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Radiation Safety Specialist

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July 25, 2016

Glenn Dudley
Director of Engineering
Vermont PBS
Colchester, VT 05446

RE: The evaluation of compliance with FCC regulations for human exposure to electromagnetic fields atop Burke Mountain in East Burke, VT. The evaluation included confirmatory RF field measurements of existing RF fields post Vermont Telephone (“VTel”) and T-Mobile Wireless Services Facilities installations.

PURPOSE

I have reviewed information pertinent to the VTel and T-Mobile Wireless Services Facilities installations at the above location. The methods of regulatory compliance determination consisted of an RF hazard assessment using radio-frequency (RF) field measurements for the installed wireless facilities.

SUMMARY

RF field measurements data confirm the summation of the VTel and T-Mobile RF contributions are well within the established RF exposure guidelines. When added to the existing RF fields from the two towers, the ambient RF field levels in generally accessible areas atop Burke Mountain remain below established Federal guidelines for RF exposure to members of the public. These field measurements indicate there is no need for RF precautionary postings in this area, with the exception of the towers hosting transmitting antennas themselves. These RF field measurements are accurate and were performed in accordance with the directives and guidelines outlined by ANSI C95 documents and specified by the FCC.

Based on the RF fields I have measured, it is my expert opinion that this facility continues to comply with all regulatory guidelines for RF exposure to members of the public. Use of the antennas installed by VTel and T-Mobile Wireless Services do not produce a significant change to the ambient RF environment.

Note: The analyses, conclusions and professional opinions are based upon the precise parameters and conditions of this particular site; Burke Mountain in East Burke, VT. Utilization of these analyses, conclusions and professional opinions for any personal wireless services installation, existing or proposed, other than the aforementioned has not been sanctioned by the author, and therefore should not be accepted as evidence of regulatory compliance.

EXPOSURE LIMITS AND GUIDELINES

RF exposure guidelines enforced by the Federal Communications Commission (FCC)^{i,ii} were established by the American National Standards Institute (ANSI)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 field values are intended to be time-averaged over any contiguous 30 minute period.

Table 1: Maximum Permissible Exposure (MPE) Values in Public Areas			
Frequency Bands	Maximum Permissible Exposure (MPE)		
	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/ <i>f</i> (V/m)	2.19/ <i>f</i> (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	--	--	<i>f</i> /1500 mW/cm ²
1500 - 100,000	--	--	1.0 mW/cm ²

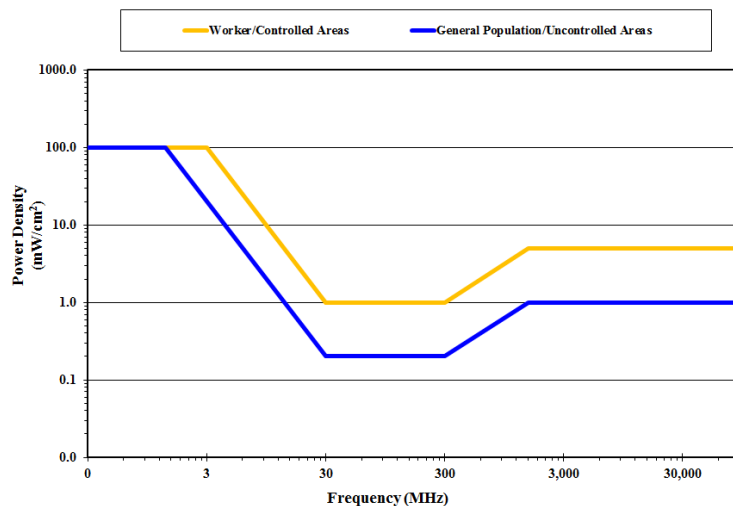


Figure 1: FCC Limits for Maximum Permissible Exposure (MPE)

NOTE: FCC 5% Rule – At multiple transmitter sites, actions necessary to bring the area into compliance with the RF exposure guidelines are the shared responsibility of all licensees whose transmitters produce RF field levels in excess of 5% of the applicable FCC MPEs.

