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Addendum
Assessment of Radiofrequency Microwave Radiation Emissions from Silver Springs OWS-NIC514 Model Wireless Electric Meter (Addendum)

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INTRODUCTION AND PURPOSE OF THIS ADDENDUM

This Report Addendum has been prepared to document radiofrequency radiation (RF) levels associated with the Silver Springs/PG&E wireless smart meter model OWS-NIC514 that is being installed in northern California and other service areas within PG&E territory.

Following completion of the original Smart Meter RF Assessment which used the Itron SKAMI-4 meter as the 'type' meter, it came to the attention of the authors that PG&E's OWS-NIC514 model might have higher RF emissions. This would likely result in greater numbers of conditions where FCC violations of the public safety limit could occur; and greater space within private residences and properties that might be chronically exposed to excessively high RF levels, some of which could reach levels reported to cause adverse health effects.

The previous report (also downloadable from this webpage) provided predicted RF levels from the ITRON SKAMI-4 model in use by Southern California Edison and possibly other utilities.

As with the original Report, computer modeling shows of the range of possible smart meter RF levels that are occurring in the typical installation and operation of a single smart meter, and also multiple meters in one location. Four reflection factors and ten duty cycles are modeled for each scenario (one meter or multiple meters). Collector meters are not assessed in this addendum.

SUMMARY OF FINDINGS

The RF emissions from the Silver Springs/PG&E OWS-NIC514 smart meter are **4.87 times (or 487% higher)** than the Itron SKAMI-4 meter. This ratio holds constant for any of the modeling scenarios previously assessed.

Potential violations of current FCC public safety standards for smart meters in the manner installed and operated in California are predicted in this Report, based on computer modeling (Data Tables D1 – D24).

Violations of FCC safety limits for uncontrolled public access are identified at distances out to a distance of more than one foot for a single meter, and several feet for multiple meters, even under the most restrictive FCC formula using only a 60% reflection factor.

This means that there is significantly more space within the area around the wireless meter that may either violate FCC public safety limits, or create excessively elevated RF levels in occupied space that is potentially exposing occupants to chronically elevated RF exposures.

See CONCLUSIONS Section for complete information.

PUBLIC SAFETY LIMITS FOR RADIOFREQUENCY RADIATION

The FCC adopted limits for Maximum Permissible Exposure (MPE) are generally based on recommended exposure guidelines published by the National Council on Radiation Protection and Measurements (NCRP) in "Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," (NCRP, 1986). In the United States, the Federal Communications Commission (FCC) enforces limits for both occupational exposures (in the workplace) and for public exposures. The allowable limits are variable, according to the frequency transmitted. Only public safety limits for uncontrolled public access are assessed in this report.

Maximum permissible exposures (MPE) to radiofrequency electromagnetic fields are usually expressed in terms of the plane wave equivalent power density expressed in units of milliwatts per square centimeter (mW/cm2) or alternatively, absorption of RF energy is a function of frequency (as well as body size and other factors). The limits vary with frequency. Standards are more restrictive for frequencies at and below 300 MHz. Higher intensity RF exposures are allowed for frequencies between 300 MHz and 6000 MHz than for those below 300 MHz. In the frequency range from 100 MHz to 1500 MHz, exposure limits for field strength and power density are also generally based on the MPE limits found in Section 4.1 of "*IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz*," ANSI/IEEE C95.1-1992 (IEEE, 1992, and approved for use as an American National Standard by the American National Standards Institute (ANSI).

