

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

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| 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
Washington, DC 20554

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I. INTRODUCTION

1. The EMRadiation Policy Institute ("EMRPI") is a 501(c)(3) non-profit citizens organization based in Marshfield, Vermont, engaged in advocacy and public education concerning the adverse effects of radio frequency (RF) radiation and electromagnetic radiation (EMR) exposure.

II. BACKGROUND

2. From EMRPI's inception in 2003, and prior to that through the EMR Network and Canyon Area Residents for the Environment (CARE), EMRPI or its present officers have attempted to educate the Federal Communications Commission (FCC) with scientific reports, affidavits and numerous demonstrations of health harm arising from the inadequacies in the current FCC electromagnetic radiation safety guidelines. These filings are found in the FCC Electronic Comment Filing System at:

<http://preview.tinyurl.com/kys3bgp> (last viewed 8/30/2013) EMRPI's filings are herein incorporated in their entirety by reference.

3. Despite EMRPI's filing repeated Public Comments, visiting with FCC staff, presentation of Congressional Staff briefings and seminars, and written complaints to get the FCC to adopt electromagnetic radiation safety limits and regulations that actually protect people, the FCC continues to disregard the problem – meanwhile authorizing thousands of new licenses to radiate increasing numbers of frequencies over a huge geographic area.

4. In 2004, The EMR Network's appeal of the FCC's Denial of The EMR Network's Petition for review of the FCC's RF safety guidelines was brought before the US Court of Appeals for the District of Columbia and was decided in favor of the FCC, appeal No. 03-1336. At that time The Court relied on the FCC's assertion in its brief at ¶ 10 that there was "no other comparable group of experts with which to consult or upon which to rely." The Court further relied on the assertion in FCC's earlier brief in *Cellular Phone Taskforce* at 92 that, "The Commission's determination to keep an eye on developments in other expert agencies suggests that . . . the Commission has an adequate 'mechanism in place for accommodating changes in scientific knowledge.'"

5. In this Comment, EMRPI challenges the FCC to weigh heavily the recommendations of “other groups of comparable experts” as well as the plethora of “changes in scientific knowledge” herein presented. EMRPI further challenges the FCC to lay out explicitly its “mechanism for accommodating changes in scientific knowledge,” i.e., the criteria by which FCC determines which “expert groups” findings merit incorporation in FCC’s RF safety policies, and what recommendation the FCC has received from them.

III. DISCUSSION

A. FCC’s Imperative to Compile a Complete Record

6. EMRPI understands that FCC ET Docket 13-84 Reassessment of FCC Exposure Limits and Policies has been issued in response to the Recommendations for Executive Action of the 2012 General Accounting Office report in GAO-12-771 at page 28:

- Formally reassess the current RF energy exposure limit, including its effects on human health, the costs and benefits associated with keeping the current limit, and the opinions of relevant health and safety agencies, and change the limit if determined appropriate.
- Reassess whether mobile phone testing requirements result in the identification of maximum RF energy exposure in likely usage configurations, particularly when mobile phones are held against the body, and update testing requirements as appropriate.

7. In conducting the GAO-recommended “formal reassessment” of its current RF radiation exposure limits, it is imperative that the FCC compiles a full and adequate record for determining whether its RF exposure limits should be changed.

8. The imperative that the agency, "of its own motion, should always seek to insure that a full and adequate record is presented to it," was set forth in 354 F.2D 608 *Scenic Hudson Preservation Conference v. Federal Power Commission* (*Scenic Hudson* 2nd Cir., 1965).

9. In the *Scenic Hudson* decision, the US Circuit Court of Appeals for the Second Circuit ruled:

- If an agency charged with the public interest is properly to discharge its duty, the record on which it bases its determination must be complete. **The petitioners and the public at large have a right to demand this completeness.** It is our view, and we find, that the Commission has failed to compile a record which is sufficient to support its decision. The Commission has ignored certain relevant factors and failed to make a thorough study of possible alternatives . . . (Emphasis added.)
- The public is entitled to know on the record that no stone has been left unturned.

- **A regulatory commission can insure continuing confidence in its decisions only when it has used its staff and its own expertise in manner not possible for the uninformed and poorly financed public.** (Emphasis added.)
- The Commission **has claimed to be the representative of the public interest.** This role does not permit it to act as an umpire blandly calling balls and strikes for adversaries before it; **the right of the public must receive active and affirmative protection at the hands of the Commission.** (Emphasis added.)
- The Commission must see to it that the record is complete. **The Commission has an affirmative duty to inquire into and consider all relevant facts.** (Emphasis added.)

B. Cost Analysis

10. GAO's recommended action for the Chairman of the FCC in 12-771 includes formally assessing "the costs and benefits associated with keeping the current limit."

11. In paragraph 109 of 03-137 *Further Notice of Proposed Rulemaking* and in paragraph 209 of 13-84 *Notice of Inquiry*, as well as in other paragraphs throughout this document, the FCC redirects the task of cost analysis to the public, asking for, "specific data and information such as actual or estimated dollar figures, including a description of how the data or information was calculated or obtained and any supporting documentation," and further warns that, "Vague or less persuasive assertions regarding costs or benefits generally will be given less weight than the more specific and supported statements."

12. *Scenic Hudson* requires that the FCC "of its own motion, should always seek to insure that a full and adequate record is presented to it," and that it use "its staff and its own expertise **in manner not possible for the uninformed and poorly financed public.**"

13. In this proceeding, the burden for full cost analysis of a change in RF human exposure limits should fall neither to the FCC because it has no expertise in health, nor to Commenters who lack the expertise and resources to carry out this analysis.

14. Rather, in accordance with the imperative of *Scenic Hudson* to fulfill its "affirmative duty to inquire into and consider all relevant facts," the FCC must explicitly request that **the EPA use its resources and expertise** present at its National Risk Management Research Laboratory¹ to conduct this analysis. American taxpayers have already funded this federal resource. If the EPA is unable to perform this cost analysis, then some other independent and qualified agency should be required to perform this role.

¹ <http://www2.epa.gov/aboutepa/national-risk-management-research-laboratory-nrmrl> NRMRL web page states: Environmental risk management seeks to determine what environmental risks exist and how to manage those risk in a way best suited to protect human health and the environment. Our mission is to advance scientific and engineering solutions to manage current and future environmental risk.

15. It will paralyze this review process if Commenters' submissions are tossed aside by the FCC (paragraphs 109 and 209 and others) because they lack the expertise or financial resources to carry out this analysis themselves, or to procure it from expert consultants.
16. For example, experts at EPA have the necessary working knowledge to assess IARC's 2011 classification of RF radiation as a Group 2B possible human carcinogen in its voluminous Monograph 102. There are experts at EPA who participated in the deliberations on this classification. See:
<http://monographs.iarc.fr/ENG/Monographs/vol102/> (last viewed 8/28/2013)
17. EPA experts have evaluated the implications of other IARC Monographs for substances EPA regulates under the Toxic Substances Control Act. They are in a position to evaluate the implications on costs and risks of any action FCC takes to align the IARC finding with responsible RF exposure policy.
18. Experts at EPA have access to academic and professional journals that present peer-reviewed research findings and that analyze the implications of these findings on specific diseases and disorders.
19. Autism is a crucial neuro-developmental disorder that is currently under discussion in many academic journals. The July 2013 issue of the *North American Journal of Medicine & Science* (NAJMS) is one such publication. It is entirely devoted to "Advances in Autism." In the preface of this issue (**EMRPI Exhibit 1**), NAJMS states that the CDC categorizes Autism Spectrum Disorder (ASD) as a "national public health crisis" and puts an annual price tag of \$137 billion for ASD costs in the US and "this debt is expected to increase in the next decade.
20. Neuroscience expert Martha R. Herbert, MD, PhD, of Harvard Medical School is a contributing expert in this NAJMS issue. She is also a contributing author of *The BioInitiative Report 2012*, specifically Section 20: Findings is Autism Consistent with Electromagnetic Fields and Radiofrequency Radiation. See:
http://www.bioinitiative.org/report/wp-content/uploads/pdfs/sec20_2012_Findings_in_Autism.pdf (last viewed 8/28/2013).
21. Based on her findings in this paper, Dr. Herbert submitted a letter to the Los Angeles Unified School District (**EMRPI Exhibit 2**) urging it to, "do the right and precautionary thing for children."

Powerful industrial entities have a vested interest in leading the public to believe that EMF/RF, which we cannot see, taste or touch, is harmless, but this is not true.

Step back from your intention to go wifi in the LAUSD, and instead opt for wired technologies, particularly for those subpopulations that are most sensitive. It will be easier for you to make a healthier decision now than to undo a misguided decision late.

22. Despite detailed presentations from EMR and public health experts and parents, LAUSD chose the wifi option saying that its research showed RF emissions in school would be at safe levels (in compliance with FCC RF emissions limits). See: <http://www.dailynews.com/general-news/20130212/lausd-approves-50m-for-computer-tablets> (last viewed 8/28/2013)

23. However, LAUSD Superintendent John E. Deasy did send a letter to then-FCC Chairman Julius Genachowski (**EMRPI Exhibit 3**) stating:

- It is believed that a more conservative level is necessary to protect children, who represent a potentially vulnerable and sensitive population.
- We have established a threshold of 0.1 μ W/cm² or 10,000 times lower than the current FCC standard.
- We urge the FCC to thoroughly evaluate the body of scientific studies which address non-thermal health effects and establish an appropriate exposure standard for children.

C. Failure of FCC to Regulate Rooftop Antennas and Antenna Sites

24. EMRPI's Reply of 3/6/2013 in ET Docket No. 03-137 and WT Docket No. 12-357 demonstrates explicitly the FCC's failure to regulate rooftop antennas and antenna sites. See: <http://apps.fcc.gov/ecfs/document/view?id=7022128267> . (last viewed 8/28/2013) That EMRPI Reply is herein incorporated in its entirety by reference.