RF FIELD MEASUREMENTS

MEASUREMENT PROTOCOL

Electromagnetic field measurements were obtained on July 21, 2016. During the survey, the following environmental conditions were noted: Sunny skies; Temperature 76-77°F (75-78°F “Real Feel™”); Humidity 25%-26%; Winds 9-10 SW; Visibility >10 miles; Barometric pressure 1015 mbar.¹ The measuring equipment was within manufacturer’s recommended calibration intervals and included the following:

Narda model SRM-3000 Electromagnetic Radiation Meter/Spectrum Analyzer with model 3AX 75M-3G Broadband Isotropic (50 – 3000 MHz) probe. The calibration due date is 9/12/2016.

The *SRM-3000* was selected to provide a meter read-out in units of percent FCC 1997 Maximum Permissible Exposure **for members of the general public** within the frequency band of the probe attached. The RF field measurements were obtained during normal use of the existing transmitters. The measurements were obtained at **the same numbered locations** as those taken in November 2014 prior to the VTel and T-Mobile Wireless Services Facilities installations (See maps, Figures 2a and 2b). The recorded values represent the “worst case” values. Care was exercised not to move the probe to within 20 cm of any surface to minimize probe-proximity errors. While the locations for the measurements included all accessible areas on the mountain top, several locations were chosen to record the data and represent the typical RF fields present. The measurements were obtained using two methods:

- (1) **Potential RF Exposure based on Spatial Average:** The “averaging” protocol can be used to continuously scan an area from the ground plane up to a height of six feet above the ground, referred to as the “Spatial Average.
- (2) **Potential RF Exposure based on Peak Fields:** The built-in “peak hold” feature was used during the continuous scan. The **highest observed** readings at each location were recorded in units of %MPE for members of the public, and are contained in Table 2.

In addition, the *SRM-3000* has a “Spectrum Analysis” mode, where the total RF field was again examined with a visual representation of the spectrum. The total spectrum and the highest recorded “peak” were analyzed for frequency and amplitude (intensity). See results, Figures 3 - 7. Figure 8 shows the typical spectrum 50-3000 MHz for areas where main “peaks” are not discernable.

¹ Source: Weather.com

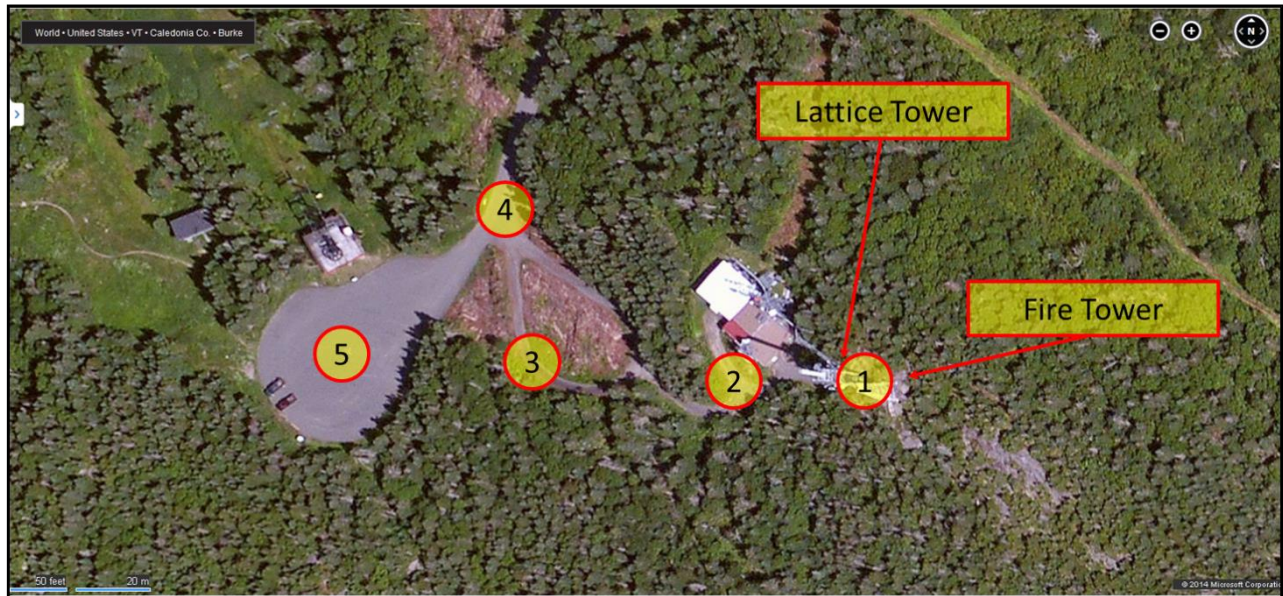


Figure 2a: Numbered Locations of RF Field Measurements



Figure 2b: Numbered Locations of RF Field Measurements

RF FIELD MEASUREMENT RESULTS

**Table 2: Results of Broadband RF Field Measurements
Vicinity of Towers on Burke Mountain, East Burke, VT**

Location # See Figures 2a and 2b	Highest Observed Total RF Field Reading (% MPE _(public) [†]) 50 - 3000 MHz	Highest Observed Identified Peak Reading (% MPE _(public) [†])
		50 - 3000 MHz See Figures 3 - 8
#1	7.010%	0.5592% @ 88.46 MHz
#2 (Entire Fire Tower)	6.482%	40.60% @ 97.7 MHz
#3	2.467%	1.301% @ 88.56 MHz
#4	1.353%	0.9010% @ 88.71 MHz
#5	1.378%	0.4469% @ 162.42 MHz
#6	1.107%	Not discernable
#7	1.228%	Not discernable
#8	1.103%	Not discernable
#9	1.123%	Not discernable
#10	1.143%	Not discernable

Table Notes:

[†] Meter readings in “percent FCC MPE” for members of the public.

RESULTS – SPECTRAL ANALYSIS; HIGHEST MEASURED RF FIELD

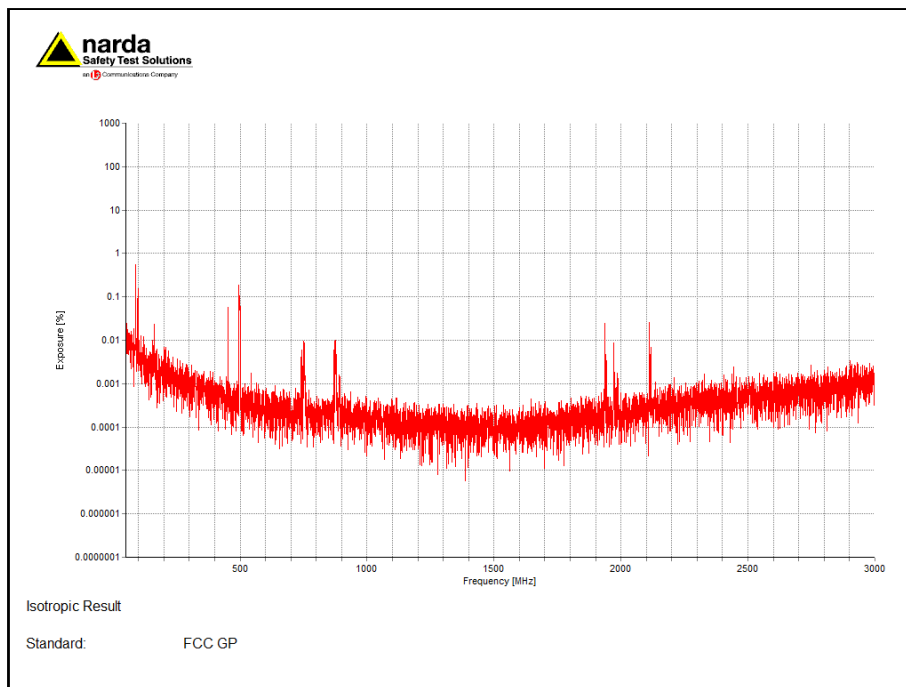


Figure 3: Measured Spectrum; Location # 01;
 $f = 50 - 3000$ MHz in % MPE General Public