US Federal Communications Commission (FCC) Exposure Standards

Table 1, Appendix A FCC LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

(A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm2)	Averaging Time $[E]^2$ $[H]^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	$(900/f_2)$*	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6

B) FCC Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm2)	Averaging Time $[E]^2$ $[H]^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	30
3.0-30	824/f	2.19/f	$(180/f_2)$*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz *Plane-wave equivalent power density

NOTE 1: ***Occupational/controlled*** limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2: ***General population/uncontrolled*** exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure. Source: FCC Bulletin OET 65 Guidelines, page 67 OET, 19

METHODOLOGY

Radiofrequency fields associated with SMART Meters were calculated following the methodology described here. Prediction methods specified in Federal Communications Commission, Office of Engineering and Technology Bulletin 65 Edition 97-01, August 1997 were used in the calculations.[1]

FCC equations 6 and 10 require use of a 100% duty cycle (how much time the meter is transmitting RF signals), since the public cannot be excluded from areas around the meter. The report, however, calculates RF levels from 1% duty cycle to 100% duty cycle, for informational purposes, and because there is still much uncertainty and debate about how frequently the meters will be emitting RF signals. In this meter, both the 915 MHz antenna and the 2400 MHz antenna can transmit at the same time.

Section 2 of FCC OET 65 provides methods to determine whether a given facility would be in compliance with guidelines for human exposure to RF radiation. We used equation (3)

$$S = \frac{P \times G \times \partial}{4 \times \pi \times R^2} = \frac{EIRP \times \partial}{4 \times \pi \times R^2} = \frac{1.64 \times ERP \times \partial}{4 \times \pi \times R^2}$$

where:

S = power density (in $\mu W/cm^2$)
P = power input to the antenna (in W)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
∂ = duty cycle of the transmitter (percentage of time that the

transmitter actually transmits over time)
R = distance to the center of radiation of the antenna
EIRP = PG
ERP = 1.64 EIRP

where:

EIRP = is equivalent (or effective) isotropically radiated power referenced to an isotropic radiator

ERP = is equivalent (or effective) radiated power referenced to a half-wave dipole radiator

SMART Meter Assumptions

Red figures used to Calculate ERP		**ACS and TCB Certification data sheet**							
		SK9AMI-2A				**SK9AMI-4**			
		ACS			TCB	**ACS**			TCB
Radio	Frequency	dBm	Watts	dBi	Watts	dBm	Watts	dBi	Watts
GSM	850	31.8	1.5136	-1.0					
LAN	0	21.92	0.1556	3.0	0.189	24.27	0.2673	**2.2**	**0.267**
LAN SSN	0	29.86	0.9683	4.00	1.483				1.483
GSM	1900	28.7	0.7413	1.0					
Register	2405	18.71	0.0743	**1.0**	**0.074**	19.17	0.0826	4.4	
WLAN SSN	2405	21.7	0.1479	**1.0**	0.114				
Cell Relay	2480	-14.00	0.00004	4.00					

Assumptions: TPO per TCB , Antenna Gain per ACS Certification								Delta ERP
ERP Calculation: **Bold** figures are used for single meter ERP in modeling								
Type	TPO	dBi	dB	Mult	ERP	Freq		
1900 GSM	0.741	1.0	-1.15	0.77	0.5689	1900		
850 GSM	1.514	-1.0	-3.15	0.48	0.7328	850	Model	
RFLAN	0.267	2.2	0.05	1.01	**0.2704**	915	SK9AMI-4	
Silver Springs	0.968	4.0	1.85	1.53	**1.4825**	915	Silver Springs Network Pg 54	5.48
ZIG BEE	0.074	1.0	-1.15	0.77	**0.0570**	2405	SK9AMI-2A	
Silver Springs	0.148	1	-1.15	0.77	**0.1135**	2405	Silver Springs Network Pg 31	1.99

ERP (Effective Radiated Power) used in the computer modeling here is calculated using the TPO and antenna gain established for each model. The figures in red are used in this analysis (from Silver Springs FCC data).

