**COMMENTS OF ADVOCATES**

**FOR THE PROTECTION OF THE UPPER DELAWARE CORRIDOR**

These comments are being submitted by the following:

(collectively, hereinafter, “**Advocates for the Protection of the Upper Delaware Corridor**”) submit these comments in response to the Upper Delaware Council’s examination of whether wireless infrastructure should be installed in the Upper Delaware Corridor.

We comprise grass-roots organizations, non-profits and individuals providing information and support to communities such as the UDC regarding the hazards posed by cell towers which many, if not all, have experienced personally. The lessons learned from other pollutants and toxins, such as asbestos, lead and smoking, indicate that following established science will better serve in preserving people’s health, the economy and the precious flora and fauna that forms the UDC. That man-made RF radiation is hazardous is established science (even by industry) and the majority view in peer-reviewed scientific communities, as these comments will demonstrate.

We are submitting these comments in support of keeping the UDC safe for residents and visitors, preserving the ecosystem with its essential flora and fauna, and preserving the aesthetics of the UDC.

These comments are in the form of a position paper to help the UDC make an informed decision. The position paper is entitled:

“Preserving The Aesthetics of The Upper Delaware Corridor (UDC)

and The Health of its Residents and Visitors;

The Case Against Wireless Infrastructure in the UDC”

and is attached hereto and incorporated herein by this reference.

Respectfully submitted,

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**The following groups and individuals have granted permission to submit these comments and position paper on their behalf under the name of “Advocates for the Protection of the Upper Delaware Council:”\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

**PRESERVING THE AESTHETICS OF THE**

**UPPER DELAWARE CORRIDOR (UDC) AND THE HEALTH**

**OF ITS RESIDENTS AND VISITORS:**

**THE CASE AGAINST WIRELESS INFRASTRUCTURE IN THE UDC**

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Acknowledgements to the Advocates for the Protection of the Upper Delaware Corridor for their editorial contributions.

**Introduction**

The expressed purpose of considering wireless infrastructure in the UDC is for public safety, such as being able to contact someone in the event of an emergency. As the saying goes, we need to be “connected, but protected.”[[1]](#footnote-1) But what if the wireless infrastructure would do more harm than good? Wireless infrastructure has the potential of putting the public and our natural resources, at risk. Acute and chronic adverse physiological reactions to radio frequency radiation from wireless infrastructure have already been established. The problem then becomes, what if the emergency is caused by the wireless infrastructure?

Radio frequency (RF) radiation (also referred to as electro-magnetic radiation or frequency (EMR or EMF)) emitted from wireless infrastructure cannot be perceived with the naked eye or by smell (such as gas leaking from a stove) and therefore goes unnoticed until one develops symptoms or is injured by it. Similary, loss of flora and fauna “is often unseen and undocumented until tipping points are reached.”[[2]](#footnote-2)

Industry has already acknowledged in published annual reports that they run the risk of litigation arising from personal injuries from their wireless infrastructure that may substantially affect their financial stability. Industry, in published consumer brochures, warns that EMF emissions are pollutants. (See section entitled “Wireless is Not Clean Energy.”)

The UDC Guidelines require, essentially, that any actions taken “[p]rovide for the protection of the health, safety, and welfare of residents and visitors while also providing for the protection and preservation of natural resources.” A careful cost/benefit analysis should be done prior to any decision to install wireless infrastructure. As we will explain, any action to install wireless infrastructure conflicts with protecting health, safety and welfare and conflicts with protecting and preserving the natural resources in the UDC.

The reason to come to the UDC is to enjoy nature, the recreational activities and the scenic views. While the residents and visitors now enjoy the UDC, with the advent of wireless infrastructure, they will be subject to erratic, pulsating waves on a constant 24/7 basis with no relief except to leave the UDC. EMFs have been likened to natural sources, such as the sun, except that, with the sun, one can put on sunscreen, protective clothing or get out of the sun altogether. There are no such options with RF radiation, where there is no ‘off’ switch. Even the sun has an ‘off’ switch when it sets. If we had to be exposed to the sun 24/7, we’d probably burn to a crisp.

Industry acknowledges that RF radiation emitted from wireless infrastructure is a pollutant, which is expected to substantially increase the amount of greenhouse gases, as well as the associated health outcomes. If wireless infrastructure is permitted in the UDC, the scenic views will be marred, and there will potentially be an emerging form of environmental pollution in the UDC and a potential constellation of adverse health outcomes.

References to mobile cell base stations, cell towers, “5G” cells, “smart” utility meters, and other telecommunications infrastructure and devices is hereinafter referred to, collectively, as “wireless infrastructure.”

We will address the following:

* The Outstanding Importance of the Upper Delaware Corridor (UDC) and the stated goals of the UDC Guidelines
* The Technology
* Potential Adverse Impacts from Wireless Infrastructure: Aesthetics; Risk of Cell Tower Fire, Collapse, Ice Falls; Risk to Agriculture; Devaluation of Property Values
* Adverse Impacts on Flora & Fauna: Wildlife, Bees and Trees
* FCC and RF Radiation Emission Limits
* Adverse Impacts on Public Health: RF Radiation Effects on Children, Women, Firefighters; Common Symptoms of RF Radiation Sickness; Findings
* The Settled Science on Adverse Health Effects of RF Radiation from Industry, FCC, FDA, the U.S. Navy, Scientists and Experts
* Wireless is not Clean Energy
* A Word on Fiber Optics

Also included is Appendix B – Compilation of Research Studies on Cell Tower Radiation and Health.

[IN PROCESS]

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**CREDENTIALS OF NOTABLE EXPERTS**

**WHOSE WORKS ARE REFERENCED IN THIS PAPER**

[IN PROCESS]

|  |  |
| --- | --- |
| Beatrice Golomb |  |
| David Carpenter |  |
| Martin Pall |  |
| Blake Levitt |  |
| Manville |  |
| Henry Lai |  |
| Linda Birnbaum |  |
| Martin Blank |  |

**NOTABLE PRIMARY SOURCE MATERIALS**

**WHICH ARE REFERENCED IN THIS PAPER**

[IN PROCESS]

|  |  |
| --- | --- |
| The Bioinitiative Report[[3]](#footnote-3) | A comprehensive scientific review of 1800 scientific studies on the biological and health effects of Electromagnetic Fields (EMF) and Radio Frequency (RF) based wireless technology conducted by independent scientists with no conflict of interests with the telecommunications industry.  Conclusions: bioeffects are established and can occur within  minutes of exposure to even very low levels of RF. With chronic exposures the biological effects can become adverse effects and result in illness. |
| Final Report of the New Hampshire Commission to Study the Environmental and Health Effects of  Evolving 5G Technology, November 2020 [[4]](#footnote-4) | The majority of the Commission concluded that exposure to wireless radiation at levels below the FCC emission limits is harmful to human health and the environment. The commission was convened through bipartisan legislation that was signed by the governor. Commission membership included unbiased experts in fields relating to health and radiation exposure. |
|  |  |
| ECOLOG Report Commissioned by T-Mobil (German parent of T-Mobile USA) | The study conducted by scientists at the University of Hannover, Germany, concluded that with respect to the risks of electromagnetic fields (EMFs), (1) adverse health impacts were associated with exposure to EMFs including risks of cancer, leukemia and damage to the immune system and cognitive impairments and (2) strong precautions and warnings to significantly lower the power of the EMFs to which the public would be exposed. |
| IARC Monograph |  |

**The Outstanding Importance of the Upper Delaware Corridor (UDC)**

The UDC has been part of the National Wild and Scenic River Systems to preserve its beauty and resources since 1978 when Congress designated the UDC’s 73.4 miles as part of the River Systems.[[5]](#footnote-5) The UDC was so designated under the National Wild and Scenic Rivers Act of 1968. Subsequently, the River Management Plan Land & Water Use Guidelines (the “Guidelines”) were adopted in 1986 to reflect input by the townships surrounding the UDC. The stated goals of the Guidelines are to:

“protect, for residents and visitors of both present and future generations, the values for which the Upper Delaware was designated as a Scenic and Recreational River.”[[6]](#footnote-6)

More specifically:

“to protect water quality, preserve natural features, provide for recreational uses, provide for the continuation of agriculture, conserve river resources, and maintain existing land use patterns.”[[7]](#footnote-7)

The UDC has been recognized for its “outstanding scenic geologic features” and valuable geologic deposits such as “bluestone, sand and gravel, shale and peat.”[[8]](#footnote-8) The forests support a lumber industry, provide food, cover and habitat for wildlife, and are a “protective cover for this watershed which serves many local towns.”[[9]](#footnote-9) Forests “are a necessity to the surrounding ecosystem, provide food and cover for wildlife, purify waters, improve air quality, and help prevent soil erosion” and provide cover for fish habitats.[[10]](#footnote-10) The forests, the Upper Delaware River and its scenic features make for outstanding aesthetics of the UDC.

The UDC is also known for its excellent air quality and water quality which contribute to its overall quality of life. Its recreational opportunities include canoeing, where the river is reputed to be one of the most outstanding canoeing rivers in the Northeast.[[11]](#footnote-11)

The UDC’s diverse habitats “support abundant wildlife populations” such as “river otter, bobcats, coyotes and wild turkey.” Its wooded riverside habitats support a large number of waterfowl and waterbirds. About 200 bird species identified within the UDC includes the bald eagle which winters in the Delaware watershed.

“According to wildlife biologists, the highest concentration of eagle wintering areas in New York is found in this watershed.”[[12]](#footnote-12)

Rare species of plants are also included in these habitats, including “Great Saint John’s wort, prostrate sand cherry, river birch, and sand plain gerardia.”[[13]](#footnote-13)

The UDC is rich in cultural, historical and archeological resources, such as “[p]rehistoric archeological sites, historic architecture, and historic engineering and industrial sites …”[[14]](#footnote-14) For example, there are “the remains of canal operations – bridges, locks, aqueducts, dams and related buildings” and “[s]egments within the corridor have been listed on the National Register of Historic Places.”[[15]](#footnote-15) The UDC is also home to the Roebling Bridge, forming part of “the Delaware and Hudson Canal National Historic Landmark in 1968, the highest designation of national significance that a structure can receive.”[[16]](#footnote-16)

**Stated Goals of the UDC**

The Upper Delaware Council is entrusted with maintaining the UDC consistent with the Guidelines as articulated in the Council’s Project Review Workbook:

• “Principle A: Maintain the high water quality found in the Upper Delaware River

• Principle B: Provide for the protection of the health, safety, and welfare of residents and visitors while also providing for the protection and preservation of natural resources

• Principle C: Provide for recreational and other public uses while protecting the Upper Delaware as a natural resource

• Principle D: Provide for the continuance of agricultural and forestry uses

• Principle E: Conserve river area resources

• Principle F: Maintain existing patterns of land use and ownership”[[17]](#footnote-17)

The Guidelines provide when a municipality is determined to be in “substantial conformance.” The municipality:

* Must not approve the development of new incompatible land uses;
* Must permit conditional or special uses only in accordance with the principles and objectives of the Land and Water Use Guidelines; and
* Must meet each of the principles and objectives contained in the Guidelines and the Plan by
  + Employing a combination of management alternatives listed in the Guidelines, or
  + Demonstrating that it meets the objectives in another way.

In the following comments, we will demonstrate how wireless infrastructure is inconsistent with the above stated principles, and would make a municipality in substantial non-conformance with the Guidelines.

**THE TECHNOLOGY**

What is emitted from wireless infrastructure, as well as cell phones, is commonly referred to as radio-frequency radiation (RFR) or RF radiation, electro-magnetic radiation (EMR), electro-magnetic fields or frequencies (EMF), microwave radiation or wireless radiation. The most common references in this paper will be to RF radiation. RF radiation is anthropogenic (man-made) and artificial. This RF radiation is pulsed; therefore, all references herein to RF radiation should be read as “pulsed RF radiation.” It is the pulsations of RF radiation that cause adverse health outcomes.[[18]](#footnote-18)

Electromagnetic waves carry information. The RF “signal” is the “carrier wave.” Communications require carrier wave manipulation to “encode” the data and does so through two main techniques: “modulation” and “pulsation.” Modulation places additional “mini”-waves on the RF. Pulsation injects “bursts” or turns the signal on/off. Devices using the same code can “communicate” and exchange information.[[19]](#footnote-19)

An electromagnetic field (EMF”) is created by electric and magnetic components. The interaction between the electric and magnetic fields “radiates” energy (“radiation”). The electromagnetic spectrum spans from extremely low frequencies (ELFs), radio frequencies (microwaves are a subgroup of RFs), infrared, visible light, ultraviolet, X-rays and gamma rays. RFs have a wave-cycle between 3 kilohertz and 300 gigahertz.[[20]](#footnote-20)

Radiation, generally, can be ionizing or non-ionizing. Ionizing radiation means that it produces ions at the molecular level, so that it can directly affect the structure of atoms or damage DNA. Non-ionizing radiation means that it does not produce such ions. Ionizing radiation causes a thermal effect, i.e., heating up cells (e.g. X-Rays, gamma rays) while non-ionizing radiation can heat up cells, but it is thought to do so to a lesser extent.[[21]](#footnote-21) It has been posited that RF radiation cannot be carcinogenic as it has insufficient energy to cause direct DNA damage or any other physiological injury. However, that assertion has been soundly disproven as RF radiation has been shown to cause breakage in DNA strands, a precursor to cancer (see the “Settled Science” section). RF radiation can harm without heating.[[22]](#footnote-22)

That means that RF radiation can cause physiological injury ***below the thermal threshold***. Therefore, the distinction being drawn between ionizing and non-ionizing radiation, as it relates to physiological injury caused by RF radiation, becomes artificial and meaningless. As confirmed by renowned scientist, Dr. Golomb,

*“much or most of the damage by ionizing radiation, and radiation above the thermal limit, occurs by mechanisms also documented to occur* ***without ionization, and below the thermal limit.”***[[23]](#footnote-23) [Emphasis added.]

RF radiation cannot be perceived with the naked eye or by smell (such as gas leaking from a stove) and therefore goes unnoticed until one develops symptoms or is injured by it.

The term “5G” is a marketing term to mean the 5th generation of cellular networks. Prior generations of cellular networks have included 1G, 2G, 3G and 4G. The 4G LTE (long term evolution) has multiple data streams (M.I.M.O.), and is data-dense and complex in wave structure than 2G or 3G.[[24]](#footnote-24)

The 5G wave signals are different from “previous generations because of their complex beamformed transmissions in both directions – from base station to handset and for the return.”[[25]](#footnote-25)

5G adds new technologies to the 4G networks:

* M.I.M.O means Multiple-Input Multiple-Output, which allows cell phones and cell towers to use multiple high and low frequencies to communicate. It uses “multiple transmitters and receivers to transfer more data at the same time” by combining “data streams arriving from different paths.”[[26]](#footnote-26) This is in contrast to Single-Input Single-Output (SISO) technology which sends or receives one spatial stream at a time. [IS THAT 3G OR 4G?]
* Phased array antennas: this is a beamforming phased-array of antennas with a large number of active antennas used to multiply signal strength; “phased-array beamforming achieves spatial multiplexing (i.e., the transmission of multiple streams of data over the same bandwidth)” which is used to increase system capacity.[[27]](#footnote-27)
* Beam forming technology: allows towers to communicate with each other and 5G cell phones with a higher power focused beam of energy. “This directs the radiofrequency signal to users and devices rather than transmitting it in all directions.”[[28]](#footnote-28)
* Millimeter wave technology: adds frequencies above 24 GHz for higher bandwidth, that travel shorter distances, requiring higher densities of cell towers. “Initially 5G will work in connection with 4G technologies. 5G will operate at frequencies of 600-700 MHz, 3-4 GHz, 26-28 GHz and 38-42 GHz. In the future, it is expected to operate at much higher frequencies again, around 86 GHz.”[[29]](#footnote-29)

Dariusz Leszcynski, docent of biochemistry at the University of Helsinki, further explains 5G technology:

“New in wireless 5g communication is the use of millimeter waves and frequencies above 20 GHz – 300 GHz. Although millimeter waves can transfer large amounts of data, they have the problem of how far the data can be sent within the limits of short wavelength bandwidth. This causes very frequent deployment of base stations (cell antennas) in different areas.”[[30]](#footnote-30)

Alisdair Phillips, an E.U. expert in electrical and electronic engineering,[[31]](#footnote-31) describes the nature of 5G wave signals:

“Instead of a nice smooth sine wave, the RF carrier [microwave signal] repeatedly jumps from one part of the sine wave to a different part as it encodes the data. This produces a lot of VERY fast, sharp 'edges' and a lot of 'aggressive' low frequency noise (10-HZ to 100 kilohertz) or even faster."[[32]](#footnote-32)

The signals “vary rapidly with time and movement and so are unpredictable” and because they are “violent and erratic,” experts say that it is not possible to accurately simulate or measure 5G emissions in the real world."[[33]](#footnote-33) If these RF radiation emissions from 5G cannot be measured, then how can they be compliant with government standards or be considered safe?

Leszczynski cautions that, at this time, “[r]esearch has not yet been done sufficiently and ***the safety of 5g cannot be scientifically proven.***” [Emphasis added]

RF radiation, including 5G’s phased array of antennae, raises serious concerns. The “wave form is the biologically active component,” with very fast peak radiation pulses generating bursts of energy

“that can give rise to what are called Sommerfeld and Brillouin precursors in living cells that can in turn penetrate and disperse much deeper than traditional models predict. Sommerfeld/Brillouin precursors most notably form with ultra wideband exposures as proposed with 5G.”[[34]](#footnote-34)

[CAN SOMEONE GIVE ME AN EXPLANATION FOR SOMMERFELD/BRILLOUIN AND A GOOD SOURCE?]

**Comments from Industry Experts**

Frank Clegg, former President of Microsoft, Canada, speaks up against the deployment of 5G.[[35]](#footnote-35) He explains that the FCC ‘safety’ limits were developed based on small, short-term, infrequent exposure to RF radiation, not on the cumulative, constant exposure of 24/7 or the cumulative effect on children, pregnant women or those already sensitive to RF radiation. Since there is no oversight by the FCC, the telecommunications industry is self-policing. “We’re left with almost a Wild West scenario.”[[36]](#footnote-36)

In 2016, six radiation experts stated that the risk for developing glioma brain cancer is over three times higher from 3G signals than from 2G signals, and that 3G signals more effectively prevent the repair of DNA damage.[[37]](#footnote-37)

A former Motorola electrical engineer, the late Robert C. Kane, Ph.D., advised:

"The belief that microwaves cannot cause bond breaking in chromosomes or DNA, or damage tissue more generally is quite inaccurate ... the same chromosome and DNA damages [as in ionizing radiation such as X-rays] are being reported at frequencies across the entire range, including 100 MHz [FM radio], 300 MHz, 837 MHz, 954 MHz [cell phones] 1,250 MHz, 2,450 MHz [2.45 gigahertz: Wi-Fi, Bluetooth, smart phones], and up to 9000 MHz [9 gigahertz: vehicle-to-vehicle radar systems]."[[38]](#footnote-38)

**POTENTIAL ADVERSE IMPACTS**

**OF WIRELESS INFRASTRUCTURE**

There are potential adverse impacts of wireless infrastructure which include adverse aesthetic impacts, the risk of cell tower fires and collapses, the risk of melting ice hurtling from cell towers, the dangers presented for flora and fauna, and impacts to public health and safety.

**Aesthetics**

Wireless towers will not magically appear. They are going to require that many trees be cut down to create roads for construction vehicles for cell tower installations. The cell tower installations will also require wired connections to be installed either underground or above ground, as wireless antennas require a wired connection in order to function. If wire is placed below ground, it will mean digging up the ground and cutting down more trees which will interfere with the natural habitat of the forest. If wire is above ground, there will need to be poles installed in intervals throughout the landscape. With the combination of those wired poles and the installation of wireless infrastructure, the scenic views will be marred. Will the site developers restore the wilderness anywhere close to its original state? Not likely.

It may create debris that may be dumped in the River during construction, depending on how close the towers would be to the River.

The above possible scenario of dumping debris into the River would not be compatible with Guidelines’ Principle A, to “maintain the high water quality found in the Upper Delaware River.” [HOW CAN THIS BE BEST HIGHLIGHTED? I TRIED USING A DIFFERENT COLOR. DOES THAT WORK?]

For example, the Town of Islip on Long Island decided against the installation of a cell tower monopole of between 120 and 150 feet because it would have an “adverse visual impact” near otherwise pristine parkland surrounded by a nature preserve.[[39]](#footnote-39) The President of the civic association opposed the tower because “[t]he nature and character of the hamlet of Bayport will be irreparably scarred…”[[40]](#footnote-40) One resident likened the potential view of the tower from within his home to “put[ting] a dump across the street.”[[41]](#footnote-41)

If any wireless infrastructure installations are 5G, there may be many towers installed very close together. In order for them to work, they would need to be taller than the trees. Any ensuing multitude of towers will likely be an eyesore to the otherwise scenic beauty of the UDC.

