

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies)	ET Docket No. 13-84
)	
Proposed Changes in the Commission’s Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields)	ET Docket No. 03-137

REPLY COMMENTS OF ENVIRONMENTAL WORKING GROUP

Environmental Working Group (“EWG”) submits these reply comments in response to the Federal Communications Commission’s (“FCC”) First Report And Order, Further Notice of Proposed Rule Making, and Notice Of Inquiry (“NOI”) in the above-captioned dockets. In its initial comments, EWG urged the Federal Communications Commission to strengthen its cell phone radiation standards so that they will adequately protect both children and adults, reflect actual current use patterns and provide meaningful consumer disclosure without preempting states from requiring additional disclosure. EWG also urged the FCC to not weaken its existing

standards by altering its testing guidelines to adopt average radiation exposure testing over a larger volume of tissue.

Some commenters in these proceedings have made a number of false assertions surrounding the safety factor in current RF standards, the state of the science surrounding potential harm from cell phone radiation, the adequacy of current federal and international standards to protect children and adults, the trends in RF exposure among Americans, the consensus of the international community on the need for precautionary action, and the pitfalls of increasing consumer education and transparency measures, among other issues. EWG submits the following comments to clarify the record and urges the FCC to dismiss these mischaracterizations.

I. THE FCC SHOULD DISMISS ASSERTIONS THAT CURRENT FEDERAL AND INTERNATIONAL STANDARDS FOR CELL PHONE RADIATION ARE OVERLY PROTECTIVE. IN REALITY, THESE STANDARDS ARE NOT SUFFICIENTLY PROTECTIVE OF CHILDREN OR ADULTS.

A. The FCC's standard does not include a 50-fold safety factor for exposure to the head, the organ of greatest concern for cell phone radiation.

Several groups put forth in their comments to the FCC that the 50-fold safety factor used to set federal standards makes those standards conservative. What is important to note, however, is that there is only a 50-fold safety factor employed for whole body SAR standards of 0.08 W/kg. The maximum SAR standard for the head, in contrast, is 1.6W/kg, giving a “safety factor” of only 2.5, which could be considered negligible. For hands, wrists, and feet there is no safety factor. This is a critical point given that one of the key organs of greatest concern when it comes to potential impacts of cell phone radiation.

To make matters worse, an assessment done by EPA in 1984 concluded that biological effects occur at SAR levels of 1 W/kg, 4 times lower than the level chosen by IEEE (U.S. EPA 1984). Therefore the point of departure of 4W/kg used by IEEE and adopted by FCC is likely an overestimate. Based on EPA's proposed point of departure of 1W/kg, and the unusually small safety factor applied by FCC, the calculated maximum SAR values are much higher than what would be assumed to be health protective. At best, FCC standards give adults a slim margin of safety over emission levels that harm animals. For children, the margin is even smaller.

B. Current standards do not account for children's higher RF exposures and greater health risks.

As detailed extensively in EWG's original filing, research shows that children may be more vulnerable to RF-EMF, yet limits on specific absorption rates are the same for children and adults and do not account for children's higher exposures and greater health risks. The size and tissue properties of a child's head increase radiation absorption, and several scientific studies have shown that the head and brain of a child absorb significantly more radiation than those of an adult (de Salles 2006; Gandhi 1996; Kang 2002; Martinez-Burdalo 2004; Peyman 2009; Wang 2003; Wiart 2008).

When cell phones are used by children, the average RF energy deposition is 2 times higher in certain regions of the brain and up to ten times higher in the bone marrow of the skull, compared to energy deposition in adult brains (IARC 2010; Christ 2010).

Comments submitted by the Mobile Manufacturers Forum state the phantom model is conservative. But research studies have indicated that the phantom model based on an adult head may grossly underestimate the RF-EMF exposure on a 1 gram level with respect to children, an issue of increasing concern. In a study published by France Telecom in 2008, peripheral brain tissue showed a maximum SAR two times higher than measured in adults due to lower

thicknesses of the pinna, skin and skull (Wuart 2008). All these data, taken together, suggest that when a child uses a cell phone that complies with the FCC standards, he or she could easily absorb an amount of radiation over the maximum allowed radiation limits defined by the federal guidelines.

C. Only 10 percent of EPA risk assessments employ uncertainty factors as low as 50.

Even it were true that the FCC's standards employed a 50-fold safety factor for adults and children, it is important to note that in government risk-assessments of environmental toxicants, a 50-fold safety factor is actually quite *low*. The Environmental Protection Agency, for example, typically uses safety factors in the 100s or 1000s range, sometimes as much as even 10,000. An EWG review of the 457 risk assessments that EPA has completed for potentially toxic chemicals finds that only 46 of them, or 10% employ safety factors of 50 or below (U.S. EPA 2013).