Reflection Factor

This equation is modified with the inclusion of a ground reflection factor as recommended by the FCC. The ground reflection factor accounts for possible ground reflections that could enhance the resultant power density. A 60% (0.6) enhancement would result in a 1.6 (1 + 0.6) increase of the field strength or a 2.56 = $(1.6)^2$ increase in the power density. Similar increases for larger enhancements of the field strength are calculated by the square of the original field plus the enhancement percentage. [2.3.4]

Reflection Factors:

$60\% = (1 + 0.6)^2$ = 2.56 times
$100\% = (1 + 1)^2$ = 4 times
$1000\% = (1 + 10)^2$ = 121 times
$2000\% = (1 + 20)^2$ = 441 times

Duty Cycle

How frequently SMART Meters can and will emit RF signals from each of the antennas within the meters is uncertain, and subject to wide variations in estimation. For this reason, and because FCC OET 65 mandates a 100% duty cycle (continuous exposure where the public cannot be excluded) the report gives RF predictions for all cases from 1% to 100% duty cycle at 10% intervals. The reader can see the variation in RF emissions predicted at various distances from the meter (or bank of meters) using this report at all duty cycles. Thus, for purposes of this report, duty cycles have been estimated from infrequent to continuous.

Duty cycles for SMART Meters were calculated at:

Duty cycle ∂:

1% 50%

5%	60%
10%	70%
20%	80%
30%	90%
40%	100%

Continuous Exposure

FCC Bulletin OET 65 and the ANSI/IEEE C95.1-1992, 1999 requires that continuous exposure be calculated for situations where there is uncontrolled public access. Continuous exposure in this case means reading the tables at 100% duty cycle.

> *"Another feature of the exposure guidelines is that exposures, in terms of power density, E2 or H2, may be averaged over certain periods of time with the average not to exceed the limit for continuous exposure.*[11]
>
> *"As shown in Table 1 of Appendix A, the averaging time for occupational/controlled exposures is 6 minutes, while the averaging time for general population/uncontrolled exposures is 30 minutes. It is important to note that for general population/uncontrolled exposures it is often not possible to control exposures to the extent that averaging times can be applied. In those situations, it is often necessary to assume continuous exposure."* (FCC OET 65, Page 15)

Calculation Distances in Tables (3-inch increments)

Calculations were performed in 3-inch (.25 foot) increments from the antenna center of radiation. Calculations have been taken out to a distance of 96 feet from the antenna center for radiation for each of the conditions above. The antenna used for the various links in a SMART Meter is assumed

to be at the center of the SMART Meter from front to back – approximately 3 inches from the outer surface of the meter.

Calculations have also been made for a typical nursery and kitchen. In the nursery it has been assumed that the baby in his or her crib that is located next to the wall where the electric SMART Meters are mounted. The closest part of the baby's body can be as close as 11 inches* from the meter antenna. In the kitchen it has been assumed that a person is standing at the counter along the wall where the electric SMART Meters are mounted. In that case the closest part of the adult's body can be located as close to the meter antenna as 28 inches.

CONCLUSIONS

FCC compliance violations for the OWS-NIC514 meter made by Silver Springs are likely to occur under widespread conditions of installation and operation of smart meters and collector meters in California. Violations of FCC safety limits for uncontrolled public access are identified at distances about one foot for a single meter, and several feet for multiple meters.

The RF emissions from the Silver Springs/PG&E OWS-NIC514 smart meter are **4.87 times (or 487% higher)** than the Itron SKAMI-4 meter. This ratio holds constant for any of the modeling scenarios previously assessed.

Potential violations of current FCC public safety standards for smart meters in the manner installed and operated in California are predicted in this Report, based on computer modeling (Data Tables D1 – D24).

Violations of FCC safety limits for uncontrolled public access are identified at distances out to a distance of more than one foot for a single meter, and several feet for multiple meters, even under the most restrictive FCC formula using only a 60% reflection factor.

This means that there is significantly more space within the area around the wireless meter that may either violate FCC public safety limits, or create excessively elevated RF levels in occupied space that is potentially exposing occupants to chronically elevated RF exposures.

Table 1 shows how far away the meter(s) may violate the FCC thermal public safety limit of 655 uW/cm2. Even using the most conservative FCC equation with a 60% reflection factor, the meter exceeds the FCC limit outside the meter itself at 40% duty cycle, and all higher duty cycles to 100%. Using the FCC's reflection factor of 100%, the FCC limit is exceeded at all duty cycles from 30% to 100%. The emissions from one meter are strong enough that the public is put at risk from exposures outward from the meter from approximately one foot to over six feet, depending on the reflection factor. For multiple meters at the same location, the zone of impact where FCC limit may be violated is somewhere between three feet and 19 feet, depending on the reflection factor.