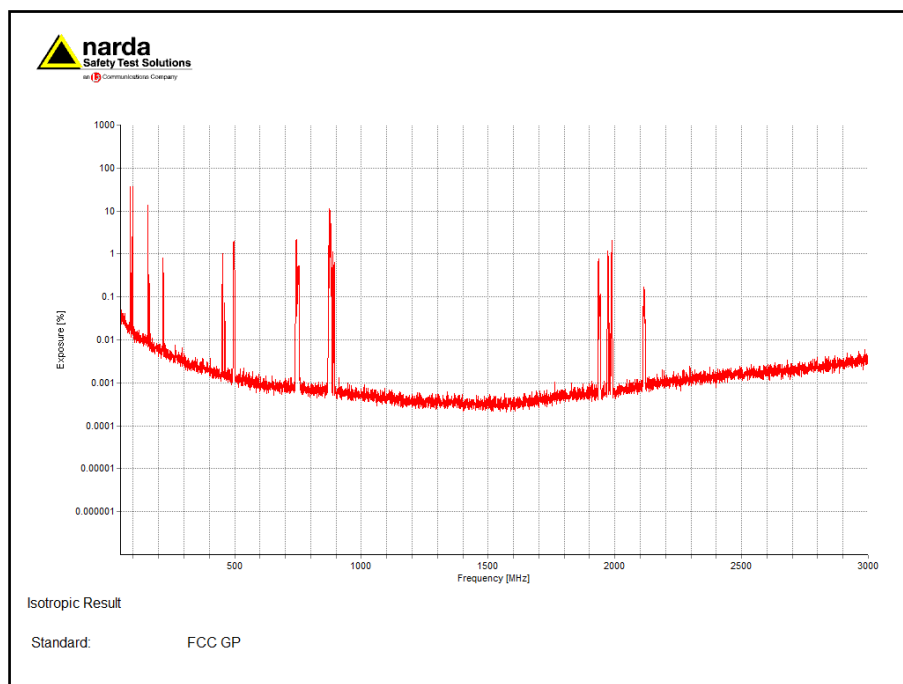


Figure 4: Measured Spectrum; Location # 02;
 $f = 50 - 3000$ MHz in % MPE General Public