25. EMRPI filed more than 100 written Complaints with the FCC Enforcement Bureau in Washington DC (EB) that document rooftop antennas and antenna sites across the country where RF emissions exceed the FCC's "General Population/Uncontrolled" limit and where many exceed the FCC's "Occupation/Controlled" limit. Those Complaints are herein incorporated in their entirety by reference. To date EMRPI has received no written notification from EB describing how it has dealt with these Complaints.

26. FCC's proposal now for Exemption Thresholds for such sites is wrong-headed and premature until EB demonstrates its ability and commitment to ensure the safety of the public, who are already spending time at the out-of-compliance sites documented in EMRPI's Complaints, by enforcing current FCC RF safety policies.

27. In this regard, EMRPI draws attention to FCC's statements in paragraphs 75 and 76. EMRPI's investigation and the subsequent Complaints filed by EMRPI with EB are evidence that RF safety training programs are non-existent at the sites in these Complaints. Given this evidence, EMRPI questions why the FCC is introducing a new category of "transient individuals" who do not require training. What is the definition of "transient? Where, when and how does a transient individual transition from qualifying for protection at FCC's occupational/controlled emissions limits to general population/uncontrolled emission limits and vice versa? How will "transient individuals" be made aware of the implications of these transitions?

28. EMRPI found no evidence of the existence of "appropriate training regarding work practices that will ensure that exposed person are 'fully aware of the potential for exposure and can exercise control over their exposure'". FCC states that this is "required to be provided" and concludes that "this two-tiered approach will provide sufficient information to ensure that people are adequately protected." Neither EB nor anyone else at FCC has responded to the evidence in EMRPI's written Complaints that third party workers are not protected.

29. EMRPI sent copies of the Complaints to each OSHA office with responsibility for each geographic area in question. The OSHA personnel that did contact EMRPI told EMRPI that they cannot investigate until a worker reports a safety violation directly to OSHA.

30. The Comment of Robert E. Johnson, Director, L-3 Communications, Narda-East, clearly points out that there are non-technical workers on rooftops who do not know what an antenna is. These workers do not have knowledge or understanding of their workplace exposure or when they have been exposed above the FCC's safety limits, and so do not file complaints with OSHA. This constitutes a regulatory void.

31. Cost analysis of injury to rooftop workers under the present FCC system presents a complex challenge as there are no data at OSHA on the vast majority of the out-of-compliance sites across the US. In the August 21, 2013 on-line article,

“Hidden Insurance Risk Lurks in Property Leases,” at:

<http://www.claimsjournal.com/news/national/2013/08/21/235352.htm>, the estimate of risk analyst A. M. Best is that 250,000 workers per year may be over-exposed to RF radiation from the 600,000 governmental and commercial RF radiating antenna systems across the nation. Author and risk specialist Gloria Vogel emphasizes that, “The insurers should not rely on the lack of RF injury claims to proclaim there isn’t a significant RF injury problem with workers being exposed to RF radiation on a daily basis. The lack of claims is the result of injured parties being unaware that they were over-exposed to RF radiation.”

32. EMRPI endorses the Comments filed on 6/17/2013 in ET Dockets No. 03-137 and No. 13-84 by Robert E. Johnson, Director, L-3 Communications, Narda-East. EB is well aware of Mr. Johnson’s expertise and has used Mr. Johnson’s services to train regional EB staff to make accurate RF emissions measurements. Quoting specifically from the Johnson Comment:

- The FCC has neither the staff [n]or the time to investigate every shared rooftop where compliance may or [may] not be maintained.
- It is recommended that field strength measurements remain the recommended method for verifying compliance.
- It is well known that SAR measurements are the basic dosimetric quantity in a laboratory, but cannot be easily used outside the laboratory.
- It is obvious to any experienced engineer that a large portion of rooftop sites do[es] not comply with the commission’s rules.
- Most rooftop sites have inconsistent and/or misplaced signage, ineffective controls, and poorly implemented safety programs. [Proper use of all of these elements is often required in order for a specific site to achieve compliance with current FCC safety regulations.]
- If the site is not **designed** to be compliant, **it most likely will never be compliant.** (Emphasis added.)
- [I]t seems that apparently a common rooftop that has a locked door and appropriate signage is interpreted as a “controlled environment.” Access is given to persons whose occupation requires them to enter these environments and there would be no other program or controls required.

- There is the potential for non-technical persons to be on rooftops who do not know what an antenna is. Posting signs instructing them to stay a certain distance away from something they cannot identify will have no effect. It is highly recommended that the FCC require barriers that restrict persons from entering areas [where] they do not want them to be. **Posting of signs alone [has] not shown to be effective and should not be relied upon with only a locked door to make a rooftop “Controlled.”** (Emphasis added.)

33. RF radiation “non-technical” persons who regularly frequent rooftop antenna sites include fire fighters, building managers, building maintenance personnel such as elevator technicians, heating-ventilation-air conditioning (HVAC) technicians, roofers, painters, window washers, as well as building residents and/or hotel guests where roofs serve as “patios.”

34. EMRPI strongly urges the FCC to adopt Robert Johnson’s recommendations. Quoting from Johnson’s recommendations, specifically:

- Our recommendation is that all levels of government below Federal have the right to insure compliance with the FCC’s limits.
- Consistent and clear language policy for risk Categories signage.
- Specific recommendations for appropriate signal words, text color, and text size in accord with IEEE Std. C95.2-1999, “IEEE Standard for Radio-Frequency Energy and Current-Flow Symbols.”
- Set a maximum distance that antenna-mounted signs are acceptable to minimize the potential for persons to be exposed above the FCC limits.
- Category Three or higher areas that exceed two meters from the antenna would require barrier mounted (rather than antenna mounted) signs.

35. EMRPI proposes an additional compliance tool for rooftop antenna sites, as well as for tower antenna sites, that is in line with the Johnson recommendations. This tool will enable local government officials to monitor RF emissions compliance. It is common engineering practice to install sensors at locations where new equipment is being tested for performance reliability. Emissions levels are recorded and sent to a computer interface via a phone line. This type of sensor installation can be installed at antenna sites and can relay the emissions readings to a local government compliance officer. 47 U.S.C. § 332 Subsection (c)(7) **does not preempt local government** from

determining that “such facilities comply with the Commission's regulations concerning such emissions.”

D. Power Density Should Be Retained as the Primary Exposure Metric to Evaluate Ambient RF Emissions

36. SAR is useful as an exposure metric in controlled scenarios involving models and single-path, single source, single-frequency exposures such as in laboratory settings. In general, SAR is most relevant for quantifying exposure to devices that are employed in close proximity to the body of the user.

37. Power density calculations and measurements are the most meaningful tools for quantifying ambient exposure levels for fixed transmitters such as antenna sites, Distributed Antenna Systems (DAS), wireless Smart Meters, WiFi nodes in offices and classrooms, and other emitters that are not required by their function to be held against or in very close proximity to the body of the user.

38. Exposure metrics must address the effects of cumulative RF exposure to the body. No current equations consider the power density of exposure to multiple devices. For example, in an aircraft with 50 persons using cell phones simultaneously, allowable emissions limits for individual phones may need to be lowered.

39. The biological effects of intermittent peak fields must be evaluated, i.e., the impact of repeated high-intensity bursts of RF energy on the varying tissue types of the device user and bystanders, as well as on persons exposed to ambient emissions of transmitter infrastructure. Equations must address real-time, real-life peak field exposures rather than just time-weighted averages.

40. SAR should not be used to determine “Exemption Thresholds” for multi-path, multi-source, multi-frequency transmitter scenarios.

41. SAR addresses exposures at 100 KHz and above. Many electronic devices employ frequencies below that level.

42. FCC does not regulate frequencies below 9KHz, including 60 Hz power frequencies and metal detectors. No federal agency has regulatory authority over this lower range of frequencies, and no one is monitoring or making measurements to assure the safety of devices that employ these lower frequencies in their modulation characteristics, including metal detectors.

43. Persons with implanted medical devices and metallic medial equipment are especially vulnerable to these frequencies.
44. The U.S.'s 60 Hz electrical grid is unregulated for electromagnetic field exposures to humans and the environment. In this Comment, "environment" refers to plants, wildlife, pollinators, and domestic animals.
45. The US needs nationwide, standardized, mandatory regulations for the electrical grid that recognize "harmful interference" to electrical and electronic equipment as well as to human health and the environment, i.e., plants, wildlife, pollinators, domestic animals.
46. The Smart Grid and Smart Meters are the most recent near-nationwide technologies introduced into the environment without mandatory federal standardized regulations that expressly address safety. See: http://articles.philly.com/2012-10-11/news/34364508_1_sensus-meters-landis-gyr-ag-smart-meters (last viewed 8/28/2013)
47. Cardiac pacemakers have malfunctioned after installation of Smart Meters. See: <http://www.pressherald.com/news/At-Maine-hearing-opponents-question-safety-of-smart-meters.html> (last viewed 8/28/2013)
48. Much of the buildout of Smart Grid and Smart Meter infrastructure and devices has been financed directly by taxpayer dollars.
49. OSHA is the agency to regulate 60 Hz technologies exposures and impacts on workers in the workplace. FDA is the agency to regulate 60 Hz technologies exposure impacts on the public health, including impacts on medical devices and equipment. EPA is the agency to regulate 60 Hz technologies exposure impacts on the environment.
50. Fire safety oversight policy for wireless Smart Meter installations nationwide appears to be non-existent. Fires attributable to Smart Meter installation have been reported in thirteen states as well as in two provinces of Canada, and in Australia, and New Zealand. See: http://emfsafetynetwork.org/?page_id=1280 (last viewed 8/28/2013)
51. The "socket" onto which the Smart Meter is attached is considered the property of the property owner, so the utilities do not bear the costs of fire losses. Some homeowner insurance policies cover this type of loss. Many do not. Many property owners are uninformed and possibly unwilling recipients of these poorly-regulated installations while having to bear the cost of damages incurred by fires not of their making.
52. How fires occur after Smart Meter installation is addressed by Cindy Sage of Sage Associates and James J. Biergiel, EMF Electrical Consultant:

Typical gauge electrical wiring that provides electricity to buildings (60 Hz power) is not constructed or intended to carry high frequency harmonics that are increasingly present on normal electrical wiring. The exponential increase in use of appliances, variable speed motors, office and computer equipment and wireless technologies has greatly increased these harmonics in community electrical grids and the buildings they serve with electricity. Harmonics are higher frequencies than 60 Hz that carry more energy, and ride along on the electrical wiring in bursts. Radio frequency (RF) is an unintentional by-product on this electrical wiring.

