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ENVIRONMENTAL HEALTH TRUST

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September 4, 2020

Margaret Everson, Counselor to the Secretary, Exercising the Delegated Authority of the Director, National Park Service
National Park Service
1849 C Street NW
Washington, DC 20240

CC:
Lena McDowall, Deputy Director, Management and Administration
Shawn Benge, Deputy Director, Operations
Susan Farinelli, Acting Chief of Staff
Lisa Mendelson-Ielmini, Acting Area Director National Capital Area
Gay Vietzke, Regional Director, Region 1
Stan Austin, Regional Director Region 2
Bert Frost, Regional Director, Regions 3, 4, and 5
Mike Reynolds, Regional Director, Region 6, 7 and 8
Stan Austin, Regional Director, Regions 9, 10, and 12
Linda Walker, Acting Regional Director, Region 11

Re: Telecommunications Infrastructure in National Parks

Dear Ms. Margaret Everson,

Environmental Health Trust (EHT) is a nonprofit think tank and policy organization dedicated to identifying and reducing environmental health hazards. EHT provides independent scientific research and advice on controllable environmental hazards to local, state, and national governments. Today, we write to advise you of the scientific grounds for consideration of major health and environmental implications regarding any proposal for the installation of 5G wireless telecommunications facilities and associated wireless infrastructure in national parks and wilderness. We are also writing to express our opposition to the planned expansion of mobile communications in Grand Teton National Park and Yellowstone.

We fully recognize there is a need for communication for emergency purposes. We further recognize that parks play a unique role in our country and in our lives by providing a wilderness that is apart from the

hectic life that many Americans lead today. Expanding wireless communications in parks will irrevocably impair the wilderness experience. With the science on our side, we firmly believe there are wired solutions that would be far less damaging.

The transmissions to and from these proposed microwave wireless installations will be emissions that are an environmental pollutant known to cause cancer (in both experimental animals and humans) and other adverse health and environmental effects (e.g., on birds, bees, and trees) according to internationally recognized authoritative research. The prestigious institutions that have conducted these studies include the U.S. National Toxicology Program, the nation's premier testing institute.

As the Natural Resources Defense Council has argued, an environmental impact assessment should be performed before building out these networks.

In light of the scientific documentation showing harmful effects, EHT writes today to offer technical scientific information on impacts to human health, wildlife, and the environment. In this letter, we hope to explain why more than 400 expert scientists are calling for a halt to 5G and for immediate reductions in public exposure to microwave wireless radiation. We ask for a halt to 5G and any densification of wireless infrastructure.

FCC Limits Are Not Adequate To Protect People Nor Wildlife

We are also submitting to you the July 8, 2020 letter to EHT Director Theodora Scarato from the Environmental Protection Agency's Director of the Radiation Protection Division and Office of Radiation and Indoor Air, Lee Ann B. Veal. This letter confirms that the EPA has never reviewed the impact to birds, bees, or trees. There is no federal health agency that has ever set safety limits for trees, birds, or bees. Our outdated wireless radiation limits were never intended to protect the nature around us. No agency has a funded mandate to ensure our flora and fauna are safe from cell tower radiation. In other words, it is a gaping hole in federal accountability. Thus, wireless infrastructure expansion should be halted until proper safety limits are developed.

The U.S. Department of the Interior sent a letter in 2014[1] reviewing several research studies showing harm to birds and concluding that "The electromagnetic radiation standards used by the Federal Communications Commission (FCC) continue to be based on thermal heating, a criterion now nearly 30 years out of date and inapplicable today."

A now-retired U.S. Fish and Wildlife Service wildlife biologist, the former lead on telecommunications impacts, Dr. Albert Manville, has written to the FCC on impacts to birds and on higher frequencies to be

[1] Washington DC, Veenendaal ME. Department of Interior Letter. *United States Department of the Interior OFFICE OF THE SECRETARY.*

used in 5G. Dr. Manville authored numerous publications detailing research showing harm to birds.[2,3,4] "The race to implement 5G and the push by FCC to approve the related 5G license frequencies to industry are very troubling and downright dangerous."

Documented Impacts to Wildlife and the Environment

- "A review of the ecological effects of RF-EMF" reviewed 113 studies finding RF-EMF had a significant effect on birds, insects, other vertebrates, other organisms, and plants in 70% of the studies (Cucurachi 2013). Development and reproduction in birds and insects were the most strongly affected. As an example of the several studies on wildlife impacts, a study focusing on RF from antennas found increased sperm abnormalities in mice exposed to RF from GSM antennas (Otitoloju 2010).
- "Exposure of Insects to Radio-Frequency Electromagnetic Fields from 2 to 120 GHz" published in Scientific Reports is the first study to investigate how insects (including the Western honeybee) absorb the higher frequencies (2 GHz to 120 GHz) to be used in the 4G/5G rollout. The scientific simulations showed increases in absorbed power between 3% to 370% when the insects were exposed to the frequencies. Researchers concluded, "This could lead to changes in insect behaviour, physiology, and morphology over time…."
- Studies on bees have found behavioral effects (Kumar 2011, Favre 2011), disrupted navigation (Goldsworthy 2009, Sainudeen 2011, Kimmel et al. 2007), decreasing egg laying rate (Sharma and Kumar, 2010), and reduced colony strength (Sharma and Kumar, 2010, Harst et al. 2006).
- Research has also found a high level of damage to trees from antenna radiation. For example, a field monitoring study spanning 9 years involving over 100 trees (Waldmann-Selsam 2016) found trees sustained more damage on the side of the tree facing the antenna.
- A study on Aspen trees near Lyons, Colorado entitled "Adverse Influence of Radio Frequency Background on Trembling Aspen Seedlings" published in the *International Journal of Forestry* found adverse effects on growth rate and fall anthocyanin production, concluding that "results of this preliminary experiment indicate that the RF background may be adversely affecting leaf and shoot growth and inhibiting fall production of anthocyanins associated with leaf senescence in Trembling Aspen seedlings. These effects suggest that exposure to the RF background may be an underlying factor in the recent rapid decline of Aspen populations. Further studies are underway to test this hypothesis in a more rigorous way."[5]
- An analysis of 45 peer-reviewed scientific publications (1996–2016) on changes in plants due to the non-thermal RF-EMF effects from mobile phone radiation entitled "Weak radiofrequency radiation exposure from mobile phone radiation on plants" concludes, "Our analysis demonstrates that the data from a substantial amount of the studies on RF-EMFs from mobile phones show physiological and/or morphological effects (89.9%, $p < 0.001$). Additionally, our analysis of the results from these reported studies demonstrates that the maize, roselle, pea, fenugreek,

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[2] ECFS Filing Detail. https://www.fcc.gov/ecfs/filing/1060315601199. Accessed July 8, 2020.
[3] Albert M. Manville Ph.D. Former U.S. Fish and Wildlife Service Senior Biologist. Memorandum on the Bird and Wildlife Impacts of Non-ionizing Radiation. Environmental Health Trust. Accessed July 8, 2020.
[4] Manville AM. *Collisions, Electrocutions, and Next Steps-Manville BIRD STRIKES AND ELECTROCUTIONS AT POWER LINES, COMMUNICATION TOWERS, AND WIND TURBINES: STATE OF THE ART AND STATE OF THE SCIENCE B NEXT STEPS TOWARD MITIGATION 1.*; 2002.
[5] Katie Haggerty, "Adverse Influence of Radio Frequency Background on Trembling Aspen Seedlings: Preliminary Observations," *International Journal of Forestry Research*, vol. 2010, Article ID 836278, 7 pages, 2010. doi.org/10.1155/2010/836278.

duckweeds, tomato, onions and mungbean plants seem to be very sensitive to RF-EMFs. Our findings also suggest that plants seem to be more responsive to certain frequencies…."[6]

Electromagnetic Fields Alter Animal and Insect Orientation

Science of the Total Environment published environmental scientist Alforso Balmori's "Anthropogenic radiofrequency electromagnetic fields as an emerging threat to wildlife orientation," which states, "Current evidence indicates that exposure at levels that are found in the environment (in urban areas and near base stations) may particularly alter the receptor organs to orient in the magnetic field of the earth. These results could have important implications for migratory birds and insects, especially in urban areas, but could also apply to birds and insects in natural and protected areas where there are powerful base station emitters of radio frequencies. Therefore, more research on the effects of electromagnetic radiation in nature is needed to investigate this emerging threat."[7]

Multiple research studies have documented how animals' magnetoreception can be disrupted by external electromagnetic fields, from mice[8] to cows to dogs to birds.[9] Electromagnetic exposure is especially disruptive to migratory birds.[10] Electromagnetic fields have been shown to disrupt the magnetic compass orientation used by birds to navigate.[11,12] Researchers have suggested this disruption of magnetoreception is due to cryptochrome photoreceptors that allow birds to use built-in receptors as a biological compass.

In 2012, the government of India's Ministry of the Environment and Forest issued a report on the potential impacts of communication towers on wildlife, citing hundreds of research studies that found adverse effects. Recommendations from the Ministry include, "Introduce a law for protection of urban flora and fauna from emerging threats like ERM/EMF as conservation issues in urban areas are different from forested or wildlife habitats."[13]

A 2017 report to UNESCO[14] by botanist Mark Broomhall details the association between increasing amounts of electromagnetic radiation from cellular antennas on the Mt. Nardi tower complex and species

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[6] Malka N. Halgamuge (2017) Review: Weak radiofrequency radiation exposure from mobile phone radiation on plants, *Electromagnetic Biology and Medicine*, 36:2, 213-235, DOI: 10.1080/15368378.2016.1220389.
[7] Alfonso Balmori, Anthropogenic radiofrequency electromagnetic fields as an emerging threat to wildlife orientation, *Science of The Total Environment*, Volumes 518–519, 2015, Pages 58-60, ISSN 0048-9697, doi.org/10.1016/j.scitotenv.2015.02.077.
[8] Malkemper, E.P., et al. "Magnetoreception in the wood mouse (Apodemus sylvaticus): influence of weak frequency-modulated radio frequency fields." *Scientific Reports*, vol. 4, no. 9917, 2015.
[9] Wiltschko Roswitha, Thalau Peter, Gehring Dennis, Nießner Christine, Ritz Thorsten, Wiltschko Wolfgang. Magnetoreception in birds: the effect of radio-frequency fields.12. *Journal of The Royal Society Interface*.
[10] Engels, Svenja, et al. "Anthropogenic electromagnetic noise disrupts magnetic compass orientation in a migratory bird." *Nature* 509.7500 (2014): 353-356.
[11] Wiltschko, Roswitha, et al. "Magnetoreception in birds: the effect of radio-frequency fields." *Journal of The Royal Society Interface* 12.103 (2015): 20141103.
[12] Schwarze, S., et al. "Weak Broadband Electromagnetic Fields are More Disruptive to Magnetic Compass Orientation in a Night-Migratory Songbird (Erithacus rubecula) than Strong Narrow-Band Fields." *Front Behav Neurosci*. 10.55 (2016).
[13] Expert Committee, Ministry of Environment and Forest, Government of India, Report on Possible Impacts of Communication Towers on Wildlife Including Birds and Bees, Constituted on 30th August, 2010.
[14] Broomhall, Mark. "Report detailing the exodus of species from the Mt. Nardi area of the Nightcap National Park World Heritage Area during a 15-year period (2000-2015.)" United Nations Scientific and Cultural Organization (2017).

disappearance and exodus from the Mt. Nardi area of the Nightcap National Park World Heritage Area during a 15-year period (2000–2015). He estimates "in both volume and species that from 70 to 90% of the wildlife has become rare or has disappeared from the Nightcap National Park within a radius of the Mt. Nardi tower complex. This statement can be summarised with concrete data: 3 bat species once common have become rare or gone, 11 threatened and endangered bird species are gone, 11 migratory bird species are gone, 86 bird species are demonstrating unnatural behaviours, 66 once common bird species are now rare or gone." The Report concludes, "With these short explanations of events we can appreciate that the effects of this technology and its application on Mt. Nardi over the last fifteen years, affect not only the top of the life chain species but they are devastating the fabric of the continuity of the World Heritage, causing genetic deterioration in an insidious, massive and ever escalating scale. To truly understand what these studies reveal is to stare into the abyss."

It is very important that in considering antenna placement, there be a full environmental assessment on migratory animal patterns (from the smallest to the largest) and not simply on birds and mammals like the pronghorn but also on impacts to amphibians and insects.

Wireless Radiation is Known to Harm Humans and Wildlife

Human health effects include impaired reproduction, increased incidence of brain cancer, DNA breaks, oxidative stress, immune dysfunction, altered brain development, sleep changes, hyperactivity, and memory and cognitive problems.[15] Since the WHO/IARC classified EMF as a Group 2B Possible Carcinogen in 2011, the peer-reviewed research connecting wireless exposure to cancer has significantly strengthened and several scientists have published documentation that the weight of current peer-reviewed evidence supports the conclusion that radiofrequency radiation should be regarded as a human carcinogen.[16,17,18]

- The 10-year $30 million National Institute of Environmental Health Sciences National Toxicology Program's (NTP) "Studies of the Toxicology and Carcinogenicity of Cell Phone Radiation"[19,20] found that RFR was associated with "clear evidence" of cancer due to the increased malignant schwannomas found in RFR-exposed male rats. The brain (glioma) cancers and tumors in the adrenal glands were also considered evidence of an association with cancer. In

[15] For more information on acute health symptoms, see, e.g., Martin Pall, Microwave Frequency Electromagnetic Fields (EMFs) Produce Widespread Neuropsychiatric Effects Including Depression, 75 *J. Chemical Neuroanatomy* 43-51 (Sept. 2016); Response of residents living in the vicinity of a cellular phone base station in France ; Electromagnetic Fields: A Hazard to Your Health?, Healthy Children.
[16] Adams, Jessica A., et al. "Effect of mobile telephones on sperm quality: a systematic review and meta-analysis." *Environment International,* 70, 2014, pp. 106-112.
[17] Deshmukh, P.S., et al. "Cognitive impairment and neurogenotoxic effects in rats exposed to low-intensity microwave radiation." *International Journal of Toxicology*, vol. 34, no. 3, 2015, pp. 284-90.
[18] Aldad, T.S., et al. "Fetal Radiofrequency Radiation Exposure From 800-1900 MHz-Rated Cellular Telephones Affects Neurodevelopment and Behavior in Mice." *Scientific Reports,* vol. 2, no. 312, 2012.
[19] National Toxicology Program, Cell Phone Radio Frequency Radiation
[20] High exposure to radio frequency radiation associated with cancer in male rats

addition, exposed animals had significantly more DNA damage, heart damage, and low birth weight.

