

January 19, 2020

To: Carla A. Reid

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CC: Washington Suburban Sanitary Commission Officials

WSSC Board of Commissioners, c/o Sheila R. Finlayson, Esq., WSSC Corporate Secretary
WSSC Legal Counsel, Amanda Stakem Conn, Esq., c/o Sheila R. Finlayson, Esq., WSSC Corporate Secretary
WSSC Board of Ethics, c/o Latonya Allen, Administrative Assistant to the Board
WSSC Office of the Inspector General, Arthur A. Elkins, Jr., J.D., CFE, CBA

Officials of Maryland counties served by WSSC

Montgomery County Executive, Marc Elrich
Montgomery County Council Members
Prince George's County Executive, Angela D. Alsobrooks
Prince George's County Council Members

From: Ronald M. Powell, Ph.D.

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(short biography appended)
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Subject: Wireless smart meters harm human health.

Washington Suburban Sanitary Commission (WSSC) is, indeed, a vital component of our community. As a subdivision of the Maryland Government, WSSC provides water and sewer services to 475,000 customer accounts that serve 1.8 million residents of Montgomery County and Prince George's County in Maryland.

The issue

WSSC's web site indicates that it is planning to replace its current water meters with wireless smart meters. And WSSC's Capital Improvement Program for 2021-2026 suggests that the cost will be about \$100 million.

Reference: <https://www.wsscwater.com/AMI>

Reference: WSSC FY 2021 - 2026 Capital Budget: Capital Improvements Program Commission Meeting July 17, 2019, page 27 of introductory viewgraphs. http://bit.ly/WSSC_Capital_Improvements_Program_2021-2026

Wireless smart meters communicate regularly using radiofrequency radiation, and radiofrequency radiation is harmful to human health. Further, the wireless smart meters that WSSC is contemplating, according to the first

web site above, are wireless AMI smart meters, where AMI stands for the "Advanced Metering Infrastructure". The wireless AMI smart meters with which I am familiar to date operate in a wireless network that is highly active. They expose everyone in their vicinity to radiofrequency radiation every day of the year.

As a WSSC customer, and as a scientist, I urge WSSC to consider the adverse health effects of wireless AMI smart meters and to abandon plans to implement them. This message explains why and raises questions that merit answering whenever any form of wireless metering technology is contemplated. This message is focused on health effects and does not address other concerns about wireless smart meters, such as invasion of privacy, cyber insecurity, and disregard of property rights.

Public concern about the harm caused by radiofrequency radiation is greatest for the sources of radiation with these characteristics:

- Their installation is mandated. Under pressure from wealthy wireless industries, each level of government is forcing lower levels of government to comply. And lower levels of government are forcing the public to comply.
- Their installation is permanent, with no prospect that they are ever going away.
- They are placed close to people, where they live, sleep, work, or play, and where the radiation levels they produce are the highest.
- They radiate every day, even at night, throughout the year.
- They are beyond control by the individuals who are irradiated by them.

Wireless AMI smart meters have all of the above characteristics. And they are being introduced at a time when aware members of the public are already concerned about other sources of radiofrequency radiation placed close to them. The primary examples are these:

- The mandatory irradiation of everyone by wireless smart meters for measuring electricity, which are located inside, on, or adjacent to homes, apartment buildings, and businesses.
- The mandatory irradiation of the entire populace by emerging 5G cell towers, located right in front of homes and businesses.
- The mandatory irradiation of our children in the schools by Wi-Fi systems and by cell towers on school grounds.

Especially puzzling about WSSC's interest in wireless AMI smart meters is the timing. That interest comes as three developments are occurring simultaneously:

- Personal stories of those harmed by radiofrequency radiation from wireless utility meters and other wireless devices continue to accumulate.
- Scientific evidence of harm from radiofrequency radiation has been growing for decades and has become overwhelming.
- Public awareness of harm from radiofrequency radiation is growing and is finding expression at local, state, national, and international levels.

I document these three developments later in this message. But first, I provide an Overview that describes, in general terms, the health challenges posed by radiofrequency radiation. The Overview provides a context for the documentation of harm that follows the Overview.

Overview of the health challenges posed by radiofrequency radiation

What is meant by "radiofrequency radiation"?

"Radiofrequency radiation" refers to waves of electromagnetic energy that travel through our atmosphere at virtually the speed of light. The frequencies of radiofrequency radiation are variously defined, but generally extend from a low frequency of 3 kilohertz (3 thousand hertz) to a high frequency of 300 gigahertz (300 billion hertz). "Microwave radiation" falls within this definition of radiofrequency radiation and is generally considered to cover frequencies from 1 gigahertz (1 billion hertz) to 30 gigahertz (30 billion hertz).

The frequencies within this broad range that are most important for the discussion here are those used for wireless smart meters, cellular technology, and Wi-Fi. Those frequencies lie primarily in the range of 300 megahertz (300 million hertz) to 6 gigahertz (6 billion hertz); but higher frequencies, perhaps extending up to 60 gigahertz (60 billion hertz), may come into use for a new version of cellular technology called 5G, which stands for "Fifth Generation".

Why does radiofrequency radiation threaten human health?

- All living things are bioelectrical in nature. That is why electrocardiograms and electroencephalograms work. They, of course, measure the tiny electrical signals that operate the heart and the brain. The critical tasks performed by these tiny electrical signals, and so many other electrical signals in all living things, can be disrupted by radiofrequency radiation. Thus, it is not surprising that radiofrequency radiation affects human health. It would be more surprising if radiofrequency radiation did not affect human health.
- The levels of radiofrequency radiation that we ourselves have generated in our environment are increasing exponentially and already vastly exceed the levels in which all life on Earth evolved. Simply stated, we are drowning in a rising sea of radiofrequency radiation that is of our own making.
- The radiofrequency radiation that we have inflicted upon ourselves comes from many sources, not just from wireless smart meters, but also from cell phones, Wi-Fi, and other sources. But the radiation from wireless smart meters is a key contributor. Not only can that radiation cause harm on its own, but also it can raise our sensitivity to the radiation from the other sources.
- The form of radiofrequency radiation that is most disruptive to biological entities is digitally modulated radiofrequency radiation. Unfortunately, this is the type of radiation used in nearly all modern communications applications, including wireless smart meters. It is very effective for successful communications. But it is harmful to life. It is characterized by rapid, sharp changes in signal level, and those rapid changes have proven highly disruptive to biological systems.

Why is convincing the public of the risk of radiofrequency radiation so challenging?

- Radiofrequency radiation is invisible to the human eye. That invisibility leaves the public and the decision-makers unaware of the rising levels of radiation around them. If we could see that radiation, we would be stunned by its presence everywhere.
- The genuine usefulness and convenience of the wireless devices that use radiofrequency radiation promotes denial of the risks.

- The intense advertising, the economic power, and the political power of profitable wireless industries enable them to dominate the public dialogue and to hold sway over government regulators and legislators.
- Current Federal guidelines for limiting the exposure of the public to radiofrequency radiation are outdated and overly permissive. Those guidelines come from the Federal Communications Commission and are commonly called the Maximum Permissible Exposure (MPE) Limits for the General Population. Those guidelines were put in place in 1996, 24 years ago, before most of the modern digital devices we use today were even created. Further, those guidelines are described by the FCC as "generally based" on even older publications from 1986 and 1992. And those guidelines have not been updated since, despite requests from many sources, including my own Montgomery County Government.

Reference: Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, FCC OET Bulletin 65, Edition 97-01, pages 65-66 (August 1997).

<https://www.fcc.gov/bureaus/oet/info/documents/bulletins/oet65/oet65.pdf>

Those guidelines provide a measure of protection against adverse health effects that are based on thermal heating. But those guidelines do not protect against a host of other adverse health effects that occur at much lower levels of radiation, called "non-thermal levels", leaving the public inadequately protected.

- Widespread misunderstanding of the risks of exposure to radiofrequency radiation has led the Federal Government, and some state and municipal governments, to advocate virtually unlimited expansion of wireless technology. In some cases they have even co-funded that expansion and have mandated the acceptance of wireless technology by the public. These actions reflect a lack of knowledge of, or even willful blindness to, the underlying science and its consequences for public health.

Who is vulnerable to harm from radiofrequency radiation?

- Everyone is vulnerable to harm from radiofrequency radiation. But some are more vulnerable than others. Of special concern are pregnant women, children, men of reproductive age, individuals with compromised immune systems or other health conditions, and seniors.
- Different individuals experience different symptoms from exposure to radiofrequency radiation. Some individuals will experience a single symptom, but most will experience multiple symptoms, from dozens of known possibilities. Insomnia, headaches, and ringing in the ears are frequent examples.
- Some of the more serious consequences of exposure to radiofrequency radiation give no symptoms as early warning signs. Examples include reproductive harm, DNA damage, and cancer.
- Other health effects are currently under study to see if radiofrequency radiation plays a role in causing or worsening them, including autism, attention deficit hyperactivity disorder (ADHD), and Alzheimer's disease.
- Some people evidence harm very quickly when exposed to radiofrequency radiation, even in minutes. Other people may not evidence harm for months or even years.
- Some people evidence harm at much lower levels of exposure to radiofrequency radiation than others, so setting uniform exposure limits that protect the entire population must accommodate the most sensitive of us.

- The consequences of exposure appear to be cumulative, so the longer that people are exposed, the greater the probability that they will become symptomatic. Some will become so sensitive to radiofrequency radiation that they can no longer function in an environment with even a relatively low level of radiofrequency radiation. They are deemed to have "Electromagnetic Hypersensitivity Syndrome (EHS)", which historically has been called "microwave radiation sickness".

Why is the harm from radiofrequency radiation so difficult to diagnose and treat?

- The absence of routine training of physicians in the biological effects of radiofrequency radiation makes it difficult for them to identify the causes and to provide responsive guidance.
- Many of the symptoms of overexposure can have multiple causes, making it difficult to determine whether radiofrequency radiation is the actual cause.
- Diagnostic aids for identifying harm from radiofrequency radiation are still in the earliest stages of development.
- Because of these difficulties, it is highly likely that many individuals afflicted by overexposure to radiofrequency radiation do not know the cause; and even fewer individuals know what to do about it.
- Recovery from overexposure to radiofrequency radiation invariably requires reducing exposure to a very low level. Such a reduction is difficult to achieve in our current highly irradiated environment. Often affected individuals must leave their current jobs or must move to areas of very low exposure to recover, and such areas are increasingly difficult to find.
- Even individuals aware of the hazards of radiofrequency radiation cannot control their exposure in an environment shared with others, because the radiation around them, much like second-hand smoke, is forced on them by unaware individuals.

Conclusion: Only governments can fully solve this problem, but they are currently part of the problem. For now the public will have to protect itself, best it can; and that will require continued public education and action.

Personal stories of those harmed by radiofrequency radiation from wireless utility meters and other wireless devices continue to accumulate.

Nothing brings home the seriousness of the harm caused by radiofrequency radiation quite like the personal stories of those affected. They speak so that the rest of us may learn.

Three surveys link health problems to exposure from wireless utility meters.

In 2011, 2013, and 2014, three surveys were conducted of the health impact of wireless utility meters. Those meters were used for metering electricity, natural gas, or water. Respondents came from three countries: the USA, Canada, and Australia. All three surveys found multiple adverse health effects after exposure to the radiofrequency radiation emitted by wireless utility meters. Among the symptoms most widely reported were: insomnia; headaches; ringing in the ears; cognitive disturbances, such as problems with concentration, memory, or learning; dizziness or loss of balance; cardiac disturbances, such as heart palpitations and arrhythmia; and fatigue or weakness.

I attach to this message a "Summary of Symptoms after Exposure to Wireless Utility Meters". The summary enables a quick comparison of the symptoms experienced by individuals after such exposure. After that summary, I attach the full analyses of the findings of all three surveys for more extensive examination. The three surveys are these:

- **Survey in 2011:** Ed Halteman, Ph.D. (statistics), Wireless Utility Meter Safety Impacts Survey, Final Results Summary, September 13, 2011. The survey instrument was developed by the EMF Safety Network (<http://emfsafetynetwork.org>), and the data were analyzed by Dr. Halteman.
- **Survey in 2013:** Richard H. Conrad, Ph.D. (biochemistry), and Ed Friedman, B.S. (environmental science), Smart Meter Health Effects, Survey and Report, 2013. The survey instrument and the analysis of the data were conducted by Dr. Conrad and Mr. Friedman. The analysis of the survey results was accepted as legal testimony before the Maine Public Utilities Commission.