It may be contributing to electrical fires where there is a weak spot (older wiring, undersized neutrals for the electrical load, poor grounding, use of aluminum conductors, etc.). The use of smart meters will place an entirely new and significantly increased burden on existing electrical wiring because of the very short, very high-intensity wireless emissions (radio frequency bursts) that the meters produce to signal the utility about energy usage.

E. FCC’s “Harmful Interference” Definition Must Be Expanded

53. EMRPI understands that the FCC’s primary authority to regulate RF frequencies relates to interference among licensed radio and broadcast stations, ships at sea, and radio operators, and that the FCC’s priority is to prevent “harmful interference” with public safety communications, i.e., first responders.

54. Essentially, the FCC’s current definition of “harmful interference” is anything that endangers a radio-navigation service (like GPS) or a public safety service (police, fire, Emergency Medical Technicians (EMTs), distress beacons, etc.). As for other licensed services, “harmful interference” is defined as whatever “seriously degrades, obstructs, or repeatedly interrupts” radio, TV, personal wireless or public safety communications services.

55. It is now time, in its response to GAO’s recommendations, for the FCC to expand its definition of “harmful interference” to include biological harm caused by radio frequencies and by modulated signals from broadcast, personal wireless and Smart Grid/Smart Meter emitters. EMRPI proposes:

“Harmful interference” includes acute, chronic, or prolonged exposure to RF signals and emissions that endangers, degrades, obstructs or repeatedly interrupts biological functioning of a person, plant, animal or ecosystems, or results in adverse health effects, or malfunctioning of medical devices or equipment.

56. Before listing parameters that can measure “harmful interference,” it must be recognized that:

- a. The same source of RF radiation penetrates children and adults differently. WiFi exposure affects 0-3-month-old infants differently than adults. Children exposed *in utero* to their mothers' cell phone use may, once they reach school age, behave differently than children not exposed *in utero*. Persons with medical implants will be affected differently by metal detectors; cell phones use in an elevator, train, subway or aircraft; and/or wireless "smart" meters than persons who have no implant. Large persons and small persons will be affected differently by RF exposure, as will dehydrated and well-hydrated persons, and persons with compromised and healthy immune systems. Persons taking medications will be affected differently than persons taking other or no medications. The definition of "harmful interference" shall account for these differences.
 - b. Before listing examples of quantifiable parameters that can determine whether "harmful interference" from RF exposure has occurred, it must be recognized that there are measurable effects from RF exposure other than a change in temperature.
57. "Harmful interference" that results in biological harm shall be defined as any negative change in a measurable biological, physiological or ecological parameter (outside the range within which it is regulated in normal circumstances with no exposure to the influence in question).
58. Examples of biological or physiological parameters that demonstrate biological effects caused by "harmful interference", i.e., harmful RF and/or EMR exposure to humans, include:
- a. the EEG spindle frequency during sleep (reproducible within a person, not necessarily across a population);
 - b. the brain metabolic rate based on brain scans of glucose metabolism;
 - c. the rate of DNA breakage in healthy cells;
 - d. disruption of the rate of calcium efflux through a cell's membrane;
 - e. melatonin production and metabolism;
 - f. insulin production and metabolism;
 - g. heart rate and blood pressure variability;
 - h. temperature (Note that a temporary temperature change of 0.2 degrees Fahrenheit shall be considered a biological effect because a healthy body normally regulates temperature within a range smaller than this).
59. With regard to these parameters and to assist the FCC in "its determination to keep an eye on developments in other expert agencies," EMRPI directs the FCC to "consult with" and

“rely on” the medical experts of The Austrian Chamber of Physicians (OAK – Austria’s parallel organization to the American Medical Association). In 2012, OAK issued its “Guideline of the Austrian Medical Association (Austrian Chamber of Physicians) for the diagnosis and treatment of EMF-related health problems and illnesses (EMF syndrome). It is “intended as an aid in diagnosing and treating EMF-related health problems.” (**EMRPI Exhibit 4**) It lists basic diagnostic tests that should be carried out that relate to the biological and physiological parameters listed at ¶42.

60. Examples of ecological parameters that demonstrate biological effects caused by “harmful interference”, i.e., harmful RF and/or EMR exposure to the environment include:
- a. the mortality rate of plants or animals;
 - b. the incidence of deformed offspring of plants or animals;
 - c. altered growth or morphology in plants or animals;
 - d. behavioral changes (such as nesting, increased piping signaling of bees, or altered feeding habits by any animal).
61. Given that exposure to EMR and RF radiation has become ubiquitous and unavoidable, the life of a person who depends on a medical device may be defined as much by inadvertent “harmful interference” as by the device’s battery’s expiration. The FCC is overdue for regulating the effects of RF signals and emissions on persons who depend on medical devices and medical equipment.
62. “Harmful interference” with a medical device shall be defined as:
- a. Exposure to electronics, metal detectors or wireless services that causes an FDA-approved medical device such as a cardiac pacemaker, an insulin pump, a deep brain stimulator, a cochlear implant to malfunction and results pain, bodily harm or death;
 - b. Exposure to metal detectors and/or RF signals while a person is in a metal or electronic wheelchair and that results in pain, bodily harm, negative health effects or death.
 - c. Exposure to metal detectors and/or RF signals of persons with implanted metallic bone replacement devices that result in pain, bodily harm or death.
63. Exposure to a “smart” utility meter (transmitting, wireless, digital meters), including a “smart” meter installed on a neighboring property that results in malfunction of an implanted medical device, behavioral changes in wildlife, and/or plant morphology shall be considered “harmful interference.”

64. Any biological, physiological or ecological effect that can plausibly create negative health or environmental consequences shall be considered “harmful interference.”

65. If an electronic device, wireless service, or RF transmitter generates “harmful interference” and there exists a plausible means by which that interference can cause harm, then manufacturers and service providers shall be required to prove their devices’ safety before persons or the environment, i.e., plants, wildlife, pollinators, domestic animals, are exposed to them.

F. The Concept That Thermal Injury Is “the Only Scientifically Established Mechanism of Harm” for EMR and RF Effects Is Simplistic and Outdated

66. The thermal safety limit is necessary to protect the public from injury due to burns, induced current, and shock.

67. Thermal injury is most often the result of the relatively simple mechanism of overheating of body tissue that leads to pain and burns after a short exposure time. Even short-term exposure at thermal levels can result in permanent cognitive effects. See AT&T Alascom v. John Orchitt – worker’s compensation decision from the Alaska Supreme Court: http://www.swgtread.org/images/admissibility/court_materials/state_cites/alaska_att_orchitt_john.pdf (last viewed 8/28/2013)

68. The published research literature on biological (non-thermal) effects of exposure to EMR and RF radiation continues to mount. From *The BioInitiative Report 2012* - Section 4: Evidence for Inadequacy of the Standards:

Since 2007, there are important new milestone publications that underscore the critical need to update public safety limits. These newer documents calling for review and updating are based on a deluge of new scientific studies reporting effects at non-thermal, low-intensity ELF and RF exposure levels. There is little doubt that bioeffects and adverse health effects are occurring at lower than safety limit levels, meaning the existing protections are inadequate. See: http://www.bioinitiative.org/report/wp-content/uploads/pdfs/sec04_2012_Evidence_for_Inadequacy_of_the_Standards.pdf (last viewed 8/28/2012)

69. David O. Carpenter MD, Director of the Institute for Health and the Environment at the University at Albany and co-editor of *The BioInitiativeReport*, makes these points when addressing the subject of “Fallacies and Answers in the Debate over EMF Evidence”²:

- a. We don’t know the mechanism of cancer in general.

² *The BioInitiative Report*, Section 24: Key Scientific Evidence and Public Health Policy Recommendations at: http://www.bioinitiative.org/report/wp-content/uploads/pdfs/sec24_2007_Key_Scientific_Studies.pdf

- b. We know mechanisms of action for some carcinogenic substances, but for most cancers we know neither the environmental trigger nor the mechanism of action.
- c. We don't know the mechanism or cause for development of Alzheimer's Disease or ALS.
- d. Rather than discounting the relationship between EMF exposure and neurodegenerative diseases we should be using this information as a tool to better understand the etiology of these diseases.
- e. As with many environmental agents, it would be a mistake to assume that there is only one target or mechanism of action.
- f. The lack of complete understanding of basic mechanisms does not alter the importance of the relationships.

G. Biological Mechanisms Are Comprised of Complex Interrelationships at the Microscopic Level.

70. Non-life scientists, such as physicists and chemists, do not understand the complexity of biological systems and how they operate under the direction of very weak cell membrane-level signals, sometimes from very small molecules.