**Risk of Cell Tower Fire, Collapse, Ice Falls**

Cell towers have been known to catch on fire and/or collapse. Cell site developers tend to construct monopole cell towers as quickly and as cheaply as possible, meaning that any quality control over their manufacture, construction or maintenance is probably close to non-existent.

In addition, industry commentary admits that 5G runs hot. That means that thermal buildup at cellular base stations occurs because these base stations are tightly packed with lots of equipment required to do digital to analog conversions, and they are “power-hungry” requiring a large amount of energy consumption.[[42]](#footnote-42) A side effect of the 5G array of antennas is that the circuits are inefficient and “[t]hey get hot.”[[43]](#footnote-43) A lot of heat needs to be dissipated because of the amount of equipment, conversions and inefficiencies.[[44]](#footnote-44)

The risk of fire has been a problem with cellular installations. They are, essentially, electrical installations and should require compliance with strict electrical building codes. A subject matter expert on electrical safety in California and Nevada states that:

“Many people are not aware that electrical equipment, including all cell towers and 5G small cell sites, pose a fire threat that must be mitigated by a recognized electrical fire safety expert. Every electrical device is going to fail at some point. The goal is to ensure that failures do not imperil life, health and property.”[[45]](#footnote-45)

Therefore, wireless fires are electrical fires. There were three notable fires in California that were started in whole in or in part by telecommunications equipment failures or telecommunications equipment overload. The Silverado Fire in 2020 was suspected to have been caused by the failure of a telecommunications lashing wire of T-Mobile. The Woolsey Fire in 2018 was also suspected at two ignition points to have been caused by a similar failure of lashing wire of a yet undisclosed telecommunications carrier. The Woolsey Fire, encompassing 96,949 acres [SUSAN DO YOU HAVE A SOURCE FOR THE ACREAGE?]:

“destroyed over 400 homes in Malibu and caused residents to flee into the ocean because the three routes of exit out of the city were blocked by traffic and fire. The carrier, at this point, is unknown because the Woolsey Fire remains under criminal investigation. Over $6 billion in damages was inflicted before the fire was finally extinguished. SCE [Southern California Edison] and the telecom that owned the lashing wire have shared responsibility for the Woolsey inferno.”[[46]](#footnote-46)

[SUSAN, IN YOUR PRESENTATION YOU REFER TO THE FIRE BURNING 1643 HOMES AND KILLING 3 PEOPLE; DO YOU HAVE A SOURCE THAT I CAN USE?]

The Malibu Canyon Fire in 2007, encompassing 3836 acres [SUSAN DO YOU HAVE A SOURCE FOR THE ACREAGE?]:

“was caused by the failure of an SCE utility pole that was overloaded with telecom equipment owned by AT&T, Verizon, and Sprint (now T-Mobile). These four and NextG, now owned by telecom infrastructure builder Crown Castle International, Inc. [were] accused of misleading investigators, and eventually settled with the California Public Utilities Commission for over $60 million.” [[47]](#footnote-47)

More recently, in April 2021, Verizon recalled 2.5 million hotspots due to fire risks. In 2021, a light pole on a high school campus in Chula Vista, California carrying an AT&T cell tower collapsed due to electrical arcing and damaged the stadium. [[48]](#footnote-48)

“Electrical arcing is when electricity jumps from one connection to another. This flash of electricity reaches temperatures of 35,000°F … The heat from arcing burns the insulation around the wires” and can cause a fire.[[49]](#footnote-49)

Firefighters had to wait a half hour for the power to be turned off before they could put out the fire (see footnote for footage of damage).[[50]](#footnote-50)

Cell tower fires are not limited to California, but have also occurred across the country, including in New York.[[51]](#footnote-51) In 2021 in Brooklyn, the cause of fire on an apartment building rooftop was reported to be caused by an “electrical malfunction of a cell tower on the roof of a building.”[[52]](#footnote-52) In Hanover, VA in 2020, a cell tower was engulfed in flames which officials believed to have been caused by electrical/mechanical issues.[[53]](#footnote-53)

Although cell tower fires are infrequent, they are devastating when they do occur.[[54]](#footnote-54) Fire has the danger of warping the tower and collapsing the tower down to a burning heap, that can endanger anything around it, causing property damage, injury or death.

Fire consultant, Susan Foster (also honorary firefighter with the San Diego Fire Department) cautions that:

“electrical fires cannot be fought through conventional means until the power has been cut. Firefighters or anyone else trying to put water on an energized cell tower fire will be electrocuted … Imagine this scenario, a cell tower catches on fire with winds gusting at 50 miles an hour. This fire is going to spread until the utility cuts the power and that can take between 10 minutes and one hour.” [[55]](#footnote-55)

Foster further cautions sufficient setbacks from all wireless installations so that people have time to escape. But what happens in the event of a fire to the beautiful UDC forests, lake, animals, fish, rare and endangered species and their habitat? Fires can be fast and uncontrollable, and the UDC has already experienced its share of fires. Why would we want to add to the existing fire risks that UDC may already have?

The setbacks or fall zones from residences and structures would typically be at least 110% of the height of the cell tower. That would probably mean some clear-cutting of trees that would further mar the scenic landscape of the UDC.

Foster further cautions that, “[f]rankly, the promise of 5G is hype, and the fire danger of having cell towers close to our homes, schools and places of business can have devastating consequences,”

To help protect from similar wildfires caused by telecommunications equipment, any installation design of a cellular site would need to be regulated with at least the same rigor as applied to electrical and building codes, rather than just leaving the design to telecommunications engineers.[[56]](#footnote-56)

There are also cell tower collapses which pose a danger. In 2022 in Las Vegas, NV, a cell tower came crashing only feet from people’s homes.[[57]](#footnote-57) In 2019 near Tucson, AZ, a 1000 foot cell tower crashed, and residents expressed concern about having no access to emergency services.[[58]](#footnote-58) In 2003 in Oswego, NY, a 165-foot cell tower crashed down within seconds, crushing the Fire Dept Chief’s car, missing a busy shopping area, the Fire Dept museum and the fire station.[[59]](#footnote-59)

There is also the danger of chunks of ice falling from cell towers. When ice begins to melt, it can dislodge and come hurtling to the ground at high speeds, [[60]](#footnote-60) with the risk of serious personal injury and property damage.

Similar scenarios as above of cell tower fires, collapses and other calamities would be incompatible with Guidelines’ Principle B, to provide “for the protection of the health, safety, and welfare of residents and visitors while also providing for the protection and preservation of natural resources” and Principle F, to maintain “existing patterns of land use and ownership,” particularly if one loses the use of one’s land from any of these possible calamities.

**Risk to Agriculture**

Soon after the installation of a 4G antenna cell tower just 200 meters from his farm, a farmer in France noticed that among his dairy cow herd, milk production had dropped by 15-20% and 40 of his 200 cows had died. [[61]](#footnote-61) The farmer claimed the cell tower was damaging his cows’ health. A French court in 2022 ordered the antenna to be switched off while the situation would be monitored. The farmer said that “[t]here are no medical elements that could [otherwise] explain this brutal drop in milk production.” The mayor who had authorized the installation had testified in favor of the farmer and feared “a catastrophe on a human level” for the 1500 inhabitants of his town.

A similar scenario in the UDC would not be consistent with Guidelines’ Principle D, to provide for the continuance of agricultural uses, or Principle B, to provide for the protection of the health, safety, and welfare of residents.

**Devaluation of Property Values**

There are potential buyers who do not want to live near cell towers, and in some areas that have cell towers, property values have gone down by as much as 20%.[[62]](#footnote-62)

Property values for homes in close proximity to a cell tower, or within the fall zone of the tower, reportedly dropped 15%-21%. As far back as 2004, a study of 9,514 residential sales in 10 suburbs found that the price was reduced, on average, by 15%.[[63]](#footnote-63) During another study spanning 1984 to 2002, 4,283 residential sales in 4 suburbs, found price reductions at about 21%.[[64]](#footnote-64) In 2012, a New Jersey appraiser determined that a cell tower close to a home would reduce its value by 10%.[[65]](#footnote-65)

Residents have expressed their concern over the devaluation of their homes in close proximity to cell towers. For example, in the Town of Islip, the zoning board denied T-Mobile’s application for the siting of a cell tower based, among other things, on the potential devaluation of their homes, corroborated by experts who “testified on the neighbors’ behalf regarding the anticipated diminution in property values.”[[66]](#footnote-66)

**HUD Categorizes Cell Towers Under “Hazards and Nuisances”**

The U.S. Department of Housing and Urban Development (HUD) has categorized cell towers under “Hazards and Nuisances” which real estate appraisers are required to report if property is within the fall zone of the cell tower, and if not within the fall zone, the appraisers must take into consideration the proximity of cell towers in determining the marketability of the property.[[67]](#footnote-67) “HUD prohibits FHA underwriting of mortgages for homes that are within the engineered fall zone of a cell tower.”[[68]](#footnote-68)

**General Legal Context on Aesthetics and Devaluation of Property Values**

***Please note that this section and the entirety of this position paper is not legal advice nor is it to be construed as legal advice, but simply commentary on the legal backdrop surrounding RF radiation and wireless infrastructure.***

Although RF radiation emission limits are set by the FCC under the Telecommunications Act of 1996 (“TCA”), the Second Circuit (which has jurisdiction over New York) determines the limits of the FCC’s jurisdiction within NY and the requirements that must be fulfilled before any federal preemption in the installation of wireless infrastructure can apply. The Second Circuit requires that carriers show evidence of a gap in telephone service and that they are using the least intrusive means to fill that gap; otherwise, there is no federal preemption on installing cell towers.[[69]](#footnote-69)

Federal courts have ruled that adverse aesthetic impacts are a valid legal ground for local zoning authorities in New York to deny applications for wireless facilities.[[70]](#footnote-70) In New York, wireless providers are given the status of public utilities for any zoning applications and their applications must comply with the “public necessity” standard under NY case law. Within the context of zoning decisions, this has been interpreted by NY courts to mean that the telecommunications provider must establish: (1) gaps in telecommunications service, (2) the proposed facility locations will remedy those gaps and (3) “the facility presents a minimal intrusion on the community.”[[71]](#footnote-71) In the case of the Town of Islip on Long Island denying T-Mobile’s cell site application, the federal district court affirmed the zoning board’s denial of T-Mobile’s application and found that the proposed facility’s impact:

“was more than “minimally intrusive” based on evidence that the 120–foot monopole, which would be located ***in a pristine parkland and visible from a number of streets and residences,*** was not in the nature and character of the surrounding area and would have a negative aesthetic impact on the scenic view of the Sans Souci Nature Preserve and Sans Souci Lakes enjoyed by residents in the community.”[[72]](#footnote-72)

The court also took notice of other substantial evidence regarding adverse aesthetic impact and diminution of property values. The 120-foot tower would be twice as high as the surrounding trees, visible from a number of residential streets, from the Montauk Highway, and would be even more visible during the winter. One resident likened the potential view of the tower from within his home to “put[ting] a dump across the street.” The residents were also involved in beautification and preservation efforts in the area. The zoning board found that the tower would have an “adverse visual impact” near otherwise pristine parkland surrounded by a nature preserve. One expert testified that the “tower cannot effectively be disguised as an evergreen in a neighborhood where the tallest evergreen is just 51 feet high.” The President of the Bayport Civic Association stated that:

“The scenic vista overlooking the Sans–Souci Preserve will be forever disturbed. The nature and character of the hamlet of Bayport will be irreparably scarred by allowing a structure to be built 400 percent taller than any other structure in the town, a town that built itself up on single-story and two-story dwellings.”[[73]](#footnote-73)

It is generally understood that the Telecommunications Act of 1996 (TCA) reserves to local governments the general authority to regulate the placement, construction, and modification of wireless facilities within their jurisdiction,[[74]](#footnote-74) subject to certain finite limitations.[[75]](#footnote-75) To that end over the past couple of decades, towns and municipalities have protected themselves by adopting ordinances that articulate local government control and oversight which incorporate the requirements articulated in the above case law, for wireless infrastructure installations. [NOT SURE IF RELEVANT FOR THIS PRESENTATION; IF NOT, WOULD PREFER TO DELETE]

**ADVERSE IMPACTS ON FLORA AND FAUNA:**

**WILDLIFE, BEES AND TREES[[76]](#footnote-76)**

RF radiation from wireless infrastructure is hazardous for flora and fauna.[[77]](#footnote-77) There is no federal agency setting safety limits for trees, birds or bees, nor is there any funded mandate to do so.[[78]](#footnote-78)

“FCC limits were not developed to protect flora or fauna. Wireless radiation ‘safety’ limits for trees, plants, birds and bees simply do not exist. No U.S. agency nor international authority with expertise in science, biology or safety has ever acted to review research and set safety limits for birds, bees, trees and wildlife.”[[79]](#footnote-79) Other attempts are being made to protect flora and fauna.[[80]](#footnote-80)

**Wildlife**

The Delaware River from Hancock, NY to the Delaware Water Gap has been recognized as “one

of the largest and most important inland bald eagle wintering habitats in the Northeastern United States.” [[81]](#footnote-81) The U.S. Fish and Wildlife Service considers this habitat “essential” for their full recovery and long-term survival.[[82]](#footnote-82)

The highest concentration of eagle wintering areas in New York is found in the Delaware watershed. An area similar in richness and beauty to the UDC is the city of Delta in British Columbia, Canada, a part of which is considered one of the most heavily populated and ecologically important eagle territories in North America and one of the richest areas for bald eagle reproduction. However, eagles have been harmed or killed by lightning rod fixtures on cell towers; the Orphaned Wildlife Rehabilitation Society (OWL) in Delta has been reported to retrieve these eagles.[[83]](#footnote-83) Residents have been concerned that cell towers “will increase the odds of attracting lightning strikes directly into the habitat which could … occur at a time when it is heavily populated.”[[84]](#footnote-84)

David Hancock, a renowned biologist of the Hancock Wildlife Foundation who has been studying eagles for more than 60 years, said that cell towers adversely affect their breeding activity:

“Cell towers have a very negative affect on eagles (and other raptors). The towers attract them to perch and even nest, which results in unproductive breeding activity.”[[85]](#footnote-85)

With regard to animals in general, scientists have observed that RF radiation have toxic effects on animals at “vanishingly low intensities,” including effects on “orientation and migration, food finding, reproduction, mating, nest and den building, territorial maintenance, defense, vitality, longevity and survivorship” of wildlife.[[86]](#footnote-86) “Wildlife loss is often unseen and undocumented until tipping points are reached.”[[87]](#footnote-87)

Artificial, man-made RF radiation is a form of environmental pollution which can harm wildlife, including bats and birds such as sparrows. Cell towers located in their habitats would be continuously irradiating 24/7, 365 days a year, without refuge from the cell towers, and wildlife could suffer long-term effects, such as:

“reduction of their natural defenses, deterioration of their health, problems in reproduction and reduction of their useful territory through habitat deterioration.”[[88]](#footnote-88)

Toxic effects “have been observed in mammals such as bats, cervids, cetaceans, and pinnipeds among others, and on birds, insects, amphibians, reptiles, microbes and many species of flora. Cyto- and geno-toxic effects have long been observed in laboratory research on animal models that can be extrapolated to wildlife.” [[89]](#footnote-89) Different habitats for wildlife, including aquatic environments, “rely on the Earth’s natural geomagnetic fields for critical life-sustaining information,” with which RF radiation interferes. [[90]](#footnote-90)

Bees

Bees, as our primary source of pollination, are injured from RF radiation which means a decrease in pollination and, in turn, food production. A study showed that “every time a bee approaches a power line or a cell phone antenna, it becomes stressed and, therefore, its internal temperature increases and the pollination service decreases.”[[91]](#footnote-91) Moreover, “[h]oneybees are among the species that use magnetoreception, which is sensitive to anthropogenic electromagnetic fields, for navigation.”[[92]](#footnote-92)

Researchers have proposed that the stress of exposure to RF radiation has weakened bee populations’ resistance to other environmental stressors such as pesticides and chemicals.[[93]](#footnote-93) A study performed by placing two mobile phones under a beehive showed that when the phones were turned on, within 20-40 minutes, the bees began emitting “piping” calls and squeaks announcing their start of swarming which means they are about to abandon the hive. [[94]](#footnote-94) Another study corroborated this study and found that the bees “stopped producing honey, egg production by the queen bee halved, and the size of the hive dramatically reduced.”[[95]](#footnote-95)

Another study examining how insects, including the Western honeybee, react to RF radiation exposure at frequencies from 2GHz to 120GHz, in simulations found increases in absorbed power of 3-370%.[[96]](#footnote-96) Researchers concluded that “[t]his could lead to changes in insect behaviour, physiology and morphology over time…”[[97]](#footnote-97) and that:

“enough research has been performed to indicate an urgent need to reduce electromagnetic radiation exposures to protect the bee population and in turn, protect the environment. As 5G will increase radiation exposures and use new higher frequencies shown to be highly absorbed into insects, scientists are calling for a moratorium on 5G.”[[98]](#footnote-98)

Andrew Goldsworthy, a biologist from the UK's Imperial College, London, explains that insects, as well as animals, use cryptochrome for navigation and:

“to sense the direction of the earth's magnetic field and their ability to do this is compromised by radiation from [cell] phones and their base stations. So basically bees do not find their way back to the hive." [[99]](#footnote-99)

Goldsworthy contacted the UK communications regulator OFCOM (Office of Communications), that “a change of phone frequencies would stop the bees being confused.” [[100]](#footnote-100)

Bees pollinate about 90 commercial crops worldwide. Their estimated economic value in the U.S. is about $12 billion.[[101]](#footnote-101)

A review of 45 peer-reviewed scientific studies found physiological and morphological changes in plants, such maize, roselle, pea, fenugreek, duckweeds, tomato, onions and mungbean plants, which appeared to be very sensitive to RF radiation.[[102]](#footnote-102) This can have repercussions for our food supply.

Trees

It has been shown that trees are damaged by RF radiation from mobile phone base stations, with damage starting on one side and then “extending to the whole tree over time.”[[103]](#footnote-103) Tree damage was found with chronic exposure to RF radiation.[[104]](#footnote-104) Visual observations of tree damage include:

“irregular leaf coloration, leaf wilt, leaf loss, temporal and spatial irregularities in the seasonal leaf color change and leaf loss, fewer shoots, greatly elongated shoots with foliage at the tip and bare patches farther down the shoot, changes in branching patterns, and dead limbs and branches. The damage is most prominent at the edge on one side of the crown. This area is referred to as the starting point of damage. From there, the damage decreases in its intensity toward the opposite side of the crown that may be less affected or not at all. The crown volume, which is damaged within this geometric space, is referred to as the damage area. It will continue to develop further over the course of several growing seasons.[[105]](#footnote-105)

**Example of a cell antenna with adverse impacts on a tree:**

A picture containing tree, sky, outdoor, grass

Description automatically generated

Red Oak Tree

August 2013[[106]](#footnote-106)



A tree in a park

Description automatically generated with low confidence

Same Red Oak Tree

August 2015[[107]](#footnote-107)

Sparse foliage on the left side facing the cell antenna

Photo credits:

Photos and RF measurements by Cornelia Waldmann Selsam

Additional photos by Alfonso Balmori, Helmut Breunig, Örjan Hallberg,

Volker Schorpp and Monika Schuberth Brehm

New York State forests are instrumental for maintaining air quality, preserving habitat for wildlife and providing cover for fish habitats. In fact, a state agency working group tasked with implementing the goals of the Community Leadership and Community Participation Act (CLCPA) is depending on NY’s forests to serve as a carbon sink for greenhouse gases. This hoped for carbon sequestration from trees is not likely to occur if trees are damaged or die from the proliferation of wireless infrastructure. With the advent of wireless infrastructure installations in the UDC, many trees are likely to be damaged, making the forests less able to absorb greenhouse gases.

Similar scenarios as above of hazards to wildlife, bees and trees would be incompatible with Guidelines’ Principle B, to provide for the “protection and preservation of natural resources.”

**THE FCC AND RF RADIATION EMISSION LIMITS**

It is important to note that the FCC does not monitor cell towers to determine if they are in compliance with FCC emission limits. Only when they receive a complaint will they investigate, placing the onus on the public, thereby exercising no meaningful oversight over the levels of RF radiation to which the general public is exposed. The FCC’s website states in its FAQ section in response to “Does the FCC Routinely Monitor Radiofrequency Radiation From Antennas?”:

“***The FCC does not have the resources or the personnel to routinely monitor the exposure levels due at all of the thousands of transmitters that are subject to FCC jurisdiction.*** However, while there are large variations in exposure levels in the environment of fixed transmitting antennas, it is exceedingly rare for exposure levels to approach FCC public exposure limits in accessible locations. ***In addition, the FCC does not routinely perform RF exposure investigations unless there is a reasonable expectation that the FCC exposure limits may be exceeded.***”[[108]](#footnote-108) [Emphasis added]

In contrast to the FCC’s claim of rare violations of compliance with its limits, a group of RF engineers who “examined thousands of cell sites in various municipalities in the U.S., … found that ***one in 10 were non-compliant with FCC limits***.[[109]](#footnote-109) It was reported that “six engineers examined more than 5,000 sites during safety audits for carriers and local municipalities.”[[110]](#footnote-110) It was also reported that the FCC had issued “just two citations to cell carriers since adopting the rules in 1996” with penalties amounting to only $50,000 in the last 25 years.[[111]](#footnote-111) An engineer commented that “[i]t’s like having a speed limit and no police.”[[112]](#footnote-112) These non-compliance results are particularly noteworthy since the audit examined compliance with FCC limits for occupational workers which is five times higher than otherwise permitted for the public.[[113]](#footnote-113)

Once the FCC receives a non-compliance report, it is not clear how long the FCC has to reply and rectify the situation. When a non-compliance report was issued by one of these engineers to the FCC in a separate audit, the FCC had not yet replied even a year after the report was submitted.

In addition, the FCC does not require that a cell tower less than 200 feet be registered with the FCC, which appears to be a vast majority of cell towers. Consequently, there is no database of cellular antennas which the safety and health director of the Mechanical Workers Association of America representing 270,000 workers had requested of the FCC as far back as 2014.[[114]](#footnote-114) This lack of regulatory oversight is further underscored by the remand and rebuke that the FCC received from the Court of Appeals for the D.C. Circuit in August of 2021 on its outdated “safety” emission limits dating back to 1996 when the TCA was first enacted. Now a year later, the FCC has done nothing to update those limits. Although the FCC has sole jurisdiction in setting RF emission limits that purport to protect safety, it asserts that it is not a “health” agency.[[115]](#footnote-115)

Further on the Court’s remand order, the Court called out the FCC for acting in an **“*arbitrary and capricious*”** manner in ***“its complete failure to respond to comments concerning environmental harm caused by” RF radiation below the current FCC emission limits.***[[116]](#footnote-116) Those comments in the FCC docket consisted of 11,000 pages of scientific studies of proven biological harms and substantial anecdotal evidence of people’s injuries, from RF radiation. The Court continued to admonish the FCC:

*"....That failure undermines the Commission’s conclusions regarding the adequacy of its testing procedures,* ***particularly as they relate to children****, and its conclusions regarding the implications of long-term exposure to RF radiation, exposure to RF pulsation or modulation, and the implications of technological developments that have occurred since 1996,* ***all of which depend on the premise that exposure to RF radiation at levels below its current limits causes no negative health effects.*** *Accordingly, we find those conclusions* ***arbitrary and capricious*** *as well.” [Emphasis added.]*

“***The factual premise—the non-existence of non-thermal biological effects—underlying the current RF guidelines may no longer be accurate***.”

As scientists have warned, the “safety” limits protect industry, not people, since harmful health effects can occur well below those limits.[[117]](#footnote-117) To underscore the point, Senator Blumenthal of Connecticut established during Senate testimony by telecommunications executives in 2019 that there has been no safety testing of “5G” cells.[[118]](#footnote-118)

The Second Circuit (whose jurisdiction includes New York) in 1999 upheld the denial of a permit to install cell towers when it reaffirmed the obligation of a planning board “to deny a site plan that does not satisfy SEQRA's substantive and procedural requirements.”[[119]](#footnote-119) SEQRA is the State Environmental Quality Review Act. However, there has been no environmental review of “5G” deployment under SEQRA.[[120]](#footnote-120) New York City is a prime example of the kind of densification that can be expected with “5G” cell sites, e.g., as little as 10-15 feet away from the windows of the homes of residents, or over rooftops.[[121]](#footnote-121)

The FCC does not monitor wireless infrastructure installations as the TCA has reserved that to local government. That makes local government the **first and only line of defense to protect the safety and health of its residents and to protect its natural resources**.

There are two types of entities generally involved in wireless installations, wireless providers and site developers. Wireless providers provide personal wireless services. [[122]](#footnote-122) Site developers are private, for-profit companies engaged in the business of constructing wireless facilities, and then leasing space or capacity to the wireless carriers.[[123]](#footnote-123) Site developers generally choose locations that are the least expensive, regardless of any potential adverse impacts to nearby lands, properties or homes, and then seek to convince local officials that they lack authority to counter them, which is the exact opposite of the very authority that Congress reserved to local authorities.

Site developers have been known to construct towers without permit approvals. In the case of a Long Island couple, the workers lied and said they were installing a lamp post in their front yard, only to have the couple come home one day to a 40-foot cell tower in their front yard.[[124]](#footnote-124) The town of Brookhaven ordered its prompt removal. Apparently, the same site developer which installed the tower had installed nine other towers elsewhere which would also need to be removed.[[125]](#footnote-125)

**ADVERSE IMPACTS ON PUBLIC HEALTH**

RF radiation can produce adverse health outcomes in vulnerable populations such as children, pregnant women and the elderly, and for the unsuspecting public who have not been informed of potential health hazards of RF radiation.

As reported by a pre-eminent scientist, Dr. Beatrice Golomb, who conducted a study on the effects of RF radiation, the common refrain is that people were either not aware of, did not hear about, or gave no credence to any possible health hazards connected to wireless infrastructure, until they themselves were injured. [[126]](#footnote-126)

There have been numerous reports of adverse health effects from RF radiation and cell towers that have been placed in close proximity to people, either at their residences, businesses or other areas which they frequent.[[127]](#footnote-127) The relevance of this for the UDC is that cell towers placed in the UDC can have similar effects for any residents or visitors seeking to continue to partake in the recreational activities that the UDC offers.

Public exposure to RF radiation is chronic – 24/7, 365 days a year. Therefore, there is an entire spectrum of conditions produced ranging from neurological and immunological disorders to DNA damage (a precursor to cancer).

Dr. Golomb,[[128]](#footnote-128) conducted a survey on RF radiation exposure whereby hundreds participated.[[129]](#footnote-129) She observed that, although prior to their exposure they had no problem navigating in the world, after exposure their access to basic services such as hospital care, post offices and libraries became restricted. As a result of their injuries, they reported their condition cost them up to 2 million dollars, many lost their homes, and “a number became homeless and have swelled the ranks of so-called ‘EMF refugees.’” [[130]](#footnote-130) Many had been high-functioning individuals, such as engineers, doctors and lawyers. She further states that:

“***The best and the brightest are among those whose lives – and ability to contribute to society –will be destroyed.*** High profile individuals with acknowledged electrohypersensitivity include, for instance, ***Gro Harlem Brundtland*** – the former 3-time Prime Minister of Norway and former Director General of the World Health Organization; [and] ***Matti Niemela,*** former Nokia Technology chief … ” [[131]](#footnote-131) [Emphasis added]

Dr. Golomb further explains the plight of those unwittingly injured by RF radiation, that:

“their problems arose ***due to actions of others, against which they were given no control*** – and can be reversed, in most cases, if the assault on them is rolled back.” [[132]](#footnote-132)

In the case of a 59 year old social worker, she was found to be permanently disabled from exposure to RF radiation by her medical practitioner:

“***Mrs. Burns has a medical condition that renders her permanently incapable of undertaking any gainful work.*** There currently are no treatments available for her condition; avoidance of emissions is the only way to significantly reduce her symptoms.”[[133]](#footnote-133) [Emphasis added.]

Unfortunately, because this condition is not commonly understood, Mrs. Burns commented on the unrelenting discrimination that she has been exposed to:

“I have worked in Health and Social Care for 35 years, supporting some of the most disabled and vulnerable members of our society and advocating to ensure their rights have been upheld. ***To have been on the receiving end of societal prejudice, discrimination, ignorance and misunderstanding, has been devastating.***”[[134]](#footnote-134) [Emphasis added.]

**RF Radiation Effects on Children**

Children are particularly vulnerable and are adversely affected by RF radiation in their environment, homes and schools.[[135]](#footnote-135) A special risk factor has been identified for children “due to their smaller body mass and rapid physical development, both of which magnify their

vulnerability to known carcinogens, including radiation.”[[136]](#footnote-136) The American Academy of Pediatrics has pointed out that children are disproportionately affected by cell phone radiation due to their lower bone density and amount of fluid in the brain allowing for absorption of greater quantities of RF radiation than in adults.[[137]](#footnote-137)

Children absorb more RF radiation than adults, and fetuses are at even greater risk.[[138]](#footnote-138) Children’s “brain tissues are more absorbent, their skulls are thinner and their relative size is smaller.”[[139]](#footnote-139) RF radiation penetrates more deeply into the skulls of children compared to adults,[[140]](#footnote-140) as shown below in cell phone usage.[[141]](#footnote-141)

Graphical user interface, application

Description automatically generated

Source: Exposure limits: the underestimation of absorbed cell phone radiation, especially in children, Gandhi, Morgan, Augusto de Salles, Han, Heberman, Davis, October 14, 2011.[[142]](#footnote-142)

Exposure to RF radiation “can result in degeneration of the protective myelin sheath that surrounds brain neurons” and “[d]igital dementia has been reported in school age children.”[[143]](#footnote-143) It also increases the risk of childhood leukemia.[[144]](#footnote-144)

There are also neurological implications to RF radiation exposure for children.[[145]](#footnote-145) Cell towers near schools and Wi-Fi in schools are potentially hazardous to children.[[146]](#footnote-146)

* Elementary school children who were exposed to high levels of RF radiation generated from mobile phone base stations 200 meters from their schools “had a significantly higher risk of type 2 diabetes mellitus” than those exposed to lower RF radiation.[[147]](#footnote-147)

* Adolescent school children who were exposed to high levels of RF radiation generated from mobile phone base stations within 200 meters from their schools had “delayed fine and gross motor skills, spatial working memory and attention” than those exposed to lower RF radiation.[[148]](#footnote-148)
* A ten-year old child testified of his cardiac condition being caused by exposure to RF radiation in a library where he was being tutored.[[149]](#footnote-149)

RF radiation “… has toxic effects in pregnancy, to the fetus and subsequent offspring … and is tied to developmental problems in later life, including attention deficit and hyperactivity.”[[150]](#footnote-150)

Children born of mothers who used cell phones during pregnancy developed more behavioral problems by school age than those whose mothers did not use cell phones during pregnancy, with the following results: “25% more emotional problems, 35% more hyperactivity 49% more conduct problems and 34% more peer problems.”[[151]](#footnote-151) A study involving 24,499 children found a 23% increase of emotional and behavorial difficulties.[[152]](#footnote-152)

Altered neural development *in utero* was found in an animal study, RF radiation exposure altered fetal brain development, and similar to the children, showed hyperactivity and impaired memory.[[153]](#footnote-153) In 2012, a study of newborns cared for in high RF radiation incubator environments found that they had disrupted melatonin levels, and had adverse heart variability similar to adults.[[154]](#footnote-154) Incidentally, altered fetal development and cardiovascular changes was already documented by a report of the U.S. Naval Medical Institute as early as 1971 (see “Settled Science” section).

A young child testified at a Sacramento, CA City Council meeting regarding a cell tower that was installed outside the bedroom where she and her sibling slept.[[155]](#footnote-155) The mother continued the testimony, and said that soon afterward, they were injured with flu-like symptoms which persisted for two months until the family realized that RF radiation was the cause. They installed metal shielding on the house to deflect the cell tower’s RF radiation. From a real estate perspective, they would have to leave their “dream” home and try to sell it, although most likely at a devalued amount because of its proximity to the cell tower.

It was found that a study examining “risk of glioma and acoustic neuroma stratified by age at first exposure to cell phones found the highest odds ratios among those first exposed before age 20 years.”[[156]](#footnote-156)

A cautionary note from Dr. Golomb,:

“… if you have a child, or a grandchild, his sperm, or her eggs (all of which she will already have by the time she is a fetus in utero), will be affected by the oxidative stress damage created by the electromagnetic radiation, in a fashion that may affect your future generations irreparably.”[[157]](#footnote-157)

Incidentally, scientists and doctors warn that “[c]hildren should not use wireless devices except in the case of emergencies, or be exposed on an involuntary and chronic basis to wireless in their living, sleeping or learning environments.”[[158]](#footnote-158)

Technology executives already appear to heed this caution. In an article, “*Why Tech Leaders Don't Let Their Kids Use Tech*,”[[159]](#footnote-159) it’s reported that technology executives restrict or forbid their children’s use of the very technology that they are providing to the public, including “the makers of smartphones and tablets, of social media channels and game boxes.” Reported examples have included technology “titans” such as former Apple’s Steve Jobs and Bill and Melinda Gates have admitted to placing restrictions on their children’s use of technology. Chris Anderson, former Wired magazine editor and CEO of 3D Robotics, said that his kids “accuse me and my wife of being fascists and overly concerned about tech, and they say that none of their friends have the same rules. That’s because we have seen the dangers of technology firsthand. I’ve seen it in myself, I don’t want to see that happen to my kids.”[[160]](#footnote-160)

**RF Radiation Effects on Women**

Some studies show that RF radiation appears to disproportionately affect women. For example, respondents to participate in two studies in Finland and Japan were 80.9%[[161]](#footnote-161) and 95%[[162]](#footnote-162) women, respectively. The women reported sleeping disorders, fatigue, headaches, and difficulty in concentration, memory and thinking.

**RF Radiation Effects on Firefighters**

Functional brain scans were conducted on six firefighters in California who had been working for up to five years in fire stations with cell towers and showed abnormal brain activity with the following results:

“… slowed reaction time, lack of focus, lack of impulse control, severe headaches, anesthesia-like sleep, sleep deprivation, depression, and tremors.”[[163]](#footnote-163)

Another symptom experienced by the firefighters has been an inability to wake up for 911 emergency calls.

“***Firefighters have reported getting lost on 911 calls in the same community they grew up in, and one veteran medic forgot where he was in the midst of basic CPR on a cardiac victim and couldn’t recall how to start the procedure over again…Prior to the installation of the tower on his station, this medic had not made a single mistake in 20 years.”***[[164]](#footnote-164)

The International Association of Firefighters stated their position since 2004 that they “oppose the use of fire stations as base stations for towers and/or antennas for the conduction of cell phone transmissions” until there is proven evidence of their safety.[[165]](#footnote-165) They refer to a multitude of scientific studies showing evidence of health effects from RF radiation.

***“****Firefighters have long contended they are willing to risk their lives for their fellow citizens;* ***they are unwilling to risk deadly consequences as a result of living with cell towers on their stations in order to facilitate corporate profits.”[[166]](#footnote-166)***

What if firefighters working with cell towers on or near their fire stations could not remember where the fire was that they were supposed to respond to? As recounted above, this has already occurred. Will there be a growing number of electro-magnetically sensitive and disabled firefighters? If the UDC has a fire, will the firefighters be able to find it? This is not only placing firefighters at risk, but also the residents, visitors and the flora and fauna of the UDC.

**Common Symptoms of RF Radiation Sickness**

Common symptoms directly associated with RF radiation exposure include sleep disturbances, chronic fatigue, chronic pain, poor short-term memory, loss of immediate memory, difficulty concentrating (e.g., “brain fog”), mood disturbances (depression/ anxiety), skin problems (including skin lesions), dizziness, balance disorder, loss of appetite, heart palpitations, tremors, vision problems, tinnitus, nose bleeds, asthma, nausea, reproductive problems and headaches, among others.[[167]](#footnote-167) The symptoms are from the physiological injuries that individuals have sustained.[[168]](#footnote-168)

Those suffering injuries from exposure to RF radiation are known as having electromagnetic sensitivity (EMS), radiation poisoning or microwave sickness[[169]](#footnote-169) or radiation sickness. Therefore, those with symptoms from these injuries are referred to as “EMS sensitive,” and those with severe symptoms are referred to as “EMS disabled” (hereinafter, collectively, “EMS disabled”).

To be clear, having EMS is not about sensitivity, rather, it involves severe physiological injuries directly associated with pulsed RF radiation exposure which is known to produce adverse health outcomes.[[170]](#footnote-170) These injuries can give rise to “impairment[s] that substantially limit[] one or more major life activities” under the Americans with Disabilities Act.[[171]](#footnote-171)

There is a large, diverse and growing group of EMS sensitive and EMS disabled who suffer significant injuries from exposure to RF radiation from wireless base stations, cell towers, “5G” cells, “smart” utility meters, and other telecommunications infrastructure and devices (hereinafter, collectively, “wireless infrastructure”) placed right next to their homes, businesses, schools, libraries, medical facilities and other public locations which are frequented by the public.

EMS involves severe physiological injuries directly associated with pulsed RF radiation exposure manifested as a constellation of symptoms.[[172]](#footnote-172) It is a “spectrum condition” ranging from discomfort to debilitation and life threatening impairments.[[173]](#footnote-173)

“A 2017 MRI (magnetic resonance imaging) study shows clear evidence of impaired blood flow in 10 electro-sensitive subjects.”[[174]](#footnote-174)

EMS symptoms have been legally recognized as functional impairments. Sweden has recognized EMS as a functional impairment.[[175]](#footnote-175) EMS also became recognized: (a) in 2002 by the U.S. Access Board (the federal agency devoted to accessibility issues for people with disabilities),[[176]](#footnote-176) (b) in 2007 by the Canadian Human Rights Commission,[[177]](#footnote-177) (c) in 2009 by the European Parliament and 2019 by the European Economic and Social Committee,[[178]](#footnote-178) and (d) in 2012 by the Austrian Medical Association which released its guidelines for diagnosis and treatment.[[179]](#footnote-179) Courts have awarded disability claims to people with electro-magnetic sensitivity in Australia,[[180]](#footnote-180) France,[[181]](#footnote-181) Spain,[[182]](#footnote-182) and United States.[[183]](#footnote-183)

Despite these facts, those who have been injured from RF radiation have been the unrelenting subject of discrimination that belittle and deny the debilitating physical injuries of RF radiation exposure.[[184]](#footnote-184) They have been subject to digital discrimination and algorithmic bias. Search results belittle and invalidate the sufferings of the EMS disabled. The following provides an insight into algorithmic bias:

“Digital discrimination entails treating individuals unfairly, unethically, or just differently based on their personal data that is automatically processed by an algorithm. Digital discrimination often reproduces the existing instances of discrimination in the offline world by either inheriting the biases of prior decision-makers, or simply reflecting widespread prejudices in society.”[[185]](#footnote-185)

For example, racial discrimination in digital technologies has been recognized as an emerging problem, with race being an algorithmic profiling factor.[[186]](#footnote-186) This kind of algorithmic bias also discriminates against the EMS disabled. When conducting a simple search on Google, for instance, most of the search results show a bias against individuals with EMS symptoms caused by RF radiation, despite settled scientific evidence to the contrary (addressed in the “Settled Science” section). However, the issue extends beyond algorithmic bias to misinformation on the Internet that disadvantages the EMS disabled.

Therefore, there is the risk of any wireless infrastructure installed in the UDC of creating a population of EMS sensitive and EMS disabled in the surrounding communities. There is also the risk of visitors, hikers and campers developing adverse health reactions to RF radiation from nearby cell towers. Wireless infrastructure in the UDC will make the UDC inaccessible for those already injured from RF radiation as they will not be able to avoid the radiation.

**Other Findings**

Studies have shown biologicial effects of RF radiation on healthy individuals from extremely low RF radiation frequencies.[[187]](#footnote-187) It was also found that whole body exposure to EMFs, which is exogenous, anthropogenic and artificial, distort the natural EMFs within our bodies, the former being polarized while the latter being non-polarized.[[188]](#footnote-188) This distortion results in adverse biological effects at the molecular level, such as the brain and heart, which can induce DNA strand breaks and fragmentation.[[189]](#footnote-189)

RF radiation exposure can also lead to blood-brain barrier leakage, damage to the immune system, chronic inflammation; impaired melatonin production and impaired blood flow to the brain.[[190]](#footnote-190)

A scientific report with over 100 medical citations concludes that the erratic wave signals of RF radiation are problematic because of “the perpetual change in frequencies and pulse modulations” which is “more biologically stressful than excessive heat, cold, starvation and toxic chemicals.”[[191]](#footnote-191) As humans, we generate our own natural electromagnetic wave forms to regulate biological functions. However, within minutes of RF radiation exposure, cells produce heat-shock proteins which “cascade into free radical formation, followed by drastic DNA damage, which precedes the eventual development of cancer.”[[192]](#footnote-192) [MICHELLE, DO YOU HAVE A SOURCE FOR THIS REPORT?]

A 2022 study confirms severe neurological effects of chronic exposure to RF radiation.[[193]](#footnote-193) It concluded that “chronic exposure of 2100-MHz frequency caused oxidative stress, which leads to neural damage and demyelination.” The exposure that was used in this study was only for 3 months at 4 hours a day, 5 days a week. In contrast, the exposure for the general population, including children, to RF radiation is cumulative and is generally 24/7, 365 days a year, exponentially higher than in the study.