D. Harmonization with international standards would weaken current FCC standards.

Harmonization with international standards may seem would weaken current FCC standards because it would increase the average mass used in calculating SAR, and likely miss "hot spots" of radiation. As the mass used in the SAR value is increased the variations in exposure are averaged resulting in a corresponding decrease in the SAR value (Beard 2006). In studies using a patch antenna at 1850 MHz the 1 gram SAR values was calculated to be over 50% higher than the 10 gram SAR value (de Salles 2006).

Comments submitted by the Mobile Manufacturers Forum suggest that a 10 gram averaging mass is equivalent to the weight of the eye, one of the most sensitive organs, which when heated can cause cataracts, and therefore a 10 gram mass is more biologically based. This argument, however, is entirely misguided and grossly underestimates the size scale of localized

biological changes that may lead to long-term health consequences. The formation of cataract occurs in the lens portion of the eye (a very small part of the total eye) and occurs through the denaturing of proteins that then aggregate together and cause clouding of the lens by modifying the lens refractive index (Horwitz 2003). With the weight of these lens proteins in the attogram range, changing the averaging mass used in the SAR standard to a more biologically based number should result in a large reduction of the mass used to calculate SAR not an increase.

With biological effects occurring on the protein and single molecule level it is a concern that localized “hot spots” could also impact brain tissue (Blackwell 2009). Moreover, research has shown that using the SAR 1g calculation can be a better predictor of peak temperature increases and the location of the heating compared to the 10g model (Bakker 2011). Changing the current 1 gram mass used in calculating the SAR to a larger 10 gram mass would significantly underestimate exposure and discount the effects of localized biological damage.

II. THE FCC SHOULD REJECT CLAIMS THAT THERE IS NO EVIDENCE POINTING TO POTENTIAL HARM FROM EXPOSURE TO CELL PHONE RADIATION. THERE ARE NOW NUMEROUS STUDIES SUGGESTING THAT RF EXPOSURE AT CURRENT EXPOSURE LEVELS COULD HAVE NEGATIVE HEALTH EFFECTS, RASING QUESTIONS ABOUT THE ADEQUACY OF CURRENT STANDARDS.

A. Numerous human and animal studies now point to potential health concerns.

Some commenters contend that there is no convincing evidence of harm from cell phone radiation, while there is actually a growing body of research that points toward the opposite conclusion. In human studies, cell phone radiation has been linked to effects on male reproduction such as effects on sperm count and motility (Agarwal 2008; Agarwal 2009; De Iuliis 2009; Davoudi 2002; Gutschi 2011; Falzone 2011; Fejes 2005; Kilgallon 2005; Wdowiak 2007). Other reports suggest exposure to RF-EMF could be linked to obesity and behavioral

problems (Divan 2008; Divan 2012; Li 2012). And the International Agency for Research on Cancer (IARC) has classified radiofrequency electromagnetic fields as “possibly carcinogenic to humans (Group 2B)” based on increased risk for brain glioma observed during the large epidemiological INTERPHONE study (IARC, 2013).

There is a plethora of animal data suggesting exposure to RF may be harmful. Among the reported health impacts are effects on the developing fetus, neurological effects, reproductive effects, increased blood brain barrier permeability, hyperactivity, and immune system effects (Aldad 2012, Gul 2009, Nittby 2008, Odaci 2008, Sonmez 2010; Szmigielski 2013). Laboratory studies on the effects of cell phone radiation on rats, rabbits and other animals have also demonstrated a variety of effects on reproductive health (Al-Damegh 2011; Kesari 2011a; Kesari 2011b; Kesari 2012; Mailankot 2009; Salama 2009; Yan 2007). Some of these findings have been reported in humans, as noted above.

The CTIA states in its comments to the FCC that the INTERPHONE study found no increased risk for glioma. This is inaccurate. A 2011 article published in *The Lancet* that summarizes the results of the INTERPHONE study states that for the highest exposure (>1640 hours of use) “the OR for glioma was 1.40 (95% CI 1.03–1.89). There was suggestion of an increased risk for ipsilateral exposure (on the same side of the head as the tumour) and for tumours in the temporal lobe, where RF exposure is highest.” Therefore in some cases increased risk was reported (Baan 2011). In fact there are a variety of studies that have shown an increased risk of developing two types of brain tumors (glioma and acoustic neuroma) on the ipsilateral side (the side of the brain on which the cell phone is primarily held) among people who used a cell phone for longer than 10 years (Benson 2013; Hardell 2006b; Hardell, 2009; Hardell 2013; Lahkola 2007; Levis 2011; Schuz 2006).

Three recent studies also reported increased risk of salivary gland (parotid) tumors among cell phone users. Parotid gland malignancies involve tumors occurring in the largest salivary gland (parotid gland) located above the jaw and in front of the ear. Some results suggest these cancers were also associated with the duration of cell phone use (Duan, 2011; Lonn 2006; Sadetzki 2008). For example, a Chinese retrospective study of 136 patients with epithelial parotid gland malignancy found that long term and heavy use of cell phones was positively correlated with these tumors (Duan 2011).

It is important to note that the latency time for developing brain cancer is typically between 10-15 years (ACS, 2012). As we point out in the original comments filed, current studies may not be reflective of future trends in disease, particularly in those who began using cell phones as children. It seems likely that studies conducted in future years may find more consistent and higher cancer risks (Ahlbom 2004; Ahlbom 2009; Inskip 2010; Krewski 2001; Krewski 2007; Kundi 2009; Kundi 2004). Accordingly, a 2011 meta-analysis on head tumor risk and cell phone use found a significant increase in risk of ipsilateral brain gliomas and acoustic neuromas in people who had used cell phones for at least 10 years (Levis 2011).

In summary, emerging scientific data demonstrates that RF-EMF emitted from cell phones has the potential to adversely affect the health of people. This makes the case for setting a health-protective SAR limit and providing more information to consumers who wish to make informed choices.

B. There are several potential biological mechanisms for harm from RF energy.

In light of the growing scientific evidence showing that RF-EMF can exert negative effects on animals and may be associated with health effects in people, the question shifts to the mechanism by which RF-EMF may cause harm. Several suggestions have been made. Research

shows that electromagnetic radiation may disrupt the blood brain barrier (Ding 2010; reviewed in Nittby 2008; Söderqvist 2009a; Söderqvist 2009b). A number of studies examined the potential for genotoxicity (harm to genetic material that can lead to mutations and cancer) of electromagnetic fields (BioInitiative 2007; Phillips 2009). While the evidence is not yet conclusive, a meta-analysis of research published between 1990-2011 reports a significant association between DNA damage and radiofrequency fields in half of the results reported for 6 different indicators of genotoxicity in human cell lines (Vijayalaxmi 2012).

Scientists have also reported that cell phone radiation increases reactive oxygen species (ROS) inside the cell (Güler 2012; Irmak 2002; Kesari 2011a; Kesari 2012; Lu 2012; Zmyslony 2004). In turn, higher ROS levels trigger intracellular signaling cascades that can interrupt the smooth functioning of the cell or lead to cell death. Cell phone radiation-induced ROS may well be a causative agent that induces DNA damage, which is a precursor to cancer (Phillips 2009) and a potential mechanism of toxicity to sperm cells (Agarwal 2009; De Iuliis 2009; reviewed in Desai 2009; Kesari 2012; reviewed in Kesari 2013).

C. If researchers are finding effects at current levels of exposure to cell phone radiation, this raises serious questions as to whether FCC and international standards are truly conservative.

Some commenters have asserted that the current FCC standards and international standards are very conservative, and therefore there should be no hesitation to harmonize the standards. However if the associations between male reproductive effects, cancer, and cell phone radiation are real, these effects are occurring at the exposure levels allowed in current standard. Recent studies on men exposed to cell phone radiation at current levels show an association between reduced sperm count and motility and phone use (Agarwal 2008; Agarwal 2009; De Iuliis 2009; Davoudi 2002; Gutsch 2011; Falzone 2011; Fejes 2005; Kilgallon 2005; Wdowiak

2007). It is also concerning that animal studies have shown adverse effects at exposure levels experienced by humans. For example, fetal exposure to 800-1900 Mhz-rated cell phones produced neurodevelopmental and behavior effects in mice (Aldad 2012).

III. THE FCC SHOULD DISMISS REQUESTS FOR THE TESTING REGIME TO REMAIN UNCHANGED. THE FCC MUST MODIFY ITS TESTING GUIDELINES TO INCLUDE “ZERO SPACING” TO ACCOUNT FOR THE SIMPLE FACT THAT MANY CONSUMERS CARRY THEIR PHONES DIRECTLY AGAINST THEIR BODIES.

A. Consumers sometimes carry cell phones directly against their bodies; the FCC’s standards must be updated to reflect this simple fact.

In its Notice of Inquiry, the FCC acknowledges that there are “circumstances where test configurations may not reflect actual use” because current federal guidelines allow cell phone companies to use a spacer of up to 2.5 centimeters in “body-worn testing configurations.” These guidelines appear to stem from an FCC assumption in 1996 that consumers would be carrying their phones in holsters, rather than directly against the body.

Whatever the reason for the agency’s earlier decision, it is clear that the FCC must now update its testing guidelines to reflect the reality that many people commonly carry their phones directly against the body, often putting them phones in a pocket or and placing them on the lap – sometimes even placing them in their bras. Several commenters have asserted that a zero-spacing requirement would not mimic real usage, but this is simply untrue.

Notably, a 2012 Government Accountability Office (GAO) report concluded that consumers who hold a phone directly against the body could receive “*RF energy exposure higher than the FCC limit*” and recommended that the FCC “[r]eassess whether mobile phone testing requirements result in the identification of maximum RF energy exposure in likely usage

configurations, particularly when mobile phones are held against the body, and update testing requirements as appropriate” (GAO 212).

EWG strongly agrees with this recommendation. Given that holsters and belt clips are not commonly used today, it makes no logical sense to test RF exposure compliance of wireless devices at *any* distance from the body if the agency aims to simulate real-world usage. This is particularly important since at least some testing has indicated that RF exposure from an iPhone 4 would exceed FCC guidelines by a factor of three if tested right next to the body (Pong 2012). The difference is between allowing a 2.5 cm gap and zero spacing is not trivial.

Some commenters have suggested that it would be difficult for phones currently on the market to comply with zero-spacing proximity requirements. This should not be a reason for the FCC to keep the current testing regime. Manufacturers are constantly innovating and will be able to design for changes in the proximity requirement.

B. The industry’s SAR Tick program will not solve the inherent problems with FCC testing regimen.

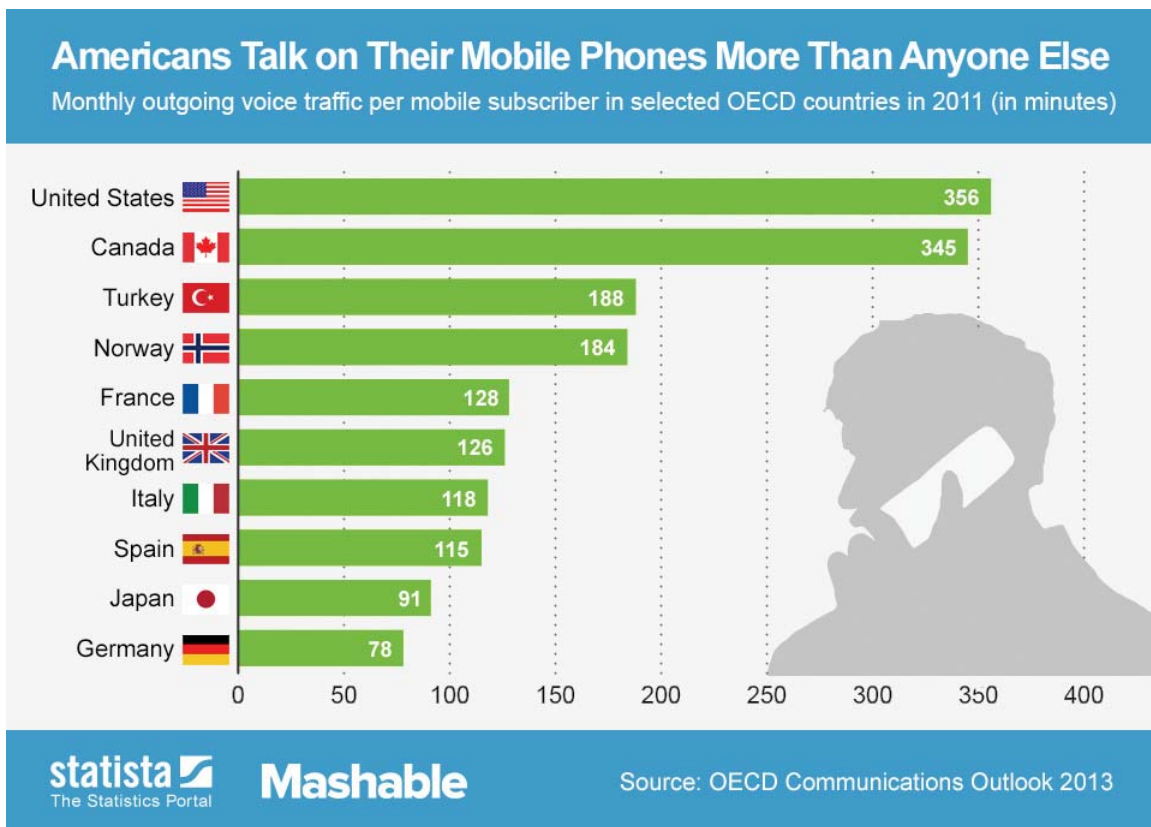
Some commenters have suggested that the cell phone industry’s new “SAR Tick” program will address the concerns around FCC’s flawed proximity testing because consumers will be better educated about how to properly use their phones so as not to exceed SAR limits. Yet the simple fact is that few consumers ever look at their cell phone manuals, and more importantly, consumers should be given real protection based on how they *actually* use their phones – not how the FCC falsely assumes people would use their phones (i.e. in a holster).