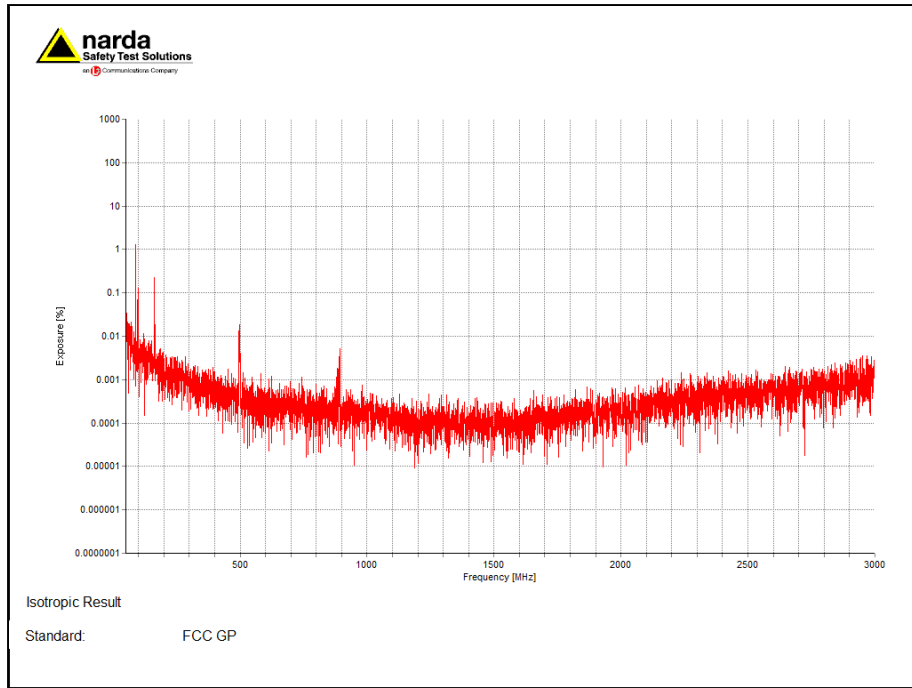


Figure 5: Measured Spectrum; Location # 03;
 $f = 50 - 3000$ MHz in % MPE General Public

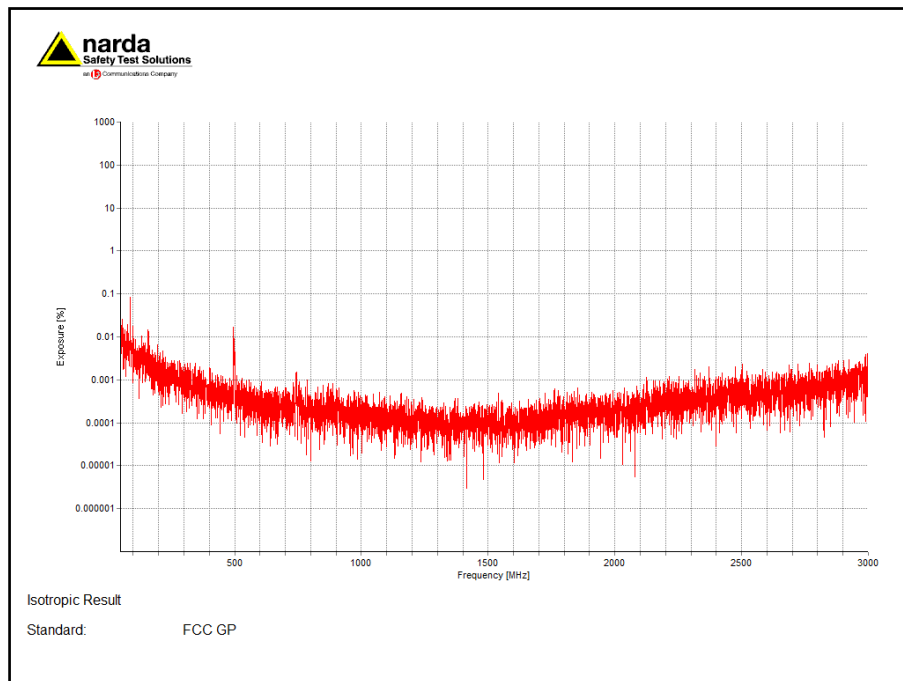


Figure 6: Measured Spectrum; Location # 04;
 $f = 50 - 3000$ MHz in % MPE General Public