- The Ramazzini Institute published its findings[21] that animals exposed to very low-level RFR developed the same types of cancers as reported by the NTP.
- Long-term research on humans who have used cell phones has found increased tumors—schwannomas and glioblastomas—the same cell type as found in the NTP and Ramazzini Institute studies. Persons who started using cell phones under age 20 had the highest risk.[22]
- A 2015 Jacobs University study (replicating a 2010 study) found that weak cell phone signals significantly promote the growth of tumors in mice and that combining a toxic chemical exposure with RF more than doubled the tumor response.[23,24]
- "5G wireless telecommunications expansion: Public health and environmental implications," is a research review published in *Environmental Research*, which documents the range of adverse effects reported in the published literature, from cancer to bacteria growth changes to DNA damage, concludes that "a moratorium on the deployment of 5G is warranted" and "the addition of this added high-frequency 5G radiation to an already complex mix of lower frequencies, will contribute to a negative public health outcome both from both physical and mental health perspectives."[25]
- A study published in Electromagnetic Biology and Medicine, "Impact of radiofrequency radiation on DNA damage and antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base station," compared people living close and far from cell antennas and found that people living closer to cell antennas had higher radiation levels in the homes and several significant changes in their blood predictive of cancer development."[26]
- A 2019 study of students in schools near cell towers found their higher RF exposure was associated with impacts on motor skills, memory, and attention (Meo 2019).[27] Examples of other effects linked to cell towers in research studies include neuropsychiatric problems,[28] elevated

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[21] L. Falcioni, L. Bua, E. Tibaldi, M. Lauriola, L. De Angelis, F. Gnudi, D. Mandrioli, M. Manservigi, F. Manservisi, I. Manzoli, I. Menghetti, R. Montella, S. Panzacchi, D. Sgargi, V. Strollo, A. Vornoli, F. Belpoggi, Report of final results regarding brain and heart tumors in Sprague-Dawley rats exposed from prenatal life until natural death to mobile phone radiofrequency field representative of a 1.8 GHz GSM base station environmental emission, *Environmental Research*, Volume 165, 2018, Pages 496-503, ISSN 0013-9351, doi.org/10.1016/j.envres.2018.01.037.

[22] https://www.pathophysiologyjournal.com/article/S0928-4680(14)00064-9/fulltext

[23] Lerchl, Alexander, et al. "Tumor promotion by exposure to radiofrequency electromagnetic fields below exposure limits for humans." *Biochemical and Biophysical Research Communications,* vol. 459, no. 4, 2015, pp. 585-90.

[24] Tillmann, Thomas, et al. "Indication of cocarcinogenic potential of chronic UMTS-modulated radiofrequency exposure in an ethylnitrosourea mouse model." *International Journal of Radiation Biology,* vol. 86, no. 7, 2010, pp. 529-41.

[25] https://doi.org/10.1016/j.envres.2018.01.016

[26] Zothansiama & Zosangzuali, Mary & Lalramdinpuii, Miriam & Jagetia, Ganesh & Siama, Zothan. (2017). Impact of radiofrequency radiation on DNA damage and antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base stations. Electromagnetic Biology and Medicine. 36. 1-11. 10.1080/15368378.2017.1350584.

[27] Meo, S. A., Almahmoud, M., Alsultan, Q., Alotaibi, N., Alnajashi, I., & Hajjar, W. M. (2019). Mobile Phone Base Station Tower Settings Adjacent to School Buildings: Impact on Students' Cognitive Health. *American Journal of Men's Health*. doi.org/10.1177/1557988318816914.

[28] G. Abdel-Rassoul, O. Abou El-Fateh, M. Abou Salem, A. Michael, F. Farahat, M. El-Batanouny, E. Salem, Neurobehavioral effects among inhabitants around mobile phone base stations, NeuroToxicology, Volume 28, Issue 2, 2007, Pages 434-440, ISSN 0161-813X, doi.org/10.1016/j.neuro.2006.07.012.

diabetes[29], headaches[30], sleep problems[31] and genetic damage[32]. Such research continues to accumulate after the 2010 landmark review study on 56 studies that reported biological effects found at very low intensities, including impacts on reproduction, permeability of the blood-brain barrier, behavior, cellular and metabolic changes, and increases in cancer risk (Lai and Levitt 2010).[33]

- Published research has found impacts from wireless radiation exposure to reproduction and brain development in addition to a myriad of other adverse effects.[34,35,36,37] Although renowned institutions, such as the Cleveland Clinic, advise men to keep phones and wireless devices away from their reproductive organs, the public remains largely unaware.