Table 2 shows predicted RF levels and potential FCC violations of the public safety limit in a simulated nursery or bedroom, where the sleeping area is against a wall with a wireless meter flush-mounted on the outside wall at 11" distance from occupied space. Violations are predicted to occur

in all scenarios modeled, with higher RF exposures predicted with higher reflection factors and higher duty cycles. The lowest RF level calculated under any of the conditions is 6.8 uW/cm2 at 11", which is an excessively high RF level for chronic exposure. Most of the predictions fall in the range of several hundred microwatts per centimeter squared at 11" distance from the single meter. For multiple meters, the lowest predicted figure is 23.4 uW/cm2. Nearly all conditions modeled show that FCC violations may occur, regardless of how conservative the reflection factors and duty cycles are. For multiple meters at the same location, RF levels range from 23 to over 2000 uW/cm2 depending on duty cycle (at 60% reflection). RF levels range from 37 to over 3600 uW/cm2 depending on duty cycle (at 100% reflection).

Table 3 shows predicted RF levels and potential FCC violations of the public safety limit in a simulated kitchen, where the counter workspace is against a wall with a wireless meter flush-mounted on the outside wall at 28" distance from occupied space. There are no FCC violations predicted at 28" for the two lower reflection factors (60% and 100%), however, there are numerous predicted violations at the higher reflection factors (1000% and 2000%). For one meter, at 28", the RF levels range from 1.1 to 105 uW/cm2 at 60% reflection; and 1.6 to 165 uW/cm2 at 100% reflection.. For multiple meters, the comparable ranges are 2.7 to 268 uW/cm2 at 60% reflection, and 4.2 to 418 uW/cm2 at 100% reflection (the two lowest factors).

The absolute RF levels are significantly higher that those reported in many scientific studies to be associated with adverse health effects.

Tables 4 and 5 compare RF levels in the nursery simulation (at 11”) and the kitchen simulation (at 28”) to RF levels reported to impair DNA repair in human stem cells. Tables 4 and 5 allow a comparison of predicted RF levels from the OWS-NIC514 meter against a scientific benchmark for harm of 92 uW/cm2 that is reported to impair the ability of human stem cells to repair damage to DNA.

Nearly every scenario modeled predicts RF levels from either one smart meter or multiple smart meters to be in excess of that shown to reduce DNA repair in human stem cells.

Of 96 cases modeled at 11” (nursery crib example), only seven are below the 92 uW/cm2 benchmark for harm.

Of 96 cases modeled at 28” (kitchen workspace example) only 27 are below the 92 uW/cm2 benchmark for harm.

Tables 6 and 7 compare RF levels in the nursery simulation (at 11”) and the kitchen simulation (at 28”) to RF levels reported to cause pathological leakage of the blood-brain barrier. Such leakage is associated with neuron death (death of brain cells).

Every scenario modeled predicts RF levels from either one smart meter or multiple smart meters to be in excess of associated with pathological leakage of the blood-brain barrier. Regardless of duty cycle or reflection factor, ALL cases modeled showed that for a single meter or multiple meters, RF levels exceed that associated with damage to the blood-brain barrier.

Of 96 cases modeled at 11” (nursery crib example), ALL produce RF levels in excess of the 0.4-8 uW/cm2 benchmark for harm to the blood-brain barrier.

Of 96 cases modeled at 28” (kitchen workspace example, ALL produce RF levels in excess of the 0.4 – 8 uW/cm2 benchmark for harm to the blood-brain barrier.

Table 8 and 9 compare RF levels in the nursery and kitchen simulations to RF levels reported to cause adverse neurological symptoms (headache, sleep disruption, restlessness, tremor, cognitive impairment, tinnitus), increased cancer risk or heart problems (arrhythmias, altered heart rhythm, palpitations).

Of 96 cases modeled at 11” (nursery crib example) ALL produce RF levels in excess of the 0.1uW/cm2 benchmark for neurological effects, cardiac problems and increased cancer risk.

