

TO: Nevada County Board of Supervisors

FROM: David Adams

DATE: March 13, 2018

RE: Cell Tower Conditional Use Permit Application for 19406 Burning Bush Road

Information and Documentation of Adverse Health and Property Effects from Cell Towers and Low-Frequency Electromagnetic Radiation

I understand that a representative for the applicant has stated that there were no health effects to worry about from this 130' cell-tower project on Burning Bush Road. To better inform the Board of Supervisors and County Planning Department personnel, this document wants to present an alternative, more accurate picture of the current "regulation" (rather, non-regulation) concerning known health and environmental impacts and a sampling of the evidence from scientific research on this matter.

The State of the Current Federal RFR Exposure Standards

The adverse non-thermal biological and medical effects of low-frequency electromagnetic radiation (RFR, or Radio Frequency Radiation) are well documented in tens of thousands of published scientific studies – more thoroughly, in fact, than the effects of asbestos, DDT, dioxins, tobacco, or PCBs. But they are not recognized by the Federal Communications Commission (FCC) in their 30-year-old exposure standards applicable only to thermal (heat) effects from temporary exposure to *high-frequency* electromagnetic radiation. For communications equipment, the federal Telecommunications Act of 1996 awarded authority over the environmental and health effects of RF radiation exclusively to the FCC, an agency with no environmental expertise and no biologists or medical scientists on staff, whose stated mission is not environmental protection, but the *promotion* of communication technology. In response to challenges, the FCC has repeatedly told congress and the federal courts that it does not have expertise in RF field exposure health issues.

Evidence in point: To test its RFR safety limits, the FCC gave a mannequin filled with fluid a cell phone for 6 minutes; when the temperature of its head didn't rise or show any significant heat effects, they determined that cell phones were safe. *But what about non-thermal effects?*

In official comments to the FCC about guidelines for evaluation of electromagnetic effects of RFR (FCC Docket ET 93-62, November 9, 1993), the Environmental Protection Agency (EPA) found that the FCC's exposure standards are "serious flawed" (emrpolicy.org). The Food and Drug Administration (FDA) commented to the FCC on November 10, 1993, that "FCC rules do not address the issue of long-term, chronic exposure to radio frequency fields" (emrpolicy.org Exhibit 46).

"Safe' levels were based on thermal heating standards, now inapplicable. The standards are nearly 30 years out of date, and the EPA office tasked to direct the human safety issues was eliminated due to budget cuts in the early 1980s. Furthermore, the standards in place do not address the potential effects of radiation on wildlife. No government agency currently monitors the rising background levels of electromagnetic radiation (EMF). Current safety standards assume that non-ionizing radiation is safe if the power is too weak to heat living tissue. However, since the 1980s, growing amounts of published research are showing adverse effects on both humans and wildlife far below a thermal threshold – usually referred to as "nonthermal effects," especially under conditions of long-term, low-level exposure."

U.S. Fish and Wildlife Service Briefing Paper, April 17, 2009:

<http://electromagnetichealth.org/pdf/CommTowerResearchNeedsPublicBriefing-2-409.pdf>

“The existing safety limits did not anticipate these kinds of technologies affecting the health of people living with and using wireless devices on a daily basis. (Biological) effects are now widely reported to occur at exposure levels significantly below most current national and international limits.”
David O. Carpenter, MD, Coeditor of The Bioinitiative Report, Director of the Institute for Health and the Environment, SUNY, Albany, NY.

In May 2011 the World Health Organization (WHO) International Agency for Research on Cancer (IARC) classified radiofrequency radiation as possibly carcinogenic to humans, based on an increased risk for glioma (brain cancer) – the same classification given to DDT, lead, chloroform, and asbestos. Based on research since 2011, many WHO-affiliated scientists have been calling for this rating to be upgraded to more definitely carcinogenic.

According to the exposure standards of OSHA (the federal Occupational Safety and Hazard Administration), determined by engineers for work on telecommunications equipment, magnetic fields above one gauss (or 1000 mG, i.e., milligauss) are dangerous. The FCC limit also is 1000 mG. By contrast, the 2012 Bioinitiative Report recommends a maximum of 1/1000th of what OSHA and the FCC allow. The Bioinitiative Report presents results of more than 1,800 scientific studies that document the effects of exposure to electronics, including cellular antennas, on DNA, memory, learning, behavior, attentions, sleep, cancer, Alzheimer’s, sperm damage, neurological diseases, allergies, autism, and more. (C. Sage and D. Carpenter, MD, Bioinitiative Report 2012; <http://www.bioinitiative.org>) The Seletun Statement, put forward by an international scientific panel that met in Seletun, Norway in 2009, also recommends a limit of 1.0 mG exposure (i.e., below 1,700 $\mu\text{W}/\text{m}^2$ vs. the FCC limit of 6 to 10 million $\mu\text{W}/\text{m}^2$) – based on risk for leukemia, brain tumors, Alzheimer’s, sperm damage, and DNA strand breaks. Milligauss readings above 1.0 are especially hazardous for children, pregnant women, people with medical implants, and those with compromised health. Based upon the results of expert studies worldwide, a few other countries have determined that the maximum safe limits for RF radiation are as much as 5,000 times lower than the level permitted by the FCC.

RF signals can interfere with the functioning of medical implants such as cardiac pacemakers, insulin pumps, and deep brain stimulators. Furthermore, the negative biological effects are far more dangerous to children and pregnant women. “Children are disproportionately affected by environmental exposures, including cell phone radiation. The differences in bone density and the amount of fluid in a child’s brain compared to an adult’s brain could allow children to absorb greater quantities of RF energy deeper into their brains than adults.”

Thomas K. McInerney, MD, FAAP, President of the American Academy of Pediatrics. From a 12/12/2012 letter to Representative Dennis Kucinich in support of the Cell Phone Right to Know Act.

What Distance from a Cellular Antenna Is Safe to Live and/or Work? A Sampling of the Evidence

This is a brief review of selected examples of the many scientific studies researching this question (with references).

- People who lived within *350 meters (1148 feet)* of a cellular antenna for more than a decade experienced 4.15 times as much cancer. Among women, the increase was 10 times.