Once the towers are erected, they will be upgraded over time with new antennas and soon 5G technology. 5G would use today's wireless frequencies while adding new, higher frequencies to transmit data at faster speeds. These higher frequency millimeter waves uniquely penetrate the eyes and skin,[38,20,21,22] and have been shown to accelerate bacterial and viral cell growth.[39] Millimeter waves were originally developed as a military weapon to create the sensation that the skin is burning.[40] Currently accepted standards are not sophisticated enough to measure effects on sweat glands or quantify the risks of cumulative exposure.[41,42]

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[29] SA, Meo & Alsubaie, Yazeed & Almubarak, Zaid & Almutawa, Hisham & AlQasem, Yazeed & Hasanato, Rana. (2015). Association of Exposure to Radio-Frequency Electromagnetic Field Radiation (RF-EMFR) Generated by Mobile Phone Base Stations with Glycated Hemoglobin (HbA1c) and Risk of Type 2 Diabetes Mellitus. International Journal of Environmental Research and Public Health. 12. 14519-14528;. 10.3390/ijerph121114519.

[30] Hutter, H. P., Moshammer, H., Wallner, P., & Kundi, M. (2006). Subjective symptoms, sleeping problems, and cognitive performance in subjects living near mobile phone base stations. *Occupational and environmental medicine*, *63*(5), 307–313. doi:10.1136/oem.2005.020784.

[31] R. Santini, P. Santini, J.M. Danze, P. Le Ruz, M. Seigne, Enquête sur la santé de riverains de stations relais de téléphonie mobile: I/Incidences de la distance et du sexe, Pathologie Biologie, Volume 50, Issue 6, 2002, Pages 369-373, ISSN 0369-8114, doi.org/10.1016/S0369-8114(02)00311-5.

[32] Gursatej Gandhi, Gurpreet Kaur & Uzma Nisar (2015) A cross-sectional case control study on genetic damage in individuals residing in the vicinity of a mobile phone base station, Electromagnetic Biology and Medicine, 34:4,344-354, DOI: 10.3109/15368378.2014.933349.

[33] B. Blake Levitt and Henry Lai, Biological effects from exposure to electromagnetic radiation emitted by cell tower base stations and other antenna arrays, Environ. Rev. Downloaded from www.nrcresearchpress.com by 172.58.41.200 on 04/10/19

[34] Adams, Jessica A., et al. "Effect of mobile telephones on sperm quality: a systematic review and meta-analysis." *Environment International,* 70, 2014, pp. 106-112.

[35] Deshmukh, P.S., et al. "Cognitive impairment and neurogenotoxic effects in rats exposed to low-intensity microwave radiation." *International Journal of Toxicology*, vol. 34, no. 3, 2015, pp. 284-90.

[36] Aldad, T.S., et al. "Fetal Radiofrequency Radiation Exposure From 800-1900 MHz-Rated Cellular Telephones Affects Neurodevelopment and Behavior in Mice." *Scientific Reports,* vol. 2, no. 312, 2012.

[37] Sonmez, O.F., et al. "Purkinje cell number decreases in the adult female rat cerebellum following exposure to 900 MHz electromagnetic field." *Brain Research,* vol. 1356, 2010, pp. 95-101.

[38] A lecture by Paul Ben-Ishai, PhD at the Israel Institute for Advanced Studies on this finding can be found on the 2017 IIAS Conference website. Feldman, Yuri and Paul Ben-Ishai. "Potential Risks to Human Health Originating from Future Sub-MM Communication Systems." *Conference on Wireless and Health*, 2017.

[39] Cindy L. Russell, 5G Wireless Telecommunications Expansion: Public Health and Environmental Implications, 165 Envt'l Res. 484 (2018).

[40] For information on Active Denial Systems, see, e.g., Vehicle-Mounted Active Denial System (V-MADS) ; Active Denial System FAQs.

[41] A lecture by Paul Ben-Ishai, PhD at the Israel Institute for Advanced Studies on this finding can be found on the 2017 IIAS Conference website. Feldman, Yuri and Paul Ben-Ishai. "Potential Risks to Human Health Originating from Future Sub-MM Communication Systems." *Conference on Wireless and Health*, 2017.

[42] Hayut, Itai, Paul Ben Ishai, Aharon J. Agranat and Yuri Feldman. "Circular polarization induced by the three-dimensional chiral structure of human sweat ducts." *Physical Review E*, vol. 89, no. 042715, 2014.

Any future applications of these technologies must consider the biological effect of cumulative exposures to these frequencies.

Radiofrequency radiation exposure is increasing at a rapid pace.