Included in this survey are the narrative descriptions offered by 139 of the survey respondents, describing the impact on their lives of wireless smart meters. They tell, in their own words, how life changed for them after exposure to the radiofrequency radiation from wireless smart meters. They indicate what it meant to be unable to sleep, to be in constant pain, to see their health and the health of their children deteriorate, to be unable to continue on their jobs, or to be forced to move. The narrative descriptions appear in Appendix 6 on pages 64 to 95.

- **Survey in 2014:** Federica Lamech, MBBS (physician), Self-Reporting of Symptom Development from Exposure to Radiofrequency Fields of Wireless Smart Meters in Victoria, Australia: A Case Series. Alternative Therapies, Nov/Dec 2014, Vol. 20, No. 6, pages 28-38, and NIH PMID 25478801. The data were obtained from the health and legal registers on an Australian public web site and were analyzed by Federica Lamech as a case series.

Individuals harmed by exposure to radiofrequency radiation tell their stories in videos.

Individuals tell their stories of being harmed by the radiofrequency radiation from wireless smart meters, and other wireless devices, in a video format.

Reference: Garic Schoen of Gaithersburg, Maryland, who suffers from multiple sclerosis, describes his experience after installation of a wireless smart meter on his home (March 7, 2013). This video was filmed by Maryland Smart Meter Awareness. Video (3 minutes):

<http://marylandsmartmeterawareness.org/smart-meter-news/maryland-ms-resident-testimony-to-economic-matters-committee-re-hb1038-on-march-14-2013/>

Reference: A young woman in Maryland describes her experience after moving into a condo with a bank of 26 smart meters outside its kitchen wall. Because of the deeply personal nature of the impact on her health, her statement is presented anonymously (January 21, 2015). This video was filmed by Maryland Smart Meter Awareness. Video (3 minutes):

<https://www.youtube.com/watch?v=F9QZuWPw6Y0&feature=youtu.be>

Reference: A former Silicon-valley engineer, Jeromy Johnson, presents his TEDx Talk, called "Wireless Wake-up Call" (2016). He describes the threat of wireless technologies -- including wireless smart meters, cell phones, and Wi-Fi -- to human health, especially for children. He shares how his own high sensitivity to radiofrequency radiation was triggered by exposure to a bank of wireless smart meters where he lived. Video (17 minutes):

<https://www.youtube.com/watch?v=FONEaPTu9oI>

Reference: Attorney Jimmy Gonzales describes his experience with cellular radiation to his local government officials in Pembroke, Florida, in "Cell Phones Cause Cancer" (October 17, 2012). Damage from that radiation ultimately took his life, but he left this video as a warning for the rest of us. Video (9 minutes): <https://www.youtube.com/watch?v=DII0VJd0IA8>

Reference: The plight of individuals with high sensitivity to the radiofrequency radiation from wireless devices search for, or endeavor to create, safe electromagnetic environments in which to sleep or live, in "Searching for a Golden Cage" (May 8, 2014). Produced by Nadav Neuhaus. Video (13 minutes): <http://time.com/golden-cage/>

Reference: The web site "We Are The Evidence" continues to assemble the stories of individuals harmed by exposure to radiofrequency radiation. This site was founded by attorney, Dafna Tachover, MBA, who told her own story in "Searching for a Golden Cage" above. Multiple video and audio clips: <https://wearetheevidence.org/harmed-by-wireless/>

Scientific evidence of harm from radiofrequency radiation has been growing for decades and has become overwhelming.

The scientific documentation of the adverse health effects of radiofrequency radiation is extensive, based on thousands of peer-reviewed biomedical articles published over many decades. Clearly, such a mass of evidence cannot be presented in an email message like this one. So, I have selected key examples for mention below, each supported by on-line references.

The NIH National Toxicology Program finds "clear evidence" that radiofrequency radiation causes cancer.

In 2018 the National Toxicology Program (NTP) of the National Institutes of Health (NIH) published the results of the largest study it has ever undertaken of any toxin: radiofrequency radiation (RFR). The study cost \$30 million and was conducted over 10 years. That study exposed test animals to digitally modulated cellular radiofrequency radiation at a frequency of 900 megahertz. The NIH study found the following, and I quote:

- **"Clear evidence of tumors in the hearts of male rats.** The tumors were malignant schwannomas."
- **"Some evidence of tumors in the brains of male rats.** The tumors were malignant gliomas."
- **"Some evidence of tumors in the adrenal glands of male rats.** The tumors were benign, malignant, or complex combined pheochromocytoma."

"Clear evidence" is the highest classification that NIH has for risk.

Why is this finding especially important for wireless smart meters, too? Wireless smart meters commonly employ digitally modulated radiofrequency radiation at the same frequency of 900 megahertz.

In a further analysis of the test results, NIH noted the following, and, again, I quote:

"NTP scientists found that RFR exposure was associated with an increase in DNA damage. Specifically, they found RFR exposure was linked with significant increases in DNA damage in:

- the frontal cortex of the brain in male mice,

- the blood cells of female mice, and
- the hippocampus of male rats."

Reference: <https://ntp.niehs.nih.gov/whatwestudy/topics/cellphones/index.html>

The World Health Organization classifies radiofrequency radiation as a Group 2B human carcinogen.

In 2011, the International Agency for Research on Cancer (IARC) of the World Health Organization classified radiofrequency radiation as a Group 2B human carcinogen (a "possible human carcinogen"), naming explicitly the "increased risk for glioma, a malignant type of brain cancer". [That is the same type of cancer for which NIH found "some evidence" in the study described above.]

Reference: https://www.iarc.fr/wp-content/uploads/2018/07/pr208_E.pdf

The IARC is now planning a review, beginning in 2020, of the latest research findings to determine if the risk classification of radiofrequency radiation should be raised to either Group 2A ("probable human carcinogen") or Group 1 ("known human carcinogen") which is its highest risk classification.

