BCTC VