

TO: Nevada City Planning Commission

FROM: David Adams, Richard Cristdahl, and a Group of Concerned Citizens, Businesses, and Property Owners

DATE: June 13, 2016

This information, for your June 16 meeting in regard to the use-permit application to install 8 cellular antennas on the building at 109 North Pine Street, concerns the negative health effects of such cellular antennas and the radiofrequency radiation (RFR) that they emit, well documented in thousands of published scientific research studies. We understand that a representative for the applicant stated in your last meeting that there were no health effects to worry about from this project. This document wants to present an alternative picture of the current "regulation" (rather, non-regulation) concerning known health impacts. We further assert that these increasingly known effects will have a negative economic impact on downtown Nevada City and its citizens, both on existing businesses and on tourism.

The State of the Current Federal RFR Exposure Standards

The adverse non-thermal biological and medical effects of *low-frequency* electromagnetic radiation (RFR) are well documented in tens of thousands of published scientific studies – more thoroughly, in fact, than the effects of asbestos, DDT, dioxins, or PCBs. But they are not recognized by the Federal Communications Commission (FCC) in their 30-year-old exposure standards applicable only to temporary exposure to *high-frequency* electromagnetic radiation. For communications equipment, the 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.

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.

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, 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. McInerny, 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 Work?

This is a brief review of selected examples of the many scientific studies researching this question (with references). Of course, in today's climate all of these health impacts are likely to be made more severe by simultaneous exposure to multiple sources and increased intensity of RFR transmissions.

- 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 transmitted 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 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) experience 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

- 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 Health Impacts

- In a partial, peer-reviewed report published May 26, 2016, of a carefully designed, \$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. Felzenszwalba, "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 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 Kyrylenko⁵ "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 thBt 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