A 2018 article published in *The Lancet Planetary Health* points to unprecedented increasing RF exposures, and the abstract concludes, "due to the exponential increase in the use of wireless personal communication devices (eg, mobile or cordless phones and WiFi or Bluetooth-enabled devices) and the infrastructure facilitating them, levels of exposure to radiofrequency electromagnetic radiation around the 1 GHz frequency band, which is mostly used for modern wireless communications, have increased from extremely low natural levels by about 1018 times…"(Bandara and Carpenter 2018).[43]

Another key finding from Zothansiama 2017 was that homes closer to antennas had measurably higher radiation levels—adding to the documentation that antennas increase RF levels. An Australian study also found that children in kindergartens with nearby antenna installations had nearly three-and-a-half times higher RF exposures than children with installations further away (more than 300 meters (Bhatt 2016).[44]

A 2018 multi-country study that measured RF in several countries found that cell phone tower radiation is the dominant contributor to RF exposure in most outdoor areas exposure in urban areas was higher and that exposure has drastically increased. As an example, the measurements the researchers took in Los Angeles, USA was 70 times higher than the US EPA estimate 40 years ago.[45]

Telecommunications Companies Warn Their Shareholders

In fact, a number of corporations already advise their shareholders that they could face serious financial risks from the health damages due to RF. For instance, Crown Castle's 2019 10-K ANNUAL REPORT states that,

> If radio frequency emissions from wireless handsets or equipment on our communications infrastructure are demonstrated to cause negative health effects, potential future claims could adversely affect our operations, costs or revenues.
> The potential connection between radio frequency emissions and certain negative health effects, including some forms of cancer, has been the subject of substantial study by the scientific community in recent years. We cannot guarantee that claims relating to radio frequency emissions will not arise in the future or that the results of such studies will not be adverse to us.

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[43] Priyanka Bandara, David O Carpenter, Planetary electromagnetic pollution: it is time to assess its impact, *The Lancet Planetary Health*, Volume 2, Issue 12, 2018, Pages e512-e514,ISSN 2542-5196, doi.org/10.1016/S2542-5196(18)30221-3.
[44] Bhatt, C. R., Redmayne, M., Billah, B., Abramson, M. J., & Benke, G. (2016). Radiofrequency-electromagnetic field exposures in kindergarten children. *Journal Of Exposure Science And Environmental Epidemiology*, *27*, 497. Retrieved from https://doi.org/10.1038/jes.2016.55.
[45] Sanjay Sagar, Seid M. Adem, Benjamin Struchen, Sarah P. Loughran, Michael E. Brunjes, Lisa Arangua, Mohamed Aqiel Dalvie, Rodney J. Croft, Michael Jerrett, Joel M. Moskowitz, Tony Kuo, Martin Röösli, Comparison of radiofrequency electromagnetic field exposure levels in different everyday microenvironments in an international context, Environment International, Volume 114, 2018, Pages 297-306, ISSN 0160-4120, doi.org/10.1016/j.envint.2018.02.036.

> If a connection between radio frequency emissions and possible negative health effects were established, our operations, costs, or revenues may be materially and adversely affected. We currently do not maintain any significant insurance with respect to these matters.

Most wireless companies, from AT&T to Nokia to T Mobile to Verizon Wireless, have issued similar warnings to their shareholders. Why are shareholders being warned but not the people living near the equipment? These disclosures show that even corporations cannot assure safety.

Due to these evaluations and the published scientific evidence, cell phone manufacturers cannot insure against health damages from the radiofrequency radiation emitted by their products and networks. In fact, most insurance plans do not cover electromagnetic fields (EMF) and have very clear "electromagnetic field exclusions." In order for insurance companies to cover EMF, one often must purchase additional "Pollution Liability" or "Policy Enhancement" coverage.

According to CFC Underwriting LTD in London, the UK agent for Lloyd's:

> The Electromagnetic Fields Exclusion (Exclusion 32) is a General Insurance Exclusion and is applied across the market as standard. The purpose of the exclusion is to exclude cover for illnesses caused by continuous long-term non-ionising radiation exposure i.e. through mobile phone usage.

Even AT&T Mobile Insurance excludes loss from "pollutants" and its policy defines "Pollutants" as "Any solid, liquid, gaseous, or thermal irritant or contaminant including smoke, vapor, soot, fumes, acid, alkalis, chemicals, artificially produced electric fields, magnetic field, electromagnetic field, sound waves, microwaves, and all artificially produced ionizing or non- ionizing radiation and waste" (pg. 4) AT &T Mobile Insurance Policy, February 2014.

If insurance companies will not insure EMF, and if even telecommunications companies consider EMF as a "pollutant," how can governments allow such an environmental pollutant without also warning their citizens as companies do?

