

**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
)	
)	

To: Office of the Secretary
Federal Communications Commission (FCC), Washington, DC 20554

As officially presented in the Federal Register/ Vol. 78, No. 107 / Tuesday, June 4, 2013 / Proposed Rules. Federal Communications Commission, 47 CFR Parts 1, 2, 15, 24, 25, 27, 73, 90, 95, 97, and 101 [ET Docket Nos. 03-137 and 13-84; FCC 13-39], Reassessment of Exposure to Radiofrequency Electromagnetic Fields Limits and Policies, Federal Communications Commission

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November 18, 2013

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Updated Reply Comments of SkyVision Solutions
and Compilation of Prior Comments As Amended
November 18, 2013

Introduction to Updated “Reply” Comments

1. Kit T. Weaver (hereafter referred to as “SkyVision Solutions”) submits these “reply” comments in response to the publication of FCC 13-39, First Report and Order, Further Notice of Proposed Rule Making and Notice of Inquiry (ET Docket No. 13-84 and ET Docket No. 03-137) released March 29, 2013, by the FCC and published in the Federal Register on June 4, 2013.
2. SkyVision Solution previously submitted “reply” comments on November 1, 2013, intended to address certain comments submitted to the FCC for its Notice of Inquiry (NOI) by the Telecommunications Industry Association (TIA) dated September 3, 2013.
3. In addition, SkyVision Solutions previously submitted comments on August 31, 2013, and “reply” comments on October 23, 2013.
4. Upon submitting “reply” comments on November 1, 2013, SkyVision Solutions was unaware that the FCC had extended the due date for submittal of reply comments until November 18, 2013. Due to this additional time allowance and developments since November 1, 2013, SkyVision Solutions is updating its prior “reply” comments as well as providing a compilation of all recent submittals to the FCC. Some editorial improvements have also been made to prior compiled comments. It is hoped that this updated submittal and compilation of comments will assist the FCC in its review. Administratively, this entire submittal should be considered as a set of “reply” comments, either as a “reply” to those comments submitted to the FCC by the Telecommunications Industry Association (TIA) on September 3, 2013, or as a “reply” to the comments or reply comments previously submitted by SkyVision Solutions for the dates of August 31, October 23, and November 1, 2013. Additionally, these “reply” comments do address a specific comment submitted by Richard A. Tell on August 27, 2013.

Statements contained herein are based both on personal knowledge as well as information and belief.

A security watermark consisting of a grid of small squares. Overlaid on the grid is the text "Security Watermark" at the top, "November 18, 2013" in the middle, and a handwritten signature "Kit T. Weaver" at the bottom.

Kit T. Weaver

Overview of Comments and “Reply” Comments

The current FCC exposure guidelines are based upon an antiquated limit system that only recognizes biological effects that occur as a result of a thermal mechanism on the assumption that the only effects of radiofrequency radiation harmful to human health are the acute effects resulting from the passage of electric current or overheating (stimulation of muscles and peripheral nerves, shocks, burns, and the heating of surface tissues).

Convincing evidence on the existence of non-thermal biological effects has been established due to consistently observed RF-dependent changes in controlled studies of biological exposure. These changes occur at levels insufficient to cause heating of tissue. Those who ignore this evidence do so based upon scientific bias, political agendas, corporate financial objectives, and/or fear of product safety liabilities, not based upon the available scientific evidence.

As a corollary observation, the International Agency on Research for Cancer (IARC) declaration in May 2011 that RF radiation emissions are *possibly carcinogenic* likely occurred due to a majority of the members of the IARC Working Group being convinced that non-thermal biological effects are plausible. This evidence cannot be ignored.

The legitimate issue at hand is to determine to what extent the observed biological effects pose a serious threat to human health as well as a source of adverse effects for fauna and flora. Some observed biological effects may be of little consequence and could be a normal response of a cell or organism to a stimulus. Other biological effects could be pathological that may imperil an organism’s normal functioning. In fact, a growing number of studies show the existence of potentially or definitely pathological biological effects.

Due to the evidence of non-thermal RF-related biological effects and the fact that FCC current exposure guidelines provide no protection against non-thermal effects or chronic exposure to low level RF radiation, it follows that the FCC guidelines provide no margin of safety and are therefore insufficient for protection of the public.

As stated, what remains as a legitimate debate is discussion on what observed biological effects caused by exposure to weak RF radiation fields are pathological and/or irreversible. It is quite rational, and in this case necessary, from a public policy perspective to provide protection against observed biological effects at non-thermal levels, whether it be as a part of a precautionary approach or as actions determined as warranted based upon a follow-up to a review of the Bradford Hill criteria for causation.

It is recommended that the FCC begin development of new biologically based public safety limits in concert with other qualified governmental agencies and professional organizations which would include representation from the medical community. This process to develop credible biologically based limits will understandably take time.

In the short term, the FCC should fully “endorse” common sense precautionary measures to at least slow the exponential growth of exposure to wireless RF technology emissions in our

society. Such measures would focus on educating the public on the voluntary nature of using personal wireless devices and how members of the public can use simple methods such as “time and distance” to reduce overall exposure.

Inherent in the precautionary approach mentioned above is that the use of wireless transmission devices in the home must be considered optional and voluntary. It is incumbent upon the FCC to issue regulations that protect electrically sensitive individuals in a way that ensures accommodation and compliance with provisions of the American Disabilities Act. It is therefore requested that the FCC promptly:

- Revise/ issue equipment authorizations for wireless smart meters to clearly stipulate that installation of such devices on individual homes requires the property owner’s consent, giving the homeowners the opportunity to use the precautionary approach in an effort to limit RF exposure.
- Mandate that all smart appliances containing an RF transmitter for communication with wireless smart meters or wireless routers be provided with a clear mechanism for the consumer to ensure that any RF transmitters contained within the device are deactivated.

There have been challenges faced over the years in having responsible scientific organizations and governments recognize the existence of potentially adverse health consequences caused by non-thermal exposures to RF radiation. The challenges have included:

- Pressure applied by the telecommunications industry to “soften” the language in research studies showing positive results related to RF exposure at low levels.
- Research studies funded by industry that tend not to find positive results, possibly aligned with a strategy of “canceling out” any other studies showing possible adverse health effects.

Such strategies by industry as outlined above tend to cloud the true public safety issues at hand and create doubt in the minds of policy makers in terms of recommending biologically based limits or implementing precautionary measures.

As constituted, the FCC has a difficult mission. As mentioned in its Notice of Inquiry, the FCC restated the agency’s responsibility to “provide a proper **balance** between the **need** to protect the public and workers from exposure to potentially harmful RF electromagnetic fields and the **requirement** that industry be allowed to provide telecommunications services to the public in the most efficient and practical manner possible.” [emphasis added]

Unfortunately, the reference to **balance** involves an inherent conflict of interest between public safety and corporate influence and profits. In the view of SkyVision Solutions, that balance has for too long been tilted in favor of the “industry.” Based upon the available scientific evidence, it is now time to objectively shift that balance back on the side of protecting public health and safety for this and future generations.

New Reply Comments of SkyVision Solutions
Submitted, November 18, 2013

Recognizing the Existence of Biological Effects Caused by Low Level Radiofrequency (RF) Radiation Exposures

In these “reply” comments, SkyVision Solutions focuses on explaining some of the challenges faced by the overall scientific community in recognizing the existence of biological effects caused by low level RF radiation exposures.

1. **The EPA Almost Recognized RF Radiation as a Possible Carcinogen**

In a 1990 [article](#) [1] by J. B. Sibbison in *The Lancet*, it was written that:

“Government officials in Washington tend to play down or even suppress news linking industrial pollutants to cancer. When I was a public relations man at the Environmental Protection Agency (EPA), their rationale, as explained to me, was always the same: ‘We don’t want to scare the public’.”

“At that time, the EPA scientists ... wanted to recommend that electromagnetic fields be classified as a ‘probable’ human carcinogen. **Radiofrequency and microwave radiation, the authors said, should be classified as a ‘possible’ human carcinogen.** [emphasis added]

About a week after the White House briefing, these recommendations were deleted by the authors’ superiors.”

[1] “USA: Danger from Electromagnetic Fields,” J. B. Sibbison, *The Lancet*, volume 336, Issue 8707, 14 July 1990, Page 106, [http://dx.doi.org/10.1016/0140-6736\(90\)91610-M](http://dx.doi.org/10.1016/0140-6736(90)91610-M).

So in 1990, serious consideration was given for recognizing RF radiation as *possibly carcinogenic* by the EPA. Apparently for what one might call “policy reasons,” it was not. Now, over 20 years later, although the International Agency for Research on Cancer (IARC) has finally made the *possibly carcinogenic* declaration for RF emissions, the FCC and organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP) are still in a state of denial.

2. **“War Games” at Motorola and Pressure to “Soften” Positive Findings**

As indicated above, one reason for “non-recognition” can be given as “We don’t want to scare the public.” Another reason is the influence of the telecommunications industry in its attempt to suppress information and denigrate any research study that show biological effects caused by RF emissions. In some cases, scientists indicate that they have been pressured to “soften” controversial findings. One of the more notable examples for this

strategy occurred in 1994 when a study was completed by University of Washington scientists Henry Lai and N. P. Singh showing that RF fields similar to those emitted by cell phones damaged rats' brain cells, breaking their DNA structures after just two hours of exposure. In this case, internal documents from Motorola demonstrate how it "[war-gamed the Lai-Singh issue](#)" and had a media strategy that included utilizing "third-party genetic experts ... with no specific background in RF ... to speak on ... Problems with the Lai-Singh studies." In addition, the internal Motorola memorandum indicated that it needed a "forceful one- or two- sentence ... standby statement that puts a **dampener** on speculation arising from this research, as best we can." [emphasis added]

Furthermore, according to a biochemist by the name of Jerry Phillips, he was contacted to perform research that would discredit the Lai-Singh studies. Phillips in fact designed a comparable experiment to investigate how radiation emitted by cell phones affected DNA in cells. He tested two slightly different radiation frequencies and exposure times, and found that in both cases the radiation did affect the cells' DNA, albeit in different ways.

According to an [article by the Toronto Star](#) in July 2005 (a portion of the article provided reprinted below in italics but without quotation marks):

Phillips recalls the sudden concern washing over the faces of Motorola executives in 1995 when he began detailing his findings on the impact of cellphone signals on rat cells.

What began as a friendly chat between Phillips and officials with the cellphone giant took an unpleasant turn when he explained that his Motorola-funded experiments revealed biological effects from cellular radio frequency signals, he says.

"There was a lot of agitation, frowning and long faces," Phillips recalls. "Rather than talking about the implications of the work, the (Motorola) attorney and the (public relations) guy immediately asked, 'What are you going to do if people call and ask for this?' It was at that point our relationship with Motorola changed."

In their research, Phillips and his colleagues found changes in the expression of rat genes exposed to cellphone signals. They didn't know what it meant, but they knew it was noteworthy. Phillips authored a paper describing the results and submitted a draft to Motorola.

He says he soon received a call from Dr. Mays Swicord, director of electromagnetic research at Motorola.

*"He said, '**You need to include a statement in here that, even though you see a change in this one gene, that it's of no physiological importance.**' I said, 'I can't say that. I don't know whether it is or not. Whether or not we have consequences, I don't know.' He said, 'No, it has to say it has no physiological consequences.' I said, 'No, I won't do it.' "* [emphasis added]

When the study was published in 1997, it contained a sentence at the end Phillips says he never wrote. It states that changes he discovered are "probably of no physiologic consequence."

The origins of that sentence remain a mystery to the now semi-retired Phillips.

"I have no idea how that statement got in there."

3. Most Independent Studies Show Results, Industry Funded Studies Do Not

The above account, although revealing, can be considered as anecdotal in nature. In addition, however, there is evidence that industry funded studies suffer from systematic bias towards **not** finding evidence of biological effects from research related to RF exposure. Based upon an [article](#) [2] dealing with the "Source of Funding and Results of Studies of Health Effects of Mobile Phone Use," a conclusion was reached that "Our study indicates that the interpretation of the results from existing and future studies of the health effects of radiofrequency radiation should take sponsorship into account."

As indicated in the article/abstract, "We examined whether the source of funding of studies of the effects of low-level radiofrequency radiation is associated with the results of studies. We conducted a systematic review of studies of controlled exposure to radiofrequency radiation with health-related outcomes (electroencephalogram, cognitive or cardiovascular function, hormone levels, symptoms, and subjective well-being)."

Based upon a systematic review of experimental studies, "Most (68%) of the studies assessed here reported biologic effects," while only 33% of studies funded by telecommunications industry showed at least one result suggesting a biological effect form RF exposure. [emphasis added]

The article attempted to provide possible explanations for the "association between source of funding and results ... in the context of clinical research sponsored by the pharmaceutical industry ([Baker et al. 2003](#); [Bekelman et al. 2003](#); [Lexchin et al. 2003](#)). The association could reflect the selective publication of studies that produced results that fitted the sponsor's agenda. Sponsors might influence the design of the study, the nature of the exposure, and the type of outcomes assessed. In multivariate logistic regression analysis, the only factor that strongly predicted the reporting of statistically significant effects was whether or not the study was funded exclusively by industry. We stress that our ability to control for potential confounding factors may have been hampered by the incomplete reporting of relevant study characteristics."

[2] "Source of Funding and Results of Studies of Health Effects of Mobile Phone Use: Systematic Review of Experimental Studies," Huss, et.al., *Environmental Health Perspectives*, 2007 January; 115(1): 1–4, <http://dx.doi.org/10.1289%2Fehp.9149>.

4. Business Bias

As stated in a document [3] prepared by [Angelo Gino Levis](#), Valerio Gennaro, and Spiridione Garbisa, the term “business bias” in occupational and environmental epidemiology can be understood as “an intentional study bias, specifically set up to prioritize both economic and career-related ambitions over scientific research, whose legitimate goal should be the minimization of avoidable health damage.”

Further quoting the above reference as explained in [3], “Discussion on the need to minimize exposure to electromagnetic fields (EMF) (frequency range: 0– 300 GHz) has for over half a century been split between two irreconcilable positions. On the one hand, a [so-called] ‘conservative’ stance rooted in the definition of exposure limits fixed since the mid-1950s on the assumption that the only effects of EMF dangerous to human health are the acute effects resulting from the passage of electric current or overheating (stimulation of muscles and peripheral nerves, shocks, burns, heating of surface tissues). ... This position was agreed upon at the end of the 1990s by a group of scientists which was **self-constituted** under the International Commission for Non-Ionizing Radiation Protection (ICNIRP).” [emphasis added]

“On the other hand, a large part of the scientific community – especially where there is no constraint from funding by manufacturers or managers/operators of the technologies concerned – maintains a ‘cautionary’ position based on application of the Precautionary Principle and the necessity to minimize EMF exposures. This position is justified by both epidemiological and experimental data. The former data – documented after exposure of human subjects to EMF so weak as to be able to exclude any significant heating – show immediate and long-term health effects including tumors and cancers, while the latter data reveal biological effects on in vitro systems, animals and human volunteers, indicating molecular, cellular and functional mechanisms supporting a biological plausibility,” as summarized below:

Mechanisms of Biological Action Supporting the Plausibility of Non-thermal Biological Effects Caused by RF/EMF

- 1) “Alteration of the synthesis of the hormone melatonin, involved in the deactivation of peroxide radicals, which produce DNA damage triggering carcinogenesis;
- 2) Stimulation of Fenton’s reaction, with consequent increase in damage due to free radicals on biological macromolecules;
- 3) Modification of the permeability of the cell membrane and consequent alteration of the flow of biologically important ions, in particular calcium;

- 4) Modification of the brain's electrical activity and of the permeability of the hemato-encephalic membrane, with consequent damage to the cerebral neurons and alteration of the functioning of the cerebral neuroreceptors and neurotransmitters;
- 5) Alteration of the functioning of the immune system;
- 6) Inhibition of apoptosis (programmed cell death);
- 7) Expression of heat shock proteins;
- 8) Genetic and epigenetic effects;
- 9) Synergistic interactions with other carcinogens (ionizing radiation, polycyclic aromatic hydrocarbons, benzene derivatives)."