IV. AMERICAN’S EXPOSURE TO CELL PHONE RADIATION IS ON THE RISE, AND LIKELY TO INCREASE FURTHER WITH THE TRANSITION TO LTE NETWORKS.

A. The average number of minutes Americans spend talking on their cell phones has increased by 6.5 times since 1996; Americans talk on their cell phones more than people

in any other country.

According to data published in 2013 by the Organization for Economic Co-operation and Development (OECD), the number of minutes Americans have spent talking on their cell phones has increased from 651 minutes per year in 1996, to 1,929 minutes in 1999, to 3,369 minutes in 2004 to 4,273 minutes in 2013 (OECD 2013). In other words, the amount of time Americans have spent talking on their cell phones has increased by a factor of 6.5 since 1996. It is also worth noting that Americans spend more talking on their phones than in other countries as the graph below demonstrates (Statista 2013).



A. Recent studies suggest that average radiation exposure will increase with the transition to LTE networks.

Some commenters have correctly stated that there was a major reduction in consumer

radiation exposure in the shift from 2G to 3G WCDMA transmission technologies. While 2G transmitted at 20-70 percent maximum SAR in average usage, 3G phones generally transmitted at levels below 1 percent of maximum SAR (Gati 2009; Vrijheid 2009).

What was not mentioned, however, is that experts have raised concerns that LTE transmission technology and its multiple-in/multiple-out antenna designs have transmission characteristics similar to 2G technology and that exposure will be a larger fraction of maximum SAR than 3G technology (Shi 2012; Anderson 2011). One recent study, for example, has shown that, for a given power output to the antenna, the newer 4th generation LTE antenna design produces a SAR value that is 2-to-60 times greater than the 2G and 3G designs (Shi 2012).

V. THE NEW “SAR TICK” INITIATIVE AND OTHER EFFORTS BY THE FCC AND THE CELL PHONE INDUSTRY DOES NOT COME CLOSE TO PROVIDING SUFFICIENT REAL-WORLD INFORMATION FOR CONSUMERS ABOUT CELL PHONE RADIATION.

A. The FCC and industry acknowledges the inherent problems with using SAR as a proxy for exposure. Therefore, any education efforts that focus on SAR values will be insufficient to satisfy consumers’ right-to-know.

On its website the FCC describes in detail why the maximum Specific Absorption Rate (SAR) – currently the *only* RF exposure metric tested by the FCC and made available to consumers – is not a good predictor of actual exposure to RF energy from cell phones (FCC 2013). The FCC notes, for instance, that “a single SAR value does not provide sufficient information about the amount of RF exposure under typical usage conditions to reliably compare individual cell phone models” (FCC 2013). Therefore, doing a slightly better job at disclosing SAR values to consumers will accomplish little.

B. RF exposure varies by service provider, transmission technology, frequency bands, location and proximity to cell phone towers.

Recent studies have indicated that a consumer's choice of wireless network, with its associated frequency bands and transmission encoding, may be a more important factor in cell phone RF exposure than the cell phone model. The technology used in transmitting and encoding cell phone signals has been changing every few years: from GSM to CDMA to WCDMA and most recently to LTE. The changing antenna design, transmission frequency and encoding have large effects on average RF exposure levels (Shi 2012, Kelsh 2011).