5G Will Increase RF Exposures to the Environment and 5G Antenna Beamforming Exposures Cannot Be Accurately Measured

A 2019 European Parliament Report "5G Deployment: State of Play in Europe, USA, and Asia[46] confirms increased exposure from the 5G/4G Densification stating, "increased exposure may result not only from the use of much higher frequencies in 5G but also from the potential for the aggregation of different signals, their dynamic nature, and the complex interference effects that may result, especially in dense urban areas." The report points out that it currently "is not possible to accurately simulate or measure 5G emissions in the real world," stating,

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[46] BLACKMAN, C. and FORGE, S. (2019). *5G Deployment State of Play in Europe, USA and Asia*. [PDF] European Parliament's Committee on Industry, Research and Energy. Available at: https://www.europarl.europa.eu/RegData/etudes/IDAN/2019/631060/IPOL_IDA(2019)631060_EN.pdf [Accessed 24 Feb. 2020].

> [T]he 5G radio emission fields are quite different to those of previous generations because of their complex beamformed transmissions in both directions – from base station to handset and for the return. Although fields are highly focused by beams, they vary rapidly with time and movement and so are unpredictable, as the signal levels and patterns interact as a closed loop system. This has yet to be mapped reliably for real situations, outside the laboratory.

A 2018 study published in Annals of Telecommunications found increased RF-EMF exposure from small cell LTE networks in two urban cities in France and the Netherlands. Researchers measured the RF-EMF from LTE (Long-Term Evolution) MC (macro cells meaning large cell towers) and SC networks (low-powered small cell base stations) and found that the small cell networks increased the radio emissions from base stations (called downlink) by a factor of 7–46 while decreasing the radio emissions from user equipment exposure (called uplink by a factor of 5–17. So while the devices themselves could emit less radiation, the cell antennas will increase the ambient environmental levels (Mazloum et al., 2019). This study shows the increased exposures would be involuntary. We can turn our phones off, but we cannot turn off the antennas in the neighborhood. The birds, bees, and trees have no choice.

Thank you for your consideration of this issue. We would like to set up a phone call to discuss this issue further.

Sincerely,

Devra Davis, PhD, MPH
Fellow, American College of Epidemiology
Visiting Prof. Hebrew Univ. Hadassah Medical Center & Ondokuz Mayis Univ. Medical School
Associate Editor, Frontiers in Radiation and Health
President, Environmental Health Trust

Theodora Scarato
Executive Director, Environmental Health Trust

Letter from the EPA

--------- Forwarded message ---------
From: **Veal, Lee**<Veal.Lee@epa.gov>

Date: Wed, Jul 8, 2020 at 11:32 AM
Subject: RE: Letter with specific Questions Related to the FDA review and to the EPA, CDC, NIOSH and FDA Jurisdiction on EMFs
To: Theodora Scarato <Theodora.Scarato@ehtrust.org>

Dear Director Scarato;

Thank you for sending us your questions and references regarding radiofrequency (RF) radiation. Up through the mid-1990s, EPA did study non-ionizing radiation. The Telecommunications Act of 1996 directs the Federal Communications Commission (FCC) to establish rules regarding RF exposure, while the U.S. Food and Drug Administration (FDA) sets standards for electronic devices that emit non-ionizing or ionizing radiation. EPA does not have a funded mandate for radiofrequency matters, nor do we have a dedicated subject matter expert in radiofrequency exposure. The EPA defers to other agencies possessing a defined role regarding RF. Although your questions are outside our current area of responsibilities, we have provided a response to each one as you requested.

1. *What is your response to these scientists' statements regarding the FDA report and the call to retract it?*

   EPA Response: The EPA does not have a funded mandate for radiofrequency matters, has not conducted a review of the FDA report you cited or the scientists' statements, and therefore has no response to it.

2. *To the FDA- What consultants were hired for the FDA review and report on cell phone radiation?*

   EPA Response: This is not an EPA matter. Please refer this question to the FDA.

3. *What US agency has reviewed the research on cell phone radiation and brain damage? I ask this because the FDA only has looked at selected studies on cancer. If your agency has not, please simply state you have not.*

   EPA Response: EPA's last review was in the 1984 document Biological Effects of

Radiofrequency Radiation (EPA 600/8-83-026F). The EPA does not currently have a funded mandate for radiofrequency matters.

4. What US agency has reviewed the research on damage to memory by cell phone radiation? If so, when and send a link to the review.

   EPA Response: EPA's last review was in the 1984 document Biological Effects of Radiofrequency Radiation (EPA 600/8-83-026F). The EPA does not currently have a funded mandate for radiofrequency matters.

5. *What US agency has reviewed the research on damage to trees from cell phone radiation? If so, when was it issued and send a link to the review.Note this study showing damage from long term exposure to cell antennas.*

   EPA Response: The EPA does not have a funded mandate for radiofrequency matters, and we are not aware of any EPA reviews that have been conducted on this topic. We do not know if any other US agencies have reviewed it.

6. *What US agency has reviewed the research on impacts to birds and bees? If so, when and send a link to the review. I will note the latest research showingpossible impacts to bees from higher frequencies to be used in 5G.*

   EPA Response: The EPA does not have a funded mandate for radiofrequency matters, and we are not aware of any EPA reviews that have been conducted on this topic. We do not know if any other US agencies have reviewed it.