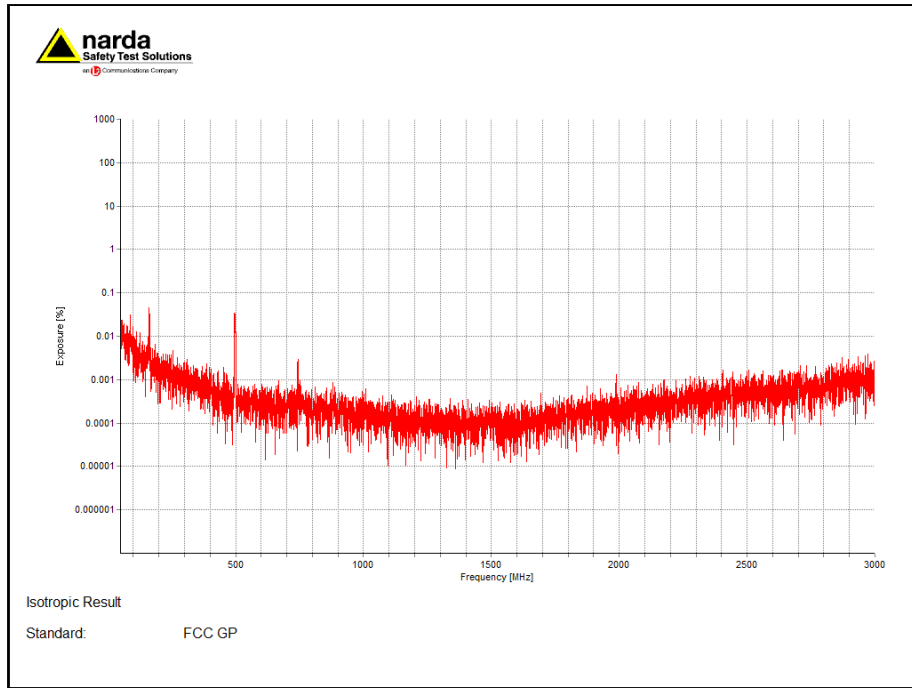


Figure 7: Measured Spectrum; Location # 05;
 $f = 50 - 3000$ MHz in % MPE General Public

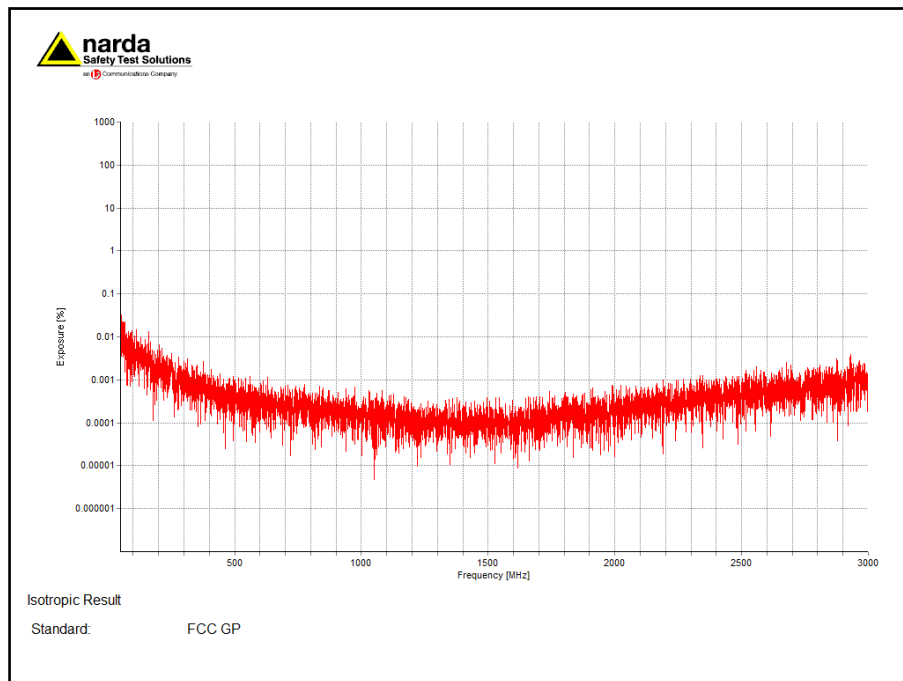


Figure 8: Representative Measured Spectrum; Locations # 06 - 10;
 $f = 50 - 3000$ MHz in % MPE General Public


CONCLUSION

RF field measurements data confirm the summation of the VTel and T-Mobile RF contributions are well within the established RF exposure guidelines. When added to the existing RF fields from the two towers, the ambient RF field levels in generally accessible areas atop Burke Mountain remain below established Federal guidelines for RF exposure to members of the public. These field measurements indicate there is no need for RF precautionary postings in this area, with the exception of the towers hosting transmitting antennas themselves. These RF field measurements are accurate and were performed in accordance with the directives and guidelines outlined by ANSI C95 documents and specified by the FCC.

