

Before the
Federal Communications Commission
Washington, D.C. 20554

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| In the Matter of |) | |
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| 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 |
| |) | |
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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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August 31, 2013

Comments of Kit T. Weaver

Submitted August 31, 2013

Introduction

1. Kit T. Weaver 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. Mr. Weaver 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. Mr. Weaver 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. Mr. Weaver 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. Mr. Weaver 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. Mr. Weaver has retired from full time employment, and under the name of SkyVision Solutions, currently operates 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.

3. Incorporated by reference are prior comments submitted by Kit T. Weaver 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.

4. Incorporated by reference are prior “reply” comments submitted by Kit T. Weaver 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 recommend 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.
5. 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:

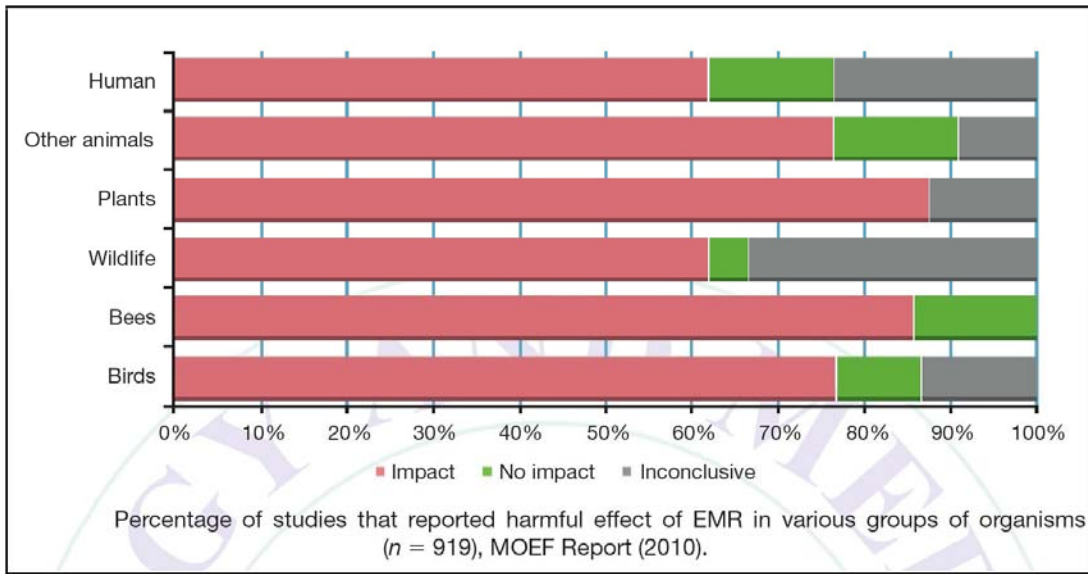
- “Weak laws and regulations, inefficient enforcement, regulatory complexity, and fragmented authority allow avoidable exposures to known or suspected cancer-causing and cancer-promoting agents to continue and proliferate in the workplace and the community. Existing regulations, and the exposure assessments 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://biomedonline.com/Articles/Vol4_4_2012/Vol4_4_202-216_BM-8.pdf. Refer to the figure presented below:



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 effects, 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, Mr. Weaver 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.

Why Wireless Smart Meters Should Not Be Mandatory

by Kit T. Weaver

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 are no epidemiological 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?”

To some extent the smart meter safety claims rely on conclusions reached based upon selected studies performed for cell phone or cordless phone exposures and where statements are made such as:

“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.

In addition, with regard to smart meters, safety claims are also based upon industry documents demonstrating that emissions from individual smart meter devices comply with Federal Communications Commission (FCC) exposure guidelines, and then referring to such documentation as a “study.”

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 performed to even attempt to demonstrate 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).

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/>.

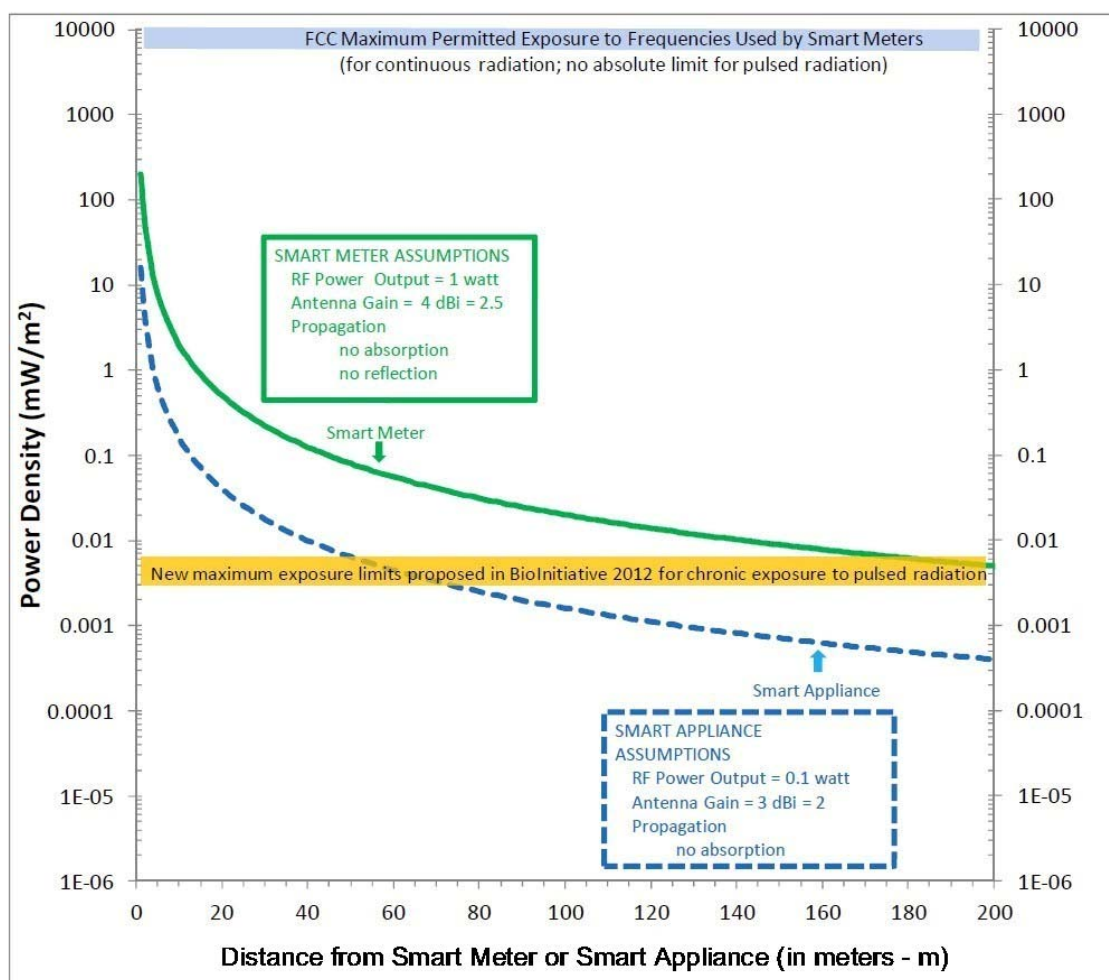
- The true issue at hand is whether a precautionary approach is warranted, the most basic of which is voluntary and prudent avoidance of wireless RF emissions.
- It is logical and reasonable that prudent avoidance of wireless smart meter emissions in the home be considered warranted since such action 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. Even though no epidemiological studies have been performed with people exposed to the emissions from wireless smart meters, this new 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.

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.