Physicists have a tendency to simplify any mechanism to the smallest number of and simplest sequential elements. **If biological processes at all of the steps of interaction with RF radiation and/or EMR have not been defined in physical-chemical terms, and agreed to by a number of scientists, the skeptical physicist will say that a “mechanism” has not been established.**

71. Life scientists such as biologists, physiologists, biochemists, and biophysicists, understand that biological systems are frequently poised to respond in a substantial way to very small information inputs. Healthy living organisms are constantly working internally to maintain homeostasis, i.e., the tendency toward a relatively stable equilibrium between interdependent elements.³ In living organisms or systems, multiple dynamic equilibrium adjustment and regulation mechanisms make homeostasis possible. In simple terms, it is a process in which the body's internal environment is kept stable.⁴ In biological systems, typically several variables are acting in concert to produce an effect, while the organism or system works simultaneously to maintain homeostasis. A life scientist expects there to be numerous “moving parts” in such complex interrelationships.

72. **In 1992**, internationally-recognized EMF researcher W. Ross Adey MD, Professor of Physiology at Loma Linda University Medical School, testified before the US Senate

³ The Oxford Dictionary and Thesaurus, American Edition. Oxford University Press, 1996.

⁴ Wikipedia – Homeostasis – accessed 8/14/2013.

Subcommittee on Consumer and Environmental Issues. Dr. Adey begins the first paragraph of both his written and oral testimonies with this analogy:

... 20 years of study to understand how body cells 'whisper' to one another... discovering how EM fields, so weak that some scientists have regarded them as incapable of biological effects, are detected by living tissues... with likely consequences for human health. (Emphasis added).

73. Dr. Adey then goes on to discuss the details of the findings in his own published research as well as the findings in the peer-reviewed published literature of that “20 years of study” on biological effects of exposure to low-intensity electromagnetic fields.

74. The question addressed at that hearing was why police officers who were required to use radar gun speed detectors on the job were developing malignant tumors in their thighs. The manufacturer of the radar guns had provided no guidance on how to use these devices safely. The users manual did not warn the user to turn off the gun before putting it in the lap. Dr. Adey’s testimony focused on why the “heating standard” with which the radar guns complied did not protect the users from biological effects that could promote cancer.

75. **In 1971**, “Program for Control of Electromagnetic Pollution of the Environment,” authored by The Electromagnetic Radiation Management Council, issued by the President’s Office of Telecommunications Policy, stated that:

The consequences of undervaluing or misjudging the biological effects of long-term, low-level exposure (to electromagnetic radiation emanating from radar, television, communications systems, microwave ovens, industrial heat-treatment systems and many other sources) could become a critical problem for the public health, especially if genetic effects are involved. (Emphasis added.)

76. It is significant to the development of US RF safety policy that this 1971 statement came long before RF-radiation-dependant wireless digital personal communications devices became a highly profitable sector of the US economy.

H. FCC Must “Accommodate Changes in Scientific Knowledge” Found in Studies Published Since 1986 on Mechanisms of Non-thermal Effects of EMR and RF Radiation Exposure to Humans and the Environment

77. In its 2004 decision 03-1336 in favor of the FCC, the US Circuit Court of Appeals for the D.C. Circuit (The Court) was convinced by the FCC that, “it has an adequate mechanism in place for accommodating changes in scientific knowledge.”

78. The Court also deferred to the FCC's assertion that, at that time, there was, "no other comparable group of experts with which to consult or upon which to rely" with regard to the scientific evidence on the biological (non-thermal) effects of exposure to EMR and RF radiation.

79. EMRPI asserts that the FCC must look beyond the IEEE, the NCRP and must also not limit its determination to input from the US federal health agencies. There are few remaining EMR and RF experts at the US federal health agencies. There is little research underway at any US federal health agency. The last federal funding for research in this area was at the EPA in 1995. (**Exhibit 5**) FCC must consider actions and policies taken by health and policy agencies in other countries that are investing in this area of research.

80. If the FCC's reassessment of its RF safety limit is to address completely and responsibly the GAO's "Recommendations for Executive Action," it must evaluate the wealth of peer-reviewed scientific research published since 1986⁵, the date of the most recently published research that is the foundation of the current FCC RF safety limits. In particular, FCC must educate itself about the findings of the more than 3,800 studies analyzed in *The BioInitiative Report* (2007 and 2012). See: www.bioinitiative.org. That document is herein incorporated in its entirety by reference.

81. EMRPI asserts that the composition of The BioInitiative Working Group is a "comparable group of experts" to those of the IEEE's and NCRP's expert panels who developed the research analysis for the current FCC RF safety policies. The following description of the expert participants who produced *The BioInitiative Report 2012* is found on its website at: <http://www.bioinitiative.org/media/spread-the-word/>

The BioInitiative 2012 Report has been prepared by 29 authors from ten countries, ten holding medical degrees (MDs), 21 PhDs, and three MsC, MA or MPHs. Among the authors are three former presidents of the Bioelectromagnetics Society, and five full members of BEMS. One distinguished author is the Chair of the Russian National Committee on Non-Ionizing Radiation. Another is a Senior Advisor to the European Environmental Agency. Full titles and affiliations of authors is in Section 25 – List of Participants.

⁵ See: <http://www.bioinitiative.org/research-summaries/> Research summaries compiled by Henry C. Lai, PhD, retired Professor of Bioengineering at the University of Washington, EMF researcher and contributing author of *The BioInitiative Report*. These are invaluable sets of abstracts (data-based to be searchable) covering the RFR scientific literature, as well as collections of scientific abstracts on free radical damage (from both RFR and ELF) and a set specific to electrosensitivity. They cover the research published between 1990-2012.

82. *The Seletun Scientific Statement's* biologically-based approach to public safety standards should be the starting point for FCC's reassessment. (**Exhibit 6**)
83. *The Seletun Scientific Statement's* biologically-based approach aligns with "Program for Control of Electromagnetic Pollution of the Environment," authored by The Electromagnetic Radiation Management Council, issued by the President's Office of Telecommunications Policy in 1971:

The consequences of undervaluing or misjudging the biological effects of long-term, low-level exposure (to electromagnetic radiation emanating from radar, television, communications systems, microwave ovens, industrial heat-treatment systems and many other sources) could become a critical problem for the public health, especially if genetic effects are involved. (Emphasis added.)

84. The FCC must get up to speed on the most recently published studies and meta-analyses that explain the understanding of biological (non-thermal) mechanisms of interaction with EMR and RF radiation if it is to knowledgeably "judge and value" these effects.
85. One such complex mechanism with broad implications for public health occurs when ion pumps and channels in cell membranes establish a transmembrane voltage difference, V_{mem} .
86. In the March 2013 issue of *Physics Today*, journalist Johanna Miller describes the recent research on V_{mem} , bioelectric signaling (**Exhibit 7**) of Michael Levin and colleagues at Tufts University.

(See: http://www.physicstoday.org/resource/1/phtoad/v66/i3/p16_s1?bypassSSO=1

"Bioelectric signaling controls tissue shape and structure"):

That biological systems respond to electricity is not a new idea. In 1771 Luigi Galvani discovered that electric sparks could cause a dead frog to twitch its legs. Of course, we now know why that is: Nerve cells convey pulses of electricity that are carried by ions throughout the body, including to muscles to stimulate their movement. (Emphasis added.)

Now Michael Levin and colleagues at Tufts University are exploring new realms of the little-understood area of bioelectric signaling.¹ They've found that manipulating an organism's internal electric signals can alter its growth in powerful and often surprising ways. And their approach suggests that questions in areas of biology and medicine traditionally viewed as disparate—morphogenesis and development, regenerative repair, and even cancer—may really fall under a single umbrella of cell communication and information. (Emphasis added.)

... Two cells with the same genes and membrane proteins can be in very different electric states. Together, ion pumps and channels establish a transmembrane voltage

difference, V_{mem} , which can influence other cells and contribute to voltage gradients on larger spatial scales. (Emphasis added.)

Among their findings was that bioelectrical signals often serve as triggers that set off chains of events more complex than the signals themselves . . . (Emphasis added.)

Levin – a computer scientist by training – views multi-cellular organisms as sophisticated information-processing systems . . . “This new electrical layer is a fascinating and untapped field for fundamental discoveries.” (Emphasis added.)

87. The Levin paper published in 2013 in the journal *Communicative & Integrative Biology* is entitled, “Cracking the bioelectric code.”

88. In the summer of 2013, Martin Pall, PhD, Professor Emeritus of Biochemistry and Basic Medical Sciences, Washington State University, published a meta-analysis that reviews twenty-three V_{mem} studies in *The Journal of Cellular and Molecular Medicine* entitled, “Electromagnetic fields act *via* activation of voltage-gated calcium channels to produce beneficial or adverse effects.” (Exhibit 8)

89. In Pall’s e-mail message announcing the publication of his meta-analysis, he describes its importance:

One of the great puzzles about the action of electromagnetic fields is how can they influence the biology of our bodies? The reason that this is such a great puzzle is that these fields are comprised of low energy photons, with energies too low to influence the chemistry of our bodies. So how can they possibly influence our biology? Many have argued that the only thing that they can possibly do is to heat things, and yet it is very clear that levels of exposure that produce only the slightest heating have been repeatedly shown to produce substantial biological effects. (Emphasis added.) *Now this puzzle has been solved in a paper with the title of this email: New Paper - Plausible mechanism of action for low-intensity EMR exposure.*

90. In the “Discussion and conclusions” section of this meta-analysis, Pall describes how this mechanism occurs at frequencies across the electromagnetic spectrum, in static electric and magnetic fields, and in pulsed signals:

Both extremely low frequency fields, including 50/60 cycle exposures, and microwave EMF [electromagnetic field] range exposures act via activation of VGCCs [voltage-gated calcium channels]. So do static electric fields, static magnetic fields, and nanosecond pulses.

Earlier modelling of electrical effects across plasma membranes of EMF exposures suggested that such electrical effects were likely to be too small to explain EMF effects at levels reported to produce biological changes. However, more recent and presumably more biologically plausible modelling have suggested that such electrical effects may be much more substantial*, and may, therefore, act directly to stimulate VGCCs. (*References omitted. Emphasis added.)*

Modelling of EMF effects on living cells suggests that plasma membrane voltage changes may have key roles.