As described above, for a given power output to the antenna, the newer 4th generation LTE antenna design produces a SAR value that is 2-to-60 times greater than the 2G and 3G designs (Shi 2012). Research has shown that there was a major reduction in consumer radiation exposure in the shift from 2G to 3G WCDMA transmission technologies. While 2G transmitted at 20-70 percent maximum SAR in average usage, 3G phones generally transmitted at levels below 1 percent of maximum SAR (Gati 2009; Vrijheid 2009). As the technology has evolved, concerns have been raised that LTE transmission technology with multiple-in/multiple-out antenna designs have transmission characteristics similar to 2G technology and that exposure will be a larger fraction of maximum SAR than 3G technology (Shi 2012; Anderson 2011).

Although studies have found marked differences in average SAR levels among cell phone networks, the FCC currently provides consumers with absolutely no information to assist them in choosing a cell phone provider that will expose them to lower cell phone RF energy. This not only inhibits consumer's ability to make informed purchasing decisions, it also deprives the public of its right to know. Because it is now clear that cell phone network technologies affect RF exposure as much as the phone design itself, the FCC-mandated exposure metrics should incorporate both parameters in an expected in-use SAR rating.

V. THE FCC SHOULD DISMISS ASSERTIONS THAT ENCOURAGING METHODS

FOR LIMITING RF EXPOSURE AND PROVIDING ADDITIONAL CONSUMER DISCLOSURE WILL CAUSE CONFUSION, ALARM, AND/OR DISCOURAGE THE USE OF PORTABLE DEVICES.

CTIA suggests that providing more information to consumers about cell phone radiation standards and ways to reduce exposure would create unnecessary fear, confusion, and discourage the use of mobile devices. This is absurd. Given their incredible usefulness, it is quite clear that consumers will continue to buy and use mobile devices. Consumers receive many types of warnings and advice on a vast array of consumer products that remain widely used nonetheless; there is nothing to suggest that cell phones would follow a different trend.

CTIA suggests that setting a conservative standard could “have the perverse effect of increasing public anxiety,” yet it is more likely that the setting of health protective RF standards will have the opposite effect and ease public anxiety. Consumers will view this as a positive response to a potential public health issue, and see that the FCC is taking the health of children into account. The public wants regulations that will protect them. If the government errs on the side of caution, the public will have the peace of mind to know that good faith efforts are being made to protect from potential adverse health effects. If the government errs of the side of less protection, this decreases trust in regulatory agencies and does not ease anxieties about potential harm.

VI. RECENT INTERNATIONAL ACTIONS SHOW GROWING CONCERN OVER POTENTIAL EFFECTS OF CELL PHONE RADIATION, PARTICULARLY FOR CHILDREN.

Several parties stated in their comments to the FCC that there is international consensus that cell phone radiation poses no health concerns and that the current standards are overly conservative. Recent action taken by countries around the world, however, demonstrate that this

assertion is false. In reality, there are a growing number of countries who are taking precautionary action as well as increasing consumer access to information.

France

In 2010, The French government banned cell phones directed at children under 6, cell phone advertising to youth under 14, and restricted use of mobile phones in school by children during lesson times (Article L511-5, Code of Education). All phones sold in France must come with a headset, and SAR values must be displayed at the point of purchase whether in stores or online. The French government, through its National Institute for Prevention and Health Education operates a cell phone safety educational program (France NIPHE 2013).

Belgium

In October of 2013, Belgium adopted new cell phone regulations that bar mobile phone models designed for, and marketed to children ages 7 and younger. Under Belgium's new rules, slated to take effect next March, cell phone retailers will be also required to disclose phones' SAR values at the point of sale (Belgium FPS 2013).

India

In 2012, the Indian Department of Telecommunications ruled that all new cell phone models manufactured in or imported into India shall "comply with the SAR values of 1.6 W/kg averaged over 1 gram of human tissue," as of September 1, 2013 and existing models that are compliant with the European standards of 2.0 W/kg averaged over 10 gram of human tissue are only be manufactured in or imported into India until August 31, 2013 (India DOT 2012). The Indian government also requires that SAR values be displayed at the point of sale.

European Union

Member states of the Council of Europe adopted a resolution in 2011 recommending among other things, to “take all reasonable measures to reduce exposure to electromagnetic fields, especially to radio frequencies from mobile phones, and particularly the exposure to children and young people who seem to be most at risk from head tumours” (Council of Europe 2011).

In 2008, the European Parliament approved a resolution calling for stricter exposure limits for cell phones and other wireless devices. “[The Parliament notes] that the limits on exposure to electromagnetic fields which have been set for the general public are obsolete. They do not take account of developments in information and communication technologies or vulnerable groups, such as pregnant women, newborn babies and children. The plenary therefore calls on the Council... to take into account the Member States' best practices and thus to set stricter exposure limits for all equipment which emits electromagnetic waves in the frequencies between 0.1 MHz and 300 GHz” (European Parliament 2008b). Article 22 of the 2008 Resolution highlights the importance of the precautionary approach supported by the European Environment Agency and promotes adoption of the stricter emission standards such as those developed in Belgium, Italy and Austria (European Parliament 2008a).