R. Wolf and D. Wolf, “Increased incidence of cancer near a cellphone transmitter station,” *International Journal of Cancer Prevention*, vol. 1, no. 2 (2004).

http://www.powerwatch.org.uk/news/20050207_israel.pdf

- Living within *400 meters (1312 feet)* of a cell tower increased the risk of developing cancer by 300%, as shown by a 10-year German study of nearly 1000 persons from 1994 to 2004.

Horst Eger, Klaus Uwe Hagen, Birgitt Lucas, Peter Vogel, Helmut Voit, "The Influence of Being Physically Near to a Cell Phone Transmission Mast on the Incidence of Cancer," English translation of: Eger, H., Hagen, K.U., Lucas, B. et al. (2004), Einfluss der räumlichen Nähe von Mobilfunksendeanlagen auf die Krebsinzidenz, Wissenschaftliche Originalarbeit. *Umwelt-Medizin-Gesellschaft*, vol. 17, no. 4 (2004): 326-335.

- Although the carcinogenic effect of RFR is typically manifested after long-term exposure (up to 10 years and more), even a year of operation of a powerful cell-phone base station (antenna) resulted in a dramatic increase of cancer incidence among population living nearby. In addition, model studies in rodents unveiled a significant increase in cancer onset after 17-24 months of RFR exposure both in tumor-prone and intact animals. Several kinds of stress impacts on living cells were also identified.

I. Yakymenko, E. Sidorik, S. Kyrylenko, V. Chekhun, "Long-term exposure to microwave radiation provokes cancer growth: evidences from radars and mobile communication systems," *Exp Oncol.* vol. 33, no. 2 (June 2011): 62-70.

- This study found that 8 of 10 epidemiological studies dealing with health effects near cell phone base stations reported increased prevalence of adverse neurobehavioral symptoms or cancer in populations living at distances up to *500 meters (1640 feet)* 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.

Vini G Khurana, Lennart Hardell, Joris Everaert, Mikko Ahonen, "Epidemiological Evidence for a Health Risk from Mobile Phone Base Stations." *International Journal of Occupational and Environmental Health*, vol. 16, no. 3 June 2010):263-7.

- People living within *200 to 500 feet* of a cellular antenna (base station) experienced fatigue, headache, sleep disruption, irritability, depression, decreased libido, memory loss, dizziness, nausea, increased risk of cancer, tremors, loss of appetite, rashes, visual disruptions, reproductive system disruptions, increases in the permeability of the blood-brain barrier, and overall discomfort.

B Levitt and H. Lai, "Biological effects from exposure to electromagnetic radiation emitted by cell tower base stations and other antenna arrays," *Environmental Reviews*, vol. 18 (2010): 369-395; and H.P. Hutter et al., "Mobile phone base stations: Effects on health and well being," *Pathophysiology*, vol. 16, nos. 2-3 (2009): 123-135.

- 3.48% of people who lived within *500 meters (1,640 feet)* of a cellular base station/antenna experienced deaths by neoplasia (cancerous tumors). Outside of this area, deaths by neoplasia were only 0.58%.

A. C. Dode et al., "Mortality by neoplasia and cellular telephone base stations in the Belo Horizonte municipality, Minas Gerais state, Brazil," *Science of the Total Environment*," vol. 409. No. 19(2011)' 3649-3665.

- A clustering and significant increase of childhood leukemia cases was found within *2.6 miles* of low-frequency radio towers in Hawaii.

Maskarinec G1, Cooper J, Swygert L. "Investigation of increased incidence in childhood leukemia near radio towers in Hawaii: preliminary observations," *Journal of Environmental Pathology, Toxicology, and Oncology*. Vol.13, no.1 (1994):33-37. <http://www.ncbi.nlm.nih.gov/pubmed/7823291>

- Studies of 7 cancer clusters around cell-phone towers in England by Dr. John Walker showed a cluster of 31 cancer cases around a single street in the village of Coleshill, Warwickshire. A quarter of the 30 staff at a special school within sight of the 90-foot high cell-phone tower had developed tumors since 2000.

Reported in: Daniel Foggo, "Cancer clusters at phone masts," *The Sunday Times*, April 22, 2007;
<http://www.avaate.org/spip.php?article700>

- In an 11-year study (1998-2009) of multiple rooftop cellular antennas installed on a 10-floor condominium building in Naha City, Okinawa, Japan involving medical exams and interviews of 107 residents, it was found that various health symptoms (tinnitus, fatigue, eye pain and sight deterioration, sleep problems, dizziness, headache, nosebleeds, numbness, etc.) radically decreased after the removal of the antennas.

<https://elettrosensibili.wordpress.com/2015/10/14/significant-decrease-of-clinical-symptoms-after-mobile-phone-base-station-removal-signifikanter-ruckgang-klinischer-symptome-nach-senderabbau>

- A study was conducted on 85 inhabitants living in a building under a cell-phone base station antenna and 48 persons opposite the street from the station, with a control group of 80 matched participants. The prevalence of neuropsychiatric complaints such as headaches, memory changes, dizziness, tremors, depressive symptoms, and sleep disturbances were significantly higher among exposed inhabitants than controls. The exposed inhabitants also exhibited a significantly lower performance than controls in tests of attention and short-term auditory memory.

Abdel-Rassoul, G., Abou El-Fateh, O., Abou Salem, M. et al. (2007), Neurobehavioral effects among inhabitants around mobile phone base stations. *Neurotoxicology*, 28(2), 434-440.

- Long-term (6 years) exposure to cellular antennas and mobile phones reduced the bodily levels of the human hormones adrenocorticotrophic hormone, cortisol, thyroid hormones, and testosterone – also serum progesterone (prolactin) in young females.

E.F.Eskander, et al., "How does long term exposure to base stations and mobile phones affect human hormone profiles?" *Clinical Biochemistry*, vol. 45, nos. 1-2 (2012): 157-161.
<http://www.sciencedirect.com/science/article/pii/S0009912011027330>

- After installation of a new cellular antenna in a German village, stress system hormones were chronically disrupted over the next 18 months, which can lead to major health problems in the long term. There were various short-term effects such as sleep problems, headaches, dizziness, concentration problems, and allergies.