One question that is not answered by any of the available data is whether ... square wave transients in EMF exposure also act by stimulating VGCCs. . . [D]igital technology is based on the use of such square wave transients⁶ and may, therefore, be of special concern in this digital era. (Emphasis added.)

91. Non-thermal intensities of EMR and RF radiation exposure activate VGCCs. This leads to increased calcium levels within cells, which lead to the production of a series of compounds including peroxynitrite. Peroxynitrite is at the root of most inflammatory diseases, including neuro-degenerative and cardiovascular diseases, migraines and allergies.

92. As the 2008 National Academies of Science (NAS) Report found, there are no studies in the scientific literature underlying the FCC's RF safety regulations that examine the effects of low-intensity (non-thermal) exposures to EMR and RF radiation such as were the subject of all 23 studies in Pall's meta-analysis. See: ¶99.

93. While many electrical and electronics engineers have wrestled with the harmful effects of dirty power including square waves on electronics, it is time for the FCC, FDA and EPA to assess and protect against the effects of square waves on American's health and the environment.

I. FCC Must Assess the Research Needs and Gaps Relating to Potential Biological and Adverse Health Effects of Wireless Communications Devices Identified in the 2008 National Academies of Science Report 12036 (2008 NAS Report)

94. An inadequate research record results in safety regulations that fail to address all exposures encountered by the public.

95. Current FCC RF Safety limits are based on:

- a. the recommendations of the Institute of Electrical and Electronics Engineers (IEEE) RF standards subcommittee based on studies published through 1985.

⁶ Square waves create harmonics on electrical wiring that rise to many MHz in frequency.

- b. the recommendations of the National Council on Radiation Protection and Measurements (NCRP) based on studies published through 1986.

96. In 1993, in the FCC proceeding leading up to the adoption of its current RF safety limits, the EPA submitted Comment on the FCC proposed RF safety limits based on the IEEE and NCRP recommendations. EPA found that the FCC's proposed RF safety policy:

- Failed to address population subgroups, i.e., women, children, the elderly, the infirm, person taking medications, persons with implanted medical devices.
- Did not support the thesis that FCC guidelines are protective of all mechanisms of harm. They address only thermal harm.
- Had no studies of chronic, long-term, low-level exposures.
- Had no studies of modulated, i.e., pulsed (digital) exposures.
- Should update its research record that stops at 1986.

97. In 1999, the federal Radiofrequency Interagency Work Group (RFIAWG) issued a letter to the IEEE's RF exposure standards setting subcommittee, whose RF exposure levels the FCC adopted in 1997. RFIAWG is comprised of the individuals at the federal health agencies with expertise in EMR health effects studies. See:

www.emrpolicy.org/litigation/case_law/docs/exhibit_a.pdf RFIAWG found that IEEE's RF standard had excluded:

- Studies of exposures to humans as its basis for RF exposure levels.
- Studies of exposure to modulated, i.e., digital, pulsed, RF emissions.
- Consideration of biological differences of exposed tissues, i.e., brain, bone marrow, muscle, fat, skin.
- Consideration of chronic, repeated or long-term exposure to low-intensity RF radiation. The IEEE safety standards address only a 6-minute exposure at high intensity for occupational exposures.
- Consideration of high quality published studies that are not an exact replication of studies that nonetheless demonstrate important health impacts.
 - Consideration of research literature on long-term, low-level exposures; neurological and behavioral effects; and micronuclei assay studies because of their relevance to cancer.

98. In 2003, the RFIAWG again wrote a letter to the IEEE RF subcommittee to identify three additional concerns with IEEE's proposed changes to its RF safety standards:

- Classifying the earlobe as an extremity, as if it is not an integral part of the head.
- No rationale for IEEE's proposal to relax its RF exposure standards.
 - No explanation of why the proposed IEEE revision ignores differences in exposed tissue types.

99. In 2008, the NAS issued its Report that identified needs and gaps in the research record underlying the current FCC RF safety limits. Based on the IEEE and NCRP compilations of studies, the 2008 NAS Report states that the research record does not take into account a

number of factors needed to protect public health. See:

www.nap.edu/catalog.php?record_id=12036 (last viewed 8/28/2013) Specifically:

- a. Exposure of juveniles, children, pregnant women, and fetuses both for personal wireless devices (e.g., cell phones, wireless personal computers [PCs]) and for RF fields from base station antennas.
- b. Variability of exposures to the actual use of the device, the environment in which it is used, and exposures from other sources.
- c. Multilateral exposures.
- d. Multiple frequency exposures.
- e. Exposure to digital (pulsed, modulated) radiofrequency radiation.
- f. Location of use (both geographic location and whether a device is primarily used indoors or outdoors).
- g. Models for men and women of various heights and for children of various ages.
- h. Exposure to other sources of RF radiation such as cordless phones, wireless computer communications, and other communications systems.
- i. Exposure to the eyes, hand or the human lap or parts of the body close to the device.
- j. RF exposure in close proximity to metallic adornments and implanted medical devices (IMDs) including metal rim glasses, earrings, and various prostheses (e.g., hearing aids, cochlear implants, cardiac pacemakers, insulin pumps, Deep Brain Stimulators).
- k. Sufficiently long exposure and follow-up to allow for detection of effects that occur with a latency of several years.
- l. Lack of information concerning the health effects associated with living in close proximity to base stations.
- m. Research that includes children, the elderly, and people with underlying diseases.
- n. Research on possible adverse RF effects identified by changes in EEG (electroencephalogram) activity.
- o. Lack of information on possible neurophysiologic effects developing during long-term exposure to RF fields.
- p. Lack of information on possible neurophysiologic effects developing during long-term exposure to RF fields.
- q. Studies focusing on possible adverse RF effects identified by changes in cognitive performance functions.
- r. Effects of RF exposure to the sensitive biological targets of neural networks.
- s. Possible effects of RF exposure on fetal and neonatal development.
- t. Possible influences of exposure on the structure and function of the immune system, including prenatal, neonatal, and juvenile exposures.
- u. Possible influences of RF exposures on the structure and function of the central nervous system, including prenatal, neonatal, and juvenile exposures.

100. The 1993 EPA Comment, the RFIAWG 1999 and 2003 letters to the IEEE, and the 2008 NAS Report all delineate the deficiencies of the FCC RF exposure regulations research record. It is inadequate to establish credible safety policy for today's RF and EMR exposure conditions.

101. It is clear from the statements of the NAS Report, the RFIAWG, and the EPA that to date the question of adverse health effects from long-term exposure to low-intensity digital (pulsed, modulated) RF radiation to all subgroups of the American public has not been answered in the research record underlying the FCC's RF safety regulations. The FCC RF radiation exposure guidelines are based on an incomplete research record.

102. The input to the FCC from federal science and health agencies' personnel with the most in-depth knowledge and career experience in EMR and RF radiation science supports the need for the FCC update its RF safety policies. Their input emphasizes the need to apply research findings that are a match with the exposures American citizens now encounter continuously and ubiquitously in their daily lives.

IV. "HARMFUL INTERFERENCE" AFFECTS PERSONS WHO DEPEND ON IMPLANTED MEDICAL DEVICES AND MEDICAL EQUIPMENT

103. A brochure from pacemaker manufacturer Biotronik states that, "pacemakers are protected against the impact of electric devices and their radiation to the greatest extent possible. However, if you should experience symptoms, such as increased heartbeat, irregular pulse, or dizziness in the vicinity of electric devices, please move away from the device immediately and/or turn off the external device."

104. The brochure also says, "You can use (a cellular) phone without hesitation." It states, "If you want to use a cellular phone, you should talk to your physician. **To prevent possible interference, you should always hold the cell phone at the side opposite from the implanted pacemaker. Even when not in use** (emphasis added) you should not keep it close to the pacemaker."

105. Gary Olhoeft, PhD, geophysicists and electrical engineer, has submitted Comment in FCC dockets describing his personal experience with his own Deep Brain Stimulator that manages his Parkinson's Disease symptoms. He has also researched extensively the lack of federal regulations to protect Americans who depend on medical implants of all types for

their life, health, and safety. Few Americans have the expertise or ability to protect themselves in the ways that Prof. Olhoeft has learned are crucial to his personal safety.

106. Prof. Olhoeft makes the following paragraphs available for the record in ET Docket No. 13-84 Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies:

107. “The Medtronic manual for my DBS lists more than sixteen pages of potential electro-magnetic interferences. I have experienced interference with the operation and programming of my medical implant in elevators, on large commercial aircraft, at malls, libraries, government buildings and other places with security systems. Because interferences are almost everywhere, I built a monitor to carry around and warn me of potential hazards to avoid, including security and inventory control systems, Wi-Fi, smart meters, cell and radio/TV towers, wireless phones and wireless devices, buildings with faulty wiring, light dimmers, certain appliances, and many more.

108. “If I walk through a security system--like the ones commonly found in retail stores, airports, government buildings or in the library at the university where I teach--my DBS sometimes shuts off. I have four seconds to reset it or I shake so badly that I am unable to reset it without help.

109. “The National Institutes of Health estimates that twenty-five million Americans now have implanted medical devices. That is 8-10% of Americans. Besides brain stimulators, the functioning of cardiac pacemakers, insulin pumps, cochlear implants and bone stimulators can also be disturbed by radiofrequency signals. A disabled person getting x-rayed while sitting in a metal wheelchair can be especially dangerous.

110. “A friend of mine who has an insulin pump has to shut it off when he flies, because his pump interferes with the plane's avionics, and they interfere with his pump. This limits how far he can travel. A former student told me that if she's around several people using cell phones, her insulin pump malfunctions.