Reference: <https://www.saferemr.com/2019/11/IARC-RFR-cancerrisk.html>

252 of the world's EMF scientists appeal to the UN and the WHO to protect the public from harm from radiofrequency radiation, including the radiation from smart meters.

As of October 15, 2019, 252 scientists, representing 43 nations, have signed the "International EMF Scientist Appeal". The Appeal is addressed to the United Nations and the World Health Organization. These are scientists who study the health effects of electromagnetic fields (EMF), which include radiofrequency radiation.

Reference: <https://emfscientist.org/>

The Appeal focuses on the health effects of multiple wireless devices, including smart meters as shown in this quotation:

"We are scientists engaged in the study of biological and health effects of non-ionizing electromagnetic fields (EMF). Based upon peer-reviewed, published research, we have serious concerns regarding the ubiquitous and increasing exposure to EMF generated by electric and wireless devices. These include—but are not limited to—radiofrequency radiation (RFR) emitting devices, such as cellular and cordless phones and their base stations, Wi-Fi, broadcast antennas, smart meters, and baby monitors as well as electric devices and infra-structures used in the delivery of electricity that generate extremely-low frequency electromagnetic field (ELF EMF)."

The Appeal makes nine requests, including the following four, which are quoted here:

- "children and pregnant women must be protected"
- "guidelines and regulatory standards must be strengthened"
- "the public be fully informed about the potential health risks from electromagnetic energy and taught harm reduction strategies"
- "white-zones (radiation-free areas) be established."

Reference: <https://emfscientist.org/index.php/emf-scientist-appeal>

Review papers document the scientific evidence of harm from radiofrequency radiation.

Multiple scientific review papers have been published over the years, warning of the harm caused by exposure to radiofrequency radiation. These review papers assemble and analyze the scientific evidence published in the biomedical research journals of the world. Here are several examples of such papers:

Reference: Igor Belyaev, Amy Dean, Horst Eger, Gerhard Hubmann, Reinhold Jandrisovits, Markus Kern, Michael Kundi, Hanns Moshhammer, Piero Lercher, Kurt Müller, Gerd Oberfeld, Peter Ohnsorge, Peter Pelzmann, Claus Scheingraber, and Roby Thilland, EUROPAEM EMF Guideline 2016 for the prevention, diagnosis and treatment of EMF-related health problems and illnesses, Reviews on Environmental Health, volume 31(3), pages 363-397 (2016). This review paper cites 308 references from the biomedical research literature.

This paper reviews the adverse health effects of electromagnetic fields, including radiofrequency radiation. It recommends "precautionary guidance values" for exposure to radiofrequency radiation, in Table 3 on page 381, that are far lower (much more protective) than the Maximum Permitted Exposure (MPE) Limits of the Federal Communications Commission.

Abstract: <https://www.ncbi.nlm.nih.gov/pubmed/27454111>

Full article: <https://www.degruyter.com/downloadpdf/j/reveh.2016.31.issue-3/reveh-2016-0011/reveh-2016-0011.pdf>

Reference: Dominique Belpomme, Lennart Hardell, Igor Belyaev, Ernesto Burgio, and David O. Carpenter, Thermal and non-thermal health effects of low intensity non-ionizing radiation: An international perspective, Environmental Pollution, volume 242, pages 643-658 (2018). This review paper cites 229 references from the biomedical research literature. It documents human vulnerability to a host of conditions caused by exposure to radiofrequency radiation, and contains, on page 647, this special warning about the vulnerability of children:

"Children, and especially fetuses, are more vulnerable than adults for most environmental exposures (Sly and Carpenter, 2012). This is because their cells are rapidly dividing and their organ systems are not mature. As a result, events that perturb cellular function early in life can result [in] abnormalities that last. There is a building body of evidence indicating that exposure to RF-EMFs has adverse effects on cognition and neurobehavior, especially in children and adolescents."

Abstract: <https://www.ncbi.nlm.nih.gov/pubmed/30025338>

Full article:

<https://ecfsapi.fcc.gov/file/12103008105187/nonionizing%20radiation%20international%20perspective%20Belpomme%20Hardell%20Carpenter%202018.pdf>

Reference: Martin Pall, Ph.D., 5G Risk - The Scientific Perspective.

Dr. Pall reviews the adverse health effects applicable to multiple wireless technologies, including wireless smart meters, and describes the evidence for disruption of human health, at the cellular level, by the radiofrequency radiation that those technologies employ. This review paper cites 139 references from the biomedical research literature.

Full article: <http://www.stopsmartmetersbc.com/wp-content/uploads/2019/08/5G-Risk-The-Scientific-Perspective-by-Martin-L.-Pall-The-5G-Summit-2019.pdf>

Reference: BioInitiative Working Group, Cindy Sage, M.A. and David O. Carpenter, M.D., Editors, BioInitiative Report: A Rationale for Biologically-based Public Exposure Standards for Electromagnetic Radiation, December 31, 2012.

The BioInitiative Report of 2012 provides a massive review of the biomedical research literature. It considered about 1800 publications issued in the five years since the publication of a previous report, The BioInitiative Report of 2007. The 2012 Report was prepared by an international body of 29 experts, heavy in Ph.D.s and M.D.s, from 10 countries, including the USA which contributed the largest contingent of experts (ten). The Report documents the broad range of biological effects caused by radiofrequency radiation and makes the case for much more restrictive radiation exposure standards to protect the public.

Website: <http://www.bioinitiative.org>

Reference: Biological and Health Effects of Microwave Radio Frequency Transmissions, A Review of the Research Literature, A Report to the Staff and Directors of the Eugene Water and Electric Board, June 4, 2013.

A group of six doctors in Oregon, led by Paul Dart, M.D., released, in June 2013, a review of 279 biomedical research publications. This 74-page review makes the health case against smart meters and other wireless technologies. The review notes that "The current levels of exposure need to be reduced rather than increased further. The FCC must especially protect vulnerable groups in the population including children and teenagers, pregnant women, men of reproductive age, individuals with compromised immune systems, seniors, and workers." This review is posted on the website of the Federal Communications Commission.