Of 96 cases modeled at 28” (kitchen workspace example) ALL produce RF levels in excess of the 0.1uW/cm2 benchmark for neurological effects, cardiac problems and increased cancer risk.

FCC compliance violations for the OWS-NIC514 meter made by Silver Springs are likely to occur under widespread conditions of installation and operation of smart meters and collector meters in California. Violations of FCC safety limits for uncontrolled public access are identified at distances about one foot for a single meter, and several feet for multiple meters.

Consumers may also have already increased their exposures to radiofrequency radiation in the home through the voluntary use of wireless devices (cell and cordless phones), PDAs like BlackBerry and iPhones, wireless routers for wireless internet access, wireless home security systems, wireless baby surveillance (baby monitors), and other emerging wireless applications. Neither the FCC, the CPUC, the utility nor the consumer know what portion of the allowable public safety limit is already being used up or pre-empted by RF from other sources already present in the particular location a smart meter may be installed and operated.

Consumers, for whatever personal reason, choice or necessity who have already eliminated all possible wireless exposures from their property and lives, may now face excessively high RF exposures in their homes from smart meters on a 24-hour basis. This may force limitations on use of their otherwise occupied space, depending on how the meter is located, building materials in the structure, and how it is furnished.

People who are afforded special protection under the federal Americans with Disabilities Act are not sufficiently acknowledged nor protected. People who have medical and/or metal implants or other conditions rendering them vulnerable to health risks at lower levels than FCC RF limits may be particularly at risk (Tables 30-31). This is also likely to hold true for other subgroups, like children and people who are ill or taking medications, or are elderly, for they have different reactions to pulsed RF. Childrens' tissues absorb RF differently and can absorb more RF than adults (Christ et al, 2010; Wiart et al, 2008). The elderly and those on some medications respond more acutely to some RF exposures.

Safety standards for peak exposure limits to radiofrequency have not been developed to take into account the particular sensitivity of the eyes, testes and other ball shaped organs. There are no peak power limits defined for the eyes and testes, and it is not unreasonable to imagine situations where either of these organs comes into close contact with smart meters and/or collector meters, particularly where they are installed in multiples (on walls of multi-family dwellings that are accessible as common areas).

In summary, no positive assertion of safety can be made by the FCC, nor relied upon by the CPUC, with respect to pulsed RF when exposures are chronic and occur in the general population. Indiscriminate exposure to environmentally ubiquitous pulsed RF from the rollout of millions of new RF sources (smart meters) will mean far greater general population exposures, and potential health consequences. Uncertainties about the existing RF environment (how much RF exposure already exists), what kind of interior reflective environments exist (reflection factor), how interior space is utilized near walls), and other characteristics of residents (age, medical condition, medical implants, relative health, reliance on critical care equipment that may be subject to electronic interference, etc) and unrestrained access to areas of property where meter is located all argue for caution.

Table 1
Potential OWS-NIC514 FCC Violations of TWA 655 (in inches)
(One Smart Meter, Four Meters)

One Meter	Table D1	Table D2	Table D3	Table D4
Duty Cycle	60% Reflection	100% Reflection	1000% Reflection	2000% Reflection
1%	1.2"	1.4"	7.9"	15.1"
10%	3.7"	4.5"	25.0"	47.6"
20%	5.2"	6.4"	35.3"	67.4"
30%	6.3"	7.9"	43.2"	82.5"
40%	7.3"	9.1"	49.9"	95.3"
50%	8.2"	10.1"	55.8"	107
60%	9.0"	11.1"	61.1"	117
70%	9.7"	12.0"	66.0"	126"
80%	10.3"	12.8"	70.6"	135
90%	11.0"	13.6"	74.9"	143"
100%	11.5"	14.3"	78.9"	151"

Four Meters	Table D5	Table D6	Table D7	Table D8
Duty Cycle	60% Reflection	100% Reflection	1000% Reflection	2000% Reflection
1%	1.4"	2.9"	22.0"	43"
10%	9.9"	12.6"	70.5"	135"
20%	14.3"	18.0"	99.6"	191"
30%	17.6"	22.1"	122"	233"
40%	20.4"	25.5"	141"	270"
50%	22.8"	28.6"	158"	301"
60%	25.0"	31.3"	173"	330"
70%	27.0"	33.9"	187"	357"
80%	28.9"	36.2"	200"	381"
90%	30.7"	38.4"	212"	404"
100%	32.4"	40.5"	223"	426"

This table shows how far away from the meter a possible FCC violation can occur

Table 2
Potential OWS-NIC514 FCC Violations of 655 uW/cm2 TWA Safety Limit
Nursery at 11"
(One Smart Meter, Four Meters)

One Meter Duty Cycle	Table D9 60% Reflection	Table D10 100% Reflection	Table D11 1000% Reflection	Table D12 2000% Reflection
1%	6.8 uW/cm2	10.7	323	1177
5%	34.2	53.4	1614	5883
10%	68.3	107	3229	11767
20%	137	214	6457	23534
30%	205	320	9686	35300
40%	273	427	12914	47067
50%	342	534	16143	58834
60%	410	640	19371	70601
70%	476	747	22600	82367
80%	546	854	25828	94134
90%	615	961	29057	105901
100%	683	1067	32285	117668

Four Meters Duty Cycle	Table D13 60% Reflection	Table D14 100% Reflection	Table D15 1000% Reflection	Table D16 2000% Reflection
1%	23.4	36.6	1108	4038
5%	117	183	5540	20192
10%	234	366	11080	40383
20%	467	733	22160	80766
30%	703	1099	33240	121148
40%	938	1465	44321	161532
50%	1172	1831	55400	201915
60%	1407	2198	66481	242298
70%	1641	2564	77561	282681
80%	1875	2930	88641	323064
90%	2110	3297	99721	363448
100%	2344	3663	110802	403831

This table shows RF power density FCC violations at 11".

Exceeds 655 uW/cm2 FCC TWA Safety Limit

Table 3
Potential OWS-NIC514 FCC Violations of the 655 uW/cm2 Safety Limit at 28" in the Kitchen
(One Smart Meter, Four Meters)

One Meter Duty Cycle	Table D17 60% Reflection	Table D18 100% Reflection	Table D19 1000% Reflection	Table D20 2000% Reflection
1%	1.1 uW/cm2	1.6	49.8	182
5%	5.3	8.2	249	908
10%	10.5	16.5	498	1816
20%	21.1	32.9	997	3632
30%	31.6	49.4	1495	5448
40%	42.2	65.9	1993	7264
50%	52.7	82.4	2491	9080
60%	63.3	98.8	2990	10896
70%	73.8	115	3488	12712
80%	84.3	132	3986	14528
90%	94.9	148	4485	16334
100%	105	165	4983	18166

Four Meters Duty Cycle	Table D21 60% Reflection	Table D22 100% Reflection	Table D23 1000% Reflection	Table D24 2000% Reflection
1%	2.7	4.2	127	461
5%	13.4	20.9	633	2305
10%	26.8	41.8	1265	4610
20%	53.5	83.6	2530	9221
30%	80.3	126	3795	13831
40%	107	167	5060	18442
50%	134	209	6325	23052
60%	161	251	7590	27663
70%	187	293	8855	32273
80%	214	335	10120	36684
90%	241	376	11385	41494
100%	268	418	12650	46014

This table shows RF power density readings at 28" in the kitchen work space.