111. “After another friend with a brain stimulator and a pacemaker had a cochlear implant installed, the signals from his implants interfered with each other. Each device functioned inappropriately, and he experienced tremendous discomfort. The surgeons who installed the devices suggested that his home's electrical system was the source of his trouble. They did not believe that implants could interfere with each other. They can.

Unfortunately, medical implants are not regulated for such interference; and my friend-- who is an MD--had to prove to his physicians that they were causing him trouble.

112. “Recently, at a meeting of people with brain stimulators for Parkinson's, I asked if any of their implants malfunction (shut off) when they walk through security doors at malls and other places. Fifty people were in the room. Everyone raised a hand.

113. “No US federal agency studies the effects of radiofrequency signals on medical implants. Doctors who recommend or even implant devices are likely unaware of the problems--though manufacturers of implants typically alert patients to pages of dangers in their manuals.”

114. Wireless medical equipment may also cause harm to patients. A 31-year-old Type-1 diabetic woman offers her personal experience with this risk in the following paragraphs:

115. “In the Spring of 2013, I got a stomach virus. After nearly twenty-four hours of vomiting, I went to the hospital. In the ICU, I was wired to several monitors and a digitalized IV drip that gave me anti-nausea medication and another drug (that I am usually on) to raise my blood pressure. For four days, vomiting and dry heaves continued. When my blood pressure went up to 166/115, the drug that raises blood pressure was stopped. I was given another drug that lowers it. I could barely talk.

116. “On Day 4, the virus began to subside. The time between vomiting got longer. I moved out of the ICU into a room that did not have a wired heart monitor--only a wireless one. This room also had a view of a cell tower about a quarter of a mile away. My health continued to improve, but I felt that the wireless monitor kept me from fully regaining my strength.

117. “My mother told the doctor that Dr. Magda Havas, a medical researcher, found that blood sugar control and blood pressure are affected by the radiofrequencies that wireless devices use to operate. She asked if he could remove the wireless heart monitor.

118. “Hospital policy states that when blood pressure meds are delivered intravenously, the patient must wear a heart monitor. This good doctor realized that if I took the medication orally, then he could remove the wireless monitor.

119. “My blood pressure normalized as soon as the monitor came off. I left the hospital the next day. My doctor wondered whether other patients are affected by wireless and digitalized equipment.

120. “Indeed, I wonder how exposure to such equipment affected me. I wonder how medical workers are affected since they're exposed to wireless transmitting medical equipment throughout the work week--along with cell towers, Wi-Fi, fluorescent lights and wireless keyboards. I wonder what my options are if I get dangerously sick again.”

121. While the FDA has the authority to regulate digitalized and wireless medical devices, Congress does not provide it with the funding to do so. There is a gaping regulatory void over harmful interference with medical implants and with electronic hospital equipment that is putting the life, health and well being of the 8-10% of Americans who depend on implanted medical devices at risk.

V. RECENT RESEARCH FINDINGS SUPPORT CONTINUING PRECAUTIONARY ACTIONS BY VARIOUS GOVERNMENTS AND AGENCIES

122. In 2009, the German state of Baden-Wurttemberg adopted policies that followed the recommendations of the European Parliament to reduce wireless internet: “Wired alternatives will be implemented and promoted by the state government wherever possible. For example, Wi-Fi networks at public institutions and wireless Internet access in cities and rural areas shall be avoided. The state government calls on all municipalities to deploy sustainable fiber-optic technology instead of LTE (Long Term Evolution, 4G).”

http://www.wirelesswatchblog.org/wp-content/uploads/2011/06/EMF-Recommendation_BW_2011-Germany.pdf (last viewed 8-28-2013)

123. In January 2011, the California Public Utilities Commission’s Division of Ratepayer Advocates (DRA) questioned the findings of the report issued by the California Council on Science and Technology (CCST) on health effects of Smart Meter RF radiation. CCST had concluded that there was “no clear evidence” that additional standards were needed to protect the public from smart meters or other electronic devices.

124. In its analysis, DRA stated that the CCST should, “explain more clearly why it concluded that the available evidence does not indicate a need to limit non-thermal impacts of RF emissions.” It further questioned why CCST merely mentioned *The BioInitiative Report* in passing as an “unsolicited document.” DRA recommended that the CCST Report:

. . . be expanded to provide a scientific critique of the BioInitiative Report, and other reports that assert a link between RF emissions and negative health impacts. CCST should explain why, in its opinion, these sources do not constitute evidence that

indicates a need to establish limits for non-thermal impacts, if only as a precautionary measure, even if conclusive findings are not yet available.

125. On May 6, 2011, The Parliamentary Assembly of the Council of Europe (PACE) passed a resolution: The potential dangers of electromagnetic fields and their effect on the environment. See: [http://www.next-up.org/pdf/Council Europe Report The potential dangers of electromagnetic fields and their effect on the environment 06 05 2011.pdf](http://www.next-up.org/pdf/Council_Europe_Report_The_potential_dangers_of_electromagnetic_fields_and_their_effect_on_the_environment_06_05_2011.pdf). It recommended that the member states of the Council of Europe should:

reconsider the scientific basis for the present electromagnetic fields exposure standards set by the International Commission on Non-Ionising Radiation Protection, which have serious limitations and apply “as low as reasonably achievable” (ALARA) principles, covering both thermal effects and the athermic or biological effects of electromagnetic emissions or radiation.

126. In 2012, The Department of Telecommunications in India set new exposure limits for cell phone towers that went into effect as of September 1, 2012 (*The Hindu*, 2012).

Exposure standards for RF-EMF radiation were reduced to one-tenth of the existing level.

127. In March 2012, the Israeli Knesset passed a bill requiring warning labels on all cell phones sold in Israel. The label will read: “Warning - the Health Ministry cautions that heavy use and carrying the device next to the body may increase the risk of cancer, especially among children.”

<http://www.haaretz.com/business/knesset-backs-bill-requiring-cell-phones-to-bear-health-hazard-warning-1.415677> (last viewed 8/28/2013)

128. In France, mobile phones are banned from primary schools, all phones must be supplied with a headset and advertising targeted at children is banned. The government has initiated a safety information program through its National Institute for Prevention and Health Education. <http://www.lesondesmobiles.fr/>.

(last viewed 8/28/2013)

129. In March 2013, the French National Assembly voted to prefer hard-wired internet rather than WiFi for public schools. The amendment cited the Precautionary Principle and the need to protect the health of young children. See: <http://www.cnetfrance.fr/news/les-deputes-ne-veulent-pas-de-wi-fi-dans-les-etablissements-scolaires-39788397.htm>

VI. CURRENT RESEARCH FINDINGS SUPPORT BIOLOGICALLY-BASED EMR AND RF EXPOSURE SAFETY LIMITS

A. Research on the Environment

130. A review of the ecological effects of radiofrequency electromagnetic fields (RF-EMF). S. Cucurachi et al, *Environment International*. (2013) Volume 51 pp. 116-140.

(Exhibit 9)

Five species groups were identified: birds, insects, other vertebrates, other organisms, and plants . . .

Information was collected from 113 studies from original peer-reviewed publications or from relevant existing review . . .

In about two thirds of the reviewed studies ecological effects of RF-EMF was reported at high as well as at low dosages. The very low dosages are compatible with real field situations, and could be found under environmental conditions . . .

B. Research on Plants

131. Adverse Influence of Radio Frequency Background on Trembling Aspen Seedlings: Preliminary Observations. Katie Haggerty, *International Journal of Forestry Research*.

Volume 2010, Article ID 836278. **(Exhibit 10)**

This study suggests that the RF background may have strong adverse effects on growth rate and fall anthocyanin production in aspen, and may be an underlying factor in aspen decline.

The background RF pollution is now many times stronger than the naturally occurring RF environment. From the perspective of evolutionary time, the change can be considered sudden and dramatic.

Seedlings that were shielded in a Faraday cage thrived. Seedlings that were exposed to man-made RFs showed necrotic lesions and abnormal coloring in their leaves.

132. EMR researcher Joris Everaert M.Sc., has compiled a reference list of 29 studies on the effects of EMR exposures on plants. **(Exhibit 11)**

C. Research on Birds

133. EMR researcher Joris Everaert M. Sc., has compiled a reference list of 25 studies on the effects of EMR exposures on birds. **(Exhibit 12)**

134. Joris Everaert and Dirk Bauwens published their study, "A Possible effect of Electromagnetic Radiation from Mobile Phone Base Stations on the Number of Breeding House Sparrows (*Passer domesticus*)" in *Electromagnetic Biology and Medicine*, Vol. 26: 63-72, 2007. The results suggest that "long-term exposure to low-intensity (pulsed) EMR from GSM base stations may have significant effects on populations of wild birds." Fewer House Sparrow males were seen at locations with higher EMR field strengths of GSM radiation. **(Exhibit 13)**

D. Research on Wildlife, Pollinators and Other Animals

135.. Electromagnetic pollution from phone masts. Effects on wildlife. Alfonso Balmori. *Pathophysiology*. (2009) Volume 16 pp.191-199. (**Exhibit 14**)

A review on the impact of radiofrequency radiation from wireless telecommunications on wildlife is presented . . . Phone masts located in their living areas are irradiating continuously some species that could suffer long-term effects, like reduction of their natural defenses, deterioration of their health, problems in reproduction and reduction of their useful territory through habitat deterioration.

In light of current knowledge there is enough evidence of serious effects from this technology to wildlife. For this reason precautionary measures should be developed, alongside environmental impact assessments prior to installation, and a ban on installation of phone masts in protected natural areas and in places where endangered species are present. Surveys should take place to objectively assess the severity of effects.