Based on the RF fields I have measured, it is my expert opinion that this facility continues to comply with all regulatory guidelines for RF exposure to members of the public. Use of the antennas installed by VTel and T-Mobile Wireless Services do not produce a significant change to the ambient RF environment.

Feel free to contact me if you have any questions.

Sincerely,



Donald L. Haes, Jr., Ph.D
Certified Health Physicist

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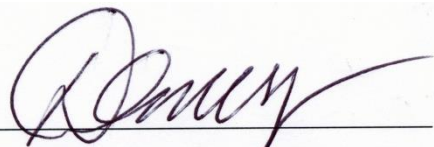
603-303-9959

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STATEMENT OF CERTIFICATION

1. I certify to the best of my knowledge and belief, 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 cause of 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: July 25, 2016



Donald L. Haes, Jr., Ph.D

Certified Health Physicist

APPENDIX

(NARDA CALIBRATION CERTIFICATES)

<p><small>Narda Safety Test Solutions GmbH Sandweierstrasse 7 · 72793 Pfullingen · Germany Phone: +49 7121 9732-0 · Fax: +49 7121 9732 790</small></p>	
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Calibration Certificate

Narda Safety Test Solutions hereby certifies that the object referred to in this certificate has been calibrated by qualified personnel using Narda's approved procedures. The calibration was carried out in accordance with a certified quality management system which conforms to ISO 9001

<p>OBJECT</p> <p>MANUFACTURER</p> <p>PART NUMBER (P/N)</p> <p>SERIAL NUMBER (S/N)</p> <p>CUSTOMER</p> <p>CALIBRATION DATE</p> <p>RESULT ASSESSMENT</p> <p>AMBIENT CONDITIONS</p> <p>CALIBRATION PROCEDURE</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Selective Radiation Meter, Basic Unit, SRM-3000</td></tr> <tr><td>Narda Safety Test Solutions GmbH</td></tr> <tr><td>3001/01</td></tr> <tr><td>G-0021</td></tr> <tr><td> </td></tr> <tr><td>06-Aug-2014</td></tr> <tr><td>within specifications</td></tr> <tr><td>Temperature: (23 ± 3) °C Relative humidity: (20 to 60) %</td></tr> <tr><td>3000-8701-00A</td></tr> </table>	Selective Radiation Meter, Basic Unit, SRM-3000	Narda Safety Test Solutions GmbH	3001/01	G-0021		06-Aug-2014	within specifications	Temperature: (23 ± 3) °C Relative humidity: (20 to 60) %	3000-8701-00A
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Narda Safety Test Solutions GmbH										
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G-0021										
06-Aug-2014										
within specifications										
Temperature: (23 ± 3) °C Relative humidity: (20 to 60) %										
3000-8701-00A										

ISSUE DATE: 2014-08-06


CALIBRATED BY
V. Kreschmann


AUTHORIZED SIGNATORY


MANAGEMENT SYSTEM
Certified by DQS against
ISO 9001:2008
(Reg.-No. 099279 QM08)

This calibration certificate may not be reproduced other than in full except with the permission of the issuing laboratory. Calibration certificates without signature are not valid.

Calibration Certificate: Narda Model SRM 3000 Meter; S/N G-0021

<p><small>Narda Safety Test Solutions GmbH Sandweierstrasse 7 · 72793 Pfullingen · Germany Phone: +49 7121 9732-0 · Fax: +49 7121 9732 790</small></p>	
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3501/02										
G-0021										
2014-08-07										
within specifications										
Temperature: (23 ± 3) °C Relative humidity: (20 to 60) %										
3000-8702-00A										

ISSUE DATE: 2014-08-08


CALIBRATED BY
Kreschmann


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MANAGEMENT SYSTEM
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ISO 9001:2008
(Reg.-No. 099379 QM08)

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Calibration Certificate: Narda SRM E-Field probe; S/N G-00217

ENDNOTES

- 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. ANSI/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 2010**).
- iv. National Council on Radiation Protection and Measurements (NCRP); *Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields*, NCRP Report 86, 1986.