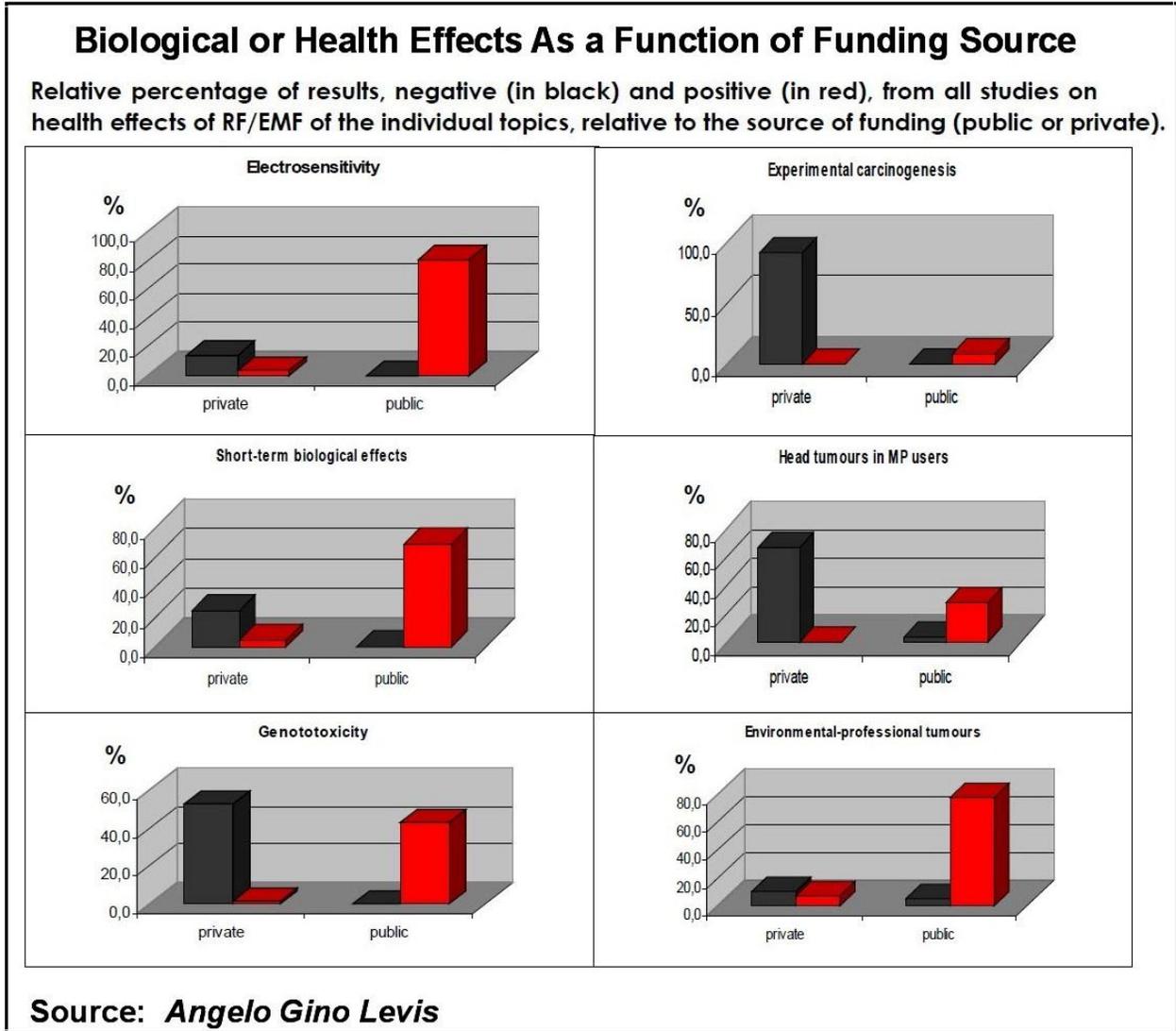
"[M]ajor national and international agencies and commissions are compromised by conflicts of interests and, as a result, make reference only to studies with negative results, that is, that are reassuring, so confirming the complete inability of mobile telephony radiation to induce head tumors, disregarding, dismissing or even manipulating the results of Hardell's work and even those – despite their indication of increased cancer risk – reported in some of the same Interphone studies."

"A critical review of studies on the biological and health effects of RF/ EMF found that, out of 1,056 articles published in peer-reviewed journals, 44 percent reported negative results (no effect), with 93 percent being funded either by private bodies or by non-specified sources. Instead, 56 percent of the articles reviewed reported some kind of biological effect or harm to health, with 95 percent funded by public bodies (Levis et al. 2012b)." Refer to the figure below (or next page).

The book referenced by [3] appropriately quotes portions of a [resolution and explanatory memorandum](#) adopted by the Committee on the Environment, Agriculture and Local and Regional Affairs of the European Parliament (EP):

- "With regard to the frequently inconclusive if not contradictory findings of scientific research and studies on the possible risks of products, medicines or, in this case, electromagnetic fields, a number of comparative studies do seem to suggest a fairly strong correlation between the origin of their funding – private or public – and the findings of risk assessments, a manifestly **unacceptable** situation pointing to **conflicts of interest** which undermine the integrity, the genuine independence and the objectivity of scientific research." [emphasis added]
- "After analysing the scientific studies available to date, and also following the hearings for expert opinions organised in the context of the Committee on the Environment, Agriculture and Local and Regional

Affairs, **there is sufficient evidence of potentially harmful effects of electromagnetic fields on fauna, flora and human health to react and to guard against potentially serious environmental and health hazards.** [emphasis added]



[3] As initially quoted for these “reply” comments, the source document was an unpublished study prepared by Levis, Gennaro, and Garbisa entitled, “Business Bias As Usual: The Case of Electromagnetic Pollution.” In final preparation for these “reply” comments and sourcing of references, it was determined that the essence of the referenced document has been published as Chapter 11 in a book titled, Social Costs Today: Institutional Analyses of the Present Crises, edited by Ramazzotti, Frigato, and Elsner, Published by Routledge, 2012, <http://www.routledge.com/books/details/9780415508469/>.

5. Some Scientists Summarily Dismiss Low Level Effects as Contentious, Unproven Speculations: Indication of Bias

In an [article](#) [4] in the *Health Physics* journal in 2007 regarding thermal mechanisms of interactions of RF energy with biological systems, a number of statements are made that essentially exclude non-thermal exposure mechanisms from consideration in establishing exposure guidelines. In addition, a discussion of utilizing the concept of a precautionary approach is completely avoided by omission. Quoting a few relevant portions of the article:

“International Commission on Non-Ionizing Radiation Protection (ICNIRP): ‘These guidelines are based on short-term, immediate health effects such as stimulation of peripheral nerves and muscles, shocks and burns caused by touching conducting objects, and elevated tissue temperatures resulting from absorption of energy during exposure to EMF’ (ICNIRP 1998).”

“In this paper, we consider the role of a mechanistic understanding of thermal hazards in setting exposure guidelines. ... We do not consider the **contentious** issue of hazards from low-level exposures to RF energy. No such hazards have been **proven**, and for that reason none have played any direct role in the IEEE and ICNIRP exposure guidelines. ... Research on the effects of chronic exposure and **speculations** on the biological significance of low-level interactions have not changed the scientific basis of the adverse effect level.” [emphasis added]

“Injuries or illness from **chronic** exposure to RF energy at nonthermal levels, which is the subject of great public discussion, remain **unproven.**” [emphasis added]

The above quotations are provided to highlight the somewhat arrogant treatment of the “contentious” issue of chronic exposure to non-thermal RF exposure hazards. Such hazards are summarily dismissed as “unproven,” despite consistently observed biological effects that occur at levels insufficient to cause heating of tissue. This attitude is attributed to a **scientific bias** to exclude evidence that does not comport with established beliefs.

[4] Thermal Mechanisms of Interaction of Radiofrequency Energy with Biological Systems with Relevance to Exposure Guidelines,” Foster and Glaser, *Health Physics*, 92 (2007) 609-620, <http://www.ncbi.nlm.nih.gov/pubmed/17495663>.

6. Irrational Strategy to “Cancel” a Positive Study with a “Negative” Study

According to another [article](#) [5] published in 2009, “When scientists maintain their beliefs in the face of contrary data, two diametrically opposed situations may result. On the one hand, data are seen as either right or wrong and there is no discussion to resolve disparities. On the other hand, and as Francis Crick has pointed out, scientists who hold theoretically opposed positions may engage in fruitful debate to enhance understanding of underlying principles and advance science in general. While the latter certainly is preferable, there are external factors involving economics and politics that keep this from happening. It is time to acknowledge this and embark on the path of fruitful discussion.”

The article further suggested that studies which find biological effects attributable to non-thermal effects are increasingly subjected to a “weight of evidence” evaluation. In such evaluations, it is pointed out that “the distinction between weight of evidence and strength of evidence often is lacking or not defined, and differences in methodologies between investigators are not considered. Consequently, weight of evidence generally amounts to what Krimsky refers to as a ‘seat-of-the-pants qualitative assessment.’ ... “To some investigators, weight of evidence does indeed refer to the balance (or imbalance) between the number of studies producing apparently opposing results, without regard to critical experimental variables.” [emphasis added]

Thus to some, based upon the above viewpoint, **the evaluation of evidence amounts to a strategy whereby one study showing non-thermal biological effects is simply canceled by any similar study showing no effect without a critical review of the experimental procedure and the investigator’s interpretations and conclusions.** Such a strategy, to the extent it exists, is not productive to the intelligent debate necessary for the full scientific community to arrive at explanations to describe the underlying mechanisms for consistently observed biological effects occurring as a result of non-thermal exposures to RF radiation.

[5] “Electromagnetic Fields and DNA Damage,” Phillips, et.al., *Pathophysiology*, 16 (2009) 79–88, <http://www.ncbi.nlm.nih.gov/pubmed/19264461>.

7. Specific Reply Comment for FCC Comments Submitted by Richard A. Tell

On August 27, 2013, Richard A. Tell submitted comments to the FCC which included the following statement:

“There is no need to recommend minimizing exposure below present SAR based limits. The safety factor of 50 associated with the present SAR based lower tier exposure values, for the general public, are already so far below the threshold of established adverse biological effects as to represent a practical **zero probability** of harmful effect.” [emphasis added]

The above statement reflects the “thermal paradigm” of those who refuse to accept the plausibility of EMF/RF non-thermally induced biological effects. The Tell statement reflects an inappropriate straw man argument that could mislead people into thinking that there is a “zero probability” of adverse health effects occurring if one maintains RF exposures below current FCC exposure guidelines.

SkyVision Solutions and a major portion of the scientific community have already established that non-thermal biological effects do occur as a result of exposure to low levels exposures to RF radiation emissions. Once one accepts this scientific fact, then one can no longer truthfully state that there is a “zero probability” of adverse biological effects.

The legitimate issue at hand is to determine to what extent the observed biological effects pose a serious threat to human health as well as a source of adverse effects for fauna and flora. Some observed biological effects may be of little consequence and could be a normal response of a cell or organism to a stimulus. Other biological effects could be pathological that may imperil an organism’s normal functioning. In fact, a growing number of studies show the existence of potentially or definitely pathological biological effects.

Therefore, the above referenced Tell statement, made from the perspective from someone who adheres to a “thermal paradigm,” becomes irrelevant to the topic of protecting public health and safety. Due to the available scientific evidence, however clouded by the attempts of industry and those adhering to the “thermal paradigm,” a precautionary stance is warranted in an effort to help protect this and future generations of our population and the environment.

8. Austrian AUVA Insurance Company Report, 2009, Non-thermal Effects Confirmed

Despite denials of non-thermal biological effects from organizations such as the ICNIRP, the Austrian Social Insurance for Occupational Risks (AUVA) commissioned the Vienna Medical University to carry out its own research project, focused on the effects of cell phone radiation on the brain, immune system, and proteins. The AUVA report issued in 2009 was entitled, "[Investigation of Nonthermal Effects of Electromagnetic Radiation in the Cell Phone Frequency Range \(ATHEM\)](#)." The title of the report itself (by using the word non-thermal) runs in direct opposition to the representatives of the "thermal paradigm" which includes organizations such as the ICNIRP that only recognize biological effects caused by the heating of tissue.

In July 2009 diagnose-funk.org released an *English* version of an [AUVA Report Summary](#). Below are noteworthy quotes from the AUVA report that confirm the existence of non-thermal biological effects:

- "The research project ATHEM, therefore, has been aimed at studying the burning issue of potential interactions between RF/EMF and biology. (p. 7) (...) The significance of the experimental investigations also lies in the fact that the demonstrated effects, which do not necessarily have disease relevance (e.g. EEG changes), should not even have occurred according to the strictly thermal interaction mechanism that would have been covered by current exposure guidelines." (p. 8)
- "Beyond that, the significance of the results also lies in the fact that the effects should not even have occurred when assuming exclusively thermal effects, which current exposure guidelines are based on. ***Thus, these effects are further evidence for the existence of nonthermal effects.***" (p. 168, see also p. 62) [emphasis added]
- "During and after the actual exposures, certain brain waves (the so-called EEG alpha band 8-13 Hz) changed. Some of the changes were statistically significant." (p. 62)
- "Some of the exposure effects were comparable with earlier studies and some of them were confirmed. In addition, new important effects were observed that may help clarify the effect mechanism of low-level RF radiation exposures on the central nervous system. (p. 92)
- ***Without any doubt, the results represent biological effects that cannot be caused by thermal mechanisms*** ... Furthermore, since the effects occurred mostly independent of whether the respective side of the head was exposed or not, ... ***a purely thermal effect mechanism may be excluded.***" (p. 93) [emphasis added]

- “Two of the significantly changed protein levels occurred in the cytoskeleton proteins..., suggesting the cell phone radiation may have a great impact on important intracellular processes.” (p. 118)
- “For the first time, it was shown that cell phone radiation exposure causes a notable change in protein synthesis profiles.” (p. 168)
- “Various neurodegenerative disorders are triggered, among other things, because nerve cells show a relatively high rate of protein synthesis, which the protein transport and distribution systems of the cell cannot handle anymore. The observed cell degenerations in neurodegenerative disorders are, for the most part, attributed to this mechanism. Under these circumstances, a further increase in the rates of protein synthesis in sensitive nerve cells may seem detrimental to human health.” (p. 137)
- “With the application of highly sensitive testing methods, it was possible to find clearly **reproducible** biological effects of cell phone radiation in cultured cells. A groundbreaking finding of this project is that cell phone radiation exposure leads to an increased formation of new proteins (e.g., **stress proteins as a sign of cell stress**, etc.) in reactive cells.” (p. 137) [emphasis added]
- “The observed pattern of a generally increased protein synthesis indicates an exposure-dependent protein inactivation. This would also explain why in metabolically active cells naturally occurring DNA breaks—caused by free radicals—are not sufficiently repaired anymore, resulting in **increased DNA breaks in cells that are exposed**.” (p. 138) [emphasis added]
- “One of the observations showed that, among the different cells, those respond particularly strongly, which are metabolically active (editor’s note: anabolic and catabolic process during metabolism). **This cell property is especially pronounced in growing tissues, that is, in children and youth. Consequently, these population groups would be more susceptible to the described effects.**” (p. 138) [emphasis added]
- “The radiation-induced effects observed, however, were not always dosage-dependent as would be expected from thermal effects. Some cells showed an even stronger response when the 5-minute exposure was followed by a 10-minute break (intermittent exposure). **This would also support a nonthermal effect mechanism. The project results, therefore, serve as a further confirmation of the existence of so-called nonthermal effects.**” (p.169) [emphasis added]

9. Radiation from Wireless Technology Affects the Blood, the Heart, and the Autonomic Nervous System

Despite the challenges for recognizing the existence of biological effects caused by low level radiofrequency (RF) radiation exposures, newly published reports documenting such effects are published on what almost seems a daily basis. One [article](#) [6] by Magda Havas published just in the last month describes how radiation from wireless technology affects the blood, the heart, and the autonomic nervous system.

Quoting the abstract for the Havas article:

“Exposure to electrosmog generated by electric, electronic, and wireless technology is accelerating to the point that a portion of the population is experiencing adverse reactions when they are exposed. The symptoms of electrohypersensitivity (EHS), best described as rapid aging syndrome, experienced by adults and children resemble symptoms experienced by radar operators in the 1940s to the 1960s and are well described in the literature.

An increasingly common response includes clumping (rouleau formation) of the red blood cells, heart palpitations, pain or pressure in the chest accompanied by anxiety, and an upregulation of the sympathetic nervous system coincident with a downregulation of the parasympathetic nervous system typical of the ‘fight-or-flight’ response.

Provocation studies presented in this article demonstrate that the response to electrosmog is physiologic and not psychosomatic. Those who experience prolonged and severe EHS may develop psychologic problems as a consequence of their inability to work, their limited ability to travel in our highly technologic environment, and the social stigma that their symptoms are imagined rather than real.” [emphasis added]

The final statements of the Havas article are:

“If we choose to minimize exposure by establishing biologically based guidelines rather than the current thermal guidelines, by encouraging *wired* Internet access in schools, universities, hospitals, workplaces, and homes, by installing *wired* smart meters, and by establishing RF-free zones for those who are highly sensitive, then we can reverse much of the damage that has been inflicted. The choice is ours, and the real question is, ‘Do we have the foresight and courage to make the right decision or will we require a health tsunami before we act?’” [emphasis added]

[6] “Radiation from Wireless Technology Affects the Blood, the Heart, and the Autonomic Nervous System,” Magda Havas, *Reviews on Environmental Health*, Volume 28 (November 2013), Issue 2-3, Pages 75–84, <http://dx.doi.org/10.1515/reveh-2013-0004>.

10. Summary for “Reply” Comments for November 18, 2013

Based upon the evidence presented, it is clear that challenges have been faced over the years in having responsible scientific organizations and governments recognize the existence of potentially adverse health consequences caused by non-thermal exposures to RF radiation. Some of these barriers have included the following:

- Non-conservative political decisions are made by governments in an attempt to not “scare” or create “anxiety” for the public.
- Pressure is applied by the telecommunications industry to “soften” the language in research studies showing positive results related to RF exposure at low levels. Resisting industry pressure can limit career potential for scientists and researchers as well as jeopardize future research funding.
- Research studies funded by industry tend not to find positive results, possibly aligned with a strategy of “canceling out” any other studies showing possible adverse health effects. Such a strategy tends to create doubt in the minds of policy makers in terms of recommending biologically based limits or implementing precautionary measures.
- Biased scientists tend to summarily dismiss studies showing biological effects at thermal RF radiation levels, labeling such studies as contentious and unproven. Such actions tend to create polarized beliefs between competing groups of scientists. As a result, intelligent and fruitful scientific debate does not occur in an attempt to enhance the understanding of consistently observed biological effects that occur at low levels of RF exposure.

Despite the challenges in having non-thermal biological effects recognized by some bureaucratic scientific organizations and many so-called Western governments, the evidence mounts each day to affirm that such biological effects exist. In many medical and scientific circles, it isn’t even an issue any longer. The evidence exists and is convincing. Those who ignore the evidence do so based upon scientific bias, political agendas, corporate financial objectives, and/or fear of product safety liabilities, not based upon the available scientific evidence.

Reply Comments of SkyVision Solutions

Submitted, November 1, 2013 (Amended)

Summary of “Reply” Comments for November 1, 2013

1. A phrase presented by the TIA in its comments is analyzed, i.e., *“epidemiological studies to date give no consistent or convincing evidence of a causal relation to RF exposure and any adverse health effect.”*
2. Epidemiological studies are important in evaluating adverse effects, but human case studies, animal studies, and in-vitro studies are also crucial in forming a complete picture of the possible health effects caused from exposure to RF radiation.
3. Use of the terms consistent and convincing evidence by organizations such as the TIA need to be treated with a fair amount of skepticism. With the type and amount of collective evidence available in the published literature, it is quite possible for one to objectively conclude that the hypothesis (or universal statement) that adverse health effects from RF exposure can only be caused through a thermal mechanism has been falsified. Consequently, claims continuing to be made by individuals or organizations that consistent or convincing evidence does not exist for RF emissions causing adverse health effects should be treated with skepticism and questioned as to possible bias. Additionally, it is inappropriate to accuse scientists who engage in the scientific process of falsification as “cherry picking.” On the contrary, those who suppress available scientific literature which identifies adverse health effects attributed to exposure to RF radiation are those who are engaging in the practice of cherry picking.
4. There is a possible parsing of words in claims made by such organizations as the TIA, the IEEE, and the ICNIRP when they claim adverse health effects have not been proven. Possibly they are secretly admitting that weak RF fields cause “health effects” but not necessarily “adverse health effects.” The scientific community, including the ICNIRP, IEEE, and the FCC should be more open about acknowledging that biological effects do result from exposure to weak RF emissions. Once this admission occurs, a more intelligent discussion can proceed regarding which biological effects should be considered “adverse” and which effects are benign, reversible, or non-pathological.
5. A causal relation is one in which there is a direct relation between one event (A) and another event (B), where A precedes B and causes B. Causality can be difficult to prove with certainty. The FCC uses a “bright line” approach to exposure standards which may not be in the best interests of protecting public health and safety in cases where a credible threat from RF exposure exists but

which cannot be proven with 100% certainty. Using the Bradford Hill criteria for assessing causality, it is asserted that a “causal link” can be established, based upon existing published literature, i.e., that RF exposure from wireless devices can cause adverse health effects. This assertion does not have to be proven with certainty to establish this causal link; one will take actions in proportion to the strength of the argument. It is shown that the concept of a precautionary approach is the modern or contemporary version of the application of Hill’s criteria for causation.

6. The current FCC exposure guidelines are based upon an antiquated limit system that only recognizes biological effects that occur as a result of a thermal mechanism. FCC exposure guidelines provide no protection against non-thermal related exposures and certainly no margin of safety. It is quite rational to provide protection against consistently observed biological effects at non-thermal levels, whether it be as a part of a precautionary approach or as actions determined as warranted based upon a follow-up to a review of the Bradford Hill criteria for causation.
7. It is a positive development within the telecommunications industry over the past several years that the power output for modern cellular phones has dropped substantially through such mechanisms as adaptive power control (implemented in order to preserve battery strength). However, many of the devices to be used in the future will not necessarily be powered by batteries. It is therefore imperative that wireless smart meters and smart appliances installed for home use be provided with mechanisms that allow the consumer to deactivate such RF transmitters.

Reply to TIA Comments, page 3, Harmonization

1. The TIA states that the FCC should “globally harmonize its exposure standard.” Use of such “global” terminology ignores the fact that approximately 40% of the world’s population is governed by radiofrequency exposure limits and guidelines that are more stringent than those of the United States (based upon the exposure standards of Russia, China, India, and numerous other smaller countries). In fact, based upon the IARC declaration that RF radiation is a *possible carcinogen*, scientific evidence, and increased use of the precautionary approach, a strong argument can be made that any harmonization should be in the direction of more stringent exposure standards. Instead, the TIA only mentions organizations such as the IEEE and ICNIRP as the possible sources of “global harmonization,” essentially setting up a straw man argument in favor of less restrictive exposure standards.
2. The TIA quotes a number of organizations that essentially do not recognize or refuse to recognize that adverse biological effects can occur from exposure to RF radiation through other than a thermal mechanism. One principal quotation by the TIA is from the ICNIRP which states that “**epidemiological studies to**

date give no consistent or convincing evidence of a causal relation to RF exposure and any adverse health effect.”

Note that at this point the TIA is selectively quoting a statement contained in the 2009 document of the International Commission on Non-Ionizing Radiation Protection (ICNIRP) entitled, “Exposure to High Frequency Electromagnetic Fields, Biological Effects and Health Consequences (100 kHz-300 GHz).”

The complete ICNIRP statement is provided below. Please note that the TIA omitted mention of the statement that associations between RF exposure and adverse health effects cannot be ruled out.

“Results of epidemiological studies to date give no consistent or convincing evidence of a causal relation between RF exposure and any adverse health effect. On the other hand, these studies have too many deficiencies to rule out an association.”

Let us briefly analyze each key word and phrase of the quoted TIA (and thus ICNIRP) statement in the sections that follow.

A. Epidemiological Studies

Epidemiological studies are important in evaluating adverse effects, but human case studies, animal studies, and in-vitro studies are also crucial in forming a complete picture of the possible health effects caused from exposure to RF radiation. Each type of study has its limitations, but reliance totally on epidemiological studies is inappropriate given the range of possible health effects and the potential ramifications if no action is taken in response to the exponential increase of wireless devices in our society and the commensurate RF exposures. Epidemiological studies are low sensitivity in nature, generally only look for the adverse health effect of cancer, and can take decades of study to account for latency periods for different types of cancers. In addition, epidemiological studies, because of their data collection over a period of years, are subject to such issues as recollection errors, that is, dependent on how often a person may have remembered using a cellular phone some years ago and whether that person may also have used a cordless phone that might not be accounted for in the results of the study.

B. Consistent and Convincing Evidence

Use of the terms consistent and convincing evidence by organizations such as the TIA need to be treated with a fair amount of skepticism. Too often, biased individuals and organizations use such words in the formulation of excuses to not properly weigh all evidence presented before them, excluding evidence that does not fully comport with

established norms and beliefs. Consistent and convincing are among words that may be called the C-words. Credible and conclusive are two other words commonly used by those rejecting the premise that RF radiation can cause adverse health effects. However, the greater point here is that when organizations such as the TIA and the IEEE reject evidence that weak RF radiation fields may cause adverse health effects, they do so at the peril of also rejecting the sound scientific principle of falsification. Using Wikipedia as a basic information source at http://en.wikipedia.org/wiki/Scientific_method, the scientific method involves a process of investigating phenomenon and acquiring knowledge through a reasoned approach.

“The scientific method is the process by which science is carried out. Because science builds on previous knowledge, it consistently improves our understanding of the world. The scientific method also improves itself in the same way, meaning that it gradually becomes more effective at generating new knowledge. For example, the concept of **falsification** (first proposed in 1934) reduces confirmation bias by formalizing the attempt to *disprove* hypotheses rather than prove them.”

Although opponents of more stringent RF exposure standards will selectively cite elements of the scientific method such as replication of results and peer review of results published in what they deem as reputable journals, the equally valid principle of falsification or falsifiability is rarely if ever mentioned by those same individuals. Proponents of the existing FCC exposure guidelines or the IEEE standards set themselves up for a huge fall by insisting that adverse biological effects are only possible or plausible through thermally induced mechanisms. The concept of falsification is typically described through an illustration that involves a hypothesis that "All swans are white." Based upon observational data, it is possible to disprove this hypothesis by finding a single black swan, i.e., deductive logic admits the conclusion that the statement that all swans are white is false. Individuals who systematically review all available literature on the subject of RF exposure effects and compile documents such as the BioInitiative Report 2012 are following an acceptable scientific approach. Authors of the BioInitiative Report, for example, are basically scientists reviewing all available literature looking for “black swans,” and since it would only take one credible “black swan” to put into serious question the entire FCC exposure guidelines framework, it would appear that those invested in maintaining the current limits or actually making such limits less restrictive have a lot to lose by admitting any evidence that “black swans” exist.

Furthermore, it is inappropriate to accuse scientists who engage in the scientific process of falsification as “cherry picking.” On the contrary, those who suppress available scientific literature which identify adverse health effects which may be caused by exposure to RF radiation emissions are those who are engaging in the cherry picking.

So in the context of RF emissions, do “black swans” exist? Certainly the authors of the BioInitiative Report would appear to believe so. Hundreds if not thousands of studies have shown positive results related to exposure from relatively weak RF fields. Other individuals have submitted documentation on many of these studies as part of this NOI comment process. For purposes of this “reply” comment letter, and for summary purposes, I will quote two reputable information sources:

- “Although it has been argued that RF radiation cannot induce physiological effects at exposure intensities that do not cause an increase in tissue temperature, it is likely that not all mechanisms of interaction between weak RF-EMF (with the various signal modulations used in wireless communications) and biological structures have been discovered or fully characterized. Biological systems are complex and factors such as metabolic activity, growth phase, cell density, and antioxidant level might alter the potential effects of RF radiation. Alternative mechanisms will need to be considered and explored to explain consistently observed RF dependent changes in controlled studies of biological exposure.” [emphasis added] [Reference: IARC Monograph, Volume 102, for non-ionizing radiation (and radiofrequency electromagnetic fields), published April 2013, page 104.]
- “The expert appraisal nevertheless shows, with limited levels of evidence, different biological effects in humans or animals, some of which had already been reported in 2009: these can affect sleep, male fertility or cognitive performance.” [emphasis added] [Reference: French ANSES “Update of the Radiofrequencies and Health Expert Appraisal,” Press Kit, October 15, 2013, page 2.]

In fact, with regard to the IARC declaration that RF radiation emissions are *possibly carcinogenic*, one can create a strong argument that such a declaration would not have been made were it not for a majority opinion of the IARC Working Group that non-thermal exposure mechanisms were believed to exist.

Therefore, with the type and amount of evidence available in the published literature, it is quite possible for one to objectively conclude that the hypothesis (or universal statement) that adverse health effects can only be caused through a thermal mechanism has been falsified.

Consequently, and in summary, any person or organization continuing to make claims that consistent or convincing evidence does not exist for RF emissions causing adverse health effects should be treated with skepticism and questioned as to possible bias.

C. Adverse Health Effects

There is also a possible parsing of words in claims made by such organizations as the TIA, the IEEE, and the ICNIRP when they claim that **adverse health effects** have not been proven. Possibly they are surreptitiously admitting that weak RF fields cause “health effects” but not necessarily “adverse health effects.” In fact, the IARC and ANSES quotations referenced above mentioned “consistently observed RF dependent changes” and “limited levels of evidence [of] different biological effects in humans or animals.” Thus, one could surmise that conclusions are being made that observed biological effects caused by weak RF fields are not necessarily “adverse.” Of course, with the French press release, effects were noted that related to sleep, male fertility or cognitive performance. These would appear to be “adverse effects.” Hopefully, individuals who may be biased due to their desire to promote the profitable use of wireless technologies in our society would not consider such effects as benign.

Although there are those scientists and other individuals who promote more stringent RF exposure standards based upon documented adverse biological effects (which may not receive universal acknowledgment), there are also those who merely have a different philosophy on how governments should protect public health and safety. For instance, as documented in an [article](#) [A] detailing a review of the rationale for the Russian RF exposure standards, it would appear to be acknowledged that Russian scientists have in fact observed a number of biological changes in animal studies due to relatively weak RF exposure over the years. “While the USSR and Russian standards were based on many areas of research, the immunology studies were viewed by the standards committees as providing the most consistent results and so were important for setting exposure limits.” In attempting to briefly summarize the article, it will be stated that the Russian standards appear to be primarily based upon a number of experiments with animals such as rabbits, rats, guinea pigs, and mice where sub-thermal RF radiation exposures under controlled conditions prompted a number of biological responses.

[A] Selected quotations are provided from “Scientific Basis for the Soviet and Russian Radiofrequency Standards for the General Public,” Repacholi, et. al., 2012, *Bioelectromagnetics*, 33: 623–633, <http://onlinelibrary.wiley.com/doi/10.1002/bem.21742/abstract>.

Regarding public health standards, “conclusions [were] as follows: chronic daily exposure to 100–500 $\mu\text{W}/\text{cm}^2$ can induce persistent pathological reactions (based on the immunology studies...), the most striking effect being offspring death after injection of foreign serum; [at approximately] 50 $\mu\text{W}/\text{cm}^2$ is the threshold exposure for the unfavorable biological effects found in the immunology studies but these effects were not pathological since the organism could compensate for the exposure, and continual compensation could lead to long-term adverse effects and thus should be protected against; and chronic exposure to $\leq 10\text{--}20$ $\mu\text{W}/\text{cm}^2$ does not induce any noticeable biological changes in small laboratory animals.”

Regarding mobile phone standards, “Because mobile phones have become an essential part of most people’s lives, the RNCNIRP decided that they needed a special standard, especially since their use involves daily, repeated, and potentially life-long RF exposure to the brain, a critical organ.” As an example, “When rats and mice of different ages were exposed to 970 MHz fields as low as 15 $\mu\text{W}/\text{cm}^2$ for up to 120 min there was a tendency toward a decrease in exploratory behavior, a suppression of the righting reflex, and a slowdown in adaption to experimental conditions. In addition, a fourfold decrease in noradrenaline levels was observed in exposed animals compared to the control group. ... When determining the limit values for mobile telecommunications technology, the RNCNIRP decided to leave the limit value of 10 $\mu\text{W}/\text{cm}^2$ for the general public unchanged, as it was set in 1984 and this value was well justified by previous research so there was no need for change. Thus, base stations should not expose the public to more than 10 $\mu\text{W}/\text{cm}^2$.” For mobile phone users, a limit value of 100 $\mu\text{W}/\text{cm}^2$ was recommended. This limit provided a safety factor of 5 as compared to “earlier studies indicating that exposure to 500 $\mu\text{W}/\text{cm}^2$ produced immune system changes considered pathogenic to the organism.” [Russian Standard, 2003].

“The general approach to public health protection and setting exposure limits by previous Soviet and current Russian committees is that people should not have to compensate for any effects produced by RF exposure, even though they are not shown to be adverse to health (pathological). In other words, these committees assume there could be long-term health consequences if people have to compensate for RF exposures that produce biological but not pathological effects. Exposure limits are then set that do not cause any possible biological consequence among the population (regardless of age or gender) that could be detected by modern methods during the RF exposure period or long after it has finished. Their approach to protection is that limits of RF exposure should not cause even a temporary initiation of the protective or adaptive compensatory mechanisms over the near or long term. Thus, the final

exposure limits are set as a fraction of the minimum RF exposure that is capable of provoking some adaptation-compensatory reactions in people.”

“Children are not small adults since they are developing organisms with special sensitivities and might be expected to be more sensitive to EMF than adults [Grigoriev, 2005; Kheifets et al., 2005]. Thus, results of studies conducted on adults might not be validly extrapolated to children; therefore, the RNCNIRP considered that children need special consideration when developing exposure limits. According to the RNCNIRP, the following health hazards are likely to be faced in the near future by children who use mobile phones: disruption of memory, decline in attention, diminished learning and cognitive abilities, increased irritability, sleep problems, increase in sensitivity to stress, and increased epileptic readiness. For these reasons, special recommendations on child safety from mobile phones have been incorporated into the current Russian mobile phone standard [Russian Standard, 2003].”

“The various USSR and Russian standards committees considered that chronic exposure to nonthermal levels of RF fields was potentially hazardous to human health. Further, the key philosophy used to set limit values in the Russian standards was that RF exposure should not produce any effect that had to be compensated for by people because it was believed that this would lead to pathologic effects over the long term [Grigoriev et al., 2003b,c].”

So to summarize with regard to Russian exposure guidelines, they are developed with the recognition that non-thermal effects do occur and these effects have been documented. It is not stated with certainty that all observed effects are pathological and/or irreversible, but in any case, it is concluded that such effects influence the physical and mental well being of affected individuals and therefore constitute a health hazard. The Russian guidelines, therefore, are science-based but include an aspect of the precautionary principle in that the guidelines are intended to prevent pathological effects that are considered plausible and possibly even likely if exposure at elevated levels were allowed to occur on a long-term basis.

The scientific community, including the ICNIRP, IEEE, and the FCC should be more open about acknowledging that biological effects do result from exposure to weak RF emissions. Once this admission occurs, a more intelligent discussion can proceed regarding which biological effects should be considered “adverse” and which effects are benign, reversible, or non-pathological.

D. Causal Relation

Now to discuss what it means to have a causal relation between RF exposure and adverse health effects. In general terms, a causal relation is one in which there is a direct relation between one event (A) and another event (B), where A precedes B and causes B. Causality can be difficult to prove. The FCC uses a “bright line” approach to developing exposure standards which may not be in the best interests of protecting public health and safety in cases where a credible threat from RF exposure exists but which cannot be proven with 100% certainty. Accordingly, SkyVision Solutions has recommended (in prior comments) that a precautionary approach to limiting RF exposures be implemented until such time that more appropriate biologically based limits can be developed.

This portion of the “reply” comments letter is intended to document how “causality” need not be a rigid “bright line” issue and that causality fits nicely into a regulatory framework that includes a precautionary approach to help protect public health and safety.

The American Academy of Environmental Medicine (AAEM) has issued a position paper on the topic of “Electromagnetic and Radiofrequency Fields Effect on Human Health” available for viewing at the following link: http://aaemonline.org/emf_rf_position.html. In this paper the AAEM states: “Because of the well documented studies showing adverse effects on health and the not fully understood quantum field effect, AAEM calls for exercising precaution with regard to EMF, RF and general frequency exposure. In an era when all society relies on the benefits of electronics, we must find ideas and technologies that do not disturb bodily function. It is clear that the human body uses electricity from the chemical bond to the nerve impulse and obviously this orderly sequence can be disturbed by an individual-specific electromagnetic frequency environment.” In this referenced position paper, the AAEM also makes what to some is a controversial statement that “many *in vitro*, *in vivo* and epidemiological studies demonstrate that significant harmful biological effects occur from non-thermal RF exposure and satisfy Hill’s criteria of **causality**.” [emphasis added]

As the AAEM position paper was issued to address possible concerns over wide-spread deployment of wireless smart meters, in the timeframe of April 2012, the Michigan Public Service Commission (MPSC) asked the Smart Grid Technical Advisory Project at the Lawrence Berkeley National Laboratory (LBNL) to review the AAEM position paper submitted to the MPSC as part of the Docket for Case U-17000. It is noted that the “Smart Grid Technical Advisory Project” has as one of its objectives to “Provide technical assistance and facilitation services to assist state regulatory

commissions and policymakers better understand near-term smart grid implementation and policy issues.” Based upon available information, it is evident that activities of this group are funded through a US DOE Energy Smart Grid Investment Grant. As such, it is expected that individuals who performed the review of the AAEM position paper may reasonably be considered advocates of smart meter deployments. That said, the review conducted by the LBNL “Smart Grid Technical Advisory Project” primarily focused on the issue of whether the AAEM could reasonably claim that Hill’s criteria of causality is satisfied for RF radiation non-thermal exposure effects. Before proceeding further with the LBNL “Smart Grid Technical Advisory Project” review, SkyVision Solutions will provide a summary of “Hill’s criteria.”

In 1965, Sir Austin Bradford Hill detailed nine criteria for assessing evidence of causation, sometimes referred to as “Hill’s criteria,” which may be used to extend research from one area to other related areas.

[Reference: Hill, Austin Bradford, “The Environment and Disease: Association or Causation?”, *Proceedings of the Royal Society of Medicine*, 1965, volume 58, pp 295-300.]

The article attempts to answer the question of, “In what circumstances can we pass from [an] observed *association* to a verdict of *causation*?” In some sense, Hill’s criteria may be viewed as a management tool or mental process by which to methodically assess whether an association (or possible link) between an environmental agent and disease can be determined to be a matter of cause and effect. The nine parameters for association are:

- 1) Strength. An example is given in the article that supports a likely strong link between smokers of cigarettes and the number of deaths due to lung cancer. At the same time, Hill states, “In thus putting emphasis upon the strength of an association we must, nevertheless, look at the obverse of the coin. We must not be too ready to dismiss a cause-and-effect hypothesis merely on the grounds that the observed association appears to be slight. There are many occasions in medicine when this is in truth so. Relatively few persons harboring the meningococcus fall sick of meningococcal meningitis.”
- 2) Consistency. “Has it been repeatedly observed by different persons, in different places, circumstances and times?” An example used (again in 1965) is that “Returning to my more general example, the Advisory Committee to the Surgeon-General of the United States Public Health Service found the association of smoking with cancer of the lung in 29 retrospective and 7

prospective inquiries.” ... “In other words we can justifiably infer that the association is not due to some constant error or fallacy that permeates every inquiry.” ... “Once again looking at the obverse of the coin there will be occasions when repetition is absent or impossible and yet we should not hesitate to draw conclusions.”

- 3) Specificity. “If, as here, the association is limited to specific workers and to particular sites and types of disease and there is no association between the work and other modes of dying, then clearly that is a strong argument in favor of causation.” ... “In short, if specificity exists we may be able to draw conclusions without hesitation; if it is not apparent, we are not thereby necessarily left sitting irresolutely on the fence.”
- 4) Temporality. Does the cause precede the effect? “My fourth characteristic is the temporal relationship of the association – which is the cart and which the horse?” ... “This temporal problem may not arise often but it certainly needs to be remembered, particularly with selective factors at work in industry.”
- 5) Biological Gradient. “Fifthly, if the association is one which can reveal a biological gradient, or dose-response curve, then we should look most carefully for such evidence. For instance, the fact that the death rate from cancer of the lung rises linearly with the number of cigarettes smoked daily, adds a very great deal to the simpler evidence that cigarette smokers have a higher death rate than non-smokers.” ... “Often the difficulty is to secure some satisfactory quantitative measure of the environment which will permit us to explore this dose-response. But we should invariably seek it.”
- 6) Plausibility. “It will be helpful if the causation we suspect is biologically plausible. But this is a feature I am convinced we cannot demand. What is biologically plausible depends upon the biological knowledge of the day.” ... “In short, the association we observe may be one new to science or medicine and we must not dismiss it too light-heartedly as just too odd. As Sherlock Holmes advised Dr Watson, 'when you have eliminated the impossible, whatever remains, however improbable, must be the truth.'”
[emphasis added]
- 7) Coherence. “On the other hand the cause-and effect interpretation of our data should not seriously conflict with the generally known facts of the natural history and biology of the disease - in the expression of the Advisory Committee to the

Surgeon - General it should have coherence. Thus in the discussion of lung cancer the Committee finds its association with cigarette smoking coherent with the temporal rise that has taken place in the two variables over the last generation and with the sex difference in mortality...”

- 8) Experiment. Are there clinical studies supporting the association? In addition, and referencing back to the tobacco cases, if people stop smoking, do death rates from lung cancer fall? We now know that it does.
- 9) Analogy. Is the observed association supported by similar associations? “In some circumstances it would be fair to judge by analogy. With the effects of thalidomide and rubella before us we would surely be ready to accept slighter but similar evidence with another drug or another viral disease in pregnancy.”

Some of Sir Hill’s final statements in the article were:

- “None of my nine viewpoints can bring indisputable evidence for or against the cause-and-effect hypothesis and none can be required as a *sine qua non*. What they can do, with greater or less strength, is to help us to make up our minds on the fundamental question - is there any other way of explaining the set of facts before us, is there any other answer equally, or more, likely than cause and effect?”
- “Finally, in passing from association to causation I believe in 'real life' we shall have to consider what flows from that decision. On scientific grounds we should do no such thing. The evidence is there to be judged on its merits and the judgment (in that sense) should be utterly independent of what hangs upon it - or who hangs because of it. But in another and more practical sense we may surely ask what is involved in our decision. In occupational medicine our object is usually to take action. If this be operative cause and that be deleterious effect, then we shall wish to intervene to abolish or reduce death or disease.”
- “While that is a commendable ambition it almost inevitably leads us to introduce differential standards before we convict. Thus on relatively slight evidence we might decide to restrict the use of a drug for early-morning sickness in pregnant women. If we are wrong in deducing causation from association no great harm will be done. The good lady and the pharmaceutical industry will doubtless survive.” [emphasis added]

- “But we should need very strong evidence before we made people burn a fuel in their homes that they do not like or ... stop eating the fats and sugar that they do like.”

In summary, the “Hill criteria” offer a quite practical thought process by which to help determine whether a suspected link between an environmental agent and a specific set of symptoms or disease can further be determined to be a cause-and-effect relationship. The AAEM asserts that such a relationship exists for RF emissions, but it is clear that a certain amount of clinical judgment is used in making that determination. Such judgment makes use of both subjective and objective data. In addition, insight provided by Sir Hill within the published article reveals that different practical decisions may be made depending on the level of evidence and the costs of taking action. Sir Hill states that in “real life,” decisions will be made based upon the “differential standards.” This explanation has the effect of the modern day concept of “prudent avoidance” or use of the “precautionary approach” in dealing with credible cause-and-effect relationships.

In a [letter](#) dated, April 18, 2012, two members of the Smart Grid Technical Advisory Project, Lawrence Berkeley National Laboratory, wrote a letter addressed to the Michigan Public Service Commission (in response to an MPSC request of a few days earlier). The letter focused on listing Hill’s criteria in a more simplistic form than described above and then attempted to apply the criteria to RF exposure emissions from both cell phones and smart meters.

Let it be clear that the LBNL limited review was an exercise where the authors attempted to demonstrate that there was insufficient evidence to show causality of adverse effects for smart meters. The remarkable aspect about the LBNL review is that it provided a reasonable tabulation (possibly inadvertently) that would lead one to conclude that several criterion of the Hill criteria could be considered met for cell phones to at least some degree. For example, for cell phones, the LBNL review indicated that there was “limited evidence” for consistency based upon the INTERPHONE study; possible “oxidative stress markers and pathological changes in brain tissue” for specificity; some “well controlled lab studies” show a cause preceding an effect for temporality; there is “limited coherence”; there is experimental evidence where “some studies suggesting reported effects”; and there is a “presumed” analogy with “earlier (generally higher power) microwave studies.” An excerpt from the table contained in the LBNL letter is provided below.

Hill Criteria Applied to RF Emissions from Cell Phone Radiation as Possible Agent to Cause Adverse Health Effects	
Hill Criteria	Cell phones
Strength: How large is the effect?	No widespread disease has yet been reported.
Consistency: Has the same association been observed by others, in different populations, using a different method?	Limited evidence from INTERPHONE study, interpreted differently by different researchers.
Specificity: Does altering only the cause alter the effect?	A variety of studies have looked at changes in experimental setup to alter the source or size of the exposure with compelling results, most of which are related to distinct endpoints (e.g. oxidative stress markers and pathological changes in brain tissue in AAEM citation 16)
Temporality: Does the cause precede the effect?	Hard to discern in some epidemiology studies because hard to know state of individuals prior to study. Generally well controlled in lab studies.
Biological gradient: Is there a dose response?	Intensity of fields is often assumed as dose in a thermal model. For non-thermal effects, these criteria may not apply until we have a better understanding of dose.
Plausibility: Does it make sense? (Hill noted that knowledge of the mechanism is limited by current knowledge).	Mechanisms have not been well developed other than heating processes, where it is assumed that energy accumulates until dissipated.
Coherence: Does the evidence fit with what is known regarding the natural history and biology of the outcome?	Limited coherence – many of the reported effects have unknown etiologies.
Experiment: Are there any clinical studies supporting the association?	There are some studies suggesting effects under certain circumstances.
Analogy: Is the observed association supported by similar associations?	Presumed to be supported by earlier (generally higher power) microwave studies.

Source: Excerpt from Table from page 2 of April 18, 2012, Letter from Smart Grid Technical Advisory Group, LBNL to Michigan PSC

For wireless smart meters, the major conclusion for the LBNL review was “No published, peer-reviewed scientific research at this time” for basically eight of the nine criteria. The overall conclusion of this review was, “It is instructive to use this framework to consider the available evidence:

based on our judgment, **the Hill's criteria have not been satisfied for smart meters, regardless of how well they may or may not be satisfied for cell phones.** [emphasis added].

SkyVision Solutions asserts that the April 2012 "Smart Grid Technical Advisory Project" review offered a somewhat simplistic review of the Hill's criteria as applied to cell phones. Nevertheless, and using Hill's criteria, the LBNL review actually helped substantiate the AAEM claim, at least for cell phones, that adverse biological effects occur based upon exposure to non-thermal RF exposure.

In prior written comments, evidence was presented that a precautionary approach was warranted for limiting future exposure to radiofrequency (RF) radiation emissions from wireless devices. As was shown, the precautionary approach is a concept that involves analyzing a situation to evaluate whether human activities may lead to **unacceptable harm** that is scientifically **plausible** but uncertain. If such harm is shown to be scientifically plausible, then actions should be taken to avoid or diminish that harm. Additionally, precautionary measures should be chosen that are proportional to the seriousness of the potential harm.

Bradford Hill himself insisted that what he was proposing was not a check list where all the boxes have to be ticked. In any real situation, some of the criteria may not be met. For example, there is no dose response when you take a drug overdose: you either die or you don't. What is deemed "plausible" can also change over time. In the nineteenth century it was thought totally implausible that doctors not washing their hands could be responsible for the deaths of women in maternity wards. But the criteria do suggest the sorts of questions we should ask when we are faced with a *prima facie* case for hazard and we are trying to decide whether action is warranted. It is thus asserted that a "causal link" can be established, based upon existing published literature, that RF exposure from wireless devices can cause adverse health effects. It does not have to be proven with certainty to establish this causal link; one will take actions in proportion to the strength of the argument. It is also clear that precautionary approach concept is the modern or contemporary version of the application of Hill's criteria for causation.

E. Published Article for Mobile and Cordless Phones Showing Causation

To more thoroughly show causation with regard to cell phones (and cordless phones), SkyVision Solutions submits as evidence another [article](#) [B] published within the last month, this time by Hardell and Carlberg, entitled, "Using the Hill Viewpoints from 1965 for Evaluating Strengths of Evidence of the Risk for Brain Tumors Associated with Use of Mobile and Cordless Phones."

The abstract for this article by Hardell and Carlberg is as follows:

Background: Wireless phones, i.e., mobile phones and cordless phones, emit radiofrequency electromagnetic fields (RF-EMF) when used. An increased risk of brain tumors is a major concern. The International Agency for Research on Cancer (IARC) at the World Health Organization (WHO) evaluated the carcinogenic effect to humans from RF-EMF in May 2011. It was concluded that RF-EMF is a group 2B, i.e., a “possible”, human carcinogen. Bradford Hill gave a presidential address at the British Royal Society of Medicine in 1965 on the association or causation that provides a helpful framework for evaluation of the brain tumor risk from RF-EMF.

Methods: All nine issues on causation according to Hill were evaluated. Regarding wireless phones, only studies with long-term use were included. In addition, laboratory studies and data on the incidence of brain tumors were considered.

Results: The criteria on strength, consistency, specificity, temporality, and biologic gradient for evidence of increased risk for glioma and acoustic neuroma were fulfilled. Additional evidence came from plausibility and analogy based on laboratory studies. Regarding coherence, several studies show increasing incidence of brain tumors, especially in the most exposed area. Support for the experiment came from antioxidants that can alleviate the generation of reactive oxygen species involved in biologic effects, although a direct mechanism for brain tumor carcinogenesis has not been shown. In addition, the finding of no increased risk for brain tumors in subjects using the mobile phone only in a car with an external antenna is supportive evidence. Hill did not consider all the needed nine viewpoints to be essential requirements.

Conclusion: Based on the Hill criteria, glioma and acoustic neuroma should be considered to be caused by RF-EMF emissions from wireless phones and regarded as carcinogenic to humans, classifying it as group 1 according to the IARC classification. Current guidelines for exposure need to be urgently revised.

A few select quotations are provided from the article:

“Because of the widespread use of wireless technology, even a small [health] risk increase would have serious public health consequences.”

“Hill noted that, ‘However, before deducing ‘causation’ and taking action we shall not invariably have to sit around awaiting the results of that research. The whole chain may have to be unravelled or a few links may

suffice. It will depend upon circumstances.... If we are wrong in deducing causation from associations no great harm will be done... All scientific work is incomplete... That does not confer upon us a freedom to ignore the knowledge we already have, or to postpone the action that it appears to demand at a given time'. These wise rules should also be considered when RF-EMF from wireless phones is evaluated as a human carcinogen.”

“Based on Hill’s viewpoints and his discussion on how these issues should be used, the conclusion of this review is that glioma and acoustic neuroma are caused by RF-EMF emissions from wireless phones. According to the IARC Preamble, the classification should be group 1, i.e., ‘the agent is carcinogenic to humans’, and urgent revision of current guidelines for exposure is needed.” [emphasis added]

[B] “Using the Hill Viewpoints from 1965 for Evaluating Strengths of Evidence of the Risk for Brain Tumors Associated with Use of Mobile and Cordless Phones,” Hardell and Carlberg, *Reviews on Environmental Health*, Volume 28 (November 2013), Issue 2-3, Pages 97–106, <http://dx.doi.org/10.1515/reveh-2013-0006>.

F. Evidence for Correlation if Not Causation for Wireless Smart Meter Health Effects

Returning to the topic of smart meters mentioned earlier in relation to the LBNL review in terms of causation, another development has occurred within the last month with the issuance of a new document by the American Academy of Environmental Medicine (AAEM).

As stated in other comments provided by SkyVision Solutions, in responding to smart grid proponents’ position that there are no peer reviewed studies that would substantiate health concerns for wireless smart meters, the counter argument was presented that there are in fact no health studies that would indicate that wireless smart meters are safe. It is further stated in comments supplied by SkyVision Solutions that “Unknown does not means safe.”

The AAEM has released a document, dated October 23, 2013, entitled, [“Wireless Smart Meter Case Studies”](#) which discloses the following information:

“Founded in 1965 as a non-profit medical association, the American Academy of Environmental Medicine (AAEM) is an international organization of physician and scientists interested in the complex relationship between the environment and health.”

“AAEM physicians and physicians world-wide are treating patients who report adverse, debilitating health effects following the installation of smart meters, which emit electromagnetic frequencies (EMF) and radiofrequencies (RF).”