Studies show that non-ionzing RF radiation, i.e., below the level of thermal (heating) effects is also known to increase oxidative stress and damage mitochondria.[[194]](#footnote-194) Oxidative stress is caused by an imbalance in cells caused by the accumulation of free radicals which interferes with the ability of cells to detoxify. Mitochondria are the energy producing mechanisms of cells. It has been found that the increase in oxidative stress and damage to mitochondria, along with many of the physiological injuries, are similar whether for ionizing or non-ionizing RF radiation.[[195]](#footnote-195)

The severity of the symptoms were shown to be based on dose-dependent exposure to RF radiation, meaning the higher the exposure, the worse the symptoms.[[196]](#footnote-196) As the CDC warns:

“As with other toxins, ‘***the dose makes the poison***.’ It is the radiation dose, or the amount of radiation, that is the critical issue in determining health consequences.”[[197]](#footnote-197) [Emphasis added.]

The dose given for ionizing radiation, such as X-rays and CT scans, tends to be time-limited and localized. ***In sharp contrast, the dose to which the public is exposed for non-ionizing, RFradiation, is constant at 24/7, 365 days a year, generally to the entire body, producing harsh health consequences***.

A quick example is when a “5G” base station had been installed on a rooftop and two individuals living in an apartment just below the rooftop developed, what the study referred to as, symptoms of microwave syndrome.[[198]](#footnote-198) After installation, the amount of RF radiation was, on average, 188 times greater than prior to installation, with the maximum peaks being over 1,000 times greater. Once they moved to a lower RF radiation environment, their symptoms decreased or disappeared. This is the first known study to test the safety of “5G.”

For an overall picture of dose-dependency, see the diagram below of resident responses living near a cell tower. The closer that people were to the tower, the more people who experienced symptoms.

Bar chart

Description automatically generated

Source: copied from <https://www.electricsense.com/emf-home-inspection/>. DOES ANYONE HAVE AN APPROPRIATE SOURCE FOR THIS GRAPH/CHART?

Similar scenarios as above of the risk of health hazards close to wireless infrastructure installations would be incompatible with Guidelines’ Principle B, to provide “for the protection of the health, safety, and welfare of residents and visitors” and Principle F, to maintain “existing patterns of land use and ownership,” particularly if one loses the use of one’s land as a result of constructive eviction, i.e., the inability to live in one’s home because it has become uninhabitable from exposure to RF radiation from nearby wireless infrastructure. One may still own his land, but he may not be able to live on it or use it for agriculture.

**The Settled Science on Adverse Health Effects of RF Radiation:**

**From Industry, FCC, FDA, Military, Scientists And Experts**

***“[W]e have … far exceeded the ‘level of proof required to justify action for health protection.’ The theory that non-ionizing RFR exposure could not cause cancer has been refuted using the scientific method.”[[199]](#footnote-199)***

Professor Tom Butler,

quoting Professor Rainer Frentzel-Beyme MD

**Industry’s Settled Science**

As early as April 2000, the ECOLOG Institute, which was commissioned by T-Mobil in Germany (parent company to T-Mobil in the U.S.), issued a report on its study of the risks of electromagnetic fields (EMFs) because of the rapidly expanding mobile telecommunications industry. The results were twofold: (1) findings of adverse health impacts associated with exposure to EMFs and (2) strong precautions and warnings to significantly lower the power of the EMFs to which the public would be exposed.[[200]](#footnote-200) The findings included risks of cancer (of the central nervous system and testicular cancer), leukemia, damage to the immune system and cognitive impairments. It found that for all stages of cancer development, power flux densities of less than 1 W/m2 were sufficient. “For some stages of cancer development, intensities of 0.1 W/m2 or even less may suffice to trigger effects.”[[201]](#footnote-201)

The Institute also provided precautions for vulnerable populations in “residential areas, schools, nurseries, playgrounds, hospitals and all other places at which humans are present for longer than 4 hours.”[[202]](#footnote-202)

In direct contradiction with its commissioned results, T-Mobile boldly states on its website 22 years later that, “[b]ased on scientific data currently available, T-Mobile has not determined that RF energy from wireless phones causes health risks.[[203]](#footnote-203)

However, the specific findings by the 2000 ECOLOG study that T-Mobile commissioned could not be clearer (quoting directly from the study, a translation from the original German version):

1. **Cancer:** “[e]lectromagnetic fields with frequencies in the mobile telecommunications range do play a role in the development of cancer. This is particularly notable for tumours of the central nervous system, for which there is only the one epidemiological study so far, examining the actual use of mobile phones. The most striking result of this study was an obvious correlation between the side at which the phone was used and the side at which the tumour occurred.”
2. **Leukemia:** “Higher risks were also demonstrated for several forms of leukaemia.”
3. **Testicular Cancer:** “The epidemiological findings for testicular cancer also need to be interpreted in conjunction with the results of the studies of fertility problems occurring in relation to high frequency electromagnetic fields.”
4. **Cellular Research & Cancer:** “The results of the studies for all stages of cancer development from the damage of the genetic material via the uninhibited proliferation of cells and debilitation of the immune system (see below) up to the manifestation of the illness prove effects at power flux densities of less than 1 W/m2. For some stages of cancer development, intensities of 0.1 W/m2 or even less may suffice to trigger effects.”
5. **Debilitation of the Immune System:** “Damaging effects on the immune system which can aid the development of illnesses were demonstrated in animal experiments at power flux densities of 1 W/m2 (mouse, exposure duration 6 days, 3 hours per day, SAR (mouse) 0.14W/kg). In *in vitro* experiments on lymphocytes, defects of the genetic material were demonstrated at power flux densities of circa 10 W/m2. The presence of stress hormones, which when permanent can debilitate the immune system, was found to be increased in human experiments from power flux densities of 0.2W/m2. In animal experiments (rat) a similar effect was observed at a Specific Absorption Rate of circa 0.2 W/kg.”
6. **Influences on the Central Nervous System and Cognitive Function:** “Effects of high frequency electromagnetic fields on the central nervous system are proven for intensities ***well below the current guidelines***. Measurable physiological changes have been demonstrated for intensities from 0.5 W/m2. Impairments of cognitive functions are proven for animals from 2W/m2.”
7. **Electrosensitivity or Electromagnetic Hypersensitivity:** “The sensitivity manifests in a variety of symptoms including: nervous symptoms such as sleep disturbances, headaches, exhaustion, lack of concentration, irritability, anxiety, stress, cardiovascular complaints, disruptions of hormones and metabolism, skin complaints. The composition and strength of the complaints varies enormously in different individuals.”

The ECOLOG Institute then went on to emphasize the importance of developing:

“a strategy for the research of the electrosensitivity phenomenon and its incidence, ***which would acknowledge the failure of traditional scientific methods to address the problem and allow the inclusion of the data available from the self-help groups and associations of the affected.”*** [Emphasis added].

The ECOLOG study recommended that when the risk is impossible to estimate, precautionary health measures must be implemented:

“If a security factor of 10 is applied to this value, as it is applied by ICNIRP [International Commission on Non-Ionizing Protection] and appears appropriate given the current knowledge, the precautionary limit should be 0.01W/m2. This should be rigorously adhered to by all base stations near sensitive places such as residential areas, schools, nurseries, playgrounds, hospitals and all other places at which humans are present for longer than 4 hours.”

**Federal Communications Commission (FCC)**

The FCC admitted in 2019 that some low-level RF radiation can cause instantaneous, non-thermal adverse effects with RF radiation frequencies ranging between 3 KHz and 10 MHz.[[204]](#footnote-204) The FCC

noted that “[a]dverse neural stimulation effects…include acute effects such as perception of tingling, shock, pain, or altered behavior due to excitation of tissue in the body’s peripheral nervous system.” 34 FCC Rcd at 11743-11744, ¶122 n.328.[[205]](#footnote-205)

**Food and Drug Administration (FDA)**

Linda Birnbaum, Ph.D., former Director of the U.S. NIEHS and former Director of the National Toxicology Program (NTP) spanning across the Department of Health and Human Services organizations which involves NIH, FDA and CDC, has stated:[[206]](#footnote-206)

* ***“Effects from [wireless] radiofrequency radiation (RFR) such as genetic toxicity, immunotoxicity, oxidative stress, changes in gene and protein expression, changes in cell differentiation and proliferation, and increased permeability of the blood brain barrier were reported ...” (pg. 8).***
* ***“The phase I [NTP] studies established that non-thermal levels (<1oC or no detectible change in temperature) of RFR exposure had toxicological implications in biological systems.” (pg. 9).***
* ***“The NTP found and published evidence of DNA damage after only 90 days of exposure.” (pg. 9).***
* ***“Overall, the NTP findings demonstrate the potential for RFR to cause cancer in humans. The independent peer review of the entire proceedings carried out by toxicologists, pathologists and statisticians independent of the NTP staff conducted March 26-28, 2018, concluded that there was ‘clear evidence of cancer,’…exposure to RFR is associated with an increase in DNA damage.” (pg. 11).[[207]](#footnote-207)***

**Note:** NTP refers to the National Toxicology Program. The FDA commissioned a $30 million study by the NTP to determine if RF radiation was harmful. [[208]](#footnote-208) The NTP is the premier institute in the U.S. to conduct toxicology studies to evaluate potential harm to human health. The NTP concluded substantial harm as noted above by Dr. Birnbaum. The results have been replicated by the prestigious Ramazzini Institute using exposures even lower than those used in the NTP study (60 to 6,000 times lower, as generated by 1.8 GHz GSM antennae of cell phone radio base stations[[209]](#footnote-209)), thereby simulating emissions from cellular base stations and wireless transmitters. Both studies showed serious risk of RF radiation exposure to human health.

**U.S. Naval Medical Research Institute**

As early as 1971, the U.S. Naval Medical Research Institute (NMRI) published a report which summarized the findings of over 2300 scientific studies which included thermal (ionizing) and non-thermal (non-ionizing), biological hazards of RF radiation. The NMRI updated its work in 1976 and published a bibliography of 3,700 scientific papers on the biological hazards of RF radiation.[[210]](#footnote-210) With respect to otherwise non-thermal, non-ionizing, RF radiation, the NMRI found, among many other things:[[211]](#footnote-211)

* “Oxidative process change (a precursor for DNA strand breaks and ultimately cancer)
* Decreased fertility
* Altered fetal development
* Muscle contraction
* Cardiovascular changes
* Altered menstrual activity
* Liver enlargement.”

Other military experts have found that RF radiation is hazardous.[[212]](#footnote-212) Declassified reports dating back to the 1970s document serious biological effects of non-ionizing RF radiation, including from the U.S. Army Medical Intelligence and Information Agency Office of the Surgeon General, CIA and NASA. [[213]](#footnote-213)

**Facts and Statements by U.S. Preeminent Scientists and Experts**

**In the Area of RFR Research**

As shown by the following facts and statements by the United States’ preeminent scientists and experts in the area of wireless RF radiation research, it has become well established that wireless radiation exposure produces or has the recognized potential of producing biological effects.[[214]](#footnote-214) See also Appendix B for a more comprehensive list of scientific studies.

1. In 2011, the World Health Organization’s (WHO) International Agency for Research on Cancer (IARC) classified wireless radiation as a Group 2B possible carcinogen.[[215]](#footnote-215) This conclusion was based upon an increased risk of malignant brain cancer (glioma) identified in those who used cell phones for over 10 years for an average of 30 minutes per day.

Anthony B. Miller, M.D., Senior Epidemiologist, IARC, states in a 2018 updated assessment to the 2011 IARC classification of wireless radiofrequency radiation (RFR), “***When considered with recent animal experimental evidence, the recent epidemiological studies strengthen and support the conclusion that*** ***RFR should be categorized as carcinogenic to humans (IARC Group 1)*.** [[216]](#footnote-216)

1. “Since 2011, the scientific evidence linking wireless to cancer has significantly increased and today several published reviews conclude that the current body of evidence indicates cell phone radiation is a proven Group 1 human carcinogen ([Miller et al 2018](https://www.sciencedirect.com/science/article/abs/pii/S0013935118303475?via%3Dihub), [Peleg et al 2018](https://pubmed.ncbi.nlm.nih.gov/29433020/) [Carlberg and Hardell 2017](https://www.hindawi.com/journals/bmri/2017/9218486/), [Belpomme et al 2018](https://www.sciencedirect.com/science/article/abs/pii/S0269749118310157?via%3Dihub)).” [[217]](#footnote-217)

In fact, in 2019, “the majority of independent researchers … have called for nonionizing microwave radiation to be reclassified as a Class 1 carcinogen, along with cigarette smoke.”[[218]](#footnote-218) By independent researchers is meant those who are not funded by industry and therefore would not have a conflict of interest in reporting results and providing transparency.[[219]](#footnote-219) Laboratory and epidemiological evidence was collected during the ensuing 8 years since 2011, whereby an Advisory Group of 29 scientists from 18 countries recommended that the IARC prioritize non-ionizing RFR to reclassify it as a Class 1 carcinogen.[[220]](#footnote-220)

1. Christopher J. Portier, Ph.D., former director of the National Center for Environmental Health at the Centers for Disease Control and Prevention (CDC) and a scientific advisor for the WHO, reviewed the most recent body of scientific research and literature to look at the feasibility of RFR causing specific brain tumors in humans and concluded in March, 2021:

* "***Given the human, animal and experimental evidence, I assert that, to a reasonable degree of scientific certainty, the probability that RF exposure causes gliomas and neuromas is high****.*" [[221]](#footnote-221)

1. Ronald Melnick, Ph.D., retired NIEHS senior toxicologist who won the American Public Health Association’s 2007 David P. Rall Award for public health advocacy and led the design of the NTP study[[222]](#footnote-222) states:

***“I strongly feel health and regulatory agencies should promote policies that reduce cell phone radiation exposure, especially for children and pregnant women. The agencies in the U.S. say, “if you are concerned” [placing the burden on the individual] rather than “we are concerned.” Agencies should be clear and straightforward educating the public on “here is what you should do.”***

***“The risk can be greater for children than adults due to the increased penetration of the radiation within brains of children and the fact that the developing nervous system is more susceptible to tissue damaging agents."*** [[223]](#footnote-223)

1. The American Academy of Pediatrics, a non-profit professional organization of 60,000 primary care pediatricians, pediatric medical subspecialists, and pediatric surgical specialists, stated in a letter to the FCC on July 12, 2012:

***“Children … are not little adults and are disproportionately impacted by all environmental exposures, including cell phone radiation. In fact, according to IARC, when used by children, the average RF energy deposition is two times higher in the brain and 10 times higher in the bone marrow of the skull, compared with mobile phone use by adults.”[[224]](#footnote-224)***

1. Professor David Carpenter, MD,[[225]](#footnote-225) a founder and former Dean of the School of Public Health at University of Albany, New York, is co-editor of the Bio-Initiative Report, a peer-reviewed scientific compendium of approximately 2,000 scientific studies by independent expert scientists on RF radiation health effects.[[226]](#footnote-226) The Report concludes that adverse biological effects occur at RF radiation levels far below FCC emission limits.[[227]](#footnote-227) These studies show that RF radiation exposure from cell towers increase cancer risk, cause changes in hormones, oxidative stress, neurological effects and symptoms of electrosensitivity such as headaches, fatigue, “brain fog,” and tinnitus. Various journals have published additional chapters of the Report.[[228]](#footnote-228)

Indeed, the Report states that biological effects occur within just minutes of exposure to RF radiation sources, such as cell phones, Wi-Fi, “smart” meters or cell towers, and that chronic or prolonged exposure to cell towers can result in illness. The reason is that RF radiation sources:

***“interfere with normal body processes (disrupt homeostasis), prevent the body from healing damaged DNA, produce immune system imbalances, metabolic disruption and lower resistance to disease across multiple pathways. Essential body processes can eventually be disabled by incessant external stresses (from systemwide electrophysiological interference) and lead to pervasive impairment of metabolic and reproductive functions.”[[229]](#footnote-229)***

The Report forms the basis for recommendations for biologically-based exposure guidelines based on the “lowest observed effect level” for RF radiation exposure.[[230]](#footnote-230) It also found that “[p]ublic safety standards are 1,000 – 10,000 or more times higher” than levels where biological effects are reported to occur from cellular base stations.[[231]](#footnote-231) It recommends “[a] precautionary limit of 0.1 [microwatts per square centimeter] (which is 0.614 Volts per meter) for cumulative RF exposure” although it cautions that even lower limits may be required in the future.[[232]](#footnote-232)

1. New Hampshire formed a State Commission to examine whether wireless radiation is harmful to human health. **The majority of that New Hampshire State Commission came to the conclusion that exposure to wireless radiation at levels below the FCC emission limits is harmful to human health and the environment.** The commission was convened through bipartisan legislation[[233]](#footnote-233) that was signed by the governor. Commission membership included unbiased experts in fields relating to health and radiation exposure, and they issued their Final Report in November 2020.[[234]](#footnote-234)

**Prevalence of Symptoms from Radiation Sickness**

The U.S. Access Board (which advises the Justice Department and other state and federal agencies under the Americans with Disabilities Act) notes that a U.S. National Institute of Building Sciences survey of a representative region found that 2-6% of the population are sensitive to electro-magnetic fields.[[235]](#footnote-235) There are other sources showing the proliferation of EMF sensitivities and disabilities.[[236]](#footnote-236)

A 2019 Bevington study[[237]](#footnote-237) analyzed the prevalence of symptoms from radiation sickness within the population:

0.65% Can’t work

1.5% Severe symptoms

5.0% Moderate symptoms

30.0% Mild symptoms

Based on a population of 19.8 million people in NYS,[[238]](#footnote-238) the numbers are high:

|  |  |
| --- | --- |
| **Percentages** | **Number of EMF Disabled in NYS** |
| Can’t work – 0.65% | 128,700 |
| Severe symptom – 1.5% | 297,000 |
| Moderate symptoms – 5% | 990,000 |
| Mild symptoms – 30% | 5.94 million |

There may be adverse implications for the economy and workforce as more people become affected by exposure to RF radiation.

With each new “generation” of wireless technology, people are being further exposed to RF radiation which they cannot avoid.[[239]](#footnote-239) You can hear directly from grassroot communities and the health problems that they have been experiencing from RF radiation.

**New York Police Lieutenant**

A police lieutenant living in Astoria, Queens suffered injuries from wireless transmitters installed in front of his front yard in NYC. He was otherwise healthy before exposure to radiation from the wireless transmitters, which caused him to suffer from heart arrhythmias and sleep deprivation. He underwent invasive medical cardiac procedures where the doctors found his condition could not be replicated in their offices away from the source of RF radiation. When he realized that his condition improved away from his home, he was compelled to evacuate his own home to live elsewhere in a safer environment, while still shouldering the financial burden of a substantial mortgage on his original house.

**Retired Actress and Showroom Model in New York**

An 84-year-old elderly woman suffered injuries from wireless transmitters placed on the rooftop of her apartment building directly over her ceiling. She suffered from severe radiation sickness for 2 years: *severe tinnitus, bilateral hearing loss, sleep deprivation, severe headaches, irritable bowel syndrome and persistent nausea and vomiting.* She could not find refuge anywhere in her studio apartment, where she had lived happily for 45 years. In her own words at the time, “It’s brutal.” She, therefore, had to evacuate her home of 45 years, but could not find a low-income housing alternative which trapped her in a toxic zone, suffering daily. Despite repeated attempts to receive accommodation, she was denied accommodation or ignored.

Her doctor, in confirming the woman’s symptoms to the building’s management, also noted that she happened to have other patients in the same building complaining of similar symptoms after the placement of wireless transmitters on the rooftop. About 150 tenants in her building (either having symptoms or supporting those with symptoms) complained of the rooftop transmitters in a letter to elected officials. They were also ignored.