K. Buchner and H. Eger, "Changes of clinically important neurotransmitters under the influence of modulated RF fields: A long-term study under real-life conditions," English translation of: "Veränderung klinisch bedeutsamer Neurotransmitter unter dem Einfluss modulierter hochfrequenter Felder – Eine Langzeiterhebung unter lebensnahen Bedingungen (Wissenschaftlicher Originalbeitrag)," *Umwelt-Medizin-Gesellschaft*, vol. 24, no. 1 (2011): 44-57.

- After 5 generations of exposure to RF radiation from cell towers (less than one microwatt per centimeter squared), mice become irreversibly infertile.

I. N. Magras and T. D. Xenos, "RF radiation-induced changes in the prenatal development of mice," *Bioelectromagnetics*, vol. 18, no. 6 (1997): 455-461.

- A laboratory-conditions Netherlands study mimicking common residential exposure to third-generation (UMTS) cell towers confirmed the “microwave syndrome” [EHS] that at least 23 teams of scientists in 16 countries have reported to be widespread in the vicinity of cell towers. Symptoms after 35 minutes of RFR exposure included dizziness, nausea, headaches, shortness of breath, numbness and tingling, inability to concentrate, fatigue weakness, muscle pains, heart palpitations, and chest pain.

Zwamborn, Vossen, van Leersum, et al. “Effects of global communications system radiofrequency fields on well being and cognitive functions of human subjects with and without subjective complaints,” *TNO Physics and Electronics Laboratory Report, FEL-03-C148* (2003), The Hague.

- Of young adults in their 20s and 30s, 53% who lived within 300 meters (984 feet) of a cell tower had disturbed sleep, compared with only 12.5% who did not live near a cell tower. 81.4% had fatigue, compared with 25% of those with no tower nearby. 57.6% had headaches, compared with 18.2% of those with no tower nearby.

Santini, R., Santini, P., LeRuz, P., Danze, J. M., and Seigne, M., “Survey study of people living in the vicinity of cellular phone base stations.” *Electromagnetic Biology and Medicine* vol. 22 (2003): 41-49, Available online at www.uergerwelle.de

- This study found that symptoms such as headache, fatigue, and difficulty in concentration were approximately 15% more common in people with higher potential exposures to radiation from nearby base stations (cell towers within 24-600 meters in a rural area and 20-250 meters in an urban area), and that the association remained significant after adjustment for various possible confounding factors, including regular personal use of mobile phones.

Hutter, H-P, Moshammer, H, Wallner, P. et al. “Subjective symptoms, sleeping problems, and cognitive performance in subjects living near mobile phone base stations,” *Occup Environ Med* 2006 63307–313.313. <https://www.ncbi.nlm.nih.gov/pubmed/16621850>

- The Military Center for Radiation Safety in Poland studied the cancer death rates for all career military personnel (approx 128,000 persons each year) for the 14-year period of 1971-1985. The study revealed that persons occupationally exposed to RF emissions were nearly twice as likely to develop brain tumors, 13.9 times more likely to develop chronic myelocytic leukemia, 8.62 times more likely to develop acute myeloblastic leukemia, and 5.82 times more likely to develop non-hodgkin lymphomas.

Stanislaw Szmigielski, “Cancer morbidity in subjects occupationally exposed to high frequency (radiofrequency and microwave) electromagnetic radiation,” A Collection of Papers Presented at The International Conference on the Effect of the Radio Frequency Electromagnetic Radiation on Organisms, *Science of The Total Environment*, vol. 180, no. 1 (February 2, 1996): 9-17.

A Few Selected Additional Research Studies of RFR/Microwave Human Health Impacts

- In a partial, peer-reviewed report published May 26, 2016, of a carefully designed, 15-year, \$25-million controlled clinical trial conducted by the U.S. National Toxicology Program (NTP) of the National Institutes of Health (from a 1999 request by the U.S. Food and Drug Administration [FDA]), thousands of rats and mice were exposed from in utero to death to full-body cell-phone radiation (CDMA and GSM) for roughly nine hours each day. The results were that a statistically significant percentage (ranging as high as 7.7%) developed either brain cancer (gliomas) and/or heart cancer (schwannomas), while none of the rodents in the control groups developed any cancers. The report notes that “even a very small increase in the incidence of disease resulting from exposure to RFR could have broad implications for public health.” A meeting of the Bioelectromagnetics Society felt that this is the largest and most comprehensive study in

animals exposed to cell phone radiation to date and that the results from this study should trump all other animal carcinogenicity studies of RFR.

Michael Wyde, Mark Cesta, Chad Blystone, Susan Elmore, Paul Foster, Michelle Hooth, Grace Kissling, David Malarkey, Robert Sills, Matthew Stout, Nigel Walker, Kristine Witt, Mary Wolfe, John Bucher "Report of Partial Findings from the National Toxicology Program Carcinogenesis Studies of Cell Phone Radiofrequency Radiation in Hsd: Sprague Dawley SD rats (Whole Body Exposures)." <http://biorxiv.org/content/early/2016/05/26/055699>

- Cell-phone radiation can cause breaking of double-strands of DNA into fragments. If the body's repair systems can't keep up with these breaks, cancer and birth defects can result.

A. Campisi, et al., "Reactive oxygen species levels and DNA fragmentation on astrocytes in primary culture after acute exposure to low intensity microwave electromagnetic field," *Neuroscience Letters* vol. 473 (2010): 52-55; and L.R. Lopes dos Santos, A.D. Tavares Jr, and I. Felzenszwalb, "The effect of electromagnetic field exposure on the formation of DNA lesions," *Redox Report: Communications in Free Radical Research* vol. 5, no. 5 (2000): 299-301.

- Studies have found that RFR exposure can remove calcium ions (positively charged calcium ions) from cell membranes in the brain. Loss of calcium ions destabilizes the membrane and can have serious metabolic and neurological consequences. The brain may become hyperactive and overloaded, leading to loss of concentration, ADHD, damage to DNA (causing loss of fertility and increased risk of cancer), and digestive enzymes from lysosomes. Membrane leakage can also open the blood-brain barrier and other protective barriers, leading to Alzheimer's, dementia, asthma, allergies, and various autoimmune disorders.