“The peer reviewed, scientific literature demonstrates the correlation between EMF/RF exposure and neurological, cardiac, and pulmonary disease as well as reproductive disorders, immune dysfunction, cancer and other health conditions. ***The evidence is irrefutable.*** Despite this research, claims have been made that studies correlating smart meter emissions with adverse health effects do not exist.” [emphasis added]

“The AAEM has received a case series submitted by Dr. Federica Lamech, MBBS, *Self-Reporting of Symptom Development from Exposure to Wireless Smart Meters’ Radiofrequency Fields in Victoria*. AAEM supports this research. It is a well documented 92 case series that is scientifically valid. ***It clearly demonstrates adverse health effects in the human population from smart meter emissions.***” [emphasis added]

“The symptoms reported in this case series closely correlate not only with the clinical findings of environmental physicians, but also with the scientific literature. Many of the symptoms reported including fatigue, headaches, heart palpitations, dizziness and other symptoms have been shown to be triggered by electromagnetic field exposure under double blind, placebo controlled conditions. Symptoms in this case series also correlate with the Austrian Medical Association’s Guidelines for the Diagnosis and Treatment of EMF Related Health Problems.

It is critically important to note that the data in this case series indicates that the ‘vast majority of cases’ were not electromagnetically hypersensitive until *after* installation of smart meters. Dr. Lamech concludes that smart meters ‘may have unique characteristics that lower people’s threshold for symptom development’.

This research is the first of its kind, clearly demonstrating the correlation between smart meters and adverse health effects.
[emphasis added]

Based on the findings of this case series, AAEM calls for:

- Further research regarding smart meter health effects.
- ***Accommodation*** for health considerations regarding smart meters.
- Avoidance of smart meter EMF/RF emissions based on health considerations, including the ***option to maintain analog meters.***

- A **moratorium** on smart meters and implementation of safer technology.
- Physicians and health care providers to consider the role of EMF and RF in the disease process, diagnosis and treatment of patients.” [emphasis added]

In reviewing the AAEM document, one can conclude that the actual claim being made by the Board of Directors of the AAEM is that the "evidence is irrefutable" that adverse health effects correlate with smart meter emissions. In this context one needs to recognize a distinction between "correlation" and "causation." From a scientific perspective, correlation does not necessarily imply causation. However, it is apparent that the AAEM now believes that the collective scientific evidence to be strong enough to call for a moratorium on the installation of smart meters and options for consumers to maintain analog meters... as research continues and actions are taken in an attempt to implement safer technologies.

G. Critics of the American Academy of Environmental Medicine

Because policies and positions taken by the AAEM on the topic of wireless technologies goes against the financial interests of the telecommunications industry and smart grid proponents, the AAEM organization has been the subject of some inaccurate criticisms. For example, in December 2012, the Public Utility Commission of Texas (PUCT) published a report entitled, "Health and RF EMF from Advanced Meters." The PUCT report offered criticism of the American Academy of Environmental Medicine (AAEM), whereby it somewhat condescendingly stated:

"The certifying board for AAEM is the American Board of Environmental Medicine (ABEM), founded in 1988. It is worth noting that neither AAEM nor ABEM is recognized by the American Board of Medical Specialties (ABMS). Furthermore, the certification criteria required by ABEM are relatively **sparse** [emphasis added] compared to those of ABMS. ABEM requires that an applicant have three years' experience practicing environmental medicine, take the AAEM medical instructional courses, and pass a written and an oral exam."

The above information totally misrepresents the certification criteria of the American Board of Environmental Medicine. The complete criteria listed at the ABEM website are as follows:

The ABEM certificate in Environmental Medicine is awarded after all the following requirements have been met:

- 1) Licensed by an accredited medical school in the United States, Canada or other countries.
 - **Additional** medical training completed in:
 - **An accredited residency program** of choice such as Internal Medicine, Pediatrics, Surgery, Emergency Medicine, etc., **with certification by the American Board of Medical Specialties**;
- 2) All required medical instructional courses specific to the practice of Environmental Medicine and Allergy presented by the American Academy of Environmental Medicine.
- 3) Physician must have practiced Environmental Medicine for three years.
- 4) Successfully completed ABEM's certifying exam including Part I (written) and Part II (oral). This exam certifies that the physician is competent in the practice of Environmental Medicine.

The PUCT report omits crucial information relevant to providing perspective for its straw man argument that the Environmental Medicine specialty is not recognized by the ABMS. In fact, **ABMS specialty certification is a prerequisite to a certification in environmental medicine.** Thus, one can argue that physicians certified in environmental medicine have the complete medical background in at least one of the 24 specialties recognized by the American Board of Medical Specialties **plus** the added training, experience, and special insight needed to handle the prevention and effective treatment of illnesses caused by the interaction between humans and their environment.

In addition, the American Academy of Environmental Medicine is recognized by the Accreditation Council for Continuing Medical Education (ACCME) as an accredited provider for continuing medical education for physicians.

TIA Comments, page 9, Exposure Standards Protecting All Populations

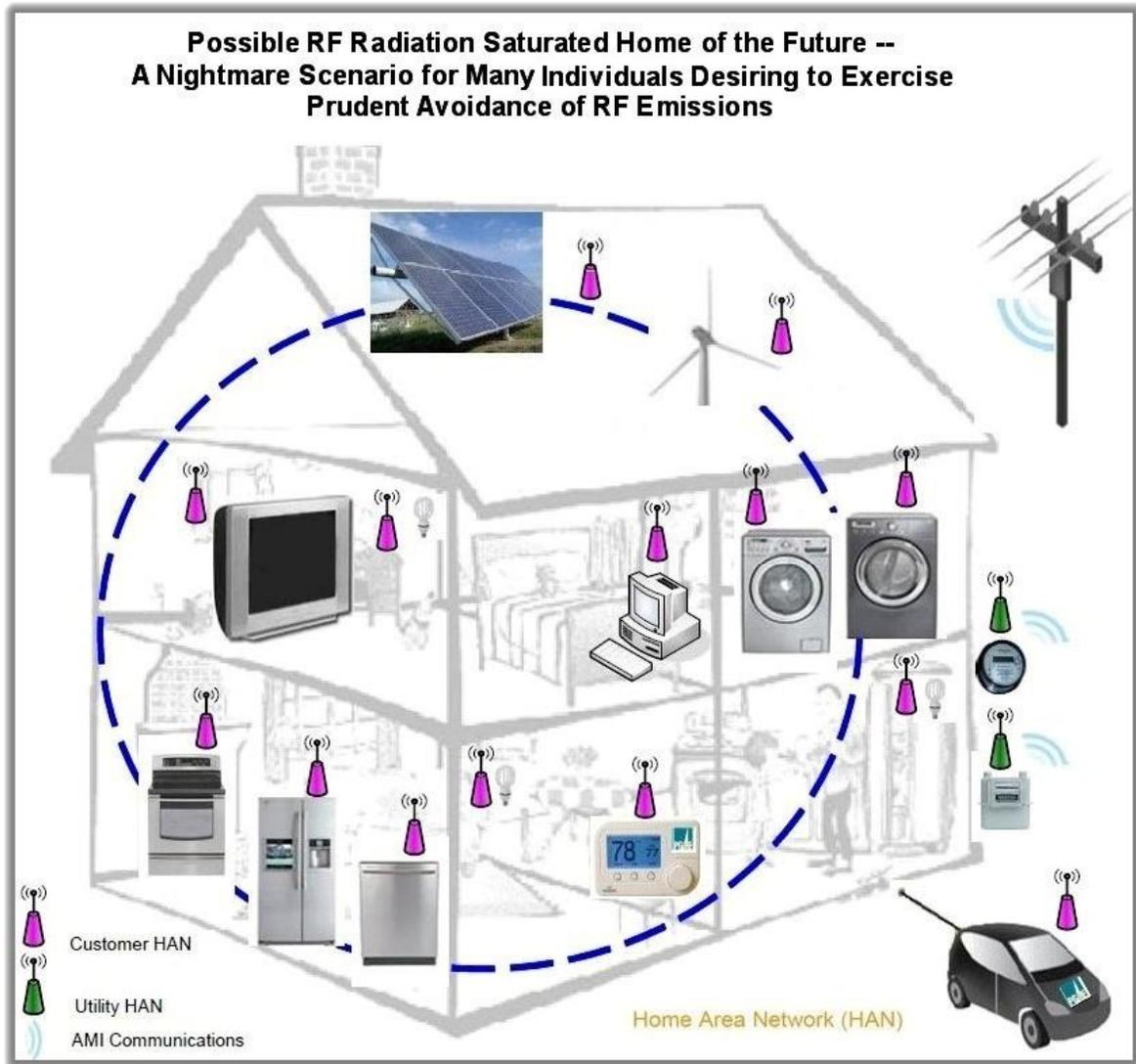
1. The TIA states that "Additional precautionary measures are not needed. In the present case, the standards already provide for a substantial margin between the exposure limits and the levels where any health effects have been observed. This substantial margin inarguably constitutes a more than sufficient precaution. It is sufficient to protect all members of the public at

large, including seniors and children. Given the current safety margins, there is no scientific rationale for additional safety margin—it simply is not needed.”

2. Based upon evidence presented by SkyVision Solutions, the above statement is completely without merit. It is indisputable that non-thermal related RF emissions from wireless devices cause biological effects that can be observed. The current FCC exposure guidelines are based upon an antiquated limit system that only recognizes biological effects that occur as a result of a thermal mechanism, essentially treating the human organism as a piece of meat to be heated in a microwave oven. FCC exposure guidelines provide no protection against non-thermal RF exposure levels and certainly no margin of safety. As has been previously stated, what remains as a legitimate debate is to discuss to what extent observed biological effects caused by exposure to weak RF radiation are pathological and/or irreversible. In addition, it is quite rational to provide protection against observed biological effects at non-thermal levels, whether it be as a part of a precautionary approach or as actions determined as warranted based upon a follow-up to a review of the Bradford Hill criteria for causation.

TIA Comments, page 20, Technical Approach to Addressing Exposure Reductions

1. The TIA states that one reason that additional technical approaches are not necessary for reducing RF exposures is that “due to market effects that result from manufacturers striving for further battery life than their competitors, exposure reduction is occurring as newer RF-emitting [information and communications technology] ICT products evolve to meet consumer needs.”
2. It is a positive development within the telecommunications industry over the past several years that power output for modern cellular phones has dropped substantially through such mechanisms as adaptive power control (implemented in order to preserve battery strength). However, many of the RF emitting devices to be used in the future will not necessarily be powered by batteries. As documented in previously submitted comments, it is imperative that wireless smart meters and smart appliances installed for home use be provided with mechanisms that allow the consumer to deactivate such RF transmitters. Otherwise, as shown below (or next page), courtesy of a smart grid industry supplied image, homes could eventually be saturated with RF emissions from possibly every appliance in the home, what to some individuals would be viewed as a “microwave nightmare scenario.”



Reply Comments of SkyVision Solutions
Submitted, October 23, 2013 (Amended)

Introduction

1. SkyVision Solutions submits these “reply” comments in response to the publication of FCC 13-39, First Report and Order, Further Notice of Proposed Rule Making and Notice of Inquiry (ET Docket No. 13-84 and ET Docket No. 03-137) released March 29, 2013, by the FCC and published in the Federal Register on June 4, 2013.
2. SkyVision Solutions previously submitted comments on August 31, 2013.

A brief synopsis of the comments previously provided can be summarized as follows:

- With the mounting evidence of adverse biological effects occurring at levels of radiofrequency exposure below the current FCC guidelines, the FCC’s stated confidence in its current guidelines is unfounded. Evidence was then given to support this assertion.
- The FCC should begin development of new biologically based public safety limits in concert with other qualified governmental agencies and professional organizations which would include representation from the medical community.
- Until new biologically based limits can be finalized, the FCC should fully endorse a **precautionary approach** to implement common sense measures that will help slow the exponential growth of RF exposure to our population caused by the increasing number of wireless devices present in our society. Such measures would focus on educating the public on the voluntary nature of using personal wireless devices and how

members of the public can use simple methods such as “time and distance” to reduce overall exposure.

- Inherent with the concept of the voluntary nature of wireless devices used in the home, the FCC should stipulate that no utility, government, or other entity can require installation of a RF emitting device upon one’s property without consent.
 - Specifically for wireless smart meters, the FCC should revise/ issue equipment authorizations to clearly stipulate that installation of such devices on individual homes requires the property owner’s consent.
 - For smart appliances, the FCC should mandate that all smart appliances containing an RF transmitter for communication with wireless smart meters or wireless routers be provided with a clear mechanism for the consumer to ensure that any RF transmitters contained within the device are deactivated.
3. These supplemental “reply” comments are primarily intended to provide additional information pertinent to the highlighted item above recommending that the FCC “fully endorse a ***precautionary approach***” to help slow the exponential growth of RF exposure to our population caused by the increasing number of wireless devices present in our society. In addition, these “reply” comments will address an issue related to accommodation of medical disabilities under the American Disabilities Act (ADA).

Utilize a Precautionary Approach to Reduce Future RF Exposures

1. As noted in prior comments, in April 2010, the “President’s Cancer Panel” issued a report entitled, *Reducing Environmental Cancer Risk*. One particular quote from the report is as follows: “When credible evidence exists that there may be a hazard, a precautionary approach should be adopted and alternatives should be sought to remove the potential hazard and still achieve the same social benefit.”

2. It would seem that the FCC is reluctant to utilize a precautionary approach in light of certain statements made in the Notice of Inquiry, where in paragraph 69 the FCC made the curious statement that “adoption of extra precautionary measures may have the unintended consequence of ‘opposition to progress and the refusal of innovation, ever greater bureaucracy,... [and] increased anxiety in the population.’”

French ANSES Expert Appraisal on Radiofrequencies and Health

1. There has been a recent significant development relevant to the consideration by the FCC of a precautionary approach for limiting RF emissions. On October 15, 2013, the French health agency, ANSES, published results of its assessment of risks related to exposure to radiofrequencies based upon a review of the international scientific literature. The actual introductory statement for the ANSES press release was as follows:

“Faced with the rapid development of wireless technologies, ANSES issues recommendations for limiting exposure to radiofrequencies, especially for the most vulnerable populations.”

The above statement essentially endorses a ***precautionary approach*** similar to that outlined in my prior comments submitted to the FCC on August 31, 2013.

Continuing with additional information from the French governmental agency announcement:

“Limited levels of evidence do point to different biological effects in humans or animals. In addition, some publications suggest a possible increased risk of brain tumour, over the long term, for heavy users of mobile phones. Given this information, and against a background of rapid development of

technologies and practices, ANSES recommends limiting the population's exposure to radiofrequencies – in particular from mobile phones – especially for children and intensive users, and controlling the overall exposure that results from relay antennas. It will also be further developing its work on electro-sensitive individuals, specifically by examining all the available French and international data on this topic that merits closer attention.”

The following additional statement is contained within the French agency announcement:

“The findings of the risk assessment have not brought to light any proven health effects.” [emphasis added]

The word proven is generally interpreted to mean: “Having been demonstrated or verified without doubt.” Well, almost nothing can be “verified without doubt” in science or medicine. So although the French announcement includes the statement that health effects have not been “proven,” the French “expert appraisal” should be considered a major development where a governmental agency of a major Western country appears to be turning in favor of prudent avoidance of RF emissions in the interests of protecting public health and safety.

The French health agency announcement continues:

“The findings of this expert appraisal are therefore consistent with the classification of radiofrequencies proposed by the World Health Organization's International Agency for Research on Cancer (IARC) as ‘*possibly carcinogenic*’ for heavy users of mobile phones. In addition, the expert appraisal nevertheless shows, with limited levels of evidence, different biological effects in humans or animals, ... these can affect ***sleep, male fertility or cognitive performance***.” [emphasis added]

To limit exposure to radiofrequencies, especially in the most vulnerable population groups, the ANSES recommends:

- “For intensive adult mobile phone users (in talk mode): use of hands-free kits and more generally, for all users, favouring the purchase of phones with the lowest SAR values;
- Reducing the exposure of children by encouraging only moderate use of mobile phones;
- Continuing to improve characterisation of population exposure in outdoor and indoor environments through the use of measurement campaigns;
- That the development of new mobile phone network infrastructures be subject to prior studies concerning the characterisation of exposures, and an in-depth study be conducted of the consequences of possibly multiplying the number of relay antennas in order to reduce levels of environmental exposure;
- Documenting the conditions pertaining at those existing installations causing the highest exposure of the public and investigating in what measure these exposures can be reduced by technical means;
- That all common devices emitting electromagnetic fields intended for use near the body (DECT telephones, tablet computers, baby monitors, etc.) display the maximum level of exposure generated (SAR, for example), as is already the case for mobile phones.”

To review the entire English version the ANSES press release, refer to the following link:

<http://skyvisionsolutions.files.wordpress.com/2013/10/french-agency-press-kit.pdf>.

The entire expert appraisal is printed in French and consists of a PDF file which is 461 pages in length. It is hoped that the FCC will review this

document in evaluating a strategy whereby the FCC would fully endorse a precautionary approach at limiting the exponential growth of RF exposure to our population caused by the increasing number of wireless devices present in our society. The full French “**Update of the ‘Radiofrequencies and health’ expert appraisal**” should be available at the following link for at least a period of one calendar year:

<http://skyvisionsolutions.files.wordpress.com/2013/10/french-rf-expert-review.pdf>.

2. What is disheartening, however, is the public relations “spin” placed upon the French report by telecommunications-related organizations. The clear headline for the report is that an agency of the French government is recommending a **precautionary approach** to complement the limits based system that exists for limiting RF exposure within France. This is the news. Accordingly, the British [The Telegraph](#) headline for the story was “**Children’s exposure to mobile phones should be limited**,” and “*French safety watchdog recommends limiting exposure to radiofrequencies for children and intensive users.*” However, according to a telecommunications industry group, [GSMA](#), the appropriate headline was that “**French government finds mobile phones have no proven health effect and keeps existing safety standards.**” It is like people are living in different worlds and the one for the telecommunications world is clearly biased. Let us hope that the FCC is not similarly inclined to misinterpret or dismiss the French agency report.

Accommodation for Individuals with Wireless Smart Meters and Smart Appliances

1. As mentioned in prior comments and due to the concept of the voluntary nature of wireless devices used in the home, the FCC should stipulate that no utility, government, or other entity can require installation of an RF emitting device upon one’s property without consent. Such stipulation by the FCC would apply to devices such as wireless smart meters and would also extend to smart appliances to the extent that consumers are provided with a

clear mechanism to ensure that any RF transmitters contained within smart appliances are deactivated.

2. By taking actions as described above, the FCC would facilitate compliance with provisions of the American Disabilities Act by utility organizations, appliance manufacturers, and corporations involved with the smart grid or smart home industry.
3. Whether the FCC, the telecommunications industry, and some bureaucratic scientific bodies want to acknowledge it or not, it is a fact that qualified medical professionals diagnose conditions related to Electromagnetic Hypersensitivity (EHS) or sensitivity related illnesses that involve adverse clinical states elicited by exposure to low-dose diverse environmental triggers, including electrical stimuli such as radiofrequency radiation. For example, a published article of interest is entitled, "Sensitivity to Electricity – Temporal Changes in Austria," written by Joerg Schröttner and Norbert Leitgeb, 2008, and published online at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2562386/>. As stated in the article, "An overwhelming percentage of general practitioners (96%) to at least some degree believed in the effects of environmental electromagnetic fields on health, and only 39% have never associated health symptoms with electromagnetic pollution. A similar discrepancy between physician's opinions and established scientific assessment was shown in an inquiry study including 342 interviews of physicians in Switzerland."

For background information on sensitivity related illnesses, refer to "Sensitivity-related Illness: the escalating pandemic of allergy, food intolerance and chemical sensitivity," available at the following link: <http://www.ncbi.nlm.nih.gov/pubmed/20920818>. Although not indicative from the title or abstract, the article provides an explanation on how impaired tolerance and hypersensitivity can cause multi-system clinical symptoms and individual impairment based upon triggers and associated reactions

originating from multiple sources including direct chemical exposure, inhalants, foodstuffs, biological triggers such as molds, and electromagnetic radiation.

4. As noted in [comments](#) provided to the FCC by the American Academy of Environmental Medicine (AAEM), “electromagnetic sensitivity and the health effects of low level RF exposure have already been acknowledged by the federal government.” Specifically,
 - The United States Access Board, an independent Federal agency devoted to accessibility for people with disabilities, has stated, “The Board recognizes that multiple chemical sensitivities and **electromagnetic sensitivities** [emphasis added] may be considered disabilities under the ADA if they so severely impair the neurological, respiratory or other functions of an individual that it substantially limits one or more of the individual's major life activities.” Reference: Federal Register, Vol. 67, No. 170, Tuesday, September 3, 2002, page 56353, “Architectural and Transportation Barriers Compliance Board.”
 - The United States Access Board sponsored the IEQ Indoor Environmental Quality Project, and the final project report includes the following statement, “For people who are **electromagnetically sensitive** [emphasis added], the presence of cell phones and towers, portable telephones, computers, fluorescent lighting, unshielded transformers and wiring, battery re-chargers, wireless devices, security and scanning equipment, microwave ovens, electric ranges and numerous other electrical appliances can make a building inaccessible.” Reference: “IEQ Indoor Environmental Quality,” NIBS IEQ Final Report, 7/14/05. Note: “NIBS” is an acronym for National Institute of Building Sciences.
5. In a U.S. Supreme Court case, *Memphis Light, Gas & Water Div. v. Craft*, 436 U.S. 1 (1978), it was stated that “Utility service is a necessity of modern life; indeed, the discontinuance of water or heating for even short periods of

time may threaten health and safety.” It then follows that if a wireless smart meter, for example, cannot be tolerated by a customer for medical reasons, then use of such a meter would prevent the customer from receiving electrical [or other] services. In such a situation, the American Disabilities Act (ADA) requires the utility to accommodate the customer with a disability by modifying its standard practice of installing a wireless smart meter, so that the customer can continue to access necessary electrical service [or possibly other services] without burden.

6. Should there be any question of whether public accommodation provisions of the ADA is applicable to wireless smart meters being attached to consumers’ residences or appliance services offered for the home, the following additional substantiation is provided:

- There is a nexus between the utility or manufacturer service offered and the entity offering the service, based on the placement of a wireless smart meter or smart appliance at the customer’s residence. Courts have found that the ADA applies to services of a public accommodation accessed in private residences, noting that the ADA covers the services ‘of’ a public accommodation, not services ‘at’ or ‘in’ a public accommodation. This is consistent with the legislative history of the ADA, which states that the list of public accommodations is to be liberally construed: “[W]ithin each of these categories, the legislation only lists a few examples and then, in most cases, adds the phrase ‘other similar entities.’ The Committee intends that the ‘other similar’ terminology should be construed liberally consistent with the intent of the legislation that people with disabilities should have equal access to the array of establishments that are available to others who do not currently have disabilities.”

[Reference: S. Rep. No. 116, 101st Cong., 1st Sess. 59 (1989)]

- Similarly, the fact that wireless smart meters and smart appliances were not available at the time that the ADA and its implementing statutes were

drafted is no impediment to the applicability of the law. The legislative history of the ADA makes clear that Congress intended the statute to be interpreted to adapt to changes in technology. See, e.g. H.R. Rep.101-485(II), at 108 (1990) (“[T]he Committee intends that the types of accommodation and services provided to individuals with disabilities, under all of the titles of this bill, should keep pace with the rapidly changing technology of the times”).

7. Electrically sensitive individuals have generally been able to limit or eliminate the number of wireless devices in the home. They live without Wi-Fi, use traditional wired telephones, etc. However, if there reaches a point where only so-called smart appliances are manufactured that all contain wireless transmitters, then there reaches a point where electrically sensitive individuals may not be able to perform basic household activities such as doing the laundry or may no longer be able to own a refrigerator. Such a situation would clearly be unacceptable in our society. Such devices must clearly be manufactured in a way that any wireless transmitters can be fully deactivated such that they are no longer transmitting a RF signal.
8. In summary, on the topic of wireless smart meters and smart appliances, it is incumbent upon the FCC to issue regulations that protect electrically sensitive individuals in a way that ensures accommodation and compliance with provisions of the American Disabilities Act.

Comments of SkyVision Solutions
Submitted, August 31, 2013 (Amended)

Introduction

1. SkyVision Solutions submits these comments in response to the publication of FCC 13-39, First Report and Order, Further Notice of Proposed Rule Making and Notice of Inquiry (ET Docket No. 13-84 and ET Docket No. 03-137) released March 29, 2013, by the FCC and published in the Federal Register on June 4, 2013.

2. Incorporated by reference are prior comments submitted by SkyVision Solutions on February 6, 2013, pertaining to FCC 12-152, ET Docket No. 03-137 and WT Docket No. 12-357. Those comments were targeted specifically for footnote 95 of paragraph 53 of WT Docket No. 12-357, where it states, in part, that, “a few commenters stated that the Commission’s RF safety rules are inadequate because the rules are based on physics rather than biological studies. ... To the extent that commenters desire to change the RF standards, commenters can file in this proceeding...” Comments provided were generally applicable for all wireless devices but did focus on wireless electrical usage “smart” meters installed on private property by electric utilities. Comments substantiated the following recommended actions for the FCC:
 - The FCC should promptly implement and fully “endorse” common sense precautionary measures to slow the exponential growth of RF exposure to our population caused by the increasing number of wireless devices present in our society.
 - The FCC should promptly revise/ issue equipment authorizations for wireless smart meters to clearly stipulate that installation of such devices on individual homes requires the property owner’s consent, giving the homeowners the opportunity to use the precautionary principle in an effort to limit exposure. Such measures would be totally consistent with the implied concept of “voluntary use” of wireless technologies in the home.

3. Incorporated by reference are prior “reply” comments submitted by SkyVision Solutions on March 5, 2013, pertaining to FCC 12-152, ET Docket No. 03-137 and WT Docket No. 12-357. Those comments focused on potential conflicts of interest of the FCC with the telecommunications industry which may affect the Commission’s ability to objectively uphold its current responsibility to establish radiofrequency exposure guidelines given to it under Congressional authority. It was recommended that the FCC either vigorously uphold the responsibility to establish appropriate RF exposure guidelines or advocate that Congress direct another Federal agency (such as the Environmental Protection Agency) to have central authority and resources to properly execute this critical responsibility.
4. Comments provided below for the current “Notice of Inquiry” (NOI) are presented in the order of selected NOI numbered paragraphs (as listed in the *Federal Register*) with the number of the paragraph appearing at the beginning of each comment.

Comments on the Reassessment of Current RF Exposure Limits and Policies

1. **NOI Paragraph 47**, Comment on “Confidence in the Current Exposure Limits.”

The FCC introduces it’s NOI by stating it has “confidence in the current exposure limits.” With the mounting evidence of adverse biological effects occurring at levels below the current FCC exposure guidelines, such **confidence** is unfounded. For the sake of brevity, four examples will be provided to demonstrate the validity of this assertion.

- 1) A recent report from the European Environment Agency, EEA Report No 1/2013, states, “It is remarkable that the IARC carcinogenic classification does not seem to have had any significant impact on governments’ perceptions of their responsibilities to protect public health from this widespread source of radiation, especially given the ease with which exposures can

be reduced.” It is as though the FCC and other similar organizations have essentially ignored this important classification by the International Agency for Research on Cancer (IARC) that all radiofrequency emissions are now considered as possibly carcinogenic. This reflects a cognitive bias towards not taking any action in response to evidence that would otherwise support at least a questioning attitude regarding the current exposure guidelines.

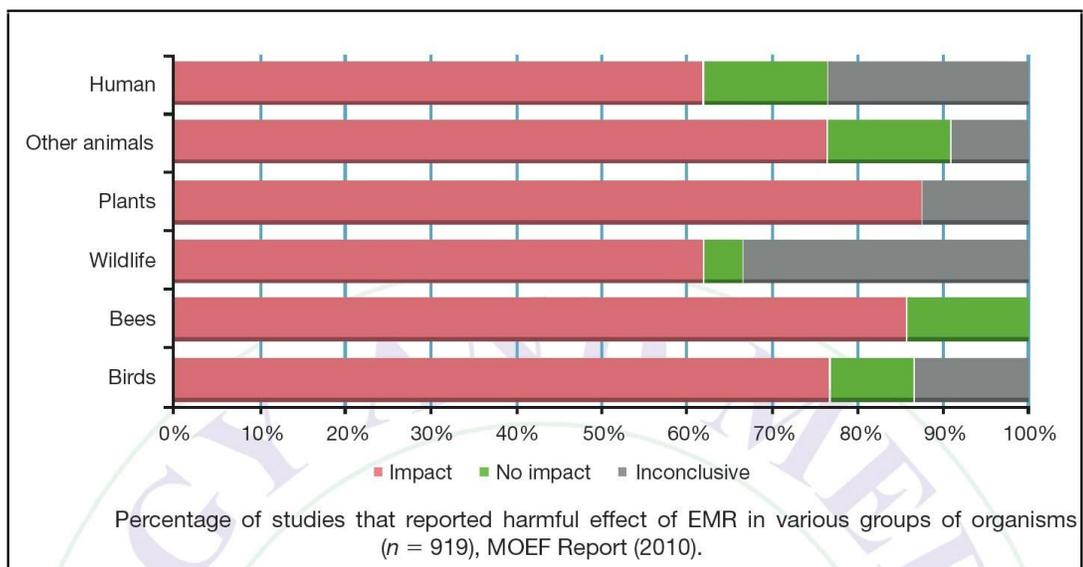
- 2) In April 2010, the “President’s Cancer Panel” issued a report entitled, *Reducing Environmental Cancer Risk*. The report recommends that a precautionary, prevention-oriented approach be taken to replace our current reactionary approach to regulating environmental contaminants in which human harm must generally be proven before action is taken to reduce or eliminate exposure. The entire report can be found at the following link:
http://deainfo.nci.nih.gov/ADVISORY/pcp/annualReports/pcp08-09rpt/PCP_Report_08-09_508.pdf.

Selected quotations are provided below:

- “Weak laws and regulations, inefficient enforcement, regulatory complexity, and fragmented authority allow avoidable exposures to known or suspected cancer-causing and cancer-promoting agents to continue and proliferate in the workplace and the community. Existing regulations, and the exposure assessments on which they are based, are outdated in most cases, and many known or suspected carcinogens are completely unregulated. Enforcement of most existing regulations is poor. In virtually all cases, regulations fail to take multiple exposures and exposure interactions into account.”
- “Industry has exploited regulatory weaknesses, such as government’s reactionary (rather than precautionary) approach to regulation.”

- “An alternative approach to regulation that supports primary cancer and other disease prevention is precautionary.”
 - “When credible evidence exists that there may be a hazard, a precautionary approach should be adopted and alternatives should be sought to remove the potential hazard and still achieve the same social benefit. Such an approach acknowledges the uncertainty of identifying cancer risks in complex, poorly understood environmental systems.”
 - “A precautionary, prevention-oriented approach should replace current reactionary approaches to environmental contaminants in which human harm must be proven before action is taken to reduce or eliminate exposure.”
- 3) Based upon currently available literature, it is not difficult to find credible evidence that supports the viewpoint that it is justified to conclude that man-made RF-EMF radiation emissions are causing adverse health effects among all types of living things including, humans, frogs, honey bees, birds, bats, trees, cows, and other wildlife. The Indian “Ministry of Environment and Forest (MOEF) set up an Inter-Ministerial Committee (IMC) to study the effects of RF-EMF radiations on wildlife and concluded that out of the 919 research papers collected on birds, bees, plants, other animals, and humans, 593 showed impacts, 180 showed no impacts, and 196 were inconclusive studies.” Source: *Biology and Medicine*, Vol. 4, No. 4 (2012), October-December, Published: 7th Jan 2013, entitled, “Impacts of Radio-Frequency Electromagnetic Field (RF-EMF) from Cell Phone Towers and Wireless Devices on Biosystem and Ecosystem – a Review.” This is an “open-access” article available at the following link:
http://biolmedonline.com/Articles/Vol4_4_2012/Vol4_4_202-216_BM-8.pdf.

Refer to the figure presented below for a visual depiction of the study results:



4) In December 2012, the *BioInitiative 2012 Report* – published by 29 highly respected health professionals from ten countries – comprehensively reviewed over 1,800 studies in the previous five years. The report concluded that “exposure to EMF and radiofrequency radiation (RFR) produces biological effects and adverse health effects at levels significantly below existing public exposure standards.” Overall, the studies were said to report:

- Abnormal gene transcription;
- Genotoxicity and single-and double-strand DNA damage;
- Stress proteins because of the fractal RF-antenna like nature of DNA;
- Chromatin condensation and loss of DNA repair capacity in human stem cells;
- Reduction in free-radical scavengers – particularly melatonin;
- Neurotoxicity in humans and animals;
- Carcinogenicity in humans;
- Serious impacts on human and animal sperm morphology and function;

- Effects on the fetus, neonate and offspring;
- Effects on brain and cranial bone development in the offspring of animals that are exposed to cell phone radiation during pregnancy; and
- Findings in autism spectrum disorders consistent with EMF/RFR exposure.

Finally, the *BioInitiative 2012 Report* stated that: “There is reinforced scientific evidence of risk from chronic exposure to low-intensity electromagnetic fields and to wireless technologies.”

2. **NOI Paragraph 53, Comment on Exposure Limits and Significance of IARC Declaration.**

Although the FCC previously stated confidence in its exposure guidelines, this NOI paragraph does thankfully request comment on whether “its current standards should be modified in any way.” Based upon the limited evidence supplied so far in these prepared comments and additional evidence that can easily be compiled, the overwhelming response should be, “Yes, current standards do need to be modified.” However, such a change or modification would take time and be performed in stages. It must start with an acknowledgment that adverse health effects do occur at levels below the current FCC exposure guidelines. Beyond that, the recommended approach should take two separate but complementary paths:

- 1) Begin development of new biologically based public safety limits in concert with other qualified governmental agencies and professional organizations which would include representation from the medical community. The current FCC thermally-based exposure guidelines are useful to prevent tissue heating and damage but do not protect against chronic exposures to biologically active non-thermal non-ionizing radiation. [This process to develop credible biologically based limits will understandably take time. In the short term, a precautionary approach can be taken to at least reduce unnecessary RF exposure to our population.]

- 2) Endorse a precautionary approach to implement common sense measures that will help slow the exponential growth of RF exposure to our population caused by the increasing number of wireless devices present in our society. This approach will be discussed in more detail in subsequent paragraphs.

Regarding the 2011 IARC declaration that RF fields are possibly carcinogenic, it has been disappointing that the FCC and other standards-related organizations have effectively ignored the significance of this event. For all the “wordsmithing” that probably went into creation of the full 500 page IARC Monograph, there was one revealing paragraph that should not be overlooked:

“Although it has been argued that RF radiation cannot induce physiological effects at exposure intensities that do not cause an increase in tissue temperature, it is likely that not all mechanisms of interaction between weak RF-EMF (with the various signal modulations used in wireless communications) and biological structures have been discovered or fully characterized. Biological systems are complex and factors such as metabolic activity, growth phase, cell density, and antioxidant level might alter the potential effects of RF radiation. ***Alternative mechanisms will need to be considered and explored to explain consistently observed RF-dependent changes in controlled studies of biological exposure*** [emphasis added].”