Full article: <https://ecfsapi.fcc.gov/file/7520940898.pdf>

Books document the harm from radiofrequency radiation.

Entire books have been written to assemble the scientific evidence about the harmful effects of radiofrequency radiation. Here are just three examples:

Reference: Devra Lee Davis, Ph.D., MPH, Disconnect: The Truth About Cell Phone Radiation, What the Industry Is Doing to Hide It, and How to Protect Your Family (Writers House LLC, 2013). Dr. Davis reviews the health concerns produced by our exposure to radiofrequency radiation and describes the forces that continue to promote increases in that exposure despite our growing knowledge of its harm. She notes, on page 9, the disconnect between "what scientists have come to learn" and "the miraculous, unquestioned, benign aura of today's smart phones."

<https://ehtrust.org/publications/disconnect-dr-devra-davis/>

Reference: Katie Singer, An Electronic Silent Spring: Facing the Dangers and Creating Safe Limits (Portal Books, 2014). Ms. Singer described how rising levels of human-made radiofrequency radiation are affecting not only humans but also other living entities, including plants, birds, and bees. Hundreds of footnotes cite references in the biomedical research literature.

<http://www.electronicsilent.spring.com/>

Reference: Arthur Firstenberg, *The Invisible Rainbow: A History of Electricity and Life* (AGB Press, 2017). Mr. Firstenberg traces the history of our sensitivity to electricity and electromagnetic fields, including radiofrequency radiation. His bibliography cites more than 2000 references from the biomedical research literature and other sources.

<https://www.cellphonetaskforce.org/buy-the-invisible-rainbow/>

Public awareness of harm from radiofrequency radiation is growing and is finding expression at local, state, national, and international levels.

Public awareness of harm from sources of radiofrequency is on the rise, especially for those sources placed close to the public on a mandatory basis. Here are some of the indications of growing awareness of harm from wireless AMI smart meters, cellular technology (especially 5G), and Wi-Fi in schools.

Tens of thousands of Maryland ratepayers have "opted out" of wireless smart meters for electricity.

Wireless AMI smart meters are always installed close to people. Wireless smart meters for metering electricity, in particular, are installed inside, on, or near to homes, apartment buildings, and office buildings. Often, they are placed on the other side of a wall against which people sit, work, play, or sleep. Installers give no special consideration to the location of the smart meters; the meters are placed without regard to whether they are on the other side of a wall from a baby's crib or from a pregnant mother's bed.

This proximity is a major factor explaining why so many residents of Maryland have opted out of the installation of wireless smart meters for metering electricity. Opting out was permitted by a decision by the Maryland Public Service Commission (PSC) in response to public demand. Written documentation of the number of Maryland ratepayers who have opted out is difficult to find. But, data, reported at a hearing of the cognizant committee of the Maryland House of Delegates in 2014, suggests that at least 37,000 households had opted out at that time. Assuming an average family size of 2.5 persons per household means that at least 92,000 persons had benefited. They are located in the service areas of Delmarva, Pepco, and Baltimore Gas and Electric (BG&E), with the vast majority in the latter where a public awareness campaign was centered and where the location of electric utility meters inside residences may have increased public resistance. (I have submitted a Maryland Public Information Act request to the Maryland PSC to update these numbers to the most recent data they have for these three companies.)

Reference: Maryland Delegate Charles Barkley, in a hearing before the Economic Matters Committee of the Maryland House of Delegates on March 6, 2014, read from submitted testimony about the number of Maryland ratepayers who have opted out and cited: 35,000 for BG&E alone (at time location 2:31:10); and 2,200 for Pepco alone (at time location 2:34:53). The numbers for Delmarva and for the other Maryland electric power companies were not cited, so they could not be included here. Video (5 hours, 31 minutes): <http://mgahouse.maryland.gov/mga/play/e4570a4a-8d08-42b3-bf38-15571909408e/?catalog/03e481c7-8a42-4438-a7da-93ff74bdaa4c>

Opting out is no small decision for homeowners because it is so expensive. The Maryland PSC permits the three electric power companies, just cited, to charge their opt-out customers a one-time fee of \$75 and monthly fees of \$17, \$14, and \$5.50 respectively, forever, for the privilege of not being irradiated by wireless smart meters. The monthly fee for BG&E was originally \$11, but was cut in half to \$5.50 by the Maryland PSC because so many BG&E customers opted out that the \$11 monthly cost of servicing them seemed no longer justified.

Note that the one-time fee of \$75 is large enough to purchase three newly refurbished analog mechanical meters that emit no radiofrequency radiation. And the two higher of the three monthly fees just cited are large enough to buy a newly refurbished analog mechanical meter every two months.

Reference: Hialeah Meter (<https://www.hialeahmeter.com/spwm.html>)

But all opt-out customers in Maryland must also pay "their share" of the costs of the wireless smart meter system, built into their rates; so they must pay both "to have", and "not to have", wireless smart meters at the same time. This odd form of extortion has been repeatedly endorsed by inaction from the two cognizant committees of the Maryland General Assembly. But new bills are submitted regularly by other Maryland Delegates and Senators in an effort to counter this regrettable practice.

Whatever the ethics of the opt-out fees, the opt out has helped to lower the radiofrequency radiation levels for those customers who can afford the fees, but it does nothing to protect them from the radiation from their neighbors' wireless smart meters. And the opt out does nothing at all to help customers who cannot afford the opt-out fees.

191,341 individuals and organizations have signed the "International Appeal to Stop 5G on Earth and in Space".

Opposition by members of the public to sources of radiofrequency radiation placed close to them has been accelerated by the efforts of the telecommunications companies to install 5G cell towers right in front of homes and businesses. That opposition is based primarily on the adverse health effects; but other factors, such as the degradation of environmental aesthetics, are also playing a role.

The intensity of public concern was reflected most recently by the "International Appeal to Stop 5G on Earth and in Space". This appeal, just issued in 2019, is addressed to the United Nations, the World Health Organization, the European Union, the Council of Europe, and the governments of all nations. As of January 14, 2020, the appeal had been signed by 191,341 individuals and organizations, from 203 nations, including thousands of scientists, thousands of engineers, thousands of physicians, thousands of nurses, and many other aware individuals from multiple professions and walks of life. A copy of the International Appeal may be read at the URL below, and a list of all signatories may be found by clicking on "Signatories". The signatories are arranged by country, then by profession, and then by name. The Appeal is administered by Arthur Firstenberg, author of the book "The Invisible Rainbow" mentioned above.