S. M. Bawin et al., "Effects of modulated VHF fields on the central nervous system," *Academy of Science*, 247 (1975): 74-81; N. D. Volkow et al., "Effects of Cell Phone Radio frequency Signal Exposure on Brain Glucose Metabolism," *Journal of the American Medical Association*, vol. 305 no. 8 (2011): 808-813; R.C. Beason and P. Semm, "Responses of neurons to an amplitude modulated microwave stimulus," *Neuroscience Letters*, vol. 333 (2002): 175-178; and J.F. Krey and R.F. Dolmetsch, "Molecular mechanisms of autism: A possible role for Ca²⁺ signaling," *Current Opinion in Neurobiology*, vol. 17 (2007): 12-119.

- RFR exposure activates voltage-gated calcium channels. This leads to increased calcium levels within cells, which leads to the production of peroxynitrite. Peroxynitrite is at the root of most inflammatory diseases, including neurodegenerative and cardiovascular diseases, migraines, and allergies.

M Pall, "Electromagnetic fields act via activation of voltage-gated calcium channels to produce beneficial or adverse effects," *Journal of Cellular and Molecular Medicine*, 6-26-2013.

- Numerous animal studies have shown that changes in magnetic field exposure (such as RFR transmissions) reduce production of melatonin, a sleep hormone and important anti-oxidant.

A. Lerchi, et al., "Pineal gland 'magnetosensitivity' to static magnetic fields is a consequence of induced electric currents (eddy currents)," *Journal of Pineal Research*, vol. 10 (1991): 109-116.

- This important 2015 review of existing studies on RFR effects was published by the National Academy of Sciences in the Ukraine, Indiana University, and the University of Campinas in Brazil. Based on 93 out of 100 peer-reviewed studies, it concluded that low-intensity RFR is an oxidative agent for living cells with a high pathological potential. The oxidative stress induced by RFR exposure explains a range of RFR

health impacts, both cancer and non-cancer illnesses. In addition to chronicling illnesses, this study provides at least 6 different biological mechanisms that explain these RFR effects in the body.

Igor Yakymenko¹, Olexandr Tsybulin², Evgeniy Sidorik¹, Diane Henshel³, Olga Kyrylenko⁴ and Sergiy Kyrylenko "Oxidative mechanisms of biological activity of low-intensity radiofrequency radiation," *Electromagnetic Biology and Medicine* (July 2015)
<http://nebula.wsimg.com/107f00a88ae36803a132e3ca6c222157?AccessKeyId=045114F8E0676B9465FB&disposition=0&alloworigin=1>

- This technical and critical examination of 16 expert cytogenetic monitoring studies performed around the world confirmed that 13 of the 16 independent studies showed evidence that RFR-exposed individuals suffered genetic damage. "A significant increase in chromosome breaks. . . was reported in all individuals."

L. Verschaeve, "Genetic damage in subjects exposed to radiofrequency radiation," *Mutat Res.* vol. 681, no. 2-3 (Mar-June 2009):259-270.

- Three scientists who work for the California Department of Health Services were directed to study whether electro-magnetic fields (EMFs) were associated with health problems. The three scientists unanimously concluded in 2002 that the likelihood of a causal relationship between EMFs and childhood leukemia is ninety five percent (95%). "To one degree or another, all three of the DHS scientists are inclined to believe that EMFs can cause some degree of increased risk of childhood leukemia, adult brain cancer; Lou Gehrig's Disease, and miscarriage."

"Executive Study of *The California EMF Risk Evaluation for Policymakers and The Public*" (2002)
http://www.bcuc.com/Documents/Proceedings/2006/DOC_10743_Exhibit%20c03-49.pdf

A Sampling of Documentation of Adverse Impacts on Wildlife and the Natural Environment from Prolonged Exposure to Low-Frequency Electromagnetic Radiation

The following is scientific documentation that, in compliance with the California Environmental Quality Act (CEQA), an Environmental Impact Report (EIR) should be performed to better evaluate the potential effects of the new exposure to radiofrequency radiation (RFR) that will be caused by the proposed 130' cell tower on Burning Bush Road. This information and evidence is submitted in preliminary and partial support of finding a positive CEQA impact declaration for this project, involving at least a CEQA Initial Study and, more responsibly, an Environmental Impact Report, either full version or focused version.

There is precedence in California for including this factor in CEQA documents. For example, RFR emissions from new wireless mobile-phone infrastructure was specifically addressed in a (draft) EIR prepared in January as the Los Angeles Regional Interoperable Communications System (LA-RICS) Joint Power Authority's Environmental Impact Report for the Land Mobile Radio (LMR) Project there: <http://www.la-rics.org/wp-content/uploads/2016/01/LA-RICS-LMR-DEIR-January-2016.pdf> (see especially ES-4, 1-11, Section 5.0 "Other CEQA Considerations," p. 5-8).

Preliminary Explanation of Radio-Frequency Radiation (RFR) Effects on Wildlife

All plants and animals, as well as humans, have adapted to the earth's electromagnetic fields, which include a direct current (DC) magnetic field, a DC electrical field, and low-frequency Schumann Resonances (natural fields that are both electric and magnetic, caused by the geometry of the earth's surface and the ionosphere near the top of the atmosphere).

To navigate in relation to these fields and to control their immune systems, birds and bees use magnetically sensitive substances called cryptochromes. These are protein pigments found in virtually all animals, plants, and many bacteria. Cryptochromes measure light to control and reset animals' and plants' biological clocks. Some animals also use cryptochromes to sense (or "see") the direction of the earth's magnetic field. Cryptochromes are badly impaired by human-made oscillating electro-magnetic fields, disrupting insects' and animals' solar and magnetic navigation abilities, likely leading to results such as bee colony collapse, loss of migratory birds and butterflies, and a weakening of the immune system. For example, radio-frequency radiation (RFR) can blot out a bird's perception of the earth's field, causing the bird (or insect) to fly in the wrong direction, and also disrupt a bird's internal clock based on the sun's changing position. Birds often leave the areas for many hundreds of feet around cell towers and antennas. Studies have shown that the hollow tubes of bird's feathers act as "aerials" for such radiation.