**Residents in Apartment Building in New York**

A man with throat cancer had readings taken in his apartment of RF radiation levels. It was found that there were high levels of RF radiation within his bedroom. Upon further inspection, the source of the RF emissions was found to be outside, one block diagonally across the street. There was an antenna farm on a five-story group of buildings beaming directly into the area of his building and bedroom. There were nine apartments with bedrooms located in the same corner of the building. Residents of eight of those apartments had cancer and a resident of the ninth apartment had three miscarriages.[[240]](#footnote-240)

**Families in Pittsfield, Massachusetts**

The most striking example has been occurring in Pittsfield, MA, in a small town nestled in the Bershires. Seventeen individuals became ill when a wireless cell tower, placed at the end of their street, became activated in August 2020.[[241]](#footnote-241) It is a 115-foot tall, 12-antenna cell tower. Many evacuated their homes and have had to pay for an extra residence that is safer, while maintaining their homes in Pittsfield. The others who could not afford to evacuate their homes have been suffering in their homes or sleeping in tents away from their homes. Children were vomiting in their beds. Their neighborhood became a toxic zone. These individuals want to return to their homes and to their lives prior to the installation of the tower with which they have been suffering for two years. A cease and desist order was issued by the Board of Health to Verizon which spelled out in great detail the suffering and the science on the dangers of RF radiation.[[242]](#footnote-242)

**Residents of Treasure Valley, Idaho**

A long-time resident of Treasure Valley, Idaho observed that “5G” was activated in late 2020 with its high-power beam forming technology. Soon thereafter, he had attacks of atrial fibrillation,[[243]](#footnote-243) went to emergency room 11 times because of it, and ultimately had to have heart surgery to treat it which cost $150,000. Someone with atrial fibrillation is five times more likely to suffer from a stroke than someone with a regular heartbeat.[[244]](#footnote-244) He stated that:

“[w]hen Macro Cell Towers are communicating with each other for an extended period of time ***using a focused beam of energy, people like myself are caught in this energy beam and thrown into tachycardia***… Some of the Macro Cell Towers in the Treasure Valley are too low to the ground and transmitting excessive power as they communicate, causing myself and others in the Treasure Valley to experience acute onset Atrial Fibrillation, Tachycardia, Atrial Flutter.”[[245]](#footnote-245) [Emphasis added]

In fact, he has observed a large cluster of residents in his area who were also experiencing similar symptoms within the same time period; he was recently surprised to find that his doctor’s office has a 1-1/2 year waiting list for Afib surgeries:

“[h]igh numbers of otherwise healthy adults are experiencing irregular and rapid heart rates, Atrial Fibrillation, Tachycardia, Atrial Flutter at younger ages than would historically be expected …”

**Wireless is Not Clean Energy**

Industry refers to RF radiation as a pollutant, and insurance companies view RF radiation as a high risk category, declining to provide any coverage for personal injury arising from RF radiation, and providing standard exclusions for such injury in their insurance policies. The high carbon emissions for powering wireless infrastructure, the erratic pulsating nature of RF radiation and its potential production of dirty electricity also contribute to the pollution emanating from wireless infrastructure.

Industry Refers to RF Radiation as a Pollutant

That RF radiation is a pollutant is documented by the telecommunications industry in their consumer product protection plans for which they disclaim liability for personal injury from RF radiation. For example, an industry brochure for consumers for cell phone insurance protection states:

***"Pollutants means any … gaseous, or thermal irritant or contaminant including … artificially produced electric fields, magnetic field, electromagnetic field, sound waves, microwaves and all artificially produced ionizing or non-ionizing radiation ..***.”[[246]](#footnote-246)

This caveat emptor disclaimer is used to warn consumers that they are using RF radiation on their cell phones, at their own risk. Similar definitions for pollution are in the product protection plans for other telecommunications companies.[[247]](#footnote-247)

Industry and Insurers View RF Radiation as High Risk Potential

Annual reports from industry acknowledge the risk of litigation from personal injuries from RF radiation. For example, AT&T’s annual report states that:

“… we also face current and potential litigation relating to ***alleged adverse health effects on customers or employees who use such technologies including, for example, wireless devices***. We may incur significant expenses defending such suits or government charges and may be required to pay amounts or otherwise change our operations in ways that could materially adversely affect our operations or financial results.”[[248]](#footnote-248) [Emphasis added]

Verizon’s SEC Form 10-K also states a similar disclaimer.[[249]](#footnote-249)

There are standard insurance exclusions for personal injury liability from exposure to RF radiation, ***even for RF emissions that are compliant with FCC emission limits.*** Two of the largest insurance companies in the world (i.e., Lloyd’s of London and Swiss Reinsurance Company) have declined to insure telecommunications companies for any liability for personal injury that results from RF radiation exposures.[[250]](#footnote-250),[[251]](#footnote-251),[[252]](#footnote-252) Insurance companies, reviewing potential RF radiation injuries to the public from a risk analysis perspective, have assessed RF radiation as “high” risk by the insurance industry and is, therefore, excluded from coverage. The insurance industry acknowledges the high potential of claims of RF radiation injuries from the public arising from RF radiation exposure.

According to A. M. Best, “the largest credit rating agency in the world specializing in the insurance industry:”[[253]](#footnote-253) warns the insurance industry of potential and serious health risks, affirming the thermal effects of RF radiation:

“Dangers to the estimated 250,000 workers per year who come in close contact with cell phone antennas … are now more clearly established. ***Thermal effects of the cellular antennas, which act at close range essentially as open microwave ovens can include eye damage, sterility and cognitive impairments***. While workers of cellular companies are well trained on the potential dangers, ***other workers exposed to the antennas are often unaware of the health risks***.”[[254]](#footnote-254) [Emphasis added]

**Protecting the UDS From Electrosmog**

To maintain the pristine quality of the UDC, knowing what can contribute to environmental pollution in the UDC will help prevent it.

RF radiation emitted from wireless infrastructure is environmental pollution, also known as electrosmog. [[255]](#footnote-255) “ElectroSmog refers to all artificial, man-made or anthropogenic electromagnetic radiation created and present in our surrounding environment.”[[256]](#footnote-256) A pollutant can be radiation or sound wave, among other things, released into the environment with actual or potential adverse, harmful, unpleasant, or inconvenient effects.[[257]](#footnote-257) Electrosmog is a pollutant. Electrosmog is constant with no off switch. RF radiation from wireless infrastructure is emitted into the air on a 24/7 basis, 365 days a year, and contributes substantially to the production of carbon dioxide in the environment and, therefore, to climate change and global warming.

The lessons learned from other pollutants and toxins, such as asbestos, lead and smoking, indicate that the longer a government refuses to follow established science, the more deleterious it is for people’s health and the economy.

Electrosmog is a greenhouse gas and co-polluant, as those terms are defined in NYS law. The Community Leadership and Community Participation Act (CLCPA) § 75-0103(B)(7) defines “greenhouse gas” as

“carbon dioxide, methane, nitrous oxide … ***and any other substance emitted into the air that may be reasonably anticipated to cause or contribute to anthropogenic climate change***.” [Emphasis added.]

The CLCPA § 75-0103(B)(3) defines “co-pollutants” as ***“hazardous air pollutants produced by greenhouse gas emissions sources.”*** [Emphasis added.]

RF radiation is anthropogenic, and emissions from powering wireless infrastructure are expected to substantially increase the amount of greenhouse gases. It has been reported that the environmental footprint of the energy required to operate wireless infrastructure contributes more to global warming than it does in preventing it.[[258]](#footnote-258) More recently, energy consumption for wireless infrastructure has been reported at ten times that of fiber optics (with “5G” infrastructure requiring 2 to 3.5 times the energy needed for 4G towers).[[259]](#footnote-259) Energy consumption from “5G” infrastructure “***is expected to increase 61x between 2020 to 2030*** due to the energy demands of powerful network elements like massive MIMO[[260]](#footnote-260) and edge servers [and] the proliferation of 5G cell sites …”[[261]](#footnote-261)

As far back as 2013, it was predicted that the “wireless cloud” would produce “an increase in carbon footprint from 6 megatonnes of CO2 in 2012 to up to 30 megatonnes of CO2 in 2015, the equivalent of adding 4.9 million cars to the roads,” with up to 90% of this consumption “attributable to wireless access network technologies … ”[[262]](#footnote-262)

“The cloud is a metaphor for a shared pool of computing resources (e.g., networks, servers, storage, applications, and services) that end users can access, configure, and release on demand. Cloud services are hosted on servers that reside in data centers—centralized clusters of computers and supporting network, storage, and power resources. Some of these data centers are enormous in size and consume prodigious amounts of electricity.”[[263]](#footnote-263)

***IMPORTANT NOTE:*** Wireless emissions are typically measured by averaging the peaks and lowest points of RF radiation emissions and exposure levels over a period of 30 minutes. There are two problems with this methodology. First, it completely obscures the effects of the pulsating nature of RF radiation emissions and does not account for constant 24/7 exposure by the population to RF emissions. Second, the pulsating peaks are higher than the recorded average.[[264]](#footnote-264) Third, the health outcomes occur with the persistent pulsations of RF radiation emissions. It is the pulsed high peak power emissions that, e.g., increase the potential for traumatic brain injury.[[265]](#footnote-265) To obtain a more accurate reading of RF radiation emissions, the maximum power density and peak power density levels per millisecond should be recorded, as adverse health outcomes arise from the peaking and pulsating nature of wireless emissions.[[266]](#footnote-266)

Electrosmog also refers to the intensity, the erratic pulsating RF radiation emanating from wireless and the production of dirty electricity. Regarding intensity, and to put this in perspective, Martin L. Pall, PhD, Professor Emeritus of Biochemistry and Basic Medical Sciences, Washington State University, provided evidence in the FCC’s docket that the FCC’s existing RF exposure limits “are approximately 7.2 million times too high.”[[267]](#footnote-267) This is noteworthy as this was in connection with a federal case decided in 2021 by the D.C. Circuit, Court of Appeals, in which the Court rebuked the FCC and remanded the FCC’s emission limits for further consideration in light of scientific evidence which the FCC ignored that had been presented into the FCC’s docket of health hazards below those limits.

It is the pulsations of RF radiation that cause adverse health outcomes.[[268]](#footnote-268) (See “The Technology” section for further information on the nature of the pulsations.)

In addition, RF radiation from cell towers can produce dirty electricity. Samuel Milham, MD, MPH, and former senior epidemiologist at Washington State Department of Health, explains how transient voltages can be generated by cell towers:

"every cell tower has an inverter or switching power supply to change the grid AC to DC to run the microwave transmitter and to charge the backup batteries. These generate dirty electricity [kilohertz pollution] which flows back into the grid."[[269]](#footnote-269)

Alasdair Philips, an E.U. electrical and electronics engineering expert, cautions that

“cell tower antennas sited close to electrical generation stations and power lines can couple with and flow through the transmission lines, even in some cases ***creating dangerous standing RF waves*** along those transmission lines” which can “resonate with house wiring, causing high fields inside houses, often from lights which hang from the ceilings, the radio frequencies running down the electric flex.” He further explains that microwave antennas mounted on power or utility poles are a “dangerous technology” and will “further degrade the public health.[[270]](#footnote-270)

There is also the danger of transients, “which carry erratic spikes of voltage into electrical systems” which can also have serious health outcomes. Transient voltages are momentary spikes or surges, which cause electrical transformers to operate inefficiently and run hotter than normal.[[271]](#footnote-271)

The possibility of creating electrosmog and allowing for the proliferation of greenhouse gases from powering wireless infrastructure (particularly “5G” which will require exponentially large carbon emissions to operate), is not compatible with Guidelines’ Principle C, “to provide for recreational and other public uses while protecting the Upper Delaware as a natural resource.” The possibility of wireless infrastructure creating dirty electricity and transients within homes is not compatible with Principle B, to provide “for the protection of the health, safety, and welfare of residents.”

**A Quick Word On Fiber Optics**

Fiber optics to and through the premises (FTTP) is the preferred method of providing telecommunications connectivity. Health benefits associated with energy efficiency interventions can be realized with wired connections, such as fiber optics. “Fiber has a minimal ecological impact, reduces waste, consumes very little energy and helps decrease greenhouse gas emissions.”[[272]](#footnote-272) Fiber optics has “[l]ower energy consumption, reduced waste and sustainable architecture, characteristics that make fiber infrastructure an environmentally advantageous choice.”[[273]](#footnote-273)

Former FCC Chair Tom Wheeler called fiber “future proof,” and said that wireless should be used only as a last resort, not a first resort, in his March, 2021 Congressional testimony.[[274]](#footnote-274) Wheeler’s statements point to the fact that wireless and fiber are not equivalent broadband media –wireless is and should be a complement, not the primary access method.[[275]](#footnote-275) A policy paper of the National Institute for Science, Law and Public Policy, “Re-Inventing Wires: The Future of Landlines and Networks", authored by Timothy Schoechle, PhD, communications technology expert, similarly states that “[f]iber is unmatched in its speed, performance, reliability, etc. … Wireless is not a substitute for fiber.” [[276]](#footnote-276)

FTTP provides the best capacity for remote learning for children and students and more reliable access to medical and other services for the elderly and disabled during emergencies or severe weather when wireless service is more likely to be interrupted. FTTP will also prevent the exclusion of the EMS disabled who cannot be near wireless infrastructure or wireless Internet.

Fiber is more affordable, scalable from symmetrical (upload and download) speeds of 100 Mbps to 1Gbps to 10Gbps, has a longer life span of 25-50 years and is safer and more cybersecure, has lower operational expenses,[[277]](#footnote-277) and is available at more affordable prices. An example of fiber deployment, consumers in Hamilton County, TN have multiple service options, which include speeds of up to 1000 Mpbs (1 Gbps). Pricing and capacity are scalable and provide for 300 Mpbs at $57.99/month and 1 Gbps at $67.99, in each instance with symmetrical speeds.[[278]](#footnote-278)

By contrast, wireless is less reliable and less scalable to meet future customer demands and has higher operational expense.[[279]](#footnote-279) Wireless typically requires equipment upgrades, constant maintenance and re-investments about every 5 years. Wireless technology is not able to effectively compete with similar high-speed Internet, hence the FCC only requiring 25 Mbps download / 3 Mbps upload speeds.[[280]](#footnote-280) [[281]](#footnote-281) Incidentally, wireless infrastructure is completely dependent on fiber optics. Fiber optics has already been deployed by the industry but, in many instances, not put into service for the “last mile,” installing wireless, instead”[[282]](#footnote-282)

The Fiber Broadband Association (FBA), the largest fiber optics trade association in the U.S., has as its tagline, ***“If it isn’t fiber, it isn’t broadband.”[[283]](#footnote-283)*** The FBA has shown that consumers prefer the higher symmetrical speeds that fiber provides.[[284]](#footnote-284) The FBA also shows the superior technology of fiber in its white paper, “The Market Has Spoken.”[[285]](#footnote-285) The National Telecommunications andInformation Administration (“NTIA”) in implementing the Infrastructure and Jobs Act is prioritizing fiber optics over wireless in creating a future-proof technology grid.[[286]](#footnote-286)

Incidentally, Fiber can also be an economic boon.[[287]](#footnote-287) For example, Chattanooga, TN used fiber optics to spring into a clean energy economy and create a vibrant workforce, earning it the accolade of “Gig City,” with the fastest broadband network in the U.S. The economic value of its fiber infrastructure over a 10 year period from 2011 to 2020 exceeded $2.69 billion and 9,516 jobs.[[288]](#footnote-288)

**Emergencies**

An example of how fiber optics made possible the restoration of service during an emergency is in Chattanooga, TN. In November 2012, a tornado ripped through Chattanooga. Because of the fiber optics installation, even though it had been only partially completed at that time, the system was able to either prevent or automatically restore service from 23,000 customer outages.[[289]](#footnote-289)

**Conclusion**

The stated goals of UDC Guidelines are to protect the health, safety and welfare of residents and visitors, to protect and preserve its natural resources, and to protect land use and ownership, among other things. Wireless infrastructure installations would be incompatible with those goals.

Incompatible with the Guidelines would be the possibility of the following occurring from wireless infrastructure and from exposure to RF radiation:

* cell tower fires
* cell tower collapses
* constructive eviction from one’s own home (one may still own his land, but he may not be able to live on it or use it for agriculture)
* adverse impacts on wildlife, trees and bees
* adverse impacts on children and
* adverse effects on firefighters’ cognitive functions when they cannot navigate to where the fire is because they forgot how to get there, through no fault of their own.

All of these possibilities should give one pause.

The evidence of health hazards from RF radiation is overwhelming and the risk of adverse health outcomes is beyond debate, from peer-reviewed scientific studies, the U.S. Naval Medical Research Institute with reports dating as far back as 1971, T-Mobile’s ECOLOG Institute study of 2000 which showed clear evidence of cancer, leukemia and other adverse health outcomes, and from other experts.

The Court of Appeals for the D.C. Circuit in 2021 remanded the FCC’s RF radiation limits for wireless infrastructure, rebuking the FCC’s putative and outdated premise of no health hazards below its limits. The Court’s remand decision, along with stark admissions by industry in published brochures that RF radiation is a pollutant, industry disclosure to investors in annual reports of the possibility of litigation based on claims of adverse health outcomes that may affect their financial stability, and a seminal industry-funded study of its health hazards (the ECOLOG Institute study), should now settle the issue. The telecommunications industry admits the potential of harm.

As shown in this paper, wireless infrastructure is incompatible with the goals of the UDC Guidelines. All of these facts and evidence should put a thumb on the scale of continuing to protect the health, safety and welfare of its residents and visitors and to protect and preserve the UDC’s natural resources.

**APPENDIX A**

[IN PROCESS]

**Abbreviations used:**

CLCPA Climate Leadership Community Participation Act of New York State

EMF Electro-Magnetic Field or Frequency

EMS Electro-Magnetic Sensitivity

FCC Federal Communications Commission

FDA Food and Drug Administration

IARC International Agency for Research on Cancer (affiliated with the WHO)

NTP National Toxicology Program (commissioned by the FDA)

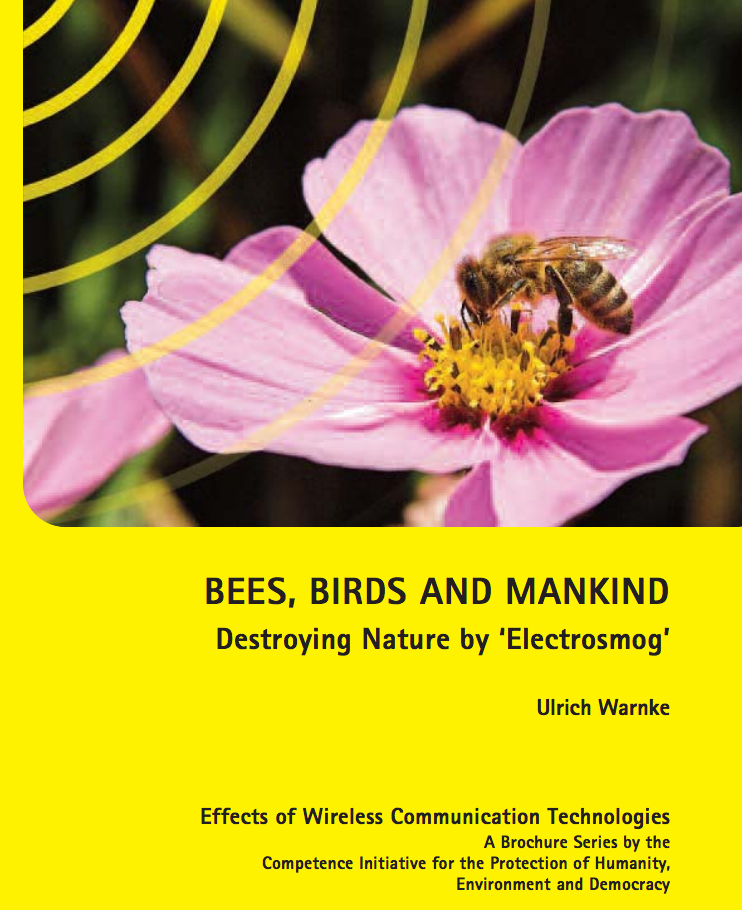
RF Radio Frequency

WHO World Health Organization

**APPENDIX B**

**Excerpted from, and the source of this compilation of studies by, the Environmental Health Trust[[290]](#footnote-290)**

Electromagnetic fields from powerlines, cell phones, cell towers and wireless has been shown to negatively impact birds, bees, wildlife and our environment in numerous peer reviewed research studies. Specifically, electromagnetic radiation has been found to alter bee behavior, produce biochemical changes and impact bee reproduction.



“Birds-Bees-and-Mankind-Destroying-Nature-by-‘Electrosmog” by Warnke-Ulrich.-

**Yes. Non-ionizing radiation can harm bees.**

…***enough published research has been performed to indicate harm and there is an urgent need to reduce electromagnetic radiation exposures to protect the bee population and in turn, protect the environment.***   As 5G will increase non-ionizing radiation exposures and as 5G use new higher frequencies shown to be highly absorbed into insects, scientists are calling for a moratorium on 5G, to protect wildlife as well as human health. [Emphasis added]

… researchers have proposed that the stress of ever increasing electromagnetic radiation exposure has weakened bee populations and added stress that then results in decreased ability to maintain their health when also exposed to increased pesticides, chemicals and infections. The bees’ resistance to environmental stressors is weakened by non-ionizing electromagnetic radiation exposure.

A 2021 study entitled, “[Combined Effects of Pesticides and Electromagnetic-Fields on Honeybees: Multi-Stress Exposure”](https://www.mdpi.com/2075-4450/12/8/716/htm) published in the journal Insects ( affiliated with the American Association of Professional Apiculturists)  by scientists of the University of Milan Italy and Instituto Zooprofilattico Sperimentale della Lombardia ed Emilia Romagna “Bruno Ubertini” found the combined effects pesticides and non-ionizing electromagnetic fields on bees potentiated several effects including disease, higher mortality, behavioral alterations (queen changes, excess of both drone-brood deposition and honey storage) and biochemical anomalies.