7. *What is a safe level of radiofrequency radiation? I ask this because the FDA and FCC both state they do not need to test cell phones at body contact and it is proven that phones will create exposure that are higher than FCC limits when phones are tested in these positions.*

   The Telecommunications Act of 1996 directs the FCC to establish rules regarding radiofrequency (RF) exposure.The U.S. Food and Drug Administration (FDA) sets standards for electronic devices that emit non-ionizing or ionizing radiation. The EPA defers to these regulatory authorities for the establishment of safe levels of radiofrequency radiation.

8. *The FDA and FCC have been provided with information and published data showing the fact that cell phones create cell phone radiation exposures that violate FCC limits. What agency has the job of ensuring accountability that the American public is not exposed to RF radiation that exceeds FCC limits. The FCC has test protocols that say body contact tests are not needed. The FDA refers to the FCC. Yet the fact is that cell phones exceed FCC limits when tested in body contact positions. Are the FCC limits legitimate? These FCC limits are being violated. Who is the responsible agency that will ensure Americans are protected? The FCC says their rules are not being violated as their rules allow for a space between the phone or device and the body? The FDA says there is a safety factor so there is no need for them to act (and will not state what the safety factor for a cell phone is) . YET government limits are being exceeded. Are agencies fine with limits being violated? If so please explain at what level of cell phone radiation a federal agency will step in? If so, which agency has jurisdiction? (March 12, 2019 Publication on Om Gandhi's paper on radiation emissions violating FCC limits 11 times and August 21, 2019 Chicago Tribune cell phone testing data released)*

   EPA Response: The Telecommunications Act of 1996 directs the FCC to establish rules regarding radiofrequency (RF) exposure. The U.S. Food and Drug Administration (FDA) sets standards for electronic devices that emit non-ionizing or ionizing radiation. The EPA does not have a funded mandate for radiofrequency matters, and the questions you raise are outside of EPA's areas of responsibilities and current expertise. Please refer this question to FCC and FDA.

9. *The National Toxicology Program states clear evidence of cancer was found and the FDA disputes this because it was just an animal study. However birds fly and nest on cell antennas mounted on towers, bees fly in front of antennas and family pets (dogs, cats) will sit directly on or near Wi-Fi routers and smart speakers despite the fact that the manuals state humans should be at a minimum of 20 cm from wireless devices (far more from antennas of towers). What about the impact to these animals? What is the US government doing to ensure safety for wildlife and family pets?*

   EPA Response: The EPA does not have a funded mandate for radiofrequency matters, and the questions you raise are outside of EPA's area of responsibility and current expertise. We defer to FDA to provide a response regarding their findings.

10. *Please send me the staff member of your respective agency who is on the Interagency Radiofrequency Workgroup as I have repeatedly tried to get this information and it is never provided to me.*

    EPA Response: The Radiofrequency Interagency Work Group (RFIAWG) is an informal forum for exchange of information and the group does not meet to set, or advise on, policy, rulemaking or guidance. The group has not met in more than two years.

11. *The FDA only reviewed selected studies on cancer until 2018. Most recently, the American Cancer Society funded* radiation in*people with genetic susceptibilities. The National Toxicology Program published research showing DNA damage. Will the FDA be updating it's review with these studies? If not, then what agency is accountable to American public to ensure humans are not harmed?*

    EPA Response: The questions you raise are outside of EPA's areas of responsibilities and current expertise. Please direct questions about FDA activities to FDA.

12. *What agency ensures safety related to extremely low frequency (ELF-EMF) electromagnetic fields- also non ionizing? Currently we have no federal limit, no federal guidelines and confirmed associations with cancer and many other health effects. Kaiser Permanente researchers have published several studies linking pregnant women's exposure to magnetic field electromagnetic fields to not only increased miscarriage and but also increased ADHD, obesity and asthma in the woman's prenatally exposed children. A recent large scale study again found associations with cancer. Please clarify which US agency has jurisdiction over ELF-EMF exposures?*

    EPA Response: There are no U.S. Federal standards limiting residential or occupational exposure to electric and magnetic fields (EMF) from power lines. The EPA does not have a funded mandate for radiofrequency matters.

13. When it comes to cell phone radiation SAR thresholds, what is your understanding of the "safety factor" in place?

EPA Response: EPA last commented on FCC proposals for SAR limits in the 1996FCC 96-236. The Telecommunications Act of 1996 directs the FCC to establish rules regarding radiofrequency (RF) exposure.The U.S. Food and Drug Administration (FDA) sets standards for electronic devices that emit non-ionizing or ionizing radiation. The EPA defers to these regulatory authorities for the establishment of safe levels of radiofrequency radiation.

Sincere regards,

Lee Ann B. Veal

Director, Radiation Protection Division

Office of Radiation and Indoor Air

www.epa.gov/radiation