

**Andrew H. Thatcher**

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**Evaluation of Compliance with FCC Guidelines for  
Human Exposure to Radiofrequency Radiation**

**Site Address:  
43307 SE 174th St  
North Bend, WA 98045**

**Site Name:  
SEA Iron Horse**

**Prepared for:  
Odelia Pacific  
on behalf of**



**January 23, 2019  
Prepared By:  
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## **Introduction**

This report details the results of the analysis of the emissions created by a proposed Verizon Wireless cellular base station with 6 antennas mounted in three sectors on a replacement utility pole located near 43307 SE 174th North Bend, WA 98045. The analysis includes predicted ground level exposures.

## **Executive Summary**

The calculated maximum exposure to radiofrequency (RF) signals at all ground level locations combining signals from the proposed Verizon Wireless antennas will be less than 2% of the FCC limits for exposure to members of the general population. The site will be in compliance with FCC exposure limits by a large margin.

## **Site Description**

The project consists of a replacement utility pole with the Verizon antennas mounted in three sectors above the power lines. The Verizon wireless data was supplied by K. Taylor, Verizon RF Engineer, on 10/25/2018. The Verizon base station will transmit in three sectors in the 700 MHz, 850 MHz, 1900 MHz, and 2100 MHz frequency bands.

Based on a search conducted on [www.antennasearch.com](http://www.antennasearch.com), no other significant (i.e. capable of affecting compliance determinations for the present installation) RF emitting source exists within 2,000 feet of this location.

## **Outdoor Ground Level Exposure Evaluation**

Equation 6 of OET Bulletin 65<sup>3</sup> is used as the basis for the calculations as it considers a truly worst case prediction of power density in an outdoor environment in which 100% of incoming radiation is assumed to reflect off a ground surface, resulting in a doubling of the predicted field strength and a four fold increase in power density. Indoor calculations would be lower than the outdoor calculations as complete ground reflection would not be included and a factor of ten reduction in signal strength due to attenuation through building materials is also considered. The formula is as follows:

$$S = [EIRP] / [\pi \cdot D^2]$$

*WHERE:*

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<sup>3</sup> Federal Communications Commission Office of Engineering and Technology. Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields. OET Bulletin 65. 1997.

S = Power density (mW/cm<sup>2</sup>)

EIRP = Effective isotropic radiated power (mW) (varies with angle as per manufacturer's specifications)

D = Hypotenuse distance (cm)

**Ground Level Exposures**

Table 1 shows the calculated maximum cumulative RF exposure at 6' above ground for all sectors assuming all antennas operating at 100% power and complete ground reflection. To determine the maximum cumulative exposure the total RF signal levels from each antenna from the Verizon Wireless base stations were summed at each location as a percent of the FCC exposure limit (which varies somewhat with frequency). The maximum cumulative exposure at any location was determined to be 0.01 mW/cm<sup>2</sup> or 1.9% of the FCC general public exposure limit. Table 1 also provides the maximum effective radiated power in each frequency band.

Table 1: Calculated Ground Level Power Density						
Site Name:	Verizon SEA Iron Horse					
	All Sectors					
Carrier Type	Worst Case ERP (watts)	Worst Case ERP (dBm)	Antenna Height (ft)	Maximum outdoor exposure (with ground reflection) (mW/cm <sup>2</sup> )	% of Standard	General Population Exposure Limit (mW/cm <sup>2</sup> )
Verizon 700 Upper LTE	2507	63.99	94	0.006	1.19%	0.497
Verizon 880 MHz	2339	63.69	102	0.003	0.54%	0.566
Verizon PCS	5612	67.49	102	0.000	0.01%	1.000
Verizon AWS	5118	67.09	94	0.001	0.11%	1.000
			<b>Total</b>	0.010	<b>1.86%</b>	

**Note: "maximum outdoor exposure" is calculated at the point at ground level where the cumulative exposure from all sources is at a maximum.**

**Discussion**

The biological effects of RF energy have been extensively studied, and there are several thousand reports in the scientific literature on this subject. These reports have been critically reviewed by numerous independent panels, most recently the IEEE (formerly Institute of Electrical and Electronics Engineers) and the International Commission on Nonionizing Radiation Protection. These groups have affirmed existing health standards, or have developed and proposed standards for exposure to RF energy that are broadly similar to the FCC limits.

**For further information** The Federal Communications Commission (FCC) maintains a World Wide Web site at <http://www.fcc.gov>. A general information sheet about possible health and safety issues regarding radiofrequency energy is at:

<https://www.fcc.gov/engineering-technology/electromagnetic-compatibility-division/radio-frequency-safety/faq/rf-safety>

### Conclusions/Recommendations

The calculations for outdoor ground level locations indicate that the Verizon Wireless antennas are in compliance with the FCC general population limit as the maximum ground level outdoor exposure is less than 2% of the general population exposure limit.

It should be noted that wireless technology is changing rapidly, and companies including Verizon Wireless are frequently upgrading and introducing new services, and updating existing services to new technologies. Consequently the calculated exposure levels in Table 1 are based on current design data which may change in the future. However, as shown in Table 1, the RF exposure levels are a fraction of the FCC exposure limits and any foreseeable upgrades to the site in the future are highly unlikely to affect its compliance with safety limits. However, compliance after major changes to the site should be established based on current design information.

### Certification

We hereby certify the following:

1. We have read and fully understand the FCC regulations concerning RF safety and the control of human exposure to RF fields.
2. To the best of our knowledge, the statements and information disclosed in this report are true, complete and accurate, based on engineering design data for the site supplied to us by Verizon Wireless.
3. The results of the analysis indicate that the site is in full compliance with the FCC regulations concerning RF exposure at all areas of public access.

Respectfully Submitted,



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