Daily Circadian metabolic rhythms of numerous animals are also driven by cryptochrome-containing internal clocks, especially in relation to dawn and dusk. Circadian rhythms control the production of melatonin (a sleep hormone); at night, they divert metabolic resources to bodily repair and immune-system strengthening. In humans reduced melatonin production would result in tiredness during the day and poor sleep at night, among other effects. Because it is supported by melatonin, the immune system may never be able to summon the great energy sometimes required to overcome pathogens or destroy developing cancer cells before they get out of control, leading to various diseases.

The following published research studies support the above and are listed with brief summary comments followed by documentation of verifying research studies:

GENERAL

- RFR fields emitted by cellular antennas cause the decline of animal populations and deterioration of plant health: Animal effects include reduction in natural defenses, reproduction problems, adversarial behavior.

A Balmori, "Electromagnetic pollution from phone masts. Effects on wildlife," *Pathophysiology* (2009).

BIRDS

Typical effects of radiation from cellular communication antennas on resident, breeding, and migratory birds: site abandonment, feather deformation, locomotion problems, weight loss, weakness, reduced survivorship and death.

The U.S. Fish and Wildlife Service continues to suggest to the Federal Communications Commission (FCC) and to Congress the pressing need for studies based on cumulative negative effects of RFR exposure on migratory birds under the National Environmental Policy Act.

Manville, A.M., II. 2007a. Comments of the U.S. Fish and Wildlife Service submitted electronically to the FCC on 47 CFR Parts 1 and 17, WT Docket No. 03-187, FCC 06-164, Notice of Proposed Rulemaking, "Effects of Communication Towers on Migratory Birds." February 2, 2007. 32 pp.

Manville, A.M., II. 2007b. U.S. Fish and Wildlife concerns over potential radiation impacts from cellular communication towers on migratory birds and other wildlife- research opportunities. Invited Presentation to "Congressional Staff Briefing on the Environmental and Human Health Effects of Radiofrequency (RF) Radiation," House Capitol 5, Washington, DC. 16 page PowerPoint presentation. May 10, 2007.

Citing a variety of scientific research, the U.S. Department of the Interior in February of 2014 called on the National Telecommunications and Information Administration of the U.S. Department of Commerce to formulate or modify policies and procedures for cellular communications towers so that they are in

conformity with Executive Order 13186 Responsibilities of Federal Agencies to Protect Migratory Birds and do not threaten from the towers' emissions of RFR the 241 species of endangered or threatened U.S. birds.

In 2003 three conservation organizations filed a lawsuit against the Federal Communications Commission ("FCC"). The groups, Forest Conservation Council, American Bird Conservancy, and Friends of the Earth, sought to enjoin the FCC from issuing any new licenses for the building of communication towers in the Gulf Coast region until their impact on migratory birds has been fully assessed and mitigated.

The suit cited violations by the FCC of the Migratory Bird Treaty Act, National Environmental Policy Act ("NEPA"), and Endangered Species Act ("ESA") in the deaths of thousands of migrating birds at towers along the Gulf Coast.

<http://electromagnetichealth.org/pdf/CommTowerResearchNeedsPublicBriefing-2-409.pdf>

- Among 15 species of wild birds, breeding failures and population declines were significantly more common within *200 meters (656 feet)* of a cell tower and in areas where measured levels of microwave radiation were high.

A. Blamori Martinez, "Birds and mobile telephony. Preliminary results of the effects of electromagnetic waves on urban fauna," *El Ecologista* vol. 36 (2003): 40–42. Available online at www.buergerwelle.de.

- Experimenting on chickens, pigeons, and seagulls, Canada's National Research Council found that most birds collapsed in distress within seconds of being exposed to microwave radiation of moderate intensity – but not if they were defeathered, since feathers act as receiving aerials for microwave radiation.

J.A. Tanner, C. Romero-Sierra, S. J.K. Davie, "Non-thermal effects of microwave radiation on birds," *Nature* vol. 216 (1967): 1139; and J. Bigu del Blanco and C. Romero-Sierra, "Bird feathers as dielectric receptors of microwave radiation," National Research Council, DME Control Systems LTR-CS-89, January 1973.

- 40% of established white stork nests within *200 meters (656 feet)* of cellular antennas had no chicks, while only 3.3% of nests beyond 300 meters (984 feet) had no chicks. The storks within 200 meters often failed to build nests, fought for sticks, and had chicks who frequently died.

A. Balmori Martinez, "Possible effects of electromagnetic fields from phone masts on a population of white stork (*Ciconia ciconia*)," *Electromagnetic Biology and Medicine*, v. 24 (2005): 109-119.

- * There are strong negative correlations between the amount of radiation presence (both in the 900 and 1800 MHz frequency bands, used for cell phones) and the presence of male house sparrows. In areas with high electric field strength values, fewer house sparrow males were observed. Long-term exposure to higher RFR levels affected bird abundance or bird behavior in this species.

Everaert, J., and D. Bauwens. "A possible effect of electromagnetic radiation from mobile phone base stations on the number of breeding House Sparrows (*Passer domesticus*)," *Electromagnetic Biology and Medicine* 26 (2007):63-72; and Balmori, A., and O. Hallberg, "The urban decline of the House Sparrow (*Passer domesticus*): a possible link with electromagnetic radiation," *Electromagnetic Biology and Medicine* 26 (2007):141-151.

- * Daily RFR exposure of chicken embryos for 4 days resulted in a decrease in production of stress-response proteins (HSPs) that protect cells in the body against lack of oxygen and decreased protection against ultraviolet radiation – both of which could increase the probability of cancer and other diseases.

A. N. DiCarlo, F. White, P. Guo, P. Garrett, and T. Litovitz, "Chronic electromagnetic field exposure decreases HSP70 levels and lowers cytoprotection," *Journal of Cellular Biochemistry* 84 (2002): 447-454.