Bee colonies were set up in a field trial under different conditions.  The multi-stress site showed the worst health condition of the bee colonies, with only one alive at the end of the experimentation out of the four ones present at the beginning.

The study concludes that, “the overall results clearly indicate that the multi-stress conditions were able to induce biochemical, physiological and behavioral alterations which severely threatened bee colony survival.”In regards to colony collapse disorder (CCD), the researchers conclude that, “overall, the loss of three out of four families in the multi-stress site confirmed the role of the multi-stress conditions as the mechanism able to cause the phenomena of hive depopulation (CCD).

A [2021 study](https://www.mdpi.com/2076-2615/11/3/863) on 12 hours of 50 Hz (non-ionizing radiation emitted by powerlines and electrical systems) found effects on honey bee proteolytic systems and behavior parameters concluding that “various intensities reduced the number of occurrences of walking, contacts between individuals, and self-grooming, and increased the activity of proteases, which are involved in the immune system response.”

A [publication](https://www.jscimedcentral.com/Behavior/Articles/behavior-2-1010.pdf) by Daniel Favre describes the methodology for a study in which direct adverse were seen in the bees’ behavior following exposure to electromagnetic fields. Favre states, “The present data strongly suggest that honeybee colonies are affected and disturbed by electromagnetic waves (RF-EMF).”

In his comprehensive [review article,](https://www.naturalscience.org/wp-content/uploads/2015/01/kompetenzinitiative-ev_study_bees-birds-and-mankind_04-08_english.pdf) Ulrich Warnke  cites multiple studies which examine the effects of radiofrequency radiation exposure on bees and notes the vital importance of bees as pollinators. Research has found behavioral effects after electromagnetic radiation exposure including inducing artificial worker piping [(Favre, 2011)](http://link.springer.com/article/10.1007%2Fs13592-011-0016-x#page-1), decreasing rate egg laying rate and reducing colony strength ([Sharma and Kumar, 2010](https://www.emf-portal.org/en/article/18302); [Harst et al., 2006](http://www.next-up.org/pdf/ICRW_Kuhn_Landau_study.pdf)). Furthermore, Neelima Kumar and colleagues found cell phone radiation  influences honey bees’ behavior and physiology.  [(Badotra et al 2011)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3052591/).

As Clarke et al. [(2013)](http://www.sciencemag.org/content/340/6128/66) has reported, bees have a particular sensory modality which allows them to detect electric fields, and thus they are particularly susceptible to large amounts of electromagnetic radiation.

A landmark three part**2021 research review** on effects to wildlife (including bees) published in R*eviews on Environmental Health*by U.S experts journalist Blake Levitt, Dr. Henry Lai and former U.S. Fish and Wildlife senior biologist Albert Manville state current science should trigger urgent regulatory action citing more than 1,200 scientific references which found adverse biological effects to wildlife from even very low intensities of non ionizing radiation with findings of  impacts to orientation and migration, reproduction, mating, nest, den building and survivorship. This 150-page report has more than 1,200 references ([Levitt et al., 2021a,](https://pubmed.ncbi.nlm.nih.gov/34047144/) [Levitt et al., 2021b](https://pubmed.ncbi.nlm.nih.gov/34243228/),  [Levitt et al., 2021c](https://doi.org/10.1515/reveh-2021-0083)).

A now retired US Fish and Wildlife Service wildlife biologist, former lead on telecommunications impacts, Dr. Albert Manville, has [written to the FCC](https://ehtrust.org/memorandum-bird-wildlife-impacts-non-ionizing-radiation-albert-m-manville-ph-d-former-u-s-fish-wildlife-service-senior-biologist/)on impacts to birds and [higher frequencies to be used in 5G](https://www.fcc.gov/ecfs/filing/1060315601199) and authored numerous [publications](https://ecfsapi.fcc.gov/file/10718080685516/manvillebirdmortality.pdf)detailing research showing harm to birds. “Now as a private wildlife consultant and part-time adjunct professor for Johns Hopkins University, I also continue to study the impacts of radiation on human health, welfare and safety, including impacts from millimeter-wide radiation frequencies on humans from 5G. 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.”

**5G Millimeter Waves, Bees and Insects**

“[Exposure of Insects to Radio-Frequency Electromagnetic Fields from 2 to 120 GHz](https://www.nature.com/articles/s41598-018-22271-3)” 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….” ([Thielens 2018](https://www.nature.com/articles/s41598-018-22271-3))

**ARTICLES**

Physics.org [Mobile phone radiation may be killing insects: German study. “](https://phys.org/news/2020-09-mobile-insects-german.html)Radiation from mobile phones could have contributed to the dramatic decline in insect populations seen in much of Europe”

[**Mobile Phone Radiation May Be Killing Insects: German Study,**](https://www.barrons.com/news/mobile-phone-radiation-may-be-killing-insects-german-study-01600356604)AFP (Agence France Presse) / Barron’s, September 17, 2020

Herriman, Sasha. [“Study links bee decline to cell phones.”](http://www.cnn.com/2010/WORLD/europe/06/30/bee.decline.mobile.phones/index.html) *CNN* (30 June 2010).

Chokshi, Niraj.[“If Cell Phones Are Behind the Bee Decline, What Are They Doing to Humans?”](https://www.theatlantic.com/technology/archive/2010/06/if-cell-phones-are-behind-the-bee-decline-what-are-they-doing-to-humans/58994/)*The Atalantic* (30 June 2010).

* “In a study at Panjab University in Chandigarh, northern India, researchers fitted cell phones to a hive and powered them up for two fifteen-minute periods each day. After three months, they found the bees stopped producing honey, egg production by the queen bee halved, and the size of the hive dramatically reduced.”
* “Andrew Goldsworthy, a biologist from Imperial College, London, told CNN that the reason may have to do with radiation from cell phones and cell towers disturbing the molecules of the chemical cryptochrome, which bees and other animals use for navigation. The “other animals” part there is key: it includes humans.”

Derbyshire, David. [“Why a mobile phone ring may make bees buzz off: Insects infuriated by handset signals.”](http://www.dailymail.co.uk/sciencetech/article-1385907/Why-mobile-phone-ring-make-bees-buzz-Insects-infuriated-handset-signals.html) Daily Mail (13 May 2011).

* Dr Favre, a teacher who previously worked as a biologist at the Swiss Federal Institute of Technology in Lausanne, said: ‘This study shows that the presence of an active mobile phone disturbs bees – and has a dramatic effect.’
* He placed two mobile phones under a beehive and recorded the high pitched calls made by the bees when the handsets were switched off, placed on stand-by and activated.
* Around 20 to 40 minutes after the phones were activated, the bees began to emit “piping” calls – a series of high pitched squeaks that announce the start of swarming.

[“Cell Phones Caused Mysterious Worldwide Bee Deaths, Study Finds.”](http://www.foxnews.com/tech/2011/05/13/cell-phones-caused-mysterious-worldwide-bee-deaths-study-finds.html) Fox News (13 May 2011).

# **REPORTS BY ENVIRONMENTAL GROUPS**

Alain Thill. Review: Biologische Wirkungen elektromagnetischer Felder auf Insekten. umwelt – medizin – gesellschaft.  Sonderbeilage in Ausgabe 3-2020 / ISSN 1437-2606 / 33. Jahrgang.

An analysis of 190 scientific studies  by Germany’s Nature and Biodiversity Conservation Union (NABU) together with two NGOs, one from Germany and one from Luxembourg found significant harm to insects. Of the 83 studies deemed scientifically relevant, 72 showed that non ionizing radiation had a [negative effect](https://phys.org/tags/negative+effect/) on bees, wasps and flies. These effects ranged from a reduced ability to navigate, to damage to genetic material and larvae.

**To download the review paper (in German) (28 pp.):**[**http://bit.ly/RFinsectreview2020**](http://bit.ly/RFinsectreview2020)

[***A new meta-study comes to the conclusion that in addition to pesticides and habitat loss, cell phone radiation also has negative effects on insects,***](https://baden-wuerttemberg.nabu.de/news/2020/september/28682.html)NABU Baden-Württemberg, September 17, 2020

**RESEARCH STUDIES AND REPORTS**

Thielens et al., “[Exposure of Insects to Radio-Frequency Electromagnetic Fields from 2 to 120 GHz](https://www.nature.com/articles/s41598-018-22271-3)” Scientific Reports volume 8, Article number: 3924 (2018)

* “Insects are continually exposed to Radio-Frequency (RF) electromagnetic fields at different frequencies. This paper is the first to report the absorbed RF electromagnetic power in four different types of insects as a function of frequency from 2 GHz to 120 GHz.   All insects showed a general increase in absorbed RF power at and above 6 GHz, in comparison to the absorbed RF power below 6 GHz. Our simulations showed that a shift of 10% of the incident power density to frequencies above 6 GHz would lead to an increase in absorbed power between 3–370%.”
* “This could lead to changes in insect behaviour, physiology, and morphology over time due to an increase in body temperatures, from dielectric heating. The studied insects that are smaller than 1 cm show a peak in absorption at frequencies (above 6 GHz), which are currently not often used for telecommunication, but are planned to be used in the next generation of wireless telecommunication systems.”

Thielens, A., Greco, M.K., Verloock, L. *et al.* Radio-Frequency Electromagnetic Field Exposure of Western Honey Bees. *Sci Rep* **10,**461 (2020). <https://doi.org/10.1038/s41598-019-56948-0>

* “numerical simulations using honey bee models, obtained using micro-CT scanning, were implemented to determine RF absorbed power as a function of frequency in the 0.6 to 120 GHz range. Five different models of honey bees were obtained and simulated: two workers, a drone, a larva, and a queen. The simulations were combined with *in-situ* measurements of environmental RF-EMF exposure near beehives in Belgium in order to estimate realistic exposure and absorbed power values for honey bees. Our analysis shows that a relatively small shift of 10% of environmental incident power density from frequencies below 3 GHz to higher frequencies will lead to a relative increase in absorbed power of a factor higher than 3.”

[Migdał P, Murawska A, Strachecka A, Bieńkowski P, Roman A. Honey Bee Proteolytic System and Behavior Parameters under the Influence of an Electric Field at 50 Hz and Variable Intensities for a Long Exposure Time. Animals. 2021; 11(3):863.](https://www.mdpi.com/2076-2615/11/3/863/htm)<https://doi.org/10.3390/ani11030863>

* The effect of an artificial electromagnetic field on organisms is a subject of extensive public debate and growing numbers of studies. Our study aimed to show the effect of an electromagnetic field at 50 Hz and variable intensities on honey bee proteolytic systems and behavior parameters after 12 h of exposure. Newly emerged worker bees were put into cages and exposed to a 50 Hz E-field with an intensity of 5.0 kV/m, 11.5 kV/m, 23.0 kV/m, or 34.5 kV/m. After 12 h of exposure, hemolymph samples were taken for protease analysis, and the bees were recorded for behavioral analysis. Six behaviors were chosen for observation: walking, flying, self-grooming, contact between individuals, stillness, and wing movement. Bees in the control group demonstrated the highest number of all behavior occurrences, except flying, and had the lowest protease activity. Bees in the experimental groups showed a lower number of occurrences of walking, self-grooming, and contacts between individuals than the control bees and had significantly higher protease activity than the control bees (except that of alkaline proteases in the 23.0 kV/m group).

Shepherd et al., [Increased aggression and reduced aversive learning in honey bees exposed to extremely low frequency electromagnetic fields.](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0223614) PLoS One. 2019 Oct 10

* Exposure to ELF EMF reduced aversive learning performance and also increased aggression scores
* “These results indicate that short-term exposure to ELF EMFs, at levels that could be encountered in bee hives placed under power lines, reduced aversive learning and increased aggression levels. These behavioural changes could have wider ecological implications in terms of the ability of bees to interact with, and respond appropriately to, threats and negative environmental stimuli.”

[Shepherd](https://www.nature.com/articles/s41598-018-26185-y#auth-1) et al., [Extremely Low Frequency Electromagnetic Fields impair the Cognitive and Motor Abilities of Honey Bees](https://www.nature.com/articles/s41598-018-26185-y), Scientific Reports volume 8, Article number: 7932 (2018)

* Extremely low frequency electromagnetic field (ELF EMF) pollution from overhead powerlines is known to cause biological effects across many phyla, but these effects are poorly understood. Honey bees are important pollinators across the globe and due to their foraging flights are exposed to relatively high levels of ELF EMF in proximity to powerlines. Here we ask how acute exposure to 50 Hz ELF EMFs at levels ranging from 20–100 µT, found at ground level below powerline conductors, to 1000–7000 µT, found within 1 m of the conductors, affects honey bee olfactory learning, flight, foraging activity and feeding. ELF EMF exposure was found to reduce learning, alter flight dynamics, reduce the success of foraging flights towards food sources, and feeding.
* The results suggest that 50 Hz ELF EMFs emitted from powerlines may represent a prominent environmental stressor for honey bees, with the potential to impact on their cognitive and motor abilities, which could in turn reduce their ability to pollinate crops.

Favre D, Johansson O, [“Does enhanced electromagnetic radiation disturb honeybees’ behaviour? Observations during New Year’s Eve 2019”](https://www.granthaalayahpublication.org/journals/index.php/granthaalayah/article/view/IJRG20_B11_3868), Internat J Research -GRANTHAALAYAH 2020; 8: 7-14

* “…a bi-directional wide frequency range microphone was placed during the New Year’s Eve night 2019 in a honeybee hive, in order to detect and analyze potential changes in the acoustic behaviour of the bees due to increased phone induced RF- EMF radiation. It was observed that the honeybees produced strong worker piping signals. Such signals are typically produced shortly before takeoff of a swarm, or as the sign of a disturbed colony. It is therefore hypothesized that planetary enhancement of electromagnetic radiation produces a disturbing pollution for honeybees, such as during the New Year’s Eve night. Evidence of proof of such electromagnetic waves taking place at New Year’s Eve should be investigated worldwide during forthcoming similar events based on a global network of long term EM measurements.

Cammaerts, Marie-Claire. [“Is electromagnetism one of the causes of the CCD? A work plan for testing this hypothesis.”](https://www.jscimedcentral.com/Behavior/behavior-2-1006.php) *Journal of Behavior*2.1 (2017): 1006.

* The decline of domestic bees all over the world is an important problem still not well understood by scientists and beekeepers, and far from being solved. Its reasons are numerous: among others, the use of pesticides and insecticides, the decrease of plant diversity, and bee’s parasites. Besides these threats, there is a potential adverse factor little considered: manmade electromagnetism.
* The present paper suggests two simple experimental protocols for bringing to the fore the potential adverse effect of electromagnetism on bees and to act consequently. The first one is the observation of bees’ avoidance of a wireless apparatus; the second one is the assessment of colonies’ strength and of the intensity of the electromagnetism field (EMF) surrounding them. If bees avoid a wireless apparatus, if hives in bad health are located in EMF of a rather high intensity, it can be presumed that bees are affected by manmade electromagnetism. This should enable searching for palliative measures.

Favre, Daniel. [“Disturbing Honeybees’ Behavior with Electromagnetic Waves: a Methodology.”](https://www.jscimedcentral.com/Behavior/Articles/behavior-2-1010.pdf) Journal of Behavior 2.2 (2017): 1010.

* “Mobile phone companies and policy makers point to studies with contradictory results and usually claim that there is a lack of scientific proof of adverse effects of electromagnetic fields on animals. The present perspective article describes an experiment on bees, which clearly shows the adverse effects of electromagnetic fields on these insects’ behavior. The experiment should be reproduced by other researchers so that the danger of manmade electromagnetism (for bees, nature and thus humans) ultimately appears evident to anyone.”

Balmori, Alfonso. [“Anthropogenic radiofrequency electromagnetic fields as an emerging threat to wildlife orientation.”](http://www.sciencedirect.com/science/article/pii/S0048969715002296) *Science of The Total Environment* 518–519 (2015): 58–60.

* 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 radiofrequencies.

Redlarski, Grzegorz, et al. “[The influence of electromagnetic pollution on living organisms: historical trends and forecasting changes.”](https://www.hindawi.com/journals/bmri/2015/234098/abs/)*BioMed Research International* 2015.234098 (2015).

* “Current technologies have become a source of omnipresent electromagnetic pollution from generated electromagnetic fields and resulting electromagnetic radiation. In many cases this pollution is much stronger than any natural sources of electromagnetic fields or radiation. The harm caused by this pollution is still open to question since there is no clear and definitive evidence of its negative influence on humans. This is despite the fact that extremely low frequency electromagnetic fields were classified as potentially carcinogenic.
* For these reasons, in recent decades a significant growth can be observed in scientific research in order to understand the influence of electromagnetic radiation on living organisms. However, for this type of research the appropriate selection of relevant model organisms is of great importance. It should be noted here that the great majority of scientific research papers published in this field concerned various tests performed on mammals, practically neglecting lower organisms.
* In that context the objective of this paper is to systematise our knowledge in this area, in which the influence of electromagnetic radiation on lower organisms was investigated, including bacteria,*E. coli* and*B. subtilis*, nematode,*Caenorhabditis elegans*, land snail,*Helix pomatia*, common fruit fly,*Drosophila melanogaster*, and clawed frog,*Xenopus laevis*.”

Richard Odemer, Franziska Odemer, [Effects of radiofrequency electromagnetic radiation (RF-EMF) on honey bee queen development and mating success](https://www.biorxiv.org/content/early/2018/10/03/434142)

* We have therefore exposed honey bee queen larvae to the radiation of a common mobile phone device (GSM) during all stages of their pre-adult development including pupation. After 14 days of exposure, hatching of adult queens was assessed and mating success after further 11 days, respectively. Moreover, full colonies were established of five of the untreated and four of the treated queens to contrast population dynamics. We found that mobile phone radiation had significantly reduced the hatching ratio but not the mating success.

Clarke, Dominic, et al. [“Detection and Learning of Floral Electric Fields by Bumblebees.”](http://www.sciencemag.org/content/340/6128/66) *Science*340.6128 (2013): 66-9.

* “We report a formerly unappreciated sensory modality in bumblebees (Bombus terrestris), detection of floral electric fields. Because floral electric fields can change within seconds, this sensory modality may facilitate rapid and dynamic communication between flowers and their pollinators.”

Cucurachi, C., et al. [“A review of the ecological effects of radiofrequency electromagnetic fields (RF-EMF).”](http://www.sciencedirect.com/science/article/pii/S0160412012002334) *Environment International*51 (2013): 116–40.

* RF-EMF had a significant effect on birds, insects, other vertebrates, other organisms and plants in 70% of the studies.
* Development and reproduction of birds and insects are the most strongly affected endpoints.

Favre, Daniel. [“Mobile phone induced honeybee worker piping.”](http://link.springer.com/article/10.1007%2Fs13592-011-0016-x#page-1) *Apidologie* 42 (2011): 270-9.

* Electromagnetic waves originating from mobile phones had a dramatic impact on the behavior of the bees, namely by inducing the worker piping signal. In natural conditions, worker piping either announces the swarming process of the bee colony or is a signal of a disturbed bee colony.

Goldsworthy, Andrew. [“The Birds, the Bees and Electromagnetic Pollution: How electromagnetic fields can disrupt both solar and magnetic bee navigation and reduce immunity to disease all in one go.”](https://ecfsapi.fcc.gov/file/7520958012.pdf) (2009).

* Many of our birds are disappearing mysteriously from the urban environment and our bees are now under serious threat. There is increasing evidence that at least some of this is due to electromagnetic pollution such as that from cell towers, cell phones, DECT cordless phones and Wifi. It appears capable of interfering with their navigation systems and also their circadian rhythms, which in turn reduces their resistance to disease. The most probable reason is that these animals use a group of magnetically-sensitive substances called cryptochromes for magnetic and solar navigation and also to control the activity of their immune systems.

Goldsworthy, Andrew. [“The Biological Effects of Weak Electromagnetic Fields: Problems and Solutions.”](https://ehtrust.org/wp-content/uploads/Goldsworthy-2012.pdf) (2012)

* “Many of the reported biological effects of non-ionising electromagnetic fields occur at levels too low to cause significant heating; i.e. they are non thermal. Most of them can be accounted for by electrical effects on living cells and their membranes. The alternating fields generate alternating electric currents that flow through cells and tissues and remove structurally-important calcium ions from cell membranes, which then makes them leak.”

Greggers, Uwe, et al. [“Reception and learning of electric fields in bees.”](http://rspb.royalsocietypublishing.org/content/280/1759/20130528.short) *Proceedings of the Royal Society*B 280.1759 (2013).