Exceeds 655 uW/cm2 FCC Limit

Table 4
OWS-NIC514 RF Levels Associated with Impaired DNA Repair Human Stem Cells
Nursery at 11" (One Smart Meter, Four Meters)

One Meter Duty Cycle	Table D9 60% Reflection	Table D10 100% Reflection	Table D11 1000% Reflection	Table D12 2000% Reflection
1%	6.8 uW/cm2	10.7	323	1177
5%	34.2	53.4	1614	5883
10%	68.3	107	3229	11767
20%	137	214	6457	23534
30%	205	320	9686	35300
40%	273	427	12914	47067
50%	342	534	16143	58834
60%	410	640	19371	70601
70%	476	747	22600	82367
80%	546	854	25828	94134
90%	615	961	29057	105901
100%	683	1067	32285	117668

Four Meters Duty Cycle	Table D13 60% Reflection	Table D14 100% Reflection	Table D15 1000% Reflection	Table D16 2000% Reflection
1%	23.4	36.6	1108	4038
5%	117	183	5540	20192
10%	234	366	11080	40383
20%	467	733	22160	80766
30%	703	1099	33240	121148
40%	938	1465	44321	161532
50%	1172	1831	55400	201915
60%	1407	2198	66481	242298
70%	1641	2564	77561	282681
80%	1875	2930	88641	323064
90%	2110	3297	99721	363448
100%	2344	3663	110802	403831

Exceeds 0.037 W/Kg or ~ 92 uW/cm2
Reported to impair human stem cell DNA repair

Table 5
OWS-NIC514 RF Levels Associated with Impaired DNA Repair Human Stem Cells Kitchen at 28"
(One Smart Meter, Four Meters)

One Meter Duty Cycle	Table D17 60% Reflection	Table D18 100% Reflection	Table D19 1000% Reflection	Table D20 2000% Reflection
1%	1.1 uW/cm2	1.6	49.8	182
5%	5.3	8.2	249	908
10%	10.5	16.5	498	1816
20%	21.1	32.9	997	3632
30%	31.6	49.4	1495	5448
40%	42.2	65.9	1993	7264
50%	52.7	82.4	2491	9080
60%	63.3	98.8	2990	10896
70%	73.8	115	3488	12712
80%	84.3	132	3986	14528
90%	94.9	148	4485	16334
100%	105	165	4983	18166

Four Meters Duty Cycle	Table D21 60% Reflection	Table D22 100% Reflection	Table D23 1000% Reflection	Table D24 2000% Reflection
1%	2.7	4.2	127	461
5%	13.4	20.9	633	2305
10%	26.8	41.8	1265	4610
20%	53.5	83.6	2530	9221
30%	80.3	126	3795	13831
40%	107	167	5060	18442
50%	134	209	6325	23052
60%	161	251	7590	27663
70%	187	293	8855	32273
80%	214	335	10120	36684
90%	241	376	11385	41494
100%	268	418	12650	46014

This table shows RF power density readings at 28" in the kitchen work space.

Exceeds 0.037 W/Kg or ~ 92 uW/cm2
Reported to impair human stem cell DNA repair

Table 6
OWS-NIC514 RF Levels Associated with Pathological Leakage of the Blood-brain Barrier Nursery at 11"
(One Smart Meter, Four Meters)

One Meter Duty Cycle	Table D9 60% Reflection	Table D10 100% Reflection	Table D11 1000% Reflection	Table D12 2000% Reflection
1%	6.8 uW/cm2	10.7	323	1177
5%	34.2	53.4	1614	5883
10%	68.3	107	3229	11767
20%	137	214	6457	23534
30%	205	320	9686	35300
40%	273	427	12914	47067
50%	342	534	16143	58834
60%	410	640	19371	70601
70%	476	747	22600	82367
80%	546	854	25828	94134
90%	615	961	29057	105901
100%	683	1067	32285	117668

Four Meters Duty Cycle	Table D13 60% Reflection	Table D14 100% Reflection	Table D15 1000% Reflection	Table D16 2000% Reflection
1%	23.4	36.6	1108	4038
5%	117	183	5540	20192
10%	234	366	11080	40383
20%	467	733	22160	80766
30%	703	1099	33240	121148
40%	938	1465	44321	161532
50%	1172	1831	55400	201915
60%	1407	2198	66481	242298
70%	1641	2564	77561	282681
80%	1875	2930	88641	323064
90%	2110	3297	99721	363448
100%	2344	3663	110802	403831