- Robins can navigate in the earth's magnetic field if they receive light from wavelengths absorbed by cryptochromes. This study explored how the human-made frequencies between 01 and 10 MHz at field strengths as little as 0.085 mT (about 500 times weaker than the earth's magnetic field) made the birds unable to respond to the earth's magnetic field. T. Ritz et al. "Resonance effects indicate radical pair mechanism for avian magnetic compass," *Nature*, vol. 429 (5/13/2004): 177-180.

- Documentation of lethal effects of RFR on chicken embryos:
A. Di Carlo, et al. "Chronic electromagnetic field exposure decreases HSP70 levels and lowers cytoprotection," *Journal of Cellular Biochemistry*, v. 84 (2001): 447-454.

- * Longcore, T., C. Rich, P. Mineau, B. MacDonald, D.G. Bert, L.M. Sullivan, E. Mutrie, S.A. Gauthreaux, Jr., M.L. Avery, R.C. Crawford, A.M. Manville, II, E.R. Travis, and D. Drake, "Avian mortality at communication towers in the United States and Canada: which species, how many, and where?" *Biological Conservation* vol. 158 (2013): 410-419.

INSECTS

In a May 2009 report the U.S. Fish and Wildlife Service urged Congress to investigate the potential relationship between wireless devices and honeybee colony collapse.

- * Bees are positively charged, flowers negatively charged (2 studies). RFR exposure disturbs the natural orientation and navigation mechanisms of bees and other insects, who use the earth's magnetic field and light energy to orient and navigate. It makes them restless, develop an urge to swarm, increasingly aggressive, and colony collapse in 62.5% of apiaries. Ulrich Warnke, *Bees, Birds and Mankind: Effects of Wireless Communication Technologies* (Kentum, 2009) ; and F. Ruzicka, "Schäden durch elektrosmog," *Bienenwelt* 10 (2003): 34-35; and 2 additional published studies.

Studies performed in Europe have documented navigational disorientation, lower honey production, and decreased bee survivorship in honeybees due to exposure to RFR from a cell tower within *500 meters (1,635 ft)* and *800 meters (2,616 feet)*.

Harst, W., J. Kuhn, and H. 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," *Acta Systemica-IIAS International Journal* vol. 6, no. 1 (2006):1-6; U. Warnke, "Effects of Electric Charges on Honeybees," *Bee World* vol. 57, no. 2 (1976): 50-56; and Kimmel, S., J. Kuhn, W. Harst, and H. Stever, "Electromagnetic radiation: influences on honeybees (*Apis mellifera*)," *Institute Environmental Sciences, Institute Science and Science Education, and Institute Educational Informatics, Univ. Koblenz-Landau/Campus Landau, Germany* (2006): 6 pp.

- * Exposure to electromagnetic radiation from DECT phone towers (similar to cell phone towers) had deleterious effects on the rate of honeybee egg laying, return to hive, and honey production
Harst, Wolfgang, et al., "Can Electromagnetic Exposure Cause a Change in Behaviour? Studying possible non-thermal influences on honey bees." Institute of Science and Science Education (ISSE), Department of Physics, University of Koblenz-Landau/Campus, Landau, Germany. *ACTA SYSTEMICA - IIAS International Journal* (2006) 6(1): 1-6.

- * RFR induces ants to abandon nests and relocate, change speed and foraging behavior, become disoriented, have difficulty moving their legs, or die.
Marie-Claire Cammaerts and Olie Johansson, "Ants can be used as bio-indicator to reveal biological effects of electromagnetic waves from some wireless apparatus," *Electromagnetic Biology and Medicine*, 8/30/2013.

- The construction of combs and the homing capability of bees change for the worse if the bees are subjected to magnetic fields.

C. Hsu, F. Ko, C. Li, J. Lue, "Magnetoreception System in Honeybees (*Apis mellifera*)," *PLoS ONE*, vol. 2, no. 4 (2007): e395.

FROGS

* Frogs within 140 meters from a cellular antenna had a mortality rate of 90%, compared to 4.2% for shielded frogs.

A. Balmori and C. Navarra, "Mobile phone mast effects on common frog (*Rana temporaria*) tadpoles; the city turned into a laboratory," *Electromagnetic Biology and Medicine*, v. 29 no. 1-2 (2010): 31-35, 59.

* Radio-frequency radiation can alter a frog's heart rhythm – and even stop it at only 0.6 microwatts per square centimeter, 1600 times less than the current FCC guideline for public exposure to microwave radiation.

A. H. Frey et al., "Neural function and behavior: Defining the relationship," *Annals of New York Academy of Science*, v. 247 (1975): 433.

TREES AND OTHER PLANTS

- Exposure of urban trees to RFR causes leakage of materials from vacuoles, which contain toxic materials and digestive enzymes normally used to digest and recycle waste. These enzymes include DNase, which destroys DNA, which can lead to mutations, loss of cellular function, and possible cell death. Other results are cancer-like growths under tree bark (phloem nodules), split bark, and premature shedding of leaves and fruit.

Andrew Goldsworthy, "Why Our Urban Trees are Dying" (2011):

<http://www.mastsanity.org/health/research/299-why-our-urban-trees-are-dying-by-andrew-goldsworthy-2011.html>

- A 2010 study at Wageningen University in the Netherlands investigating increasingly common urban tree symptoms such as bleeding bark fissures, death of parts of leaves, and abnormal growth, found a 60% increase in signs of radiation sickness (including a "lead-like shine" on leaves as a sign of near death) from 2005 to 2010.

www.antennebureau.nl/actueel/nieuws/2010/eerste-indruk-kennisplatform-onderzoek-naar-bomen-en-wifi-zendsignalen; reported in Dan Nosowitz, "Wi-Fi Radiation Is Killing Trees, New Study Finds," *Popular Science*, posted November 22, 2010: <http://www.popsci.com/technology/article/2010-11/wi-fi-radiation-killing-trees>.

* Growth rates of plants can be increased or decreased by RFR exposure:

I.Y. Petrov et al., "Possibility of correction of vital processes in plant cell with microwave radiation," in *Proceedings of IEEE International Symposium on Electromagnetic Compatibility*, pp. 234-235, Dec. 1991.

