



# EVALUATION OF COMPLIANCE WITH GUIDELINES FOR HUMAN EXPOSURE TO RADIO FREQUENCY RADIATION for Clearwire LLC

## INTRODUCTION

This engineering statement was prepared to analyze the expected level of Non-Ionizing Electromagnetic Radiation ("NIER") caused by the addition of radio transmission equipment belonging to Clearwire at the following proposed radio frequency transmitter site:

Site Name: ID-BO1104  
Site Address: 3800 North Locust Grove road  
City, State: Meridian, ID  
Coordinates (NAD83): 43-38-30.97 N / 116-22-15.78 W

## ANALYSIS

In 1985, the FCC adopted the 1982 ANSI guidelines for purposes of evaluating exposure due to RF transmitters licensed and authorized by the FCC. In 1992, ANSI adopted the 1991 IEEE standard as an American National Standard (a revision of its 1982 standard) and designated it ANSI/IEEE C95.1-1992. In 1996, the FCC adopted a modified version of its original proposal. The FCC's action also fulfilled requirements of the Telecommunications Act of 1996 for adopting new RF exposure guidelines. The FCC considered comments submitted by the EPA, FDA, NIOSH and OSHA, which have primary responsibility for health and safety in the Federal Government.

The FCC's guidelines are based on recommended exposure criteria issued by the NCRP and ANSI/IEEE and are similar to the ANSI/IEEE 1992 guidelines except for differences in recommended exposure levels at lower frequencies and higher frequencies, and for controlled and uncontrolled access areas. Over a broad range of frequencies, NCRP exposure limits for the public are generally one-fifth those for workers in terms of power density.

The NCRP and ANSI/IEEE exposure criteria are frequency dependent since the whole-body human absorption of RF energy varies with the frequency of the RF signal. The most restrictive limits on exposure are in the frequency range of 30-300 MHz where the human body absorbs RF energy most efficiently when exposed in the far field of an RF transmitting source. The exposure limits adopted by the FCC in 1996 are shown in Appendix 1. The NCRP and ANSI/IEEE exposure criteria and most other standards also specify "time-averaged" MPE limits. This means that it is permissible to exceed the recommended limits for short periods of time as long as the average exposure (over the appropriate period specified) does not exceed the limit. For example, Appendix 1 shows that for a frequency of 100 MHz the recommended power density limit is  $1 \text{ mW/cm}^2$  with an averaging time of six minutes (any six-minute period) for occupational/controlled exposure.

The Clearwire proposed transmitters operate in the FCC EBS/BRS services and broadcast in the 2500 - 2690 MHz frequency range. In addition, there may be additional point-to-point microwave transmitters operating between 5 and 23 GHz (see Table 1). Therefore, the proposed new transmitters will fall into the 1500-100,000 MHz frequency band for NIER evaluation. The mandated maximum NIER limit for the 1500-100,000 MHz band for a "General Population/Uncontrolled Exposure" area is  $1 \text{ mW/cm}^2$

**Site Address: 3800 N Locust Grove Road, Meridian, ID, 83646**

Latitude: 43-38-30.97 N Longitude 116-22-15.78 W

Site is compliant

Technology:	<b>WiMax</b>	<b>GSM</b>	<b>CDMA</b>	<b>Backhaul</b>	<b>Unit</b>
Site Name:	<b>Clearwire</b>	<b>N/A</b>	<b>N/A</b>	<b>Clearwire</b>	
Site Number:	<b>ID-BOI0104</b>			<b>Backhaul</b>	
Frequency of Carrier:	2600			5800	MHz
Total # of Carriers:	6.0			1.0	Numeric
EIRP per Carrier (in dbm) from Link Budget:	56.0			55.6	dBm
ERP per Carrier from Link Budget:	243.22			221.82	Watts
Total ERP	1459.32			221.82	Watts
Total ERP	31.6			23.5	dBW
RC Height Above Ground [Y]:	75			75	Feet
Distance Between Tower and Closest Point Worker Would Be* [X1]:	12			12	Feet
Distance Between Tower and Closest Point on Fence Line* [X2]:	20			20	Feet
Radial Distance to Worker Point of Interest [R1]:	2315.1			2315.1	centimeters
Radial Distance to Public Point of Interest [R2]:	2365.9			2365.9	centimeters
Angle from horizon to Worker Point of Interest	80.9			80.9	Degrees
Angle from horizon to Closest point on Fence Line	75.1			75.1	Degrees
Antenna centerline <b>mechanical/electrical</b> down tilt, if any	2			0	Degrees
Angle between antenna centerline and radial to Worker Point of Interest	78.9			80.9	Degrees
Angle between antenna centerline and radial to Closest Point on Fence Line	73.1			75.1	Degrees
Difference between maximum antenna gain and and antenna gain along radial to Worker point of interest	43			43	dB
Difference between maximum antenna gain and and antenna gain along radial to Closest Point on Fence Line	36			36	dB
ERP at antenna toward Worker Point of Interest	-11.4			-19.5	dBW
ERP at antenna toward Closest Point on Fence Line	-4.4			-12.5	dBW
ERP at antenna toward Worker Point of Interest	73.139			11.117	milliwatts
ERP at antenna toward Closest Point on Fence Line	366.565			55.719	milliwatts
Power Density @ Worker Point of Interest:	0.0000071			0.0000011	mW/cm <sup>2</sup>
Power Density @ Public Point of Interest:	0.0000068			0.0000010	mW/cm <sup>2</sup>
<b>ANSI 1992 Standard MPE:</b>					
Controlled Environment (Worker):	5.000			5.000	mW/cm <sup>2</sup>
Uncontrolled Environment (Public):	1.000			1.000	mW/cm <sup>2</sup>

Percentage of Total MPE per Technology:	Wimax-Clearwire			CDMA-Clearwire-Backhaul	
Controlled Environment (Worker):	0.000142			0.000022	%
Uncontrolled Environment (Public):	0.000682			0.000104	%
Percentage of Total MPE for Cell Site:					
Controlled Environment (Worker):	<b>0.000582</b>				
Uncontrolled Environment (Public):	<b>0.002680</b>				
Clearwire Contribution(Worker)	<b>0.000560</b>				
Clearwire Contribution(Public)	<b>0.002576</b>				

\* X1 refers to the horizontal distance between the base of the tower and the nearest point on the property that a worker would work for any length of time e.g. a transmitter shed.  
X2 refers to the horizontal distance between the base of the tower and the nearest point on the property line that the public could walk up to or have access to e.g. closest point on fence line.

As shown in Table 1, the cumulative transmissions at this site with the addition of the proposed Clearwire transmissions is well below the 100% limit and no exposure risk should exist.



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