136. EMR researcher Joris Everaert M.Sc., has compiled a reference list of more than 60 studies and papers on effect of EMR exposure animals other than birds. This includes bats, honeybees, bumble bees, farm animals, rabbits, rats, mice, tadpoles, frogs, fruit flies, and ants. (**Exhibit 15**)

137. Ministry of Environment and Forest, Government of India commissioned a report on 30 August, 2010 for an Expert Group to study the possible impacts of communication towers on Wildlife including Birds and Bees.(last viewed 8/28/2013)

http://www.moef.nic.in/downloads/public-information/final_mobile_towers_report.pdf

The review of existing literature shows that the Electro Magnetic Radiations (EMRs) are interfering with the biological systems in more ways than one. There had already been some warning bells sounded in the case of bees and birds, which probably heralds the seriousness of this issue and indicates the vulnerability of other species as well.

The electromagnetic radiations are being associated with the observed decline in the population of sparrow in London and several other European cities (Balmori, 2002, Balmori, 2009, Balmori & Hallberg, 2007).

In case of bees, many recent studies have linked the electromagnetic radiations with an unusual phenomenon known as ‘Colony Collapse Disorder’. A vast majority of scientific literature published across the world indicate deleterious effects of EMFs in various other species, too.

E. Research on Humans

138. *The BioInitiative Report* (2007, 2012) (www.bioinitiative.org) is the most complete compilation of peer-reviewed published research on the biological effects of

electromagnetic field exposure across the spectrum from 1990-2012. It is freely available for download. It provides the published research that is lacking in the IEEE and NCRP exposure standards. It is herein incorporated in its entirety by reference.

139. EMRPI provides herein a sample of recent studies that address the aspects of human exposure to RF radiation identified by the NAS 2008 Report to be lacking in the IEEE and NCRP standards.

140. Studies of RF radiation exposure to humans are missing from both the IEEE and NCRP exposure standards. Studies of exposure to modulated (pulsed, digital) RF signals are missing as well. A series of studies, published in the *British Journal on Cancer* in 2011-2012, of successful treatment of human liver and breast cancers with specific modulation frequencies demonstrates that different human cell types can respond differently to specific modulation frequencies. **(Exhibit 16)**

141. EMF researcher Carl Blackman's editorial on these studies **(Exhibit 17)** underscores their importance to cancer treatment as well as putting them into historical context with his own research on exposure to modulated RF signals:

Funding is needed for further medical and basic science research to identify and characterize the biological influence that amplitude-modulated EMFs have on the body, in its normal state, when recovering from disease or injury, and when initially affected by disease. As a caution, 'information content' EMF signals may not always have beneficial consequences for humans or their environment, so research should examine potential detrimental biological outcomes as well.

The group of three papers demonstrates a new, potentially important modality in the treatment of cancer that could lead to a paradigm shift in disease treatment. I hope that this medical application of AM-EMF will not be allowed to languish without funding, as happened with its previous, ill-fated emergence. (Emphasis added.)

142. Changes of Clinically Important Neurotransmitters under the Influence of Modulated RF Fields – A Long-term Study under Real-life Conditions (Buchner and Eger). *Umwelt-Medizin-Gesellschaft (2011) Volume 24 (1): 44-5* **(Exhibit 17)** is another recent study of key aspects that are missing in the IEEE and NCRP standards, i.e., long-term exposure, in a specified geographic area, exposure to humans, exposure to modulated RF signals, and under real-life conditions. **(Exhibit 18)**. It is the third study carried out by a group of primary care physicians in Bavaria. They found that:

This follow-up of 60 participants over one and a half years shows a significant effect on the adrenergic system after the installation of a new cell phone base station in the village of Rimbach (Bavaria).

After the activation of the GSM base station, the levels of the stress hormones adrenaline and noradrenaline increased significantly during the first six weeks months; the levels of the precursor dopamine decreased substantially. The initial levels were not restored even after one and half years. As an indicator of the dysregulated chronic imbalance of the stress system, the phenylethylamine (PEA) levels dropped significantly until the end of the study period.

The effects showed a dose-response relationship and occurred well below current limits for technical RF radiation exposures. Chronic dysregulation of the catecholamine system has great relevance for health and is well known to damage human health in the long run. (Emphasis added.)

143. Impacts of radio-frequency electromagnetic field (RF_EMF) from cellphone towers and wireless devices on biosystem and ecosystem – a review. Sivani and Sudarsanam. *Biology and Medicine* (2012). Volume 4 (4): 202-216. (**Exhibit 19**) This review was carried out by researchers at the Department of Advanced Zoology and Biotechnology at Loyola College, Tamil Nadu, India. They point out that, “India has one of the fastest growing mobile telephony industries in the world. By 2013, it is estimated that more than one billion people will be having cell phone connection in India.” This review found that:

Based on current literature, is justified to conclude that RF-EMF radiation exposure can change neurotransmitter functions, blood-brain barrier, morphology, electrophysiology, cellular metabolism, calcium efflux, and gene and protein expression in certain types of cells even at lower intensities.

The Department of Telecommunications in India has set new norms for cell phone towers with effect from September 1, 2012(The Hindu, 2012). Exposure standards for RF-EMF radiation have been reduced to one-tenth of the existing level.

. . . one can take the precautionary principle approach and reduce RF-EMF radiation effects of cell phone towers by relocating towers away from densely populated areas, increasing height of towers or changing the direction of the antenna.

VII. NEPA MANDATES THAT IT IS TIME FOR THE FCC TO ESTABLISH BIOLOGICALLY-BASED EMR AND RF RADIATION SAFETY REGULATIONS

144. The Telecom Act of 1996 was passed by Congress during a frenzy of campaign contributions from the telecom industry. The Act prohibits state and local governments from considering environmental effects of cell tower siting decisions.

145. Instead, Congress directed the FCC to set its own safety regulations for emissions from cell towers. The House Committee on Commerce said it was the Commission's responsibility to adopt uniform regulations "with adequate safeguards of the public health and safety." (H.R. Report No. 104-204, p. 94)

146. In 1996, the FCC set safety regulations for cell tower emissions based on the "thermal effects" (i.e., the distance at which flesh is heated -- just like a microwave oven).

147. Since 1996, scientific studies in other countries around the world have repeatedly revealed harmful non-thermal, biological effects from cell tower frequencies affecting people living close to cell transmitters, including destruction of DNA, which causes mutations in cells.

148. The National Environmental Policy Act declares national environmental policy in 42 U.S.C. §4331. In relevant part, that section provides the following declaration of responsibility for Federal Government agencies:

(b) In order to carry out the policy set forth in this chapter, it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may –

1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;
3. attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences; * * *

149. The Telecommunications Act of 1996 – passed following intensive lobbying and lavish campaign contributions to Members of Congress of both parties – blocked all local environmental opposition to the siting of cell transmitters in communities across the United States by giving the FCC total and absolute preemptive control over the question of environmental harm.

150. The Commission's regulations governing radio frequency emissions totally block any and all citizen and governmental challenges to the installation of transmission facilities based on environmental harm. The hands of town, city and state officials are completely tied on the question of potential harmful environmental effects because of this absolute vesting of power and authority in the FCC.

151. Although the Commissioners and FCC staff state they are not qualified to perform this responsibility, they have no choice in the matter. It is their duty to inform themselves.

152. The law of the land requires that they issue and maintain regulations governing radiofrequency emissions to guard the human health of every citizen in the nation. It is a duty that cannot be brushed aside. The FCC is charged by law with protecting the public from environmental harm caused by RF emissions

153. Ten years ago, in 2003, the FCC dismissed a petition for inquiry filed by EMR Network (a predecessor to the present EMR Policy Institute). In its decision, the Commission expressly disowned its statutory obligations under the Telecom Act, and justified its continuing inaction:

3. In its petition for inquiry, EMR requested that the Commission initiate a proceeding to gather information and opinion about the need to revise our regulations regarding human exposure to RF radiation. It further requested that the Commission use the information obtained in such an inquiry to revisit the guidelines currently established for evaluating human exposure to RF emissions from FCC-regulated transmitters. EMR observed that the Commission's current RF limits are several years old, and asserted that there are a number of studies which purport to demonstrate a health hazard from RF radiation that is not contemplated in our rules. In particular, EMR argued that non-thermal effects and the effects of long-term low-level exposure were not taken into consideration in setting the Commission's RF exposure guidelines. EMR supported its request by reference to a letter written by members of the Radiofrequency Interagency Working Group (IWG), an *ad hoc* group of scientific professionals from various federal agencies that have jurisdiction over or interest in various radiofrequency issues, to the Risk Assessment Working Group of the IEEE. [FN9: Letter from W. Gregory Lotz, Ph.D. to Mr. Richard Tell, June 17, 1999 (Lotz letter).] In that letter, at the request of the IEEE, the members of the IWG identified issues which they suggested should be addressed in considering revisions to IEEE's RF exposure guidelines.

4. OET [Office of Engineering and Technology at the FCC] dismissed EMR's petition, noting that in developing rules to implement health and safety related concerns, this Commission has historically relied on agencies with primary expertise and responsibility for ensuring health and safety, such as the Environmental Protection Agency ("EPA) and the Food and Drug Administration (FDA). It observed that the current exposure guidelines are derived from criteria established by the National Council on Radiation Protection and Measurements (NCRP) and the IEEE, as further informed by the advice of the EPA, FDA, and other health and safety agencies. It noted that the adequacy of the Commission's RF exposure guidelines had recently been upheld, in the face of arguments similar to those advanced here by EMR, by the Second Circuit Court of Appeals. [FN10: See *Cellular Phone Task Force v. FCC*, 205 F.3d 82 (2d Cir., 2000).] OET concluded that a determination of whether the RF safety limits should be revised is, at least initially, more properly the jurisdiction of such agencies, and accordingly dismissed the petition.

(In the matter of EMR Network Petition for Inquiry to Consider Amendment of Parts 1 and 2 Regarding Environmental Effects of Radiofrequency Radiation, FCC 03-191. Order adopted July 28, 2003 and released August 14, 2003.)

(http://transition.fcc.gov/Document_Indexes/Engineering_Technology/2003_index_OET_Order.html) (Emphasis added.)