* Growth rates of fungi can be increased or decreased by RFR exposure:

A. Berg and H. Berg, "Influence of ELF sinusoidal electromagnetic fields on proliferation and metabolic yield of fungi," *Electromagnetic Biology and Medicine*, v. 25, no. 1 (2006): 71-77.

RFR exposure can cause plants to produce more meristems (growing points of young stems, leaves, and roots), affect root cell structure, and induce stress response, causing adverse biochemical changes.

M. Tafforeau et al., "Plant sensitivity to low intensity 105 GHz electromagnetic radiation,"

Bioelectromagnetics, vol. 5, no. 6 (2004): 403-407; M. B. Bitonti et al., "Magnetic field affects meristem cell activity and cell differentiation in *Zea mays* roots," *Plant Biosystems*, vol. 140, no. 1 (2006): 87-93; W.

Wawrecki, et al., "Influence of a weak DC electric field on root meristem architecture," *Annals of Botany*, vol. 100, no. 4 (2007): 791-796.

- RFR exposure causes necrotic lesions and abnormal coloring in leaves of trembling aspen trees. Katie Haggerty, "Adverse influence of radio frequency background on trembling aspen seedlings: Preliminary observations," *International Journal of Forestry Research* (2010).

Evidence of the Likely Decrease in Property Values in the Vicinity of a Cell Tower

It is increasingly recognized and documented that putting cell antennas and towers near business or residential properties means decreased property values (with corresponding decreased property-tax revenue for local governments) and making them more difficult to sell. This negative effect can also contribute to a deterioration of neighborhoods and school districts when residents want to move out or pull their children out because they don't want to live nearby a cluster of cellular antennas.

Studies find that people don't want to live next to them not just because of health concerns, but also due to aesthetics and public safety reasons, i.e., cell towers/antennas become eyesores, obstructing or tarnishing cherished views. In addition they are also perceived as potential noise nuisances as well as creating fire and fall hazards, if not liability issues. These are real estate marketplace effects that can be considered taking of property without due process as well as

While the Telecommunications Act of 1996 states that health concerns will not impact decisions regarding location of cellular antennas, Congress is unable to dictate the marketplace that responds to such installations. It can be argued that installing these antennas constitutes a taking of property without due process or at least a reduction of one's enjoyment of one's property.

Here is a selection of studies and articles documenting the above:

1. The National Institute for Science, Law and Public Policy's survey "Neighborhood Cell Towers and Antennas—Do They Impact a Property's Desirability?" completed by 1,000 respondents as of June 28, 2014, found the following:

- 94% said a nearby cell tower or group of antennas would negatively impact interest in a property or the price they would be willing to pay for it.
- 94% said a cell tower or group of antennas on top of, or attached to, an apartment building would negatively impact interest in the apartment building or the price they would be willing to pay for it.
- 95% said they would opt to buy or rent a property that had zero antennas on the building over a comparable property that had several antennas on the building.
- 79% said under no circumstances would they ever purchase or rent a property within a few blocks of a cell tower or antennas.
- 88% said that under no circumstances would they ever purchase or rent a property with a cell tower or group of antennas on top of, or attached to, the apartment building.

2. "Cell Towers Are Sprouting in Unlikely Places," *The New York Times*, January 9, 2000 (fears that property values could drop between 5 and 40 percent because of neighboring cell towers).

3. A *New York Times* news story, "A Pushback Against Cell Towers," published in the paper's Real Estate section, on August 27, 2010, found that property values will decrease 4 to 10%, depending on the nearness and size of a cellular installation. "Homeowners have given voice to concerns that proximity to a monopole or antenna may not be just aesthetically unpleasing but also harmful to property values. Many also perceive health risks in proximity to radio frequency radiation emissions, . . ." Tina Canaris, an associate broker and a co-owner of RE/MAX Hearthstone in Merrick, N.Y., said, "You can see a buyer's dismay over the sight of a cell tower near a home just by their expression, even if they don't say anything." http://www.nytimes.com/2010/08/29/realestate/29Lizo.html?_r=1&ref=realestate.

4. The Appraisal Institute, the largest global professional membership organization for appraisers with 91 chapters throughout the world, has spotlighted the issue of cell towers/antennas and the fair market value of a home and educated its members that such an installation should, in fact, cause a decrease in home value. It concluded that "media attention to the potential health hazards of [cellular phone towers and antennas] has spread concerns among the public, resulting in increased resistance" to sites near those towers. The percentage of decrease moves toward the higher range the closer the property is to the cellular antenna."

5. A market transaction-based regression study in Christchurch, N.Z. included 4283 property sales in four suburbs that occurred between 1986 and 2002 (approximately 1000 sales per suburb). The sales data that occurred before a cell tower/base station was built were compared to sales data after it was built to determine any variance in price, "If purchasing or renting a property near a CPBS [cell phone base station], over a third (38%) of the control group respondents would reduce price of their property by more than 20%." Bond, S.G., Beamish, K. (2005). "Cellular Phone Towers: Perceived Impact on Residents and Property Values", *Pacific Rim Property Research Journal*, vol. 11, no. 2, pp. 158-177. Also: Sandy Bond and Karen Beamish, "Residents' Perceptions Towards Living Near Cell Phone Towers" presented to the Twentieth American Real Estate Society Conference, April 20-24, 2004, Captiva Island, Florida.

6. Case studies were performed in four suburbs of Christchurch, New Zealand where a cell tower had been installed. Survey data was collected on people's perceptions about the impact of the tower on their property value and, most importantly, that data was combined with actual housing price changes over time. In the two suburbs studied where towers were built in 2000, the effect of a tower on home prices was a decrease of between 20.7% and 21%. Bond, S.G. and Wang, K. (2005). "The Impact of Cell Phone Towers on House Prices in Residential Neighborhoods", *The Appraisal Journal* (Summer 2005) Volume LXXIII, No.3, pp.256-277; http://goliath.ecnext.com/coms2/gi_0199-5011857/The-impact-of-cell-phone.html

7. This 2004 study in Christchurch, N.Z., involved analysis of the residential transaction data for a total of ten suburbs: five suburbs with cell towers located in them and five control suburbs without towers. "The effect of proximity to a CPBS reduces price by 15%, on average. This effect reduces with distance from the CPBS and is negligible after 1000 feet." Bond, S.G. and Xue, J., "Cell Phone Tower Proximity Impacts on House Prices: A New Zealand Case Study", European Real Estate Society and International Real Estate Society Conference, June 15-18, 2005, Dublin, Ireland.