The European Parliament resolution on “Health concerns associated with electromagnetic fields” (INI/2008/2211), adopted by 559 votes to 22 on 2 April 2009, called for bringing greater transparency to the radiofrequency radiation exposure and for adoption of precautionary measures. The resolution stated: “Wireless technology (cell phones, Wi-Fi/WiMAX, Bluetooth, DECT landline telephones) emits EMFs that may have adverse effects on human health. Most European citizens, especially young people aged from 10 to 20, use a cell phone, while there are

continuing uncertainties about the possible health risks, particularly to young people whose brains are still developing” (European Parliament 2009). The resolution also called for a “wide-ranging awareness campaign should be initiated to familiarize young Europeans with good cell phone techniques, such as the use of hands-free kits, keeping calls short, switching off phones when not in use (such as when in classes) and using phones in areas that have good reception.”

Switzerland

The Swiss Federal Office of Public Health states on its website that although the one study looking at mobile phone use and brain tumors in children did not find a link, there is “uncertainty over the extent to which children's heads absorb radiation and about the effect on the development of nerve tissue and the brain. These uncertainties and the fact that mobile phone usage is beginning at an increasingly young age justify the use of low-emission mobile phones, especially in children and adolescents” (Swiss FOPH 2013). Similar findings are made for impacts of cell phone radiation on sperm, stating that: “As a precaution, mobile phones should not be positioned close to the genitals when making calls with hands-free devices.” In general, the Office advises consumers to minimize their exposure by using a hand-free system, keeping calls short, buying phones with low SAR values and using phones when the signal quality is good.

Germany

The German Federal Office for Radiation Protection (Bundesamt für Strahlenschutz, BfS) has created a “Blue Angel” eco-seal for low-emission cell phones, which are defined as those phones have emissions at or below 0.6 W/kg (BfS 2013a). BfS recommends a precautionary approach to cell phone use, particularly for children, such as using a landline;

making shorter cell phone calls; avoiding using a cell phone when the connection is weak; and, as much as possible, using a headset and substituting text messaging instead of making a call (BfS 2013b).

Israel

In 2008, Israel's Ministry of Health stated that although it is still not clear whether cell-phone use is connected to an increased risk of developing cancerous growths, current research already supports a policy of "preventive caution" (Israel Ministry of Health 2008). The Ministry published a set of guidelines that called for limiting children's use of cell phones, avoiding cellular communication in enclosed places such as elevators and trains, and using wired, not wireless, earpieces (Azoulay 2008). The Ministry developed these guidelines following a national study that detected an association between cell phone use and the risk for developing tumors of the salivary gland (Sadetzki 2008; Traubmann 2007).

Canada

Canada's federal public health department, Health Canada, states on its website: "Health Canada reminds cell phone users that they can take practical measures to reduce their RF exposure by: limiting the length of cell phone calls, using "hands-free" devices, replacing cell phone calls with text messages." "Health Canada also encourages parents to take these measures to reduce their children's RF exposure from cell phones since children are typically more sensitive to a variety of environmental agents" (Health Canada 2013).

United Kingdom

The UK Department of Health supports "a precautionary approach" to the use of cell phones until more research findings become available. In 2000, the UK convened an expert panel

to examine the potential health effects of cell phone radiation, and the results were published in what became known as the “Stewart Report.” As described on Public Health England’s website:

“This expert group concluded that there was no clear scientific evidence of harm to health from exposure to mobile phone signals. However, the expert group was concerned about the widespread adoption of a new technology involving exposure from radio waves to people's heads, including those of children, at levels that are significant fractions of international guidelines. This, and some uncertainties in biological evidence, led the expert group to advise some precaution, particularly in the use of mobile phones by children. This advice was accepted by the Department of Health and leaflets and other information were provided for the public in 2000 and 2004. The basic advice from the Stewart Report continues to be the advice of the Health Protection Agency. The benefits of mobile telecommunications are widely recognised but, given the uncertainties in the science, some precaution is warranted particularly regarding the use of handsets held against the head. This is especially relevant to the use of handsets by children and the Agency recommends that excessive use by children should be discouraged” (Public Health England 2013).

