.
  - Radiation, RF and Laser Safety Officer; BAE Systems, 2005–2018 (retired).
  - Assistant Radiation Safety Officer; MIT, 1988 – 2005 (retired).
  - Radiopharmaceutical Production Supervisor - DuPont/NEN, 1981 – 1988 (retired).
  - United States Navy; Nuclear Power Qualifications, 1975 – 1981 (Honorably Discharged).

- **Professional Societies -**
  - Health Physics Society [HPS].
  - American Academy of Health Physics [AAHP]
  - Institute of Electrical and Electronics Engineers [IEEE];
  - International Committee on Electromagnetic Safety [ICES] (ANSI C95 series).
  - Laser Institute of America [LIA].
  - Board of Laser Safety [BLS].
  - American National Standards Institute Accredited Standards Committee [ASC Z136].
  - Committee on Man and Radiation [COMAR].

APPENDIX A

ENERGY PATTERN OF PROPOSED IWTI ANTENNA



Vertical Energy Pattern
Celwave® PD10017

TYPICAL ENERGY PATTERNS OF PWS PANEL ANTENNAS

Model: NHH-65B-R2B

<< Back to selections

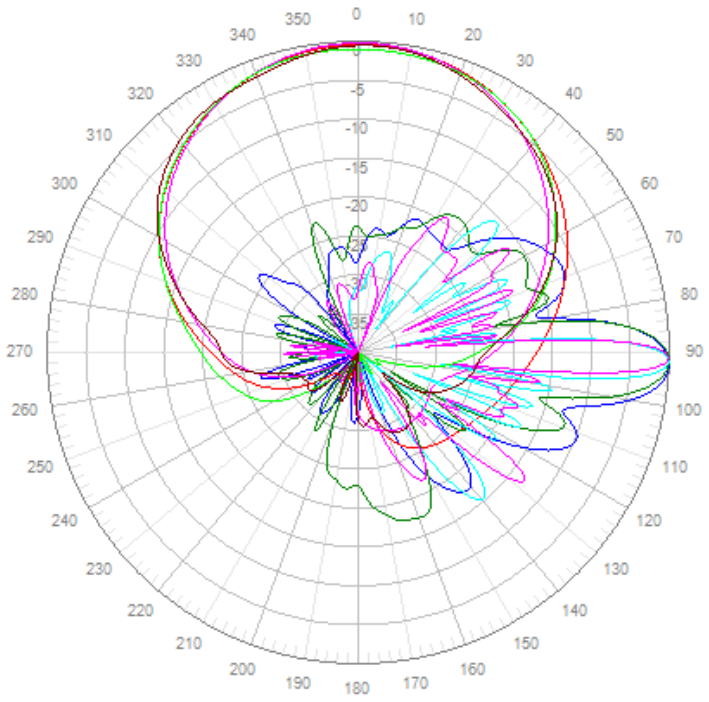
Select Radial Scale

- 25 dB
- 40 dB

Apply

Legend

Description	Port	Frequency	Tilt	Cut	Color
Dual Polarization	Port 1 +45	752	2	V	
Dual Polarization	Port 1 +45	752	2	H	
Dual Polarization	Port 2 -45	847	2	V	
Dual Polarization	Port 2 -45	847	2	H	
Dual Polarization	Port 3 +45	1720	2	V	
Dual Polarization	Port 3 +45	1720	2	H	
Dual Polarization	Port 4 -45	2110	1	V	
Dual Polarization	Port 4 -45	2110	1	H	



APPENDIX B

FCC LICENSE SEARCH DATA

ULS License

Public Safety Pool, Conventional License - WQKF790 - ENOSBURGH, TOWN OF

Frequencies Summary

Call Sign WQKF790 Radio Service PW - Public Safety Pool, Conventional

5 Frequencies for all locations
20 Frequencies per Summary Page

SC = Special Condition TP = Termination Pending

Frequency		Loc#	Ant#	Freq ID	Station Class	Units	Paging Rec.	Output Power	Maximum ERP
000153.81500000	SC	1	1	1	FB2	1		45.000	100.000
000153.81500000	SC	2	1	1	FB	1		45.000	100.000
000153.81500000		3	1	1	MO	40		45.000	45.000
000158.81250000	SC	3	1	2	MO	40		3.000	3.000
000158.81250000		4	1	1	FX1	1		3.000	3.000

ULS License

Public Safety Pool, Conventional License - WNZN974 - ENOSBURGH, TOWN OF

Frequencies Summary

Call Sign WNZN974 Radio Service PW - Public Safety Pool, Conventional

4 Frequencies for all locations
20 Frequencies per Summary Page

SC = Special Condition TP = Termination Pending

Frequency	Loc#	Ant#	Freq ID	Station Class	Units	Paging Rec.	Output Power	Maximum ERP
000153.81500000	1	1	1	FB	1	75	45.000	110.000
000153.81500000	2	1	1	MO	37		45.000	
000453.11250000	2	1	2	MO	3		2.000	
000458.11250000	2	1	3	MO	3		2.000	

REFERENCES

[i]. Federal Register, Federal Communications Commission Rules; *Radiofrequency radiation; environmental effects evaluation guidelines* Volume 1, No. 153, 41006-41199, August 7, 1996. (47 CFR Part 1; Federal Communications Commission).

[ii]. Telecommunications Act of 1996, 47 USC; Second Session of the 104th Congress of the United States of America, January 3, 1996.

[iii]. IEEE C95.1-1999: American National Standard, *Safety levels with respect to human exposure to radio frequency electromagnetic fields, from 3 kHz to 300 GHz* (Updated in 2020 as C95.1-2019/Cor 2-2020™ *Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz, Corrigenda 2*).

[iv]. National Council on Radiation Protection and Measurements (NCRP); *Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields*, NCRP Report 86, 1986.

[v]. Federal Register, Federal Communications Commission Rules; Vol. 85, No. 63 / Wednesday, April 1, 2020 / Rules and Regulations 18145.

[vi]. OET Bulletin 65: Federal Communications Commission Office of Engineering and Technology, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields*; Edition 97-01, August 1999.