154. This continuing policy of FCC inaction except at the bidding of other agencies is a violation of the letter and spirit of §4332 of NEPA. It is a significant source of delay of tower siting proceedings as local citizens and organizations continue to question and protest the FCC's failure to update its safety regulations to address the non-thermal biological health effects of continuous cell tower emissions on human beings and wildlife. (See e.g. "Schools Are No Place for Cell Towers" *Washington Post*, November 18, 2004, <http://www.washingtonpost.com/wp-dyn/articles/A57511-2004Nov17.html> (last viewed 1/6/13); "Overflow Crowd Battles Cell Tower," *CTPost.com*, December 7, 2011, <http://www.ctpost.com/news/article/Overflow-crowd-battles-cell-tower-2354263.php> (last viewed 1/6/13); "School Parents Oppose Cell Tower Project at Rancho Cucamonga Church," *Inland Valley Daily Bulletin*, December 13, 2012, http://www.dailybulletin.com/breakingnews/ci_22188966/school-parents-oppose-cell-tower-project-at-rancho (last viewed 1/6/13))

155. Why would a federal agency, with exclusive jurisdiction and an express statutory obligation to set and keep safety regulations "adequate" for public safety, defer to an industry member it regulates?

156. At the time of the enactment of the TCA, the House Committee on Commerce expressly stated that it was, and is, the Commission's responsibility to adopt "uniform, consistent requirements, with adequate safeguards of the public health and safety," and that these were, and are, to be "established as soon as possible." (H.R. Report No. 104-204, p. 94) (Emphasis added.)

157. The Congressional mandate to the FCC to maintain regulations "adequate" to safeguard public health and safety was reiterated for emphasis on page 95 of House Report 104-204:

The Committee believes the Commission rulemaking on this issue (ET Docket 93-62) should contain adequate, appropriate and necessary levels of protection of the public, and needs to be completed expeditiously.

158. It is now past time for the FCC fulfill its mandate under NEPA to base its RF safety policy on current science and establish biologically-based RF safety limits.

VIII. RECOMMENDATIONS FOR FCC ACTION

159. The FCC should adopt biologically-based EMR and RF safety limits that are developed by experts in the biological effects and adverse health effects of chronic and long-term exposures electromagnetic fields across the spectrum. The research basis of these safety limits should conform with the analysis in the NAS 2008 Report that identified the needs in the research record.

159. Specific Absorption Rate (SAR) will no longer be relevant as a measure of compliance for RF safety limits that are based on biological effects rather than thermal effects.

160. Immediate intermediate precautionary policies are necessary while new safety limits are under development. Local governments should be instructed to site antenna installations away from populated areas.

161. The FCC should follow the policy of the German state of Baden-Wurttemberg and promote wired broadband internet alternatives wherever possible. For example, Wi-Fi networks at public institutions and wireless Internet access in cities and rural areas should be avoided. The FCC should encourage all municipalities to deploy sustainable fiber-optic technology instead of LTE (Long Term Evolution, 4G).

162. The FCC should follow the example of the French National Assembly and advise hard-wired internet connections rather than WiFi for schools because the current FCC model for RF exposure in the SAM model, i.e., a 200-pound 6-foot tall male.

163. The FCC should require installation of sensors at all antenna locations, both building mounted and tower mounted. Emissions levels should be recorded and sent to a local government computer interface via a phone line. The RF emissions readings should be monitored by local government officials on a regular, on-going basis.

164. Because exposure to certain frequencies can damage a medical implant and/or cause it to malfunction, and such damage can injure or kill the person with the implant, the EMRPI recommends the following policies:

- a. The SAR of every electronic device must be posted on an easily accessible FDA-run website before it is marketed, and every new device's SAR must be labeled on the device. This is similar to the

warnings that the FDA required of microwave oven makers, beginning in 1971, in order to protect people with cardiac pacemakers.

b. All medical personnel (including physicians, nurses, orderlies, janitors as well as manufacturers of pharmaceuticals and medical equipment, etc.) must be educated about "harmful biological interference." They need to be informed about the potential harm caused to people with implants when they are exposed to Wi-Fi; "smart" digital utility meters, wireless heart monitors, cellular antennas, metal detectors, inventory control monitors, mobile phones, fluorescent lights, etc.

c. Medical personnel must know how to create a safe environment for people with implants who require doctors' visits, hospital stays and attendance in areas of public accommodation. Canada, Sweden and Austria have begun providing medical facilities for people with electrical sensitivities.

d. Every hospital should have an electromagnetic interference (EMI) specialist on staff in order to monitor equipment and safeguard patients from one medical device (i.e. an MRI) or large machinery (i.e. an elevator) interfering with another medical device or an implant. \$100,000 per specialist is a moderate estimate of annual salary and benefits for a personal with the requisite knowledge and training to be qualified for such a position.

e. Medical implant manufacturers should be required to install in every implant a hazard-overload interrupter, analogous to a ground-fault interrupter in household wiring.

f. Many common procedures, i.e. hernia surgery, require turning off the battery of an implanted medical device. This can be a 9-step process for some models of Deep Brain Stimulators, for example. Surgery personnel must be trained in these procedures on an on-going basis.

g. Because of increased risk of brain injury for persons with implanted Deep Brain Stimulators, a specific "Do Not Resuscitate" (DNR) form that addresses this specific circumstance should be readily available to such patients before surgical procedures.

IX. FCC MUST COMPLY WITH NEPA REQUIREMENTS

165. When the FCC reaches its decision on action or inaction on revision of the agency's EMR and RF energy exposure limits, and upon the FCC's reassessment of mobile phone testing requirements, the FCC must prepare Environmental Assessments, together with appropriate Findings of No Significant Impact (FONSI) or Environmental Impact Statements (EIS) on the environmental consequences of the FCC's conclusions and actions, including alternatives

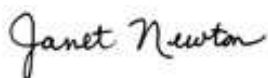
available, in compliance with the National Environmental Policy Act (NEPA) 42 U.S.C. §4332 et seq.

X. CONCLUSION

166. Should the facts in this proceeding show that the FCC is not willing or capable of setting EMR and RF radiation safety standards that actually protect people, then the FCC, the Courts and Congress must abolish any FCC preemption on any health issues and open the door to local control, and citizen's ability to hold those who harm them accountable in court.

Respectfully submitted,

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Exhibits for FCC 13-39
Comment of The EMR Policy Institute

Exhibit #

1. *North American Journal of Medicine & Science*, Vol.6, Issue 3, July 2013. Preface to the special issue of autism.
2. Letter of Martha H. Herbert PhD, MD, February 8, 2013, to the Los Angeles Unified School District.
3. Letter of Superintendent of the Los Angeles Unified School District, May 13, 2012, to then-FCC Chairman Julius Genachowski.
4. Guideline of the Austrian Medical Association (OAK) for the diagnosis and treatment of EMF-related health problems and illnesses (EMF syndrome). Adopted 3rd March 2012 in Vienna.
5. EPA Budget for EMR Activities – Fiscal Years 1990-2000.
6. Seletun Scientific Statement. “Scientific Panel on Electromagnetic Field Health Risks: Consensus Points, Recommendations, and Rationales.” *Reviews in Environmental Health*. Vol. 25, No. 4, 2010.
7. “Induction of Vertebrate Regeneration by Transient Sodium Current,” and “Cracking the bioelectric code,” by the research team Ai-Sun Tseng and Michael Levin, Department of Biology and Center for Regenerative and Developmental Biology, Tufts University.
8. Electromagnetic fields act *via* activation of voltage-gated calcium channels to produce beneficial or adverse effects. Martin Pall, *Journal of Cellular and Molecular Medicine*, 2013.
9. A review of the ecological effects of radio frequency electromagnetic fields (RF_EMF). S. Cucurachi, et al. *Environmental International*, Vol. 51, 2013.
10. Adverse Influence of Radio Frequency Background on Trembling Aspen Seedlings: Preliminary Observations. Katie Haggerty, *International Journal of Forestry Research*, Vol. 2010.
11. EMR and Plants: reference list of 29 studies on effects of EMR exposure on plants. Compiled by Joris Everaert, M.Sc. in Biology, University of Ghent.
12. EMR and Birds: reference list of 25 studies on effects of EJR exposure on birds. Compiled by Joris Everaert, M.Sc., University of Ghent.

13. A Possible Effect of Electromagnetic Radiation from Mobile Phone Base Stations on the Number of Breeding House Sparrows (*Passer domesticus*). Everaert and Bauwens, *Electromagnetic Biology and Medicine*, Vol. 26: 63-72, 2007.
14. Electromagnetic pollution from phone masts. Effects on wildlife. Alfonso Balmori. *Pathophysiology*, Volume 16: 191-199, 2009.
15. EMR and animals other than birds: reference list of 63 studies on effects of EMR exposure on animals other than birds. This includes bats, honeybees, bumble bees, farm animals, rabbits, rats, mice, tadpoles, frogs, fruit flies, and ants.
16. Studies published in the *British Journal of Cancer* in 2011-2012 demonstrating successful treatment of liver and breast cancers with specific modulation frequencies.
17. Treating cancer with amplitude-modulated electromagnetic fields: a potential paradigm shift, again? Carl Blackman. *British Journal of Cancer*, Volume 106, 241-242, 2012.
18. Changes of Clinically Important Neurotransmitters under the Influence of Modulated RF Fields – A Long-term Study under Real-life Conditions. Klaus Buchner and Horst Eger, *Umwelt-Medizin_Gesellschaft*, Volumes 24 (1): 44-57, 2011.
19. Impacts of radio-frequency electromagnetic fields (RF-EMF) from cell phone towers and wireless devices on biosystem and ecosystem – a review. S Sivani and D Sudarsanam. *Biology and Medicine*, Volume 4 (4): 202-216, 2012.