Finland

In January 2009, the Finnish government stated that children's cell phone use should be restricted, for example, by sending text messages instead of talking, making shorter calls, using a hands-free device, and avoiding the use of cell phones when connection is weak. According to the Finnish report, “although research to date, has not demonstrated health effects from cell phone’s radiation, precaution is recommended for children as all of the effects are not known” (STUK (Finnish Radiation and Nuclear Safety Authority) 2009).

The Finnish Radiation and Nuclear Safety Authority's website states that children have a "special status as mobile phone users, among others, because brains continue to develop even up to 20 years of age. It should also be taken into account that children will have much more time to use mobile phones than adults today who started their regular mobile phone use only about ten years ago. The risk of long-term use of mobile phones cannot however be assessed with certainty until mobile phones have been in use for several decades. On the grounds of the above-mentioned facts, STUK states that it is reasonable to restrict children's use of mobile phones..." (STUK (Finnish Radiation and Nuclear Safety Authority) 2013).

Russia

Listed in the Sanitary Rules of the Russian Ministry of Health (SanPiN 2.1.8/2.2.4.1190-03 point 6.9), are cautions against persons under 18 using mobile phones. The National Committee for Non-Ionizing Radiation Protection issued guidance in 2008 on the subject of children and mobile phones based on the concern and cite potential risk of illness from cell phone use to children under 16, pregnant women, epileptics, and people with memory loss, sleep disorders and neurological diseases (RNCNIRP 2008). Both the Russian Ministry of Health and the members of Committees of health protection in the Russian Parliament support the viewpoints of the RNCNIRP.

VII. TAKING PRECAUTIONARY MEASURES IS NOT UNSCIENTIFIC.

EWG strongly disagrees with CTIA's suggestion that "the fundamental nature of the "precautionary principle" means that those decisions are untethered from the existing body of scientific research." It is unnecessary and onerous to require absolute certainty before implementing standards and regulations intended to protect public health. If the scientific

evidence is sufficiently suggestive that there is a potential risk to public health, action should be taken to prevent that threat. This is the basis of the precautionary principle. Decisions under this paradigm are made with the recognition that there are always unknowns in science.

The precautionary principle is highly regarded and used by scientists and government agencies worldwide. In the European Union, the precautionary principle is accepted as an important aspect of environmental policy (Europa 2011). It is embedded in a number of environmental and public health policies in countries such as Denmark, Germany, United Kingdom and Sweden (Lokke and Christensen, 2008). Denmark, for example, utilized the precautionary principle to call for the prohibition of phthalates in children's toys (1997), to recommend avoiding triclosan in consumer goods (2001) and to recommend that specific sunscreen ingredients (4-MBC) should not be used on children under 12 years (2001) (Lokke and Christensen 2008).

The precautionary principle is also well utilized in the United States. The San Francisco Department of the Environment highlights the principle as “the first guiding principle [to reduce the impact of harmful chemicals on San Franciscans and [the] environment]” (San Francisco Department of the Environment 2013). The American Public Health Association, “recognizing that public health decision must often be made in the absence of scientific certainty, or in the absence of perfect information” explicitly endorses the precautionary principle “as a cornerstone of preventative and public health practice” (APHA 2000).

According to Kriebel (2001), one of the primary tenets of the precautionary principle is to take “preventative action in the face of uncertainty”. In this vein, health agencies in six nations – Switzerland, Germany, Israel, France, United Kingdom and Finland – have recommended reducing children's exposure to cell phone radiation in light of growing evidence of adverse

health impacts.

The CTIA also suggested that “further precautionary measures” would be arbitrary and capricious. However, there is new scientific evidence that children may be at an increased health risk, in addition to new data in animals and people suggesting what those health risks may be. Therefore further precautionary measures taken by FCC would neither be arbitrary or capricious. Not only are precautionary actions perfectly reasonable, in light of the new science they necessary to protect public health.

The precautionary principle is an important tool to help protect the public from environmental risks and remains a strong basis to call for the FCC to strengthen their cell phone radiation standards so that they will adequately protect both children and adults. Given the unknowns regarding the adverse effects of cell phone radiation and the widespread nature of exposure, the FCC is exercising remarkably little precaution in this matter.

VIII. CONCLUSION

Faced with an exploding cell phone market, growing evidence of potential harm from cell phone radiation and uncertainties that will likely remain unresolved for decades to come, it would be a mistake for the FCC to essentially weaken its standards by “harmonizing” them with international standards. Rather, this is the time to strengthen federal standards, make them more reflective of how consumers actually use their phones, provide consumers with useful, real-world information they can use to inform their choice of phones and networks, and educate consumers about other ways to reduce their exposures.

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