8. 27 Burbank, CA real estate professionals in December 2009, signed a petition/statement offering their professional opinion that a proposed T-Mobile cell tower at Brace Canyon Park would negatively impact the surrounding homes, stating: "It is our professional opinion that cell towers decrease the value of homes in the area tremendously. Peer reviewed research also concurs that cell sites do indeed cause a decrease in home value." , , , Higher property values mean more tax revenue for the city, which helps improve our city."

"I've done research on the subject and as well as spoken to many real estate professionals in the area, and they all agree that there's no doubt that cell towers negatively affect real estate values.' Steve Hovakimian, Burbank, California real estate broker, and the publisher of "*Home by Design*" monthly real estate magazine, stated that he has seen properties near cell towers lose up to 10% of their value due to proximity of the cell tower. . . So even if they try to disguise them as tacky fake metal pine trees, as a real estate professional you're required by the California Association of Realtors that sellers and licensees must disclose material facts that affect the value or desirability of a property including conditions that are known outside and surrounding areas."

(Submitted to City Council, Planning Board, City Manager, City Clerk and other city officials via e-mail on June 18, 2010. To see a copy of this, scroll down to bottom of page and click "Subpages" or:

<http://sites.google.com/site/nocelltowerinourneighborhood/home/decreased-real-estate-value/burbank-real-estate-professionals-statement>)

9. Windsor Hills/View Park, CA, 2009: Residents opposing a T-Mobile antenna in their neighborhood received several letters from local real estate companies, appraisers, homeowner associations, and resident organizations in their community confirming that real estate values would decrease with a cell phone antenna in their neighborhood, which must be disclosed to buyers according to the California Association of Realtors as a "known condition" that "affects the value or desirability of the property." To see copies of these letters, see "Report from Los Angeles County Regional Planning Commission regarding CUP Case No. 200700020-(2)," from L.A. County Board of Supervisors September 16, 2009, Meeting documents, Los Angeles County website at: <http://file.lacounty.gov/bos/supdocs/48444.pdf>

10. A Houston jury awarded \$1.2 million to a couple in 1999 because a 100-foot-tall cell tower was determined to have lessened the value of their property and caused them mental anguish: Nissimov, R., "GTE Wireless Loses Lawsuit over Cell-Phone Tower," *Houston Chronicle*, February 23, 1999, Section A, page 11. (Property values depreciated by about 10 percent because of the tower.)

11. In 2001 the assessed values of sixteen residential properties located in Colwood, British Columbia were reduced by BC Assessment by an average of 7.2% (approx. \$9,500 each) due to the aesthetic impacts of a broadcasting antenna tower installation. Facsimile from Dave Hitchcock, area assessor, *BC Assessment* (February 23, 2001) Re: Radio Transmissions and Towers, Triangle Mountain, Colwood, 2001 Assessment Reductions Due to Proximity to Transmission Towers; provided by the Colwood Transmission Towers Citizens Committee at a meeting held on 21 August 2003 in Colwood, BC.

12. Glendale, CA: During the January 7, 2009 Glendale City Council public hearing about a proposed T-mobile cell tower in a residential neighborhood, local real estate professional Addora Beall described how a Spanish home in the Verdugo Woodlands, listed for 1 million dollars, sold for \$25,000 less because of a power pole across the street. "Perception is everything," said Ms. Beall stated. "It the public perceives it to be a problem, then it is a problem. It really does affect property values." See Glendale City Council meeting, January 7, 2009, video of Addora Beall comments @ 2:35:24: http://glendale.granicus.com/MediaPlayer.php?view_id=12&clip_id=1227

13. "Tower Opponents Ring Up a Victory," by Phil Brozynski, in the *Barrington [Illinois] Courier-Review*, February 15, 1999, 5, reporting how the Cuba Township assessor reduced the value of 12 homes following the construction of a cell tower in Lake County, IL. <http://spot.colorado.edu/~maziara/appeal&attachments/Newton-43-LoweredPropertyValuation/>

14. Santa Cruz, CA: This is a story about how a preschool closed because of a cell tower installed on its grounds; "Santa Cruz Preschool Closes Citing Cell Tower Radiation," *Santa Cruz Sentinel*, May 17, 2006; Source, EMFacts website: <http://www.emfacts.com/weblog/?p=466>.

15 This British article reports that a new cell-phone antenna/tower/mast "will knock between 15 and 25 per cent off the value of a house, depending on how close it is and the size of the structure. "Melfyn Williams, chairman of the National Association of Estate Agents, said in some cases a mast could see a home reduce in value by between 5 and 10 per cent. . . . "Campaigners are considering legal action to seek compensation for the loss in value of their properties or to get the masts removed. Last week, seven householders in Swindon won sums of between £10,000 and £20,000 each from their local council after it mistakenly allowed a mast to be erected in the middle of their residential street, causing their properties to crash in value."

The Observer (U.K.), "Phone masts blight house sales: Health fears are alarming buyers as masts spread across Britain to meet rising demand for mobiles," Sunday May 25, 2003 or:
<http://www.guardian.co.uk/money/2003/may/25/houseprices.uknews>

Almost any prospective property buyer would take the existence of a nearby cell tower into account, normally as a negative factor. Nevada County government should do what it can to protect its citizens' investments in their homes, businesses, and land — which includes having rules against unwanted intrusions by cell phone towers and antennas, including minimum distances (ideally about 2000 feet) from residences and businesses.

A Few Online Sources for More Information:

scientists4wiredtech.com
powerwatch.org.uk
bioinitiative.org
electromagnetichealthl.org
saferemr.com
emfsafetynetwork.org
justproveit.net/studies
emf-portal.org