* Honeybees, like other insects, accumulate electric charge in flight, and when their body parts are moved or rubbed together. We report that bees emit constant and modulated electric fields when flying, landing, walking and during the waggle dance.
* The electric fields emitted by dancing bees consist of low- and high-frequency components. Both components induce passive antennal movements in stationary bees according to Coulomb’s law. Bees learn both the constant and the modulated electric field components in the context of appetitive proboscis extension response conditioning.
* Using this paradigm, we identify mechanoreceptors in both joints of the antennae as sensors. Other mechanoreceptors on the bee body are potentially involved but are less sensitive. Using laser vibrometry, we show that the electrically charged flagellum is moved by constant and modulated electric fields and more strongly so if sound and electric fields interact.
* Recordings from axons of the Johnston organ document its sensitivity to electric field stimuli. Our analyses identify electric fields emanating from the surface charge of bees as stimuli for mechanoreceptors, and as biologically relevant stimuli, which may play a role in social communication.

Harst, Wolfgang, Jochen Kuhn and Hermann Stever. [“Can Electromagnetic Exposure Cause a Change in Behaviour? Studying Possible Non-thermal Influences on Honey Bees – An Approach Within the Framework of Educational Informatics.”](http://www.next-up.org/pdf/ICRW_Kuhn_Landau_study.pdf) *Acta Systemica-IIAS International Journal* 6.1 (2006): 1-6.

* A pilot study on honeybees testing the effects of non-thermal, high frequency electromagnetic radiation on beehive weight and flight return behavior.  In exposed hives, bees constructed 21% fewer cells in the hive frames after 9 days than those unexposed.

Odemer, Richard & Odemer, Franziska. (2019). [Effects of radiofrequency electromagnetic radiation (RF-EMF) on honey bee queen development and mating success.](https://www.sciencedirect.com/science/article/pii/S0048969719301718) Science of The Total Environment. 661. 553-562. 10.1016/j.scitotenv.2019.01.154.

* Chronic RF-EMF exposure significantly reduced hatching of honey bee queens. Mortalities occurred during pupation, not at the larval stages. Mating success was not adversely affected by the irradiation.mAfter the exposure, surviving queens were able to establish intact colonies.

Kimmel, Stefan, et al. [“Electromagnetic radiation: influences on honeybees (Apis mellifera).](http://www.partecipiamo.it/cultura/renzo_barbattini/api_e_frequenze_elettromagnetiche_002.pdf)” IIAS-InterSymp Conference (2007).

* 39.7% of the non-irradiated bees had returned to their hives while only 7.3% of the irradiated bees had.

Kumar, Neelima R., Sonika Sangwan, and Pooja Badotra. [“Exposure to cell phone radiations produces biochemical changes in worker honey bees.”](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3052591/) *Toxicology International* 18.1 (2011): 70–2.

* The present study was carried out to find the effect of cell phone radiations on various biomolecules in the adult workers of Apis mellifera L. The results of the treated adults were analyzed and compared with the control. Radiation from the cell phone influences honey bees’ behavior and physiology. There was reduced motor activity of the worker bees on the comb initially, followed by en masse migration and movement toward “talk mode” cell phone. The initial quiet period was characterized by rise in concentration of biomolecules including proteins, carbohydrates and lipids, perhaps due to stimulation of body mechanism to fight the stressful condition created by the radiations. At later stages of exposure, there was a slight decline in the concentration of biomolecules probably because the body had adapted to the stimulus.

Lambinet, Veronika, et al.[“Honey bees possess a polarity-sensitive magnetoreceptor.”](https://link.springer.com/article/10.1007/s00359-017-1214-4) *Journal of Comparative Physiology A*(2017): 1-8

* “Honey bees, *Apis mellifera,* exploit the geomagnetic field for orientation during foraging and for alignment of their combs within hives. We tested the hypothesis that honey bees sense the polarity of magnetic fields.”
* We created an engineered magnetic anomaly in which the magnetic field generally either converged toward a sugar reward in a watch glass, or away from it. After bees in behavioral field studies had learned to associate this anomaly with a sugar water reward, we subjected them to two experiments performed in random order. In both experiments, we presented bees with two identical sugar water rewards, one of which was randomly marked by a magnetic field anomaly. During the control experiment, the polarity of the magnetic field anomaly was maintained the same as it was during the training session. During the treatment experiment, it was reversed.
* We predicted that bees would not respond to the altered anomaly if they were sensitive to the polarity of the magnetic field. Our findings that bees continued to respond to the magnetic anomaly when its polarity was in its unaltered state, but did not respond to it when its polarity was reversed, support the hypothesis that honey bees possess a polarity-sensitive magnetoreceptor.

Oschman, James and Nora Oschman. [“Electromagnetic communication and olfaction in insects.”](https://www.thefreelibrary.com/Electromagnetic+communication+and+olfaction+in+insects.-a0163395921) *Frontier Perspectives* (2004).

Philips, Alasdair and Jean Philips. [“Animals, Birds, Insects and Plants.”](http://www.powerwatch.org.uk/library/downloads/rf-emfs-6-animals-2017-07.pdf) *Radiofrequency EMFS and Health Risks*(2017).

* The current problem is thought to be a combination of different factors. Pesticides are weakening the bees without killing them, making them more susceptible to other environmental pollutants. The bees seem to leave the hive looking for nectar and fail to return.
* EMFs from telecommunications infrastructures could interfere with bees’ biological clocks that enable them to compensate properly for the sun’s movements and may fly in the wrong direction when attempting to return to the hive. They could disappear mysteriously. This phenomenon has been widely reported in the past months.

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India Report: Expert Group to study the possible impacts of communication towers on Wildlife including Birds and Bees

[“Report on Possible Impacts of Communication Towers on Wildlife Including Birds and Bees.”](http://www.moef.nic.in/downloads/public-information/final_mobile_towers_report.pdf)  Ministry of Environment and Forest, Government of India, 2010.

* This report details the on impacts of communication towers on wildlife including birds and bees submitted to MoEF. It  warns of harmful radiation and recommends special laws to protect urban flora & fauna from threats radiation emerging from mobile towers.

Sainudeen, Sahib.S. [“Electromagnetic Radiation (EMR) Clashes with Honey Bees.”](http://ipublishing.co.in/jesvol1no12010/EIJES2044.pdf) In*ternational Journal of Environmental Sciences* 1.5 (2011).

* Recently a sharp decline in population of honey bees has been observed in Kerala. Although the bees are susceptible to diseases and attacked by natural enemies like wasps, ants and wax moth, constant vigilance on the part of the bee keepers can over come these adverse conditions. The present plunge in population (< 0.01) was not due to these reasons. It was caused by man due to unscientific proliferation of towers and mobile phones.”
* Six colonies of honeybees ( Apis mellifera ) were selected. Three colonies were selected as test colonies (T1,T2&T3) and the rest were as control (C1,C2&C3). The test colonies were provided with mobile phones in working conditions with frequency of 900 MHz for 10 minutes for a short period of ten days. After ten days the worker bees never returned hives in the test colonies. The massive amount of radiation produced by mobile phones and towers is actually frying the navigational skills of the honey bees and preventing them from returning back to their hives.
* The study concludes, “More must also be done to compensate individuals and communities put at risk. Insurance covering diseases related to towers, such as cancer, should be provided for free to people living in 1 km radius around the tower. Independent monitoring of radiation levels and overall health of the community and nature surrounding towers is necessary to identify hazards early. Communities need to be given the opportunity to reject cell towers and national governments need to consider ways of growing their cellular networks without constantly exposing people to radiation.”

Sharma, V.P. and N.K. Kumar. [“Changes in honeybee behaviour and biology under the influence of cellphone radiations.”](http://beekeepingtimes.com/index2.php?option=com_content&task=view&id=272&pop=1&page=0&Itemid=1) Current Science 98.10 (2010): 1376-8.

* We have compared the performance of honeybees in cell phone radiation exposed and unexposed colonies. A significant (p < 0.05) decline in colony strength and in the egg laying rate of the queen was observed. The behaviour of exposed foragers was negatively influenced by the exposure, there was neither honey nor pollen in the colony at the end of the experiment.”

Sivani, S., and D. Sudarsanam. [“Impacts of radio-frequency electromagnetic field (RF-EMF) from cell phone towers and wireless devices on biosystem and ecosystem – A Review.”](http://www.biolmedonline.com/Articles/Vol4_4_2012/Vol4_4_202-216_BM-8.pdf) Biology and Medicine, vol. 4, no. 4, 2012, pp. 202–16.

* There is an urgent need for further research  and “of the 919 research papers collected on birds, bees, plants, other animals, and humans, 593 showed impacts, 180 showed no impacts, and 196 were inconclusive studies”.
* “One can take the precautionary principle approach and reduce RF-EMF radiation effects of cell phone towers by relocating towers away from densely populated areas, increasing height of towers or changing the direction of the antenna.”

Warnke, Ulrich. [“Birds, Bees and Mankind: Destroying Nature by ‘Electrosmog’.”](https://ecfsapi.fcc.gov/file/7521097894.pdf) *Competence Initiative for the Protection of Humanity, Environment and Democracy* 1 (2009).

* Bees pollinate approximately 1/3 of all crops  and they are disappearing by the millions. Warnke raises the concern that the dense, energetic mesh of electromagnetic fields from wireless technologies may be the cause.

[“Briefing Paper on the Need for Research into the Cumulative Impacts of Communication Towers on Migratory Birds and Other Wildlife in the United States.”](http://electromagnetichealth.org/pdf/CommTowerResearchNeedsPublicBriefing-2-409.pdf) Division of Migratory Bird Management (DMBM), U.S. Fish & Wildlife Service, 2009.

* “Potential Radiation Effects on Other Pollinators Radiation has also been implicated in effects on domestic honeybees, pollinators whose numbers have recently been declining due to “colony collapse disorder” (CCD) by 60% at U.S. West Coast apiaries and 70% along the East Coast (Cane and Tepedino 2001).
* CCD is being documented in Greece, Italy, Germany, Portugal, Spain, and Switzerland. One theory regarding bee declines proposes that radiation from mobile phone antennas is interfering with bee navigational systems. Studies performed in Europe have documented navigational disorientation, lower honey production, and decreased bee survivorship (Harst et al. 2006, Kimmel et al. 2006, Bowling 2007).
* This research needs further replication and scientific review, including in North America. Because pollinators, including birds, bees, and bats, play a fundamental role in food security (33% of our fruits and vegetables would not exist without pollinators visiting flowers [Kevan and Phillips 2001]), as pollinator numbers decline, the price of groceries goes up.
* Harst et al. (2006) performed a pilot study on honeybees testing the effects of non-thermal, high frequency electromagnetic radiation on beehive weight and flight return behavior. They found that of 28 unexposed bees released 800 m (2,616 ft) from each of 2 hives, 16 and 17 bees returned in 28 and 32 minutes, respectively, to hives. At the 1900 MHz continuously-exposed hives, 6 bees returned to 1 hive in 38 minutes while no bees returned to the other hive. In exposed hives, bees constructed 21% fewer cells in the hive frames after 9 days than those unexposed. Harst et al. selected honeybees for study since they are good bio-indicators of environmental health and possibly of “electrosmog.” Because of some concerns raised regarding the methods used to conduct the Harst et al.(2006) study, specifically the placement of the antenna where bees could contact it (i.e., potentially a bias), the experimental methods need to be redesigned and the studies retested to better elucidate and fine tune the impacts of radiation. The results, while preliminary however, are troubling. Kimmel et al. (2006) performed field experiments on honeybees under conditions nearly identical to the Harst et al. (2006) protocol except that bees were stunned with CO2 and released simultaneously 500 m (1,635 ft) from the hives. However, in one of their experimental groups, they shielded the radiation source and antenna in a reed and clay box to address potential biases raised in the Harst et al. study. Sixteen total hives were tested, 8 of which were irradiated. After 45 minutes when the observations were terminated, 39.7% of the non-irradiated bees had returned to their hives while only 7.3% of the irradiated bees had.”

**APPENDIX B**

**The source for this compilation of scientific studies is the Environmental Health Trust.[[291]](#footnote-291)**

# ****COMPILATION OF RESEARCH STUDIES ON CELL TOWER RADIATION AND HEALTH****

Anthony B. Miller, L. Lloyd Morgan, Iris Udasin, Devra Lee Davis, [Cancer epidemiology update, following the 2011 IARC evaluation of radiofrequency electromagnetic fields (Monograph 102)](http://www.sciencedirect.com/science/article/pii/S0013935118303475), *Environmental Research*, Volume 167, 2018, Pages 673-683, ISSN 0013-9351

* Radiofrequency radiation is emitted by cell towers. This review paper concludes that “Based on the evidence reviewed it is our opinion that IARC’s current categorization of RFR as a possible human carcinogen (Group 2B) should be upgraded to Carcinogenic to Humans (Group 1).”

Zothansiama, et al. [“Impact of radiofrequency radiation on DNA damage and antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base stations.”](http://www.tandfonline.com/doi/abs/10.1080/15368378.2017.1350584) Electromagnetic Biology and Medicine 36.3 (2017): 295-305.

* This study evaluated effects in the human blood of individuals living near mobile phone base stations (within 80 meters) compared with healthy controls (over 300 meters). The study found higher radiofrequency radiation exposures and statistically significant differences in the blood of people living closer to the cellular antennas. The  group living closer to the antennas had for example, statistically significant higher frequency of micronuclei and a rise in lipid peroxidation in their blood. These changes are considered biomarkers predictive of cancer.

Rodrigues NCP, Dode AC, Andrade MKdN, O’Dwyer G, Monteiro DLM, Reis INC, Rodrigues RP, Frossard VC, Lino VTS. [The Effect of Continuous Low-Intensity Exposure to Electromagnetic Fields from Radio Base Stations to Cancer Mortality in Brazil.](https://www.mdpi.com/1660-4601/18/3/1229?fbclid=IwAR0xipRSBDd5wfRAv4XqR_NHKfPGK2rvaWWyycAEjYhpajMH9uq0jItcjAg) International Journal of Environmental Research and Public Health. 2021; 18(3):1229. <https://doi.org/10.3390/ijerph18031229>

* For all cancers and for the specific types investigated (breast, cervix, lung, and esophagus cancers), the higher the exposure to RBS (radio base stations- cell antenna installations) radiofrequency, the higher the median of mortality rate. In capitals where radio base station radiofrequency exposure was higher than 000/antennas-year, the median of the breast cancer mortality rate was 27.33/100,000, while for all cancers, it was 111.68/100,000 (Table 1).

Meo, S. A., Almahmoud, M., Alsultan, Q., Alotaibi, N., Alnajashi, I., & Hajjar, W. M. (2018). [Mobile Phone Base Station Tower Settings Adjacent to School Buildings: Impact on Students’ Cognitive Health.](https://www.ncbi.nlm.nih.gov/pubmed/?term=Mobile+Phone+Base+Station+Tower+Settings+Adjacent+to+School+Buildings%3A+Impact+on+Students%E2%80%99+Cognitive+Health) *American Journal of Men’s Health*.

* High exposure to RF-EMF produced by mobile phone base station towers was associated with delayed fine and gross motor skills, spatial working memory, and attention in school adolescents compared to students who were exposed to low RF-EMF.

Rodrigues NCP, Dode AC, Andrade MKdN, O’Dwyer G, Monteiro DLM, Reis INC, Rodrigues RP, Frossard VC, Lino VTS. [The Effect of Continuous Low-Intensity Exposure to Electromagnetic Fields from Radio Base Stations to Cancer Mortality in Brazil.](https://www.mdpi.com/1660-4601/18/3/1229?fbclid=IwAR0xipRSBDd5wfRAv4XqR_NHKfPGK2rvaWWyycAEjYhpajMH9uq0jItcjAg) International Journal of Environmental Research and Public Health. 2021; 18(3):1229. <https://doi.org/10.3390/ijerph18031229>

* “Conclusions: The balance of our results indicates that the exposure to radiofrequency electromagnetic fields from an RBS increases the rate of mortality by all cancers and specifically by breast, cervix, lung, and esophageal cancers. These conclusions are based on the fact that the findings of this study indicate that, the higher the RBS radiofrequency exposure, the higher the cancer mortality rate, especially for cervix cancer (adjust RR = 2.18). The spatial analysis showed that the highest RBS radiofrequency exposure was observed in a city located in the southern region of Brazil, which also showed the highest mortality rate for all types of cancer and specifically for lung and breast cancers.”

[Long-term exposure to microwave radiation provokes cancer growth: evidences from radars and mobile communication systems.](http://www.ncbi.nlm.nih.gov/pubmed/21716201) [Yakymenko](http://www.ncbi.nlm.nih.gov/pubmed?term=Yakymenko%20I%5BAuthor%5D&cauthor=true&cauthor_uid=21716201) (2011) Exp Oncology,  33(2):62-70.

* Even a year of operation of a powerful base transmitting station for mobile communication reportedly resulted in a dramatic increase of cancer incidence among population living nearby.

[Association of Exposure to Radio-Frequency Electromagnetic Field Radiation (RF-EMFR) Generated by Mobile Phone Base Stations (MPBS)with Glycated Hemoglobin (HbA1c) and Risk of Type 2 Diabetes Mellitus](https://www.researchgate.net/publication/283726472_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) , Sultan Ayoub Meo et al, International Journal of Environmental Research and Public Health, 2015

* Elementary school students who were exposed to high RF-EMFR generated by MPBS had a significantly higher risk of type 2 diabetes mellitus relative to their counterparts who were exposed to lower RF-EMFR.

Isabel López, Nazario Félix, Marco Rivera, Adrián Alonso, Ceferino Maestú. [What is the radiation before 5G? A correlation study between measurements in situ and in real time and epidemiological indicators in Vallecas, Madrid.](https://www.sciencedirect.com/science/article/abs/pii/S0013935121000281?via%3Dihub) Environmental Research. Volume 194, March 2021, 110734. <https://doi.org/10.1016/j.envres.2021.110734>.

* Residents of a Madrid Spain neighborhood surrounded by nine telephone antennas took a survey.  105 measurements of electromagnetic radiation were taken  both outside and inside the houses. People who were exposed to higher radiation values presented with more severe headaches, dizziness and nightmares and slept fewer hours.

[Neurobehavioral effects among inhabitants around mobile phone base stations](http://www.ncbi.nlm.nih.gov/pubmed/16962663) Abdel-Rassoul et al, Neurotoxicology, 2007

* This study found that living nearby mobile phone base stations (cell antennas) increased the risk for neuropsychiatric problems such as headaches, memory problems, dizziness, tremors,depression, sleep problems and some changes in the performance of neurobehavioral functions.

Meo SA,  Almahmoud M, Alsultan Q, Alotaibi N, Alnajashi I, Hajjar WM, [Mobile Phone Base Station Tower Settings Adjacent to School Buildings: Impact on Students’ Cognitive Health.](https://www.ncbi.nlm.nih.gov/pubmed/?term=Mobile+Phone+Base+Station+Tower+Settings+Adjacent+to+School+Buildings%3A+Impact+on+Students&fbclid=IwAR129y1Degcg1-5HWkRLZksYW1ihzP15iMZ2knctvTKJVU7w2NS9QDIqOlk) Am J Mens Health. 2018 Dec 7:1557988318816914. doi: 10.1177/1557988318816914.

* This study investigated the impact of exposure to radiofrequency electromagnetic field (RF-EMF) radiation generated by mobile phone base station towers (MPBSTs) on cognitive functions. Two hundred and seventeen volunteer male students aged between 13 and 16 registered from two different intermediate schools: 124 students were from School 1 and 93 students were from School 2. The MPBSTs were located within 200 m from the schoolbuildings. In School 1, RF-EMF was 2.010 µW/cm2 with a frequency of 925 MHz and in School 2, RF-EMF was 10.021 µW/cm2 with a frequency of 925 MHz. Students were exposed to EMFR for 6 hr a day, 5 days a week for a total period of 2 years. The Narda Safety Test Solution device SRM-3006 was used to measure RF-EMF in both schools, and cognitive functions tasks were measured by the Cambridge Neuropsychological Test Automated Battery (CANTAB). Significant impairment in Motor Screening Task (MOT; p = .03) and Spatial Working Memory (SWM) task ( p = .04) was identified among the group of students who were exposed to high RF-EMF produced by MPBSTs. High exposure to RF-EMF produced by MPBSTs was associated with delayed fine and gross motor skills, spatial working memory, and attention in school adolescents compared to students who were exposed to low RF-EMF.

[Biological Effects from Exposure to Electromagnetic Radiation Emitted by Cell Tower Base Stations and Other Antenna Arrays](http://www.researchgate.net/publication/233593841_Biological_effects_from_exposure_to_electromagnetic_radiation_emitted_by_cell_tower_base_stations_and_other_antenna_arrays), Levitt & Lai, Environmental Reviews, 2010

* This review of 100 studies found approximately 80% showed biological effects near towers. “Both anecdotal reports and some epidemiology studies have found headaches, skin rashes, sleep disturbances, depression, decreased libido, increased rates of suicide, concentration problems, dizziness, memory changes, increased risk of cancer, tremors, and other neurophysiological effects in populations near base stations.”