Reference to the Appeal and its Signatories: <https://www.5gspaceappeal.org/the-appeal/>

The intensity of public concern about 5G has been expressed locally as well, right here in Montgomery County, by residents testifying at a Public Hearing on 5G, held by the Montgomery County Council of Maryland on November 19, 2019. The purpose of the event was to hear public comments on a zoning ordinance that would permit and govern the roll out of 5G in the County.

Reference: <https://youtu.be/Lpabr5GpJj8>

217,000 individuals have signed up for the "5G Summit".

The increasing awareness of the public about the risks of sources of radiofrequency radiation placed close to them was evident this past August of 2019. Beginning then and continuing to date, 217,000 individuals have

signed up to hear an on-line educational program called "The 5G Summit: 5G Crisis, Awareness & Accountability". 42 interviews were presented over a period of 7 days, addressing every aspect of 5G cellular technology imaginable. As a result of The Summit, participants have sent 210,000 email messages to their elected representatives, notifying them of the harm and the liability inherent in 5G.

Among the many topics addressed at The Summit were these:

- technology of 5G
- health impact of the radiofrequency radiation used in 5G
 - specific biological effects of radiofrequency radiation
 - mechanisms by which radiofrequency radiation causes harm
 - special vulnerability of children to harm
 - evidence for causing cancer
- legal issues surrounding 5G
- local government and community action

The following reference lists all speakers at The Summit and provides the titles of the topics that they discussed with the Summit host and organizer, Josh del Sol. (Scroll down the web page to see the speakers and topics.)

Reference: <https://the5gsummit.com/>

Public Television programs raise public awareness about the risks of exposure to radiofrequency radiation.

Public awareness of the risks of exposure to radiofrequency radiation has also been advanced by public television. In June, 2019 public television stations throughout the USA, including Maryland Public Television, broadcast two half-hour programs that introduced the health risks of radiofrequency radiation. The programs are episodes of the series "Travels and Traditions" with host Burt Wolf. A brief description of these programs is attached. The programs present the conundrum faced by users of wireless technologies, as they begin to weigh the convenience and the services provided by wireless technologies against the harm that they are causing. The two programs are available for continued viewing on the Internet:

Reference: "A Short Guide to Cell Phone Safety". Produced by Burt Wolf. Under "Season 18", click on the eighth picture which is a giant rotary telephone dial. Video: (24 minutes): <http://www.burtwolf.com/>

Reference: "Travel and the Danger of Radiofrequency Radiation". Produced by Burt Wolf. Under "Season 18", click on the ninth picture which is a cell tower. Video (24 minutes): <http://www.burtwolf.com/>

Video documentaries bring discussions of the risks of radiofrequency radiation to the public.

Full-length video documentaries, available worldwide, have raised public awareness of the risks of radiofrequency radiation. In the examples below, the first documentary focuses on wireless smart meters, the second focuses on cellular communications, and the third addresses multiple sources of radiofrequency radiation including wireless smart meters.

Reference: Take Back Your Power, an award-winning documentary film by Josh del Sol, latest release, 2017. Video (83 minutes): <https://www.takebackyourpower.net/watch-take-back-your-power-2017/>

Reference: Microwaves Science & Lies: When business leads research, can we still trust science? A documentary film by Jean Heches and Nancy de Meritens of France, September 2014. Trailer free; full documentary, \$5.00 fee. Video (92 minutes): <https://vimeo.com/ondemand/17755>

Reference: Generation Zapped, an award-winning documentary film by Sabine El Gemayel, 2017. Click on "Watch the Film" to find multiple ways of viewing it, including a free way (with inserted commercials) through Vudu (<https://www.vudu.com/>). Video (74 minutes): <https://generationzapped.com/>

U.S. Supreme Court upholds "Right to Know" ordinance about cellular radiation risk.

In May 2015, the City Council of Sacramento, California unanimously adopted an ordinance giving its public a "Right to Know" about cellular radiation risk. The ordinance required phone retailers to provide the following notification to prospective customers of cell phones:

"To assure safety, the Federal Government requires that cell phones meet radiofrequency (RF) exposure guidelines. If you carry or use your phone in a pants or shirt pocket or tucked into a bra when the phone is ON and connected to a wireless network, you may exceed the federal guidelines for exposure to RF radiation. Refer to the instructions in your phone or user manual for information about how to use your phone safely."

The wireless industry, represented by the "CTIA - The Wireless Association", went to court to overturn this ordinance as unconstitutional. After an adjustment to the wording of the notification, the Ninth Circuit Court of Appeals upheld the ordinance in April, 2016. The wireless industry carried its appeal to the U.S. Supreme Court, which, in December, 2019, denied the industry's appeal and referred the issue back to the Ninth Circuit Court of Appeals for any further consideration, effectively upholding the ordinance.

Reference: <https://www.saferemr.com/2014/11/berkeley-cell-phone-right-to-know.html>

Reference: <https://www.supremecourt.gov/search.aspx?filename=/docket/docketfiles/html/public/19-439.html>

Children's Advisory Council to the Governor of Maryland recommends phasing Wi-Fi out of Maryland's schools.

The Maryland Children's Environmental Health and Protection Advisory Council advises the Governor of Maryland on the health of the environment in the state's schools. Members of the Council include physicians, scientists, and other individuals knowledgeable about the school environment. Under Maryland Law, the mission of the Council is the following:

"Gather and disseminate information to the public, including the research and medical communities, community-based organizations, schools, and State agencies, on how to reduce, treat, and eliminate children's exposures to environmental hazards to further the public's understanding of the environmental hazards that may potentially affect children;"

"Recommend uniform guidelines for State agencies to follow to help reduce and eliminate children's exposure to environmental hazards, especially in areas reasonably accessible to children..."