Exceeds 0.4 to 8 uW/cm2

Exceeds 8 uW/cm2

Table 7
OWS-NIC514 RF Levels Associated with Pathological Leakage of the Blood-brain Barrier - Kitchen at 28"
(One Smart Meter, Four Meters)

One Meter Duty Cycle	Table D17 60% Reflection	Table D18 100% Reflection	Table D19 1000% Reflection	Table D20 2000% Reflection
1%	1.1 uW/cm2	1.6	49.8	182
5%	5.3	8.2	249	908
10%	10.5	16.5	498	1816
20%	21.1	32.9	997	3632
30%	31.6	49.4	1495	5448
40%	42.2	65.9	1993	7264
50%	52.7	82.4	2491	9080
60%	63.3	98.8	2990	10896
70%	73.8	115	3488	12712
80%	84.3	132	3986	14528
90%	94.9	148	4485	16334
100%	105	165	4983	18166

Four Meters Duty Cycle	Table D21 60% Reflection	Table D22 100% Reflection	Table D23 1000% Reflection	Table D24 2000% Reflection
1%	2.7	4.2	127	461
5%	13.4	20.9	633	2305
10%	26.8	41.8	1265	4610
20%	53.5	83.6	2530	9221
30%	80.3	126	3795	13831
40%	107	167	5060	18442
50%	134	209	6325	23052
60%	161	251	7590	27663
70%	187	293	8855	32273
80%	214	335	10120	36684
90%	241	376	11385	41494
100%	268	418	12650	46014

Exceeds 0.4 - 8 uW/cm2
and
Exceeds 8 uW/cm2

Table 8
OWS-NIC514 RF Levels Associated with Adverse Neurological Symptoms, Cardiac Problems and Increased Cancer Risk
Nursery at 11"
(One Smart Meter, Four Meters)

One Meter Duty Cycle	Table D9 60% Reflection	Table D10 100% Reflection	Table D11 1000% Reflection	Table D12 2000% Reflection
1%	6.8 uW/cm2	10.7	323	1177
5%	34.2	53.4	1614	5883
10%	68.3	107	3229	11767
20%	137	214	6457	23534
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40%	938	1465	44321	161532
50%	1172	1831	55400	201915
60%	1407	2198	66481	242298
70%	1641	2564	77561	282681
80%	1875	2930	88641	323064
90%	2110	3297	99721	363448
100%	2344	3663	110802	403831

All exposure levels exceed those identified in Khurana et al, 2010; Kundi and Hutter, 2009; and the BioInitiative Report, 2007 to be associated with increased risk of adverse neurological symptoms (headache, sleep disruption, restlessness, tremor, cognitive impairment, tinnitus) increased cancer risk or heart problems (arrythmias, altered heart rhythm, palpitations). These effects are reported in populations living at distances < 500 m from cell towers, and at levels at or over 0.05-0.1 uW/cm2 in healthy populations.

Table 9
OWS-NIC514 RF Levels Associated with Adverse Neurological Symptoms. Cardiac Problems and Increased Cancer Risk Kitchen at 28"
(One Smart Meter, Four Meters)

One Meter Duty Cycle	Table D17 60% Reflection	Table D18 100% Reflection	Table D19 1000% Reflection	Table D20 2000% Reflection
1%	1.1 uW/cm2	1.6	49.8	182
5%	5.3	8.2	249	908
10%	10.5	16.5	498	1816
20%	21.1	32.9	997	3632
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Four Meters Duty Cycle	Table D21 60% Reflection	Table D22 100% Reflection	Table D23 1000% Reflection	Table D24 2000% Reflection
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100%	268	418	12650	46014

All exposure levels exceed those identified in Khurana et al, 2010; Kundi and Hutter, 2009; and the BioInitiative Report, 2007 to be associated with increased risk of adverse neurological symptoms (headache, sleep disruption, restlessness, tremor, cognitive impairment, tinnitus) increased cancer risk or heart problems (arrythmias, altered heart rhythm, palpitations). These effects are reported in populations living at distances < 500 m from cell towers, and at levels at or over 0.05-0.1 uW/cm2 in healthy populations.

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