Reference: IARC Monograph, Volume 102, for non-ionizing radiation (and radiofrequency electromagnetic fields), published April 2013, page 104.

The evidence is still mounting on the effects of RF exposures within our environment. Let us not be “reactionary.” Let us formally acknowledge the “consistently observed” effects which are occurring at levels below the threshold necessary for thermal damage and move forward with a strategy that can be proactive and precautionary in nature to protect the public and the environment.

3. **NOI Paragraph 57, Comment on Device Duty Cycles.**

In the context of this NOI paragraph, the reference to a “source-based” time averaging provides consideration of devices with an inherent duty cycle. For

exposure to wireless devices where the public cannot be excluded, the FCC should make clear that a 100% duty cycle must be utilized in calculations for power density. Taking the example for smart meters, advocates for use of such devices like to point out that the typical or average duty cycle for such devices is “low.” On the other hand, for a person with a concern about wireless smart meter emissions, the concern is over (involuntary) potential exposure for oneself and family, not the exposure for the average person. In fact, several smart meter measurement studies show that at least some smart meters involved with each study have duty cycles in the range of 3% to 5%, and even up to 10%, depending on the study. Since the average person does not possess the equipment necessary to measure the actual RF emissions from a wireless smart meter located on his or her property, at a minimum, it *must* be assumed that the duty cycle is the maximum value measured in the field. Furthermore, one of the smart grid industry’s most publicized reports, “Health Impacts of Radiofrequency from Smart Meters,” Final Report, dated April 2011, published by the California Council on Science and Technology (CCST), states that “The PG&E commissioned report by Richard Tell Associates is based only on [a] duty cycle of transmitting data once every four hours which results in this very low estimated peak power. ... To truly be a smart grid, the data will be transmitted at a much more frequent rate than this. In this report we look at the worst – case scenario, a meter that is stuck in the “on” position, constantly relaying, at a 100% duty cycle [emphasis added]. ... Each smart meter is part of a broader ‘mesh’ network and may act as a relay between other smart meters and utility access points. The transmitter at each smart meter will be idle some of the time, with the percent of time idle (not transmitting) depending on the amount and schedule of data transmissions made from each meter, the relaying of data from other meters that an individual meter does, and the networking protocol (algorithm) that manages control and use of the communications paths in the mesh network. Theoretically the transmit time could increase substantially beyond today’s

actual operation level if new applications and functionality are added to the meter's communication module in the future.”

4. **NOI Paragraph 58, Comment on Pulsed Fields versus Time-Averaged Fields.**

Although there is a basis for using time-averaged fields for evaluating thermal RF effects, limits based upon time-averaged fields have no relevance for adverse health impacts caused by non-thermal exposure mechanisms. Consequently, for instances where new biologically based exposure limits are developed or a precautionary approach is applied to limit RF exposures, action levels need to be based upon peak power levels. Such an approach would acknowledge that many new wireless devices create pulsed RF fields and that such fields may be linked to biologically disruptive effects.

5. **NOI Paragraphs 66, 67, 68, 69, & 70, Comments on Taking a Precautionary Approach.**

As stated above and until appropriate biologically based exposure limits can be developed, a “precautionary approach” should be utilized in order to reduce needless or unnecessary exposure to RF radiation. With such a practical approach, the current FCC exposure guidelines would represent a baseline with implementation of a number of measures intended at least to slow the exponential growth of RF exposure to our population. Such measures need not include numerical action levels and could easily be implemented in a way that would provide a proper balance of protecting the public from unnecessary exposure without imposing an undue burden on the telecommunications industry.

The Precautionary Approach – Introduction

The "precautionary approach" represents the concept that when there is evidence of possible adverse health effects, precautionary measures should be

taken, even when some cause and effect relationships are not fully understood or established. Precautionary measures can be adopted which complement and do not undermine science-based guidelines. In evaluating risk, one must acknowledge that the nature of risk can lead to different perceptions of risk and whether a person is willing to accept a particular risk or reject it. Although different people perceive risks differently, when deciding to apply a precautionary approach for a particular situation, it is necessary to accept that for an action to be warranted that there should be some “credible threat of harm.” A “speculative fear of future harm” would not constitute a valid use of a precautionary approach to avoid risk. Finally, precautionary actions should be chosen that are proportional to the seriousness of the potential harm. The description for a precautionary approach described above is adapted from “The Precautionary Principle,” World Commission on the Ethics of Scientific Knowledge and Technology (COMEST), March 2005. Specifically, the approach involves analyzing a situation to evaluate whether human activities may lead to **unacceptable harm** that is scientifically **plausible** but uncertain, and if so, then actions should be taken to avoid or diminish that harm.

The narrative that follows is somewhat abbreviated for purposes of these FCC submitted comments, but it is provided to conceptually demonstrate how easily that a precautionary approach can be determined to be warranted for RF emissions.

Concept of Unacceptable Harm

“Unacceptable harm” refers to harm to humans or the environment that is: (1) threatening to human life or health, or (2) serious and effectively irreversible, or (3) inequitable to present or future generations. Due to the International Agency for Research on Cancer (IARC) declaration which classifies RF radiation as a potential carcinogen and due to other evidence to be presented in subsequent paragraphs, it is plausible that RF radiation emissions from wireless devices may threaten human health. Some medical professionals claim that medical

conditions are caused or aggravated by exposure to RF radiation, based on application of available science and clinical judgment. Additionally, numerous research studies show evidence of negative effects on human and animal physiology due to RF exposure at levels below FCC exposure guidelines.

Concept of Plausibility (Credible, Conceivable, Believable)

To support the basic claim of “plausibility” of harm for RF emissions, the following evidence is offered:

- 1) From May 24-31, 2011, the World Health Organization’s International Agency for Research on Cancer (IARC), a Working Group of 31 scientists from 14 countries, met in Lyon, France “to assess the potential carcinogenic hazards from exposure to radiofrequency electromagnetic fields.” The conclusion of the IARC Working Group was to classify “radiofrequency electromagnetic fields as possibly carcinogenic to humans (Group 2B) ... A positive association has been observed between exposure to the agent and cancer for which a causal interpretation is considered by the Working Group to be credible,...” “Dr Jonathan Samet (University of Southern California, USA), overall Chairman of the Working Group, indicated that ‘the evidence, while still accumulating, is strong enough to support a conclusion and the 2B classification.’” Reference: World Health Organization Press Release, N-208, May 31, 2011.
- 2) The Federal Communications Commission (FCC) has acknowledged that “there is no federally developed national standard for safe levels [emphasis added] of exposure to radiofrequency (RF) energy...” Reference: “Wireless Devices and Health Concerns,” FCC Consumer Facts pamphlet, available at: <http://transition.fcc.gov/cgb/consumerfacts/mobilephone.pdf>.
- 3) On the US EPA website, radiofrequency radiation is listed as a “Potential Carcinogens, Link Suspected but Unconfirmed.” The EPA website further states that: “Exposure to radio frequency (RF) radiation has climbed rapidly with the advent of cell phones and other wireless technologies. Studies of the link between exposure to RF and to electric and magnetic frequency (EMF) radiation have found RF and EMF to be ‘potential carcinogens,’ but the data linking RF and EMF to cancer is not conclusive. World wide, health physicists (scientists who study the biological effects of radiation) continue to study the issue.”

- 4) The Parliamentary Assembly of the Council of Europe has stated that, "Governments should reconsider the scientific basis for the present electromagnetic fields exposure standards set by the International Commission on Non-Ionizing Radiation Protection, which have serious limitations and apply as low as reasonably achievable (ALARA) principles. The adopted resolution underlines the fact that the precautionary principle should be applicable when scientific evaluation does not allow the risk to be determined with sufficient certainty." Reference: Council of Europe Parliamentary Assembly press release of May 27, 2011.
- 5) As explained by the Parliamentary Assembly of the Council of Europe in Resolution 1815 (2011), entitled, "The Potential Danger of Electromagnetic Fields and Their Effect on the Environment,": "Given the context of the growing exposure of the population, in particular that of the vulnerable groups such as young people and children, there could be extremely high human and economic costs if early warnings are neglected."
- 6) The United States Access Board, an independent Federal agency devoted to accessibility for people with disabilities, has stated, "The Board recognizes that multiple chemical sensitivities and electromagnetic sensitivities may be considered disabilities under the ADA if they so severely impair the neurological, respiratory or other functions of an individual that it substantially limits one or more of the individual's major life activities." Reference: Federal Register, Vol. 67, No. 170, Tuesday, September 3, 2002, page 56353, "Architectural and Transportation Barriers Compliance Board."
- 7) The United States Access Board sponsored the IEQ Indoor Environmental Quality Project, and the final project report includes the following statement, "For people who are electromagnetically sensitive, the presence of cell phones and towers, portable telephones, computers, fluorescent lighting, unshielded transformers and wiring, battery re-chargers, wireless devices, security and scanning equipment, microwave ovens, electric ranges and numerous other electrical appliances can make a building inaccessible." Reference: "IEQ Indoor Environmental Quality," NIBS IEQ Final Report, 7/14/05. Note: "NIBS" is an acronym for National Institute of Building Sciences.
- 8) The American Academy of Pediatrics, in a letter to Congressman Dennis Kucinich, dated December 12, 2012, states: "Children are disproportionately affected by environmental exposures, including cell phone radiation. The differences in bone density and the amount of fluid in a child's brain compared to an adult's brain could

allow children to absorb greater quantities of RF energy deeper into their brains than adults. It is essential that any new standards for cell phones or other wireless devices be based on protecting the youngest and most vulnerable populations to ensure they are safeguarded through their lifetimes.”

- 9) Many well educated individuals and credible organizations claim that adverse effects from RF radiation occur at levels much lower than current FCC exposure guidelines. While FCC exposure guidelines typically range from 600 to 1,000 $\mu\text{Watt}/\text{cm}^2$, it is claimed by some organizations that adverse effects can occur at levels of 0.1 $\mu\text{Watt}/\text{cm}^2$ or lower. One such organization is “The BioInitiative Working Group 2012,” mentioned earlier which has an exhaustive compilation of scientific study information and recommendations regarding exposure to RF radiation. Listed below are selected statements from the *BioInitiative 2012 Report*:

- “Bioeffects are clearly established and occur at very low levels of exposure to electromagnetic fields and radiofrequency radiation. Bioeffects can occur in the first few minutes at levels associated with cell and cordless phone use. Bioeffects can also occur from just minutes of exposure to mobile phone masts (cell towers), WI-FI, and wireless utility ‘smart’ meters that produce whole-body exposure.”
- Many of these bioeffects can reasonably be expected to result in adverse health effects if the exposures are prolonged or chronic. This is because they interfere with normal body processes (disrupt homeostasis), prevent the body from healing damaged DNA, produce immune system imbalances, metabolic disruption and lower resistance to disease across multiple pathways. Essential body processes can eventually be disabled by incessant external stresses (from system-wide electrophysiological interference) and lead to pervasive impairment of metabolic and reproductive functions.”
- “New, biologically-based public exposure standards are critically needed now and should key to scientific benchmarks for harm, plus a safety margin below that level. The standard of evidence for judging the scientific evidence should be based on good public health principles rather than demanding scientific certainty before actions are taken.”

- 10) Regarding Russian and Chinese exposure guidelines, they are considered science-based, as are the exposure guidelines for the United States. Russian and Chinese guidelines, however, acknowledge that chronic, non-thermal RF exposure effects do occur based upon biological experiments with animals and case studies with individuals. Scientists observe a range of effects, such as changes in electroencephalogram (EEG) readings, induction of autoimmune responses (formation of antibodies to brain tissues), stress-reactions, as well as adverse effects for blood serum results. It cannot be claimed with certainty that all observed effects are pathological and/or irreversible, but in any case, it is concluded that such effects influence the physical and mental well being of affected individuals and therefore constitute a health hazard. In the United States, exposure standards are primarily based upon engineering calculations assessing short-term thermal effects of RF energy on human tissue. For chronic exposures, non-thermal considerations were not included for US and most western European exposure guidelines due to a claimed “paucity of reliable data on chronic exposures.” Russian scientists argue that RF exposure guidelines based upon chronic exposure levels and interactions are more representative of the real world experience of the population and thus are more appropriate than exposure to acute situations at thermal exposure levels which are rarely encountered. Furthermore, Russian scientists assert that the establishment of threshold levels based solely on thermal considerations makes the assumption that an organism will compensate or adapt to non-thermal RF exposure effects and that there is no basis for this assumption. Information to validate the evidence presented in this section is considered common knowledge, but two sources to substantiate the claims are available at the following links:

http://archive.radiationresearch.org/conference/downloads/021235_grigoriev.pdf; and

http://www.who.int/peh-emf/meetings/day2Varna_Foster.pdf.

Based upon the type of information presented above and the fact that FCC guidelines do **not** address possible adverse effects of non-thermal RF radiation exposure levels, there are sufficient grounds for consideration that unacceptable harm be considered as scientifically plausible if not probable for RF emissions from wireless devices, i.e., that there is a “credible threat of harm” as perceived by a prudent person.

Basic Precautionary Actions

Showing that the basic threshold for plausible and unacceptable harm has been met, it is thus appropriate to consider a precautionary approach. The next step is choosing the appropriate form of precautionary action. Based upon what was presented earlier, precautionary measures should be chosen that are proportional to the seriousness of the potential harm. It is instructive to review guidance provided by the US EPA regarding use of wireless technology. At its website at <http://www.epa.gov/radtown/wireless-tech.html>, the following guidance is provided:

“What you can do to protect yourself: Although there is not sufficient evidence to conclude that there is a definite risk associated with long-term cell phone use, people who are concerned can take simple steps to reduce exposure: **Limit use** – reducing the number/length of calls; **Use ‘hands-free’ devices** – Using ‘hands-free’ devices can help to keep mobile phones away from the head.”

In addition, at the US EPA website, the topic of exposure to radiofrequency (RF) radiation is discussed in a section on “Optional” exposure mechanisms, along with smoking and exposure to UV radiation which are other exposure mechanisms that may lead to cancer. The inference is that concerned members of the public who fear cancer through these exposure mechanisms should limit or avoid exposure to cigarette smoke and sunlight.

Refer to the link at: <http://www.epa.gov/radtown/basic.html>.

Recommended Approach to Reduce Future RF Exposures

Based upon the presented information, it can be surmised that exposure to RF radiation is already considered, at least to some extent, as an optional or

voluntary exposure mechanism in our society. The recommended approach at this time for the FCC (as a precautionary measure) is relatively simple:

- 1) No immediate changes are recommended for limits involving cell tower transmissions since any such changes could significantly and negatively impact the telecommunications industry. Any such changes could await the development of more restrictive biologically based exposure guidelines, a process that should include active participation of all affected stakeholders.
- 2) The FCC should fully “endorse” common sense precautionary measures to at least slow the exponential growth of exposure to wireless RF technology emissions in our society. Such measures would focus on educating the public on the voluntary nature of using personal wireless devices and how members of the public can use simple methods such as “time and distance” to reduce overall exposure. Specific approaches could include the following:
 - Implement awareness campaigns on the potential risks of RF radiation, targeting children, teenagers, and young people who may at greatest risk for non-thermal effects;
 - Evaluate current labeling practices for wireless devices and improve language and nature of warnings for possible health hazards;
 - Particularly for schools and classrooms, indicate preference for wired Internet connections;
 - As some organizations have already recommended, emphasize hands-free operation of cellular phones and texting when possible to reduce exposure to the head area;
 - Emphasize the voluntary nature of wireless devices used in the home and stipulate that no utility, government, or other entity can require installation of a RF emitting device upon one’s property without one’s consent.

Specific Recommendations for Smart Meter and Smart Appliances

Inherent in the final approach mentioned above is that the use of wireless transmission devices in the home must be considered optional and voluntary. Unfortunately, some local governments, public utility commissions, and utilities do not respect this fundamental consideration for members of the public when it

comes to so-called wireless smart meters. They are forcibly installing RF transmitters on homeowners' properties without consent and then deferring all safety issues to the FCC. The FCC is effectively used as a scapegoat by other governmental and utility officials to be able to not fully justify their actions when it comes to exposing our entire population to a new source of environmental radiation that many people believe negatively affects their health and well-being.

Similar issues are emerging with the use of so-called smart appliances. These appliances include RF transmitters and it is not clear that all manufacturers are including an option for consumers to easily deactivate those transmitters for those individuals not desiring to be exposed to additional RF radiation in the home.

Thus, it requested that the FCC perform the following:

- 1) The FCC should promptly revise/ issue equipment authorizations for wireless smart meters to clearly stipulate that installation of such devices on individual homes requires the property owner's consent, giving the homeowners the opportunity to use the precautionary approach in an effort to limit RF exposure. Such measures would be totally consistent with the implied concept of "voluntary use" of wireless technologies in the home.
- 2) The FCC should mandate that all smart appliances containing an RF transmitter for communication with wireless smart meters or wireless routers be provided with a clear mechanism for the consumer to ensure that any RF transmitters contained within the device are deactivated.

6. **NOI Paragraph 69, Comment on "Anxiety in the Population."**

The FCC makes a curious statement that "adoption of extra precautionary measures may have the unintended consequence of 'opposition to progress and the refusal of innovation, ever greater bureaucracy,... [and] increased anxiety in the population.'" What about the anxiety and possible physical harm that can be caused by not taking prudent measures to reduce exposure?

Actually at the point where the FCC refers to “anxiety in the population,” it was selectively quoting a French published article entitled, “Conclusions. The Precautionary Principle: Its Advantages and Risks.” That article (as the title indicates) discussed the “pros and cons” of implementing a precautionary principle. One of the statements not quoted by the FCC in that same article was that “the precautionary principle can have advantages, such as motivating decision-makers in the public or private sector to explain and quantify their reasoning, and to give objective information.” This would hopefully be the case for the forcible installation of wireless smart meter for every house in America. If consumer consent was required prior to installation of a smart meter, decision-makers would more likely either completely explain their reasoning or would find a better alternative metering system.

7. Why Wireless Smart Meters Should Not Be Mandatory

As was mentioned in the Introduction to these comments filed with the FCC, SkyVision Solutions maintains a website dedicated to raising public awareness about the benefits, costs, and risks associated with smart grid systems as well as the potential hazards related to radiofrequency (RF) radiation emissions from all wireless devices, including smart meters. The attachment to these comments is adapted from an article published on his website that describes “Why Wireless Smart Meters Should Not Be Mandatory” and that no published studies conclude that smart meters are safe for the public. This article further supports the assertion made in these comments that the use of wireless devices in the home should be considered as voluntary.

Attachment to Comments for August 31, 2013

Why Wireless Smart Meters Should Not Be Mandatory

In defending the use of wireless smart meters, if someone states that there are no peer reviewed studies that would substantiate health concerns for wireless smart meters, then that person is making a non-conservative and misleading claim. The fact is that there are no epidemiological or health case studies that would indicate that wireless smart meters are safe.

Smart grid advocates frequently make a claim that: “While concerns have been raised about the potential impact of the RF generated by these smart meters, **numerous studies have shown that smart meters using RF technologies pose no health risk.**” This statement exists, for example, at the Edison Electric Institute website at: <http://smartgrid.eei.org/Pages/FAQs.aspx>, as part of an answer to the question, “Does the radio frequency (RF) signal produced from smart meters cause any health effects?”

From a smart grid industry perspective, safety claims for smart meters are made based upon industry testing documents demonstrating that emissions from individual smart meter devices comply with outdated Federal Communications Commission (FCC) exposure guidelines, and then referring to such documentation as a “study” showing that wireless smart meters pose no health risk.

Unfortunately, FCC exposure guidelines were never formulated to fully protect human health. In fact, they are only believed to protect against injury that may be caused by acute exposures that result in tissue heating or electric shock and burn over a timeframe of several minutes of exposure. FCC exposure guidelines have no relevance to protect humans from chronic exposure to pulsed radiofrequency radiation emitted by devices such as smart meters. A utility company is incorrect to categorically state that a wireless smart meter device is “safe” due to compliance with current FCC exposure guidelines. There are consistently observed biological effects that occur at levels below FCC guidelines.

Additionally, smart grid proponents will make claims such as the following:

“There currently is no **conclusive** [emphasis added] scientific evidence pointing to a non-thermal cause-and-effect between human exposure to RF emissions and negative health impacts.” [Reference: California Council for Science and Technology, Final Report, dated April 2011, entitled, “Health Impacts of Radio Frequency Exposure from Smart Meters,” page 13.]

The above statement purposely ignores the fact that substantial evidence confirms a non-thermal cause-and-effect between human exposure to RF emissions and negative health impacts. The reference to the term conclusive is generally understood to mean, “putting an end to debate or question especially by reason of

irrefutability.” The type of discussion and logic employed in the above statement essentially represents a straw man argument for this issue, which is based upon the inappropriate and irrational premise that “conclusive” and irrefutable evidence is needed prior to taking any action to protect the public. In biology and medicine, there is very little that is known conclusively or with near 100% certainty.

In medical science, not all results are consistent due to biological variability. We are all the product of thousands of genes that interact with each other and the environment in unpredictable ways. Each individual is unique. Not every smoker dies of cancer. Some people are allergic to eggs and most are not. One may be allergic to peanuts while another is not. We don't all have the same side effects from taking prescription drugs, and we can't all be expected to respond in the same way to electromagnetic insults. Just because everyone is not affected by RF radiation doesn't mean that no one is affected.

Dr. De-Kun Li* is a leading research scientist in reproductive and prenatal epidemiology. In December 2012, Dr. Li filed testimony before the Maine Public Utility Commission regarding the issues of wireless smart meter safety. Specifically, Dr. Li was asked about possible non-thermal radiation effects from RF emissions and whether science supports the conclusion that wireless smart meters are “safe.” The response was, “**No.**” Furthermore, Dr. Li indicated that, “***I am not aware of any studies that have shown that exposure to smart meters is safe for the human population.*** [emphasis added] Anyone who wants to install smart meters to every household needs to demonstrate that such massive installation is safe and will have no effect on the risk of cancer, childhood obesity and asthma, autoimmune diseases, etc.”

* Author Note: To review the entire testimony for Dr. Li, refer to the following link: <http://skyvisionsolutions.files.wordpress.com/2013/07/exhibit-2-de-kun-li-web.pdf>.

*In addition, in 2011, Dr. Li had previously commented on the draft CCST report referenced earlier in this report. In his comment letter, he made many relevant points, among them that “**Unknown does not mean safe.**” For a copy of Dr. Li's full comment letter, refer to the following link:*

<http://skyvisionsolutions.files.wordpress.com/2013/06/liccst.pdf>.

In fact, there have been no epidemiological studies or health case studies conducted that have demonstrated the safety of wireless smart grid technology in terms of widespread deployment within the human population. Because of this fact alone, informed citizens should be allowed to implement a precautionary approach with regard to wireless smart meter emissions in order to prudently avoid a new source of RF radiation in their homes. Furthermore, for some individuals, they are convinced that they are currently being harmed by the RF emissions from smart meters due to symptoms related to Electromagnetic Hypersensitivity (EHS).

Additionally, the American Academy of Environmental Medicine (AAEM) released a document in October 2013, entitled, "[Wireless Smart Meter Case Studies](#)." This document describes case series submitted by Dr. Federica Lamech, MBBS, *Self-Reporting of Symptom Development from Exposure to Wireless Smart Meters' Radiofrequency Fields in Victoria*. AAEM claims that this documented 92 case series clearly demonstrates adverse health effects in the human population from smart meter emissions. In the AAEM document, it is claimed that the "evidence is irrefutable" that adverse health effects correlate with smart meter emissions. In this context one needs to recognize a distinction between "correlation" and "causation." From a scientific perspective, correlation does not necessarily imply causation. However, it is apparent that the AAEM now believes that the collective scientific evidence to be strong enough to call for a moratorium on the installation of smart meters and options for consumers to maintain analog meters... as research continues and actions are taken in an attempt to implement safer technologies.

Furthermore, the above mentioned case series tends to refute the argument made by the smart grid industry that no studies have been documented to substantiate health concerns for wireless smart meters. [Note: As of the current date, the case series is in the process of being submitted for publication in a peer-reviewed journal.]

Smart grid advocacy groups attempt to lump cell phones, cordless phones, and wireless smart meters together as devices we all "frequently encounter," not acknowledging that there is an element of choice involved with all non-smart meter devices in the home. For those people who oppose the installation of wireless smart meters, there is an element of principle involved. A person can eliminate or curtail the use of all other wireless devices in the home, but in most cases across the country, for the wireless smart meter, a person cannot. If there is an "opt-out" provision, a fee is usually involved in order to prudently avoid a newly added source of RF emissions for the home.

Again quoting additional testimony for Dr. De-Kun Li mentioned above, "cell phone use is usually for a short duration. ... Use of cell phones is a voluntary exposure. One can choose not to use a cell phone. Vulnerable populations like infants and young children are not exposed to cell phone RF EMF in most cases. However, every resident, including infants, pregnant women and the fetus, in a household will be exposed to RF EMF from smart meters if installed nearby. Given that installation of smart meters is mandatory in most places, RF EMF exposure from smart meters is an "involuntary" exposure. Based upon the principle of risk assessment, involuntary exposures require more stringent safety standards."

Based upon the facts and the collective evidence, it is correct to make the following conclusions regarding wireless smart meter RF emissions:

- RF radiation emitted from wireless smart meters has been determined by the IARC to be *possibly carcinogenic to humans*.

[Note: The IARC Monograph Volume 102, for non-ionizing radiation (and radiofrequency electromagnetic fields) makes quite clear that applicability for the IARC declaration for a Group 2B carcinogen does indeed apply to all RF emissions in the range of 30 kHz to 300 GHz from all sorts of wireless devices, including wireless smart meters. Some smart grid advocates have tried to interpret the original IARC declaration and the associated press release in May 2011 for applicability to mobile phone emissions only. In fact, smart meters are specifically mentioned in the IARC Monograph as a “Domestic Source” of RF emissions.]

Also note that leading epidemiologists in a recent published article have concluded that radiofrequency (RF) radiation is a probable human carcinogen. This article reviews new studies published since the IARC review in 2011 and concludes that RF radiation should be re-classified as a probable human carcinogen. Impressive reports that have studied those individuals who began using cell phones before age 20 find a 4 to 8 fold increase in brain cancer as well as increases in leukemia. At one point in the published article it is states that “Current standards for exposure to radiofrequency fields were set more than fifteen years ago resting on the belief that levels of microwave radiation from mobile phones cannot induce any measureable change in temperature or other biological effect. Recent analyses show that this assumption is no longer tenable.” [emphasis added]. For more information on the article published in the April 2013 issue of *Pathophysiology*, refer to the following link:
<http://download.journals.elsevierhealth.com/pdfs/journals/0928-4680/PIIS0928468013000035.pdf>.

- The current IARC determination was made primarily based upon epidemiological studies with people exposed to RF emissions from cell phones and cordless phones.
- No epidemiological studies have been performed with people exposed to the emissions from wireless smart meters.
- The intensities of exposure received from a cell phone and a wireless smart meter are not nearly as different as claimed by smart grid advocates. In fact, the exposure is quite similar for equivalent spatial configurations. Although the greater distance from a smart meter can be considered as a differential factor under typical exposure scenarios, conversely, so can the chronic nature of smart meter exposure as opposed to most people using their cell phones for no more 20 minutes per day for voice communications. It is also possible that different signal characteristics of RF emissions from different devices may produce different biological effects.
- Based upon limited evidence that RF fields are carcinogenic, there are sufficient grounds to conclude that it is scientifically plausible that RF radiation from smart meters may threaten human health.

- It is also important to acknowledge that the IARC declaration only addresses the possible carcinogenic nature of RF radiation emissions. It does not address possible adverse health effects such as Electromagnetic Hypersensitivity (EHS) or other medical conditions potentially caused or aggravated by non-thermal RF exposure mechanisms.

Numerous studies can be listed which tend to confirm that EHS is a valid medical syndrome. See, for example, a recent article published in *Electromagnetic Biology and Medicine*, June 2013, Vol. 32, No. 2, pages 253-266. The article is entitled, "Replication of Heart Rate Variability Provocation Study with 2.4-GHz Cordless Phone Confirms Original Findings." A conclusion of the article is that radiation from a 2.4-GHz cordless phone affects the Autonomic Nervous System and may put some individuals with preexisting heart conditions at risk when exposed to electromagnetic frequencies to which they are sensitive. For more information on this article, refer to the following link:

<http://thetruthaboutsmartgrids.org/2013/08/10/replication-of-heart-rate-provocation-study/>.

- The true issue at hand is whether a precautionary approach is warranted, the most basic of which is voluntary and prudent avoidance of wireless RF emissions.
- It is logical and reasonable that prudent avoidance of wireless smart meter emissions in the home be considered warranted since such action is currently allowed for all other devices in the home which emit RF radiation.

In addition to the information presented so far in this document, a recent report has been prepared by Ronald M. Powell (Ph.D., Harvard University, 1975), entitled, "Biological Effects from RF Radiation at Low-Intensity Exposure, Based on the *BioInitiative 2012 Report*, and the Implications for Smart Meters and Smart Appliances," dated June 11, 2013. In the absence of health-related studies demonstrating the safety of people being exposed to the emissions from wireless smart meters, the Powell report provides perspective on how adverse effects documented within the context of the *BioInitiative Report 2012* would support the supposition that adverse biological effects should be expected based upon the RF radiation levels produced from smart meters and smart appliances.

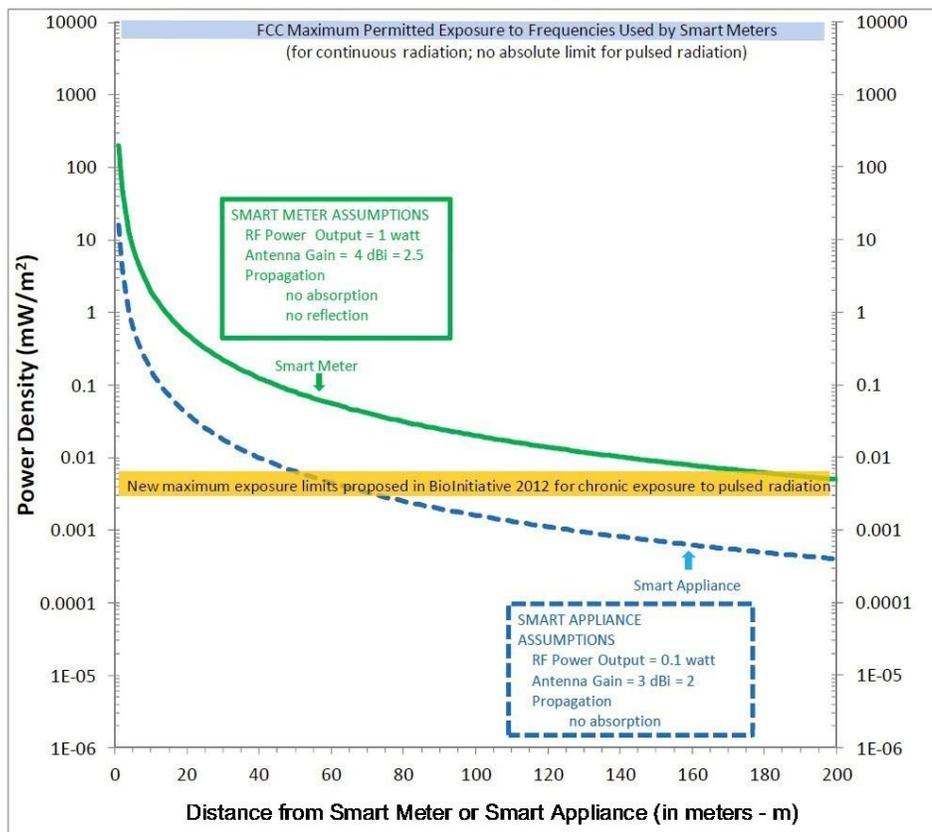
Brief commentary on the report prepared by Dr. Powell:

1. The report is somewhat unique in that it discusses not only smart meter RF emissions but also addresses emissions associated with so-called "smart appliances" that many people are beginning to purchase for their homes;
2. The report shows that RF radiation emitted from smart meters and smart appliances can affect human health at distances far in excess than will be

acknowledged by smart grid advocates. Refer to the figure below (extracted from the report);

3. In simple terms, chronic exposure to pulsed RF radiation fields at levels above the horizontal yellow band in the figure is a cause for concern for expected adverse effects.
4. Notice that the outdated FCC exposure guidelines are annotated by the horizontal blue band at the top of the chart. Radiation levels for typical smart meters and smart appliances are shown with the green and blue lines. As you can see, radiation levels exceed the *BioInitiative Report 2012* recommended action levels out to tens of meters in distance from the devices.

Figure 1: Smart Meter and Smart Appliance RF Power Densities versus Distance



For the full report, refer to the following link:

http://skyvisionsolutions.files.wordpress.com/2013/06/powell-report-bioinitiative-report-2012-applied-to-smart-meters-and-smart-appliances_june_11_2013.pdf.

Because of the foregoing information, it is reasonable and appropriate that individuals be able to opt-out of wireless smart meter installations without charge, fee, or penalty.

Exhibit A

About the Author of Comments and “Reply” Comments (SkyVision Solutions)

Mr. Kit T. Weaver (generally referred to as SkyVision Solutions within this document) has earned a B.S. in Engineering Physics and an M.S. in Nuclear Engineering with a specialty in radiation protection, both degrees received from the University of Illinois at Urbana-Champaign. He was employed by a leading electric utility for over 25 years. He served in various positions, including Station Health Physicist, Senior Health Physicist, corporate Health Physics Supervisor, and corporate Senior Technical Expert for Radiobiological Effects. He was considered qualified by the Nuclear Regulatory Commission (NRC) as a site Radiation Protection Manager in accordance with USNRC Regulatory Guide 1.8. He served in various on-call emergency response organization positions including Health Physics Director and Environmental Manager. He served as a member of the corporate Radiation Advisory Committee which dealt with radiation protection policy and litigation issues that included interaction with the company’s General Counsel and company Medical Director. He has received specialized training in radiation biophysics, radiological emergency response planning and preparedness, and project management. He has participated in various industry committees and activities related to the Edison Electric Institute, the Institute for Nuclear Power Operations, the American Nuclear Insurers, and the Nuclear Energy Institute. He is a member of the Tau Beta Pi Association and is also a member of the Honor Society of Phi Kappa Phi. He is a plenary member of the Health Physics Society and has three times served as President of the Midwest Chapter of the Health Physics Society. He has retired from full time employment and currently operates a website (under the name of SkyVision Solutions) dedicated to raising public awareness about the benefits, costs, and risks associated with smart grid systems as well as the potential hazards related to radiofrequency (RF) radiation emissions from all wireless devices, including smart meters.