[Mortality by neoplasia and cellular telephone base stations.](http://www.sciencedirect.com/science/article/pii/S0048969711005754) Dode et al. (Brazil), Science of the Total Environment, Volume 409, Issue 19, 1 September 2011, Pages 3649–3665

* This 10 year study on cell phone antennas by the Municipal Health Department in Belo Horizonte and several universities in Brazil found a clearly elevated relative risk of cancer mortality at residential distances of 500 meters or less from cell phone transmission towers. Shortly after this study was published, the city prosecutor sued several cell phone companies and requested that almost half of the cities antennas be removed. Many antennas were dismantled.

Pearce, M., [Limiting liability with positioning to minimize negative health effects of cellular phone towers,](http://www.sciencedirect.com/science/article/pii/S0013935119306425) Environmental Research, Volume 181, 2020,

* “There is a large and growing body of evidence that human exposure to RFR from cellular phone base stations causes negative health effects  including both i) neuropsychiatric complaints such as headache, concentration difficulties, memory changes, dizziness, tremors, depressive symptoms, fatigue and sleep disturbance, and ii) increased incidence of cancer and living in proximity to a cell- phone transmitter station.” The author recommends long-term planning “to minimize the risk of liability from unintended human harm due to cellular phone base station siting” including voluntary restrictions  on the placement of cellular phone base stations within 500 m of schools and hospitals.”

[Epidemiological Evidence for a Health Risk from Mobile Phone Base Stations](http://www.researchgate.net/publication/45387389_Epidemiological_evidence_for_a_health_risk_from_mobile_phone_base_stations) Khurana, Hardell et al., International Journal of Occupational Environmental Health, Vol 16(3):263-267, 2010

* A review of 10 epidemiological studies that assessed for negative health effects of mobile phone base stations (4 studies were from Germany, and 1 each from Austria, Egypt, France, Israel, Poland, Spain) found that seven showed altered neurobehavioral effects near cell tower and three showed increased cancer incidence.

The review also found that eight of the 10 studies reported increased prevalence of adverse neurobehavioral symptoms or cancer in populations living at distances < 500 meters from base stations.   None of the studies reported exposure above accepted international guidelines, suggesting that current guidelines may be inadequate in protecting the health of human populations.

[Health effects of living near mobile phone base transceiver station (BTS) antennae: a report from Isfahan, Iran](http://www.ncbi.nlm.nih.gov/pubmed/23781985).  Shahbazi-Gahrouei et al, Electromagnetic Biology Medicine, 2013.

* This  cross-sectional study found the symptoms of nausea, headache, dizziness, irritability, discomfort, nervousness, depression, sleep disturbance, memory loss and lowering of libido were statistically increased in people living closer than 300 m from cell antennas as compared to those living farther away. The study concludes that “antennas should not be sited closer than 300 m to people to minimize exposure.”

[How does long term exposure to base stations and mobile phones affect human hormone profiles?](http://www.ncbi.nlm.nih.gov/pubmed/22138021) Eskander EF et al, (2011), Clin Biochem

* RFR exposures significantly impacted ACTH, cortisol, thyroid hormones, prolactin for  females, and testosterone levels for males.

[Investigation on the health of people living near mobile telephone relay stations: Incidence according to distance and sex](http://www.ncbi.nlm.nih.gov/pubmed/12168254) Santini et al, 2002 , Pathol Bio

* People living near mobile phone masts reported more symptoms of headache, sleep disturbance, discomfort, irritability, depression, memory loss and concentration problems the closer they lived to the installation.  Study authors recommend that the minimal distance of people from cellular phone base stations should not be < 300 m.

Navarro EA, Segura J, Portoles M, Gomez-Perretta C, [The Microwave Syndrome: A preliminary Study](http://www.emrpolicy.org/science/research/docs/navarro_ebm_2003.pdf). 2003 (Spain) Electromagnetic Biology and Medicine, Volume 22, Issue 2, (2003): 161 – 169

* Statistically significant positive exposure-response associations between RFR intensity and fatigue, irritability, headaches, nausea, loss of appetite, sleeping disorder, depressive tendency, feeling of discomfort, difficulty in concentration, loss of memory, visual disorder, dizziness and cardiovascular problems.

**Two Important Animal Studies on Radiofrequency Radiation**

These studies indicate that government limits are non protective. Government limits are based on the assumption that radiofrequency radiation is only harmful at thermal levels. However, the cancers developed in animals in these studies at radiation levels that were non thermal.

Falcioni et al. 2018, “[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 base station environmental emission](https://ehtrust.org/wp-content/uploads/Belpoggi-Heart-and-Brain-Tumors-Base-Station-2018-First-page-.pdf)” Environmental Research Journal

* Researchers with the renowned Ramazzini Institute (RI) in Italy performed a large-scale lifetime [study](https://www.sciencedirect.com/science/article/pii/S0013935118300367?via%3Dihub) of lab animals exposed to environmental levels (comparable to allowable limits from cell towers) of RFR radiation and found the rats developed increased cancers- schwannoma of the heart in male rats. This study confirms the $25 million [US National Toxicology Program](https://ntp.niehs.nih.gov/about/org/sep/trpanel/meetings/docs/2018/march/index.html) study which used much higher levels of cell phone radiofrequency (RF) radiation, but also reported finding the same unusual cancers as the Ramazzini- schwannoma of the heart in male rats. In addition, the RI study of cell tower radiation also found increases in malignant brain (glial) tumors in female rats and precancerous conditions including Schwann cells hyperplasia in both male and female rats.
* “Our findings of cancerous tumors in rats exposed to environmental levels of RF are consistent with and reinforce the results of the US NTP studies on cell phone radiation, as both reported increases in the same types of tumors of the brain and heart in Sprague-Dawley rats. Together, these studies provide sufficient evidence to call for the International Agency for Research on Cancer (IARC) to re-evaluate and re-classify their conclusions regarding the carcinogenic potential of RFR in humans,” said Fiorella Belpoggi PhD, study author and RI Director of Research.
* The Ramazzini study exposed 2448 Sprague-Dawley rats from prenatal life until their natural death to “environmental” cell tower radiation for 19 hours per day (1.8 GHz GSM radiofrequency radiation (RFR) of 5, 25 and 50 V/m). RI exposures mimicked base station emissions like those from cell tower antennas, and exposure levels were far less than those used in the NTP studies of cell phone radiation.
* [Watch Press Conference](https://ehtrust.org/worlds-largest-animal-study-on-cell-tower-radiation-confirms-cancer-link/)

Wyde, Michael, et al. “National Toxicology Program Carcinogenesis Studies of Cell Phone Radiofrequency Radiation in Hsd: Sprague Dawley® SD rats (Whole Body Exposure).[Statement on conclusions of the peer review meeting by NIEHS, released after external peer review meeting](https://ntp.niehs.nih.gov/ntp/about_ntp/trpanel/2018/march/actions20180328_508.pdf)and the [DNA damage presentation](https://ehtrust.org/wp-content/uploads/Evaluation-of-Genotoxicity-of-Cell-Phone-Radiofrequency-Radiation-in-Male-and-f-the-Genot-d-Female-notoxicity-e-Rats-and-y-Ce-d-Mice-ell-Ra-e-Following-g-Subchronic-ncy-c-Exposure-Poster-.pdf).

* This 25 million dollar study is the most complex study completed by the NTP and the world’s largest rodent study on radiofrequency radiation exposure to date which found long term exposure at non thermal levels associated with brain cancer and schwannomas of the heart in male rats. In addition damage to heart was found in all exposure levels.

**More Important Studies on Cell Tower Radiation**

Cindy L. Russell, [5 G wireless telecommunications expansion: Public health and environmental implications](http://www.sciencedirect.com/science/article/pii/S0013935118300161), Environmental Research, 2018, ISSN 0013-9351

* Radiofrequency radiation (RF) is increasingly being recognized as a new form of [environmental pollution](https://www.sciencedirect.com/topics/earth-and-planetary-sciences/environmental-pollution).  This article  reviews relevant [electromagnetic](https://www.sciencedirect.com/topics/earth-and-planetary-sciences/electromagnetism) frequencies, exposure standards and current scientific literature on the health implications of 2G, 3G, 4G and 5G.
* Effects can also be non-linear. Because this is the first generation to have cradle-to-grave lifespan exposure to this level of man-made microwave (RF EMR) radiofrequencies, it will be years or decades before the true health consequences are known. Precaution in the roll out of this new technology is strongly indicated.

Noa Betzalel, Paul Ben Ishai, Yuri Feldman, [The human skin as a sub-THz receiver – Does 5G pose a danger to it or not?](http://www.sciencedirect.com/science/article/pii/S0013935118300331), Environmental Research, Volume 163, 2018, Pages 208-216, ISSN 0013-9351,

* Researchers have developed a unique simulation tool of human skin, taking into account the skin [multi-layer structure](https://www.sciencedirect.com/topics/earth-and-planetary-sciences/laminates) together with the helical segment of the sweat duct embedded in it. They found that the presence of the sweat duct led to a high specific absorption rate (SAR) of the skin in [extremely high frequency](https://www.sciencedirect.com/topics/earth-and-planetary-sciences/extremely-high-frequencies) band that will be used in 5G. “One must consider the implications of human immersion in the electromagnetic noise, caused by devices working at the very same frequencies as those, to which the sweat duct (as a helical antenna) is most attuned. We are raising a warning flag against the unrestricted use of sub-THz technologies for communication, before the possible consequences for public health are explored.”

[Mobile phone infrastructure regulation in Europe: Scientific challenges and human rights protection](http://www.sciencedirect.com/science/article/pii/S146290111300186X) Claudia Roda, Susan Perry, Environmental Science & Policy, Volume 37, March 2014, Pages 204-214.

* This article was published in Environmental Science & Policy by human rights experts. It argues that cell tower placement is a human rights issue for children.
* “We argue that (1) because protection of children is a high threshold norm in Human Right  law and (2) the binding language of the Convention on the Rights of the Child obliges States Parties to provide a higher standard of protection for children than adults, any widespread or systematic form of environmental pollution that poses a long-term threat to a child’s rights to life, development or health may constitute an international human rights violation.
* In particular we have explained how the dearth of legislation to regulate the installation of base stations  (cell towers) in close proximity to children’s facilities and schools clearly constitutes a human rights concern according to the language of the Convention on the Rights of the Child, a treaty that has been ratified by all European States.

[SAFETY ZONE DETERMINATION FOR WIRELESS CELLULAR TOWER](http://ijret.org/Volumes/V02/I09/IJRET_110209029.pdf) Nyakyi et al, Tanzania (2013)

* This research looked at the radiation that cell towers emit and states a safety zone is needed around the towers to ensure safe sleeping areas. The authors state that “respective authorities should ensure that people reside far from the tower by 120m or more depending on the power transmitted to avoid severe health effect.”

[A cross-sectional case control study on genetic damage in individuals residing in the vicinity of a mobile phone base station.](http://www.ncbi.nlm.nih.gov/pubmed/25006864) Ghandi et al, 2014 (India):

* This cross-sectional case control study on genetic damage in individuals living near cell towers found genetic damage parameters of DNA were significantly elevated. The authors state,” The genetic damage evident in the participants of this study needs to be addressed against future disease-risk, which in addition to neurodegenerative disorders, may lead to cancer.”

[Human disease resulting from exposure to electromagnetic fields](http://www.ncbi.nlm.nih.gov/pubmed/24280284), Carpenter, D. O. Reviews on Environmental Health, Volume 28, Issue 4, Pages 159172.

* This review summarizes the evidence stating that excessive exposure to magnetic fields from power lines and other sources of electric current increases the risk of development of some cancers and neurodegenerative diseases, and that excessive exposure to RF radiation increases risk of cancer, male infertility, and neurobehavioral abnormalities.

[Signifikanter Rückgang klinischer Symptome nach Senderabbau – eine Interventionsstudie. (English-Significant Decrease of Clinical Symptoms after Mobile Phone Base Station Removal – An Intervention Study)](http://nebula.wsimg.com/d1e65ba8eb587c44cba6164dfef44ed2?AccessKeyId=045114F8E0676B9465FB&disposition=0&alloworigin=1)Tetsuharu Shinjyo and Akemi Shinjyo, 2014 Umwelt-Medizin-Gesellschaft, 27(4), S. 294-301.

* Japanese study Showed Statistically Significant Adverse Health Effects from electromagnetic radiation from mobile phone base stations. Residents of a condominium building that had cell tower antennas on the rooftop were examined before and after cell tower antennas were removed. In 1998, 800MHz cell antennas were installed, then later in 2008 a second set of antennas (2GHz) were installed.  Medical exams and interviews were conducted before and after the antennas were removed in 2009 on 107 residents of the building who had no prior knowledge about possible. These results lead researchers to question the construction of mobile phone base stations on top of buildings such as condominiums or houses.

[Effect of GSTM1 and GSTT1 Polymorphisms on Genetic Damage in Humans Populations Exposed to Radiation From Mobile Towers.](http://1.usa.gov/1hlQmoj)Gulati S, Yadav A, Kumar N, Kanupriya, Aggarwal NK, Kumar R, Gupta R., Arch Environ Contam Toxicol. 2015 Aug 5. [Epub ahead of print]

* In our study, 116 persons exposed to radiation from mobile towers and 106 control subjects were genotyped for polymorphisms in the GSTM1 and GSTT1 genes by multiplex polymerase chain reaction method. DNA damage in peripheral blood lymphocytes was determined using alkaline comet assay in terms of tail moment (TM) value and micronucleus assay in buccal cells (BMN). Our results indicated that TM value and BMN frequency were higher in an exposed population compared with a control group and the difference is significant. In our study, we found that different health symptoms, such as depression, memory status, insomnia, and hair loss, were significantly associated with exposure to EMR. Damaging effects of nonionizing radiation result from the generation of reactive oxygen species (ROS) and subsequent radical formation and from direct damage to cellular macromolecules including DNA.

[Subjective symptoms, sleeping problems, and cognitive performance in subjects living near mobile phone base stations](http://www.ncbi.nlm.nih.gov/pubmed/16621850), Hutter HP et al, (May 2006), Occup Environ Med. 2006 May;63(5):307‐13

* Found a significant relationship between some cognitive symptoms and measured power density in 365 subjects; highest for headaches. Perceptual speed increased, while accuracy decreased insignificantly with increasing exposure levels.

Oberfeld, A.E. Navarro, M. Portoles, C. Maestu, C. Gomez-Perretta, [The microwave syndrome: further aspects of a Spanish study](http://www.powerwatch.org.uk/pdfs/20040809_kos.pdf),

* A health survey was carried out in La Ñora, Murcia, Spain, in the vicinity of two GSM 900/1800 MHz cellular phone base stations. The adjusted (sex, age, distance) logistic regression model showed statistically significant positive exposure-response associations between the E-field and the following variables: fatigue, irritability, headaches, nausea, loss of appetite, sleeping disorder, depressive tendency, feeling of discomfort, difficulty in concentration, loss of memory, visual disorder, dizziness and cardiovascular problems.

[Bortkiewicz et al, 2004 (Poland), Subjective symptoms reported by people living in the vicinity of cellular phone base stations: review,Med Pr.2004;55(4):345-51.](http://www.ncbi.nlm.nih.gov/pubmed/15620045)

* Residents close to mobile phone masts reported: more incidences of circulatory problems, sleep disturbances, irritability, depression, blurred vision and concentration difficulties the nearer they lived to the mast.
* The performed studies showed the relationship between the incidence of individual symptoms, the level of exposure, and the distance between a residential area and a base station.

Wolf R and Wolf D, [Increased Incidence of Cancer Near a Cell-phone Transmitter Station](http://www.powerwatch.org.uk/news/20050207_israel.pdf), International Journal of Cancer Prevention, (Israel) VOLUME 1, NUMBER 2, APRIL 2004

* A significant higher rate of cancer (300% increase) among all residents living within 300m radius of a mobile phone mast for between three and seven years was detected.
* 900% cancer increase among women alone
* In the area of exposure (area A) eight cases of different kinds of cancer were diagnosed in a period of only one year. This rate of cancers was compared both with the rate of 31 cases per 10,000 per year in the general population and the 2/1222 rate recorded in the nearby clinic (area B). The study indicates an association between increased incidence of cancer and living in proximity to a cell-phone transmitter station.

[Changes of Neurochemically Important Transmitters under the influence of modulated RF fields – A Long Term Study under Real Life Conditions](http://apps.fcc.gov/ecfs/document/view?id=7521095891)(Germany), Bucher and Eger, 2011

* German study showing elevated levels of stress hormones (adrenaline, noradrenaline), and lowered dopamine and PEA levels in urine in area residents during 1st 6 months of cell tower installation. Even after 1.5 years, the levels did not return to normal.

[The Influence of Being Physically Near to a Cell Phone Transmission Mast on the Incidence of Cancer](http://www.tetrawatch.net/papers/naila.pdf) (Umwelt·Medizin·Gesellschaft 17,4 2004) [Eger et al, 2004 (Germany)](http://apps.who.int/peh-emf/research/database/emfstudies/viewstudy.cfm?ID=1226)

* 200% increase in the incidence of malignant tumors was found after five years’ exposure in people living within 400m radius of a mobile phone mast. The proportion of newly developing cancer cases is significantly higher among patients who live within 400 meters of a cell phone transmitter. Early age of cancer diagnosis.

[Microwave electromagnetic fields act by activating voltage-gated calcium channels: why the current international safety standards do not predict biological hazard.](http://bit.ly/1nQjboA) Martin L. Pall. Recent Res. Devel. Mol. Cell Biol. 7(2014).

* “It can be seen from the above that 10 different well-documented microwave EMF effects can be easily explained as being a consequence of EMF VGCC activation: oxidative stress, elevated single and double strand breaks in DNA, therapeutic responses to such EMFs, breakdown of the blood-brain barrier, cancer, melatonin loss, sleep dysfunction, male infertility and female infertility.”

Pall ML. 2015. [Microwave frequency electromagnetic fields (EMFs) produce widespread neuropsychiatric effects including depression.](http://electromagnetichealth.org/wp-content/uploads/2015/05/reveh-2015.pdf)J. Chem. Neuroanat. 2015 Aug 20.

* Non-thermal microwave/lower frequency electromagnetic fields (EMFs) act via voltage-gated calcium channel (VGCC) activation.
* Two U.S. government reports from the 1970s to 1980s provide evidence for many neuropsychiatric effects of non-thermal microwave EMFs, based on occupational exposure studies. 18 more recent epidemiological studies, provide substantial evidence that microwave EMFs from cell/mobile phone base stations, excessive cell/mobile phone usage and from wireless smart meters can each produce similar patterns of neuropsychiatric effects, with several of these studies showing clear dose–response relationships.
* Lesser evidence from 6 additional studies suggests that short wave, radio station, occupational and digital TV antenna exposures may produce similar neuropsychiatric effects. Among the more commonly reported changes are sleep disturbance/insomnia, headache, depression/depressive symptoms, fatigue/tiredness, dysesthesia, concentration/attention dysfunction, memory changes, dizziness, irritability, loss of appetite/body weight, restlessness/anxiety, nausea, skin burning/tingling/dermographism and EEG changes. In summary, then, the mechanism of action of microwave EMFs, the role of the VGCCs in the brain, the impact of non-thermal EMFs on the brain, extensive epidemiological studies performed over the past 50 years, and five criteria testing for causality, all collectively show that various non-thermal microwave EMF exposures produce diverse neuropsychiatric effects.

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67. Hazards & Nuisances: Overhead High Voltage Transmission Towers and Lines

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    The appraiser must indicate ***whether the dwelling or related property improvements is located within the easement serving a high-voltage transmission line, radio/TV transmission tower, cell phone tower, microwave relay dish or tower, or satellite dish (radio, TV cable, etc).***

    If the dwelling or related property improvement is located within such an easement, the DE Underwriter must obtain a letter from the owner or operator of the tower indicating that the dwelling and its related property improvements ***are not located within the tower’s (engineered) fall distance*** in order to waive this requirement.

    If the dwelling and related property improvements are located outside the easement, the property is considered eligible and no further action is necessary. ***The appraiser, however, is instructed to note and comment on the effect on marketability resulting from the proximity to such site hazards and nuisances.***” [Emphasis added] <https://archives.hud.gov/offices/hsg/sfh/ref/sfh1-18f.cfm>. [↑](#footnote-ref-67)
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69. *Sprint Spectrum L.P. v. Willoth*, 176 F.3d 630 (2d Cir. 1999). [↑](#footnote-ref-69)
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    *Northeast LLC v. The Town of lslip,* 893 F.Supp.2d 338, 361 (2012) (“…the record in this case contains objective evidence that the visible tower would have more than a “negligible” or “minimal” impact on the community. As the Second Circuit noted in City of White Plains, when considering the impact on the community, a zoning board can consider community opposition in the form of “aesthetic objections raised by neighbors who know the local terrain and the sightlines of their own homes.” 430 F.3d at 534. In City of White Plains, this included testimony by neighbors that “the tower would be an eyesore” and arguments from a nearby temple that the tower “would impair the view from its glass-enclosed chapel”. Id. at 532.”) [↑](#footnote-ref-70)
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