In 2016, the Council reviewed parental concerns about the exposure of children to the radiofrequency radiation produced by Wi-Fi systems in the State's schools, ordered a review of the biomedical research literature, and considered submitted testimony from outside experts on the biological effects of radiofrequency radiation. In

response, on December 13, 2016, the Council recommended that Wi-Fi be phased out of Maryland's schools in favor of safe wired connectivity that operates "without any microwave electromagnetic field exposure." And in the interim, the Council recommended that several specific steps be taken to reduce the exposure of children to radiation sources in the schools.

Reference: Maryland Children's Environmental Health and Protection Advisory Council, Wifi Radiation in Schools in Maryland, Final Report, pages 3 and 8-9 (December 13, 2016).

Report:

https://phpa.health.maryland.gov/OEHFP/EH/Shared%20Documents/CEHPAC/MD_CEHPAC_SchoolWiFi_022017_final.pdf

Council: <https://phpa.health.maryland.gov/OEHFP/EH/Pages/children-environmental-health.aspx>

Hundreds of organizations and individuals throughout the USA are actively opposing wireless smart meters.

Organizations and individuals, representing nearly all of the states in the USA, are actively opposing wireless smart meters. Some states even have multiple organizations engaged in this opposition, particularly in those states that were among the first to receive wireless smart meters. There are so many of these organizations that it would be difficult to catalog them all, but even a partial listing, like that cited below, is informative.

Reference: StopSmartMeters.org

<https://stopsmartmeters.org/frequently-asked-questions/contacts-database/>

Informative websites provide public information about wireless technologies that give rise to health effects.

A seemingly endless number of websites have been created throughout the nation and the world to provide information about wireless smart meters and other wireless technologies. Here are just a few outstanding examples, in addition to those already cited elsewhere in this message:

Reference: Smart Grid Awareness (<https://smartgridawareness.org/>)

Reference: Environmental Health Trust (<https://ehtrust.org/>)

Reference: Electromagnetic Radiation Safety (<https://www.saferemr.com/>)

Reference: What are 5G and the Internet of Things? (<https://whatis5g.info/>)

Reference: Electrosensitivity UK (<http://www.es-uk.info/>)

Radiofrequency meters, accessible to consumers, make radiofrequency radiation "visible".

New products, in the form of radiofrequency (RF) meters, make it harder for the advocates of endless expansion of wireless technologies to continue to count on the invisibility of radiofrequency radiation to foster public acceptance. Instrument manufacturers have responded to increased public awareness of the health risks of radiofrequency radiation by providing a broad array of RF meters that can measure that radiation. In effect, these meters make invisible radiofrequency radiation visible, while also measuring its level. With these meters, people can do the following:

- They can assess the level of radiation in their environment.

- They can identify the devices in their environment that are emitting that radiation, including wireless smart meters.
- They can measure their progress as they work toward reducing that radiation.

Candidate meters can be readily found by simply searching the Internet for "RF meters". While these meters are increasingly affordable, with prices ranging from about \$100 to \$400, their cost may still be prohibitive for many individuals and families. But their costs remain far lower than the costs caused when even a single family member becomes ill from overexposure to radiofrequency radiation, let alone an entire family.

What questions are worth considering?

Plans to implement wireless smart meters raise a number of important questions. The answers may already have been pursued by WSSC. If WSSC would like to honor its stated ethical principal on "transparency", the answers would be of great interest to the public, including me.

Questions about assurances of safety

When WSSC was first investigating the possibility of implementing wireless AMI smart meters, did WSSC receive assurances about the safety of the radiation that they emit? If so --

- What documentation did WSSC rely upon for assurance that the radiofrequency radiation from wireless AMI smart meters posed no health risk to its customers? Has that documentation already been made available to the public for inspection, or will it be made available soon?
- Was that documentation from impartial and knowledgeable sources, or from sources with a vested interest, such as vendors of wireless smart meters anticipating millions of dollars of sales?
- Was that documentation from the Federal Communications Commission which has been captured by the wireless industries and has been acting as a promoter of wireless technologies, not just as a regulator?

Reference: Norm Alster, Edmond J. Safra Center for Ethics, Harvard University, Captured Agency: How the Federal Communications Commission is Dominated by the Industries it Presumably Regulates. https://ethics.harvard.edu/files/center-for-ethics/files/capturedagency_alster.pdf

Questions about the technology

Has the WSSC answered the basic technical questions about the wireless AMI smart meters that it is considering, and have those answers been made available to the public?

- What are the make, model, optional features, and Federal Communications Commission's Identification Number (FCC ID) of the wireless AMI smart meters that WSSC is contemplating employing?
- At what frequency, in megahertz (MHz), will the radiofrequency transmitters in the wireless smart meters operate?
- What is the peak radiofrequency power output, in milliwatts (mW), of the radiofrequency transmitters in the wireless smart meters?
- Where will the transmitters of the wireless smart meters be installed?
 - In the ground, but uncovered, in the yards of customers?
 - In the ground, but uncovered, in the rights of way adjacent to customers' properties?
 - On the sides of homes and buildings?
 - Or elsewhere?

- What is the approximate range, or maximum distance, over which the radiofrequency radiation from the wireless smart meters remains effective in serving their communications purposes?
- Will the wireless smart meters operate like other wireless AMI smart meters in that they will not only transmit a given customer's data on water consumption, but will also serve as relay stations for the wireless signals from the other wireless smart meters in the vicinity?
- How many transmissions will each wireless smart meter make per day, both the average number per day, and the maximum number per day? In other AMI smart meter implementations, the total number of transmissions per day greatly exceeded the number of transmissions required to convey the meter data of the customer to which the meter was assigned.

Reference: For example, a report ordered by a California court in 2011 indicated that each wireless AMI smart meter used by Pacific Gas & Electric for metering electricity issued an average of about 10,000 transmissions per day, and a maximum of about 190,000 transmissions per day to deliver just 6 readings of metering data per day. The reason for this flood of radiation is that the management and synchronization of the wireless smart meter network required many more transmissions than sending the actual metering data itself. These 6 readings per day are in the range anticipated by WSSC, of 4 to 6 readings per day (<https://www.wsscwater.com/AMI>). The report ordered by the California court is the last attachment to this message. See Table 2-1 on page 5 for the data I just described.

- Will the data that WSSC's wireless smart meters transmit 4 times per day (about every 6 hours) to 6 times per day (about every 4 hours) be more highly time resolved than that? That is, will each transmission contain water consumption data within each 6-hour interval or within each 4-hour interval, respectively?
- What source of electricity will power the wireless smart meters?
- If WSSC felt that a wireless technology for metering water consumption was absolutely mandatory, no matter what the impact on the health of its customers, why did WSSC choose wireless AMI smart meters?
 - To my knowledge, the wireless AMI smart meters generate the most radiofrequency radiation of any wireless metering technology currently used in Maryland.
 - Were "wake-up" meters considered? To my knowledge, they generate the least radiofrequency radiation of any wireless metering technology. They transmit only in response to a triggering signal from a passing utility vehicle, which, for water measurement, would require a burst of radiation only once each quarter of the year under current revenue metering practices.

Questions about liability and insurance

How does WSSC plan to address the liability and insurance issues raised by wireless smart meters?

- Does WSSC, as a government entity, plan to be self-insured?
 - That is, does WSSC plan to pay successful liability claims for harm caused by, or contributed to by, the radiofrequency radiation from its wireless smart meters?
 - If so, will WSSC then recover those costs through additional rate or tax increases paid by its customers? That is, does WSSC plan to have the customers pay for their own liability claims, one way or the other?
- Or does WSSC plan to obtain outside insurance against the health risks posed by wireless smart meters?

- If so, does WSSC realize that major insurance underwriters, like Lloyds of London, will not underwrite insurance policies that protect against health claims from wireless technologies, presumably because the associated risk is so high?

Reference: <http://themillenniumreport.com/2019/04/why-is-lloyds-of-london-excluding-coverage-for-5g/>

- Or does WSSC plan to transfer claims of liability to the providers of wireless smart metering equipment or services?
 - If so, is WSSC writing liability responsibilities into any contracts it is contemplating with the providers?
 - And will WSSC require the providers to present evidence of insurance in advance of installation, so that the providers cannot simply declare bankruptcy to avoid paying claims?

Questions about public notification and disclosure

Will WSSC provide advanced written notification to all its customers of any plan it may be contemplating to mandate the acceptance of wireless AMI smart meters for their homes and buildings? If so --

- Will that notification be provided in the form of an insert with the customers' quarterly bills?
 - Or does WSSC consider the brief web page already posted on its web site as sufficient notification of its plan (<https://www.wsscwater.com/AMI/>)?
 - Or does WSSC consider mention of wireless smart meters at WSSC's open meetings as sufficient notification of its plan?
- Will that notification spell out the radiation exposure anticipated from its wireless smart meters, by providing answers to the questions in the section above entitled: "Questions about the technology"?
- Will that notification explain why a less risky wireless technology, such as a "wake-up" metering technology, was not chosen?
- Will that notification explain whether WSSC will offer an "Opt-Out" provision for those who do not want radiation exposure from wireless smart meters? If so --
 - Will that notification indicate what the "Opt Out" will cost its customers to gain the privilege of not being irradiated?
 - Will that notification explain that, even if a customer elects to "Opt Out", so doing will not protect that customer against the radiation from the neighbors' wireless smart meters because the signals from all wireless smart meters travel considerable distances?
 - Will the fact that tens of thousands of Maryland residents have already paid to Opt Out of the radiation from the wireless smart meters of the electric power companies have a bearing on the availability of an Opt Out from WSSC's wireless smart meters? Or will the reduction in radiation exposure paid for by those Opting Out of the smart meters for electricity simply be undone by WSSC's wireless smart meters?
- Will that notification warn WSSC customers to keep away from WSSC's wireless smart meters because radiation levels rise steeply with proximity to the meters. For example --
 - Will WSSC suggest that customers not sit, work, play, or sleep on the other side of a wall where a wireless smart meter is located, or where a bank of wireless smart meters is located?
 - Will the wireless smart meters that WSSC is contemplating contain highly visible signs to warn customers not to approach the meters because of the radiofrequency radiation they emit?
 - Will WSSC suggest that customers take additional precautions to protect those especially vulnerable to harm from wireless smart meter radiation, such as pregnant mothers and children. For example --

- Will WSSC suggest that children not sit or play in yards where wireless smart meters are installed nearby, even if that yard is their own?
- Will WSSC warn parents that children should not mistake the cap of a ground-based transmitter of a wireless smart meter as a place to sit?

The ethical choice facing WSSC

The unhappy news delivered by the surveys of customers' experiences with wireless smart meters, and by the findings of the international biomedical research community, is that radiofrequency radiation, including the radiation emitted by wireless AMI smart meters, is harmful to human health. And the public is slowly, but steadily, awakening to this reality, despite conflicting messaging from the wireless industries.

But there is a positive dimension to the present situation for WSSC that is hugely important:

No customer has yet been harmed by WSSC's plan to install wireless AMI smart meters, and there is still time to ensure that no customer will be harmed.

But to protect its customers, WSSC will need to rethink its use of metering technologies that expose its customers to radiofrequency radiation. As one of those customers, and as a scientist, I urge WSSC to consider especially the adverse health effects of wireless AMI smart meters, and to abandon plans to implement them.

Is WSSC up to such a challenge? And can WSSC live up to its own admirable ethical values, quoted below? I hope so, and I believe so.

- "We are responsible employees who act ethically, are accountable, and conduct ourselves with integrity and transparency."
- "We continuously enhance and protect natural resources and the environment for the health of future generations."

Reference: <https://www.wsscwater.com/about-us/overview.html>

Thank you for reading this message. I am very grateful for your attention.

Who am I?

I am a retired U.S. Government career scientist (Ph.D., Applied Physics, Harvard University, 1975). During my Government career, I worked for the Executive Office of the President of the United States, the National Science Foundation, and the National Institute of Standards and Technology. For those organizations, respectively, I addressed Federal research and development program evaluation, energy policy research, and measurement development in support of the electronics and electrical-equipment industries and the biomedical research community. I currently interact with other scientists, with physicians, and with other informed individuals around the world about the impact of electromagnetic fields, including radiofrequency radiation, on human health.

I have been a resident of Montgomery County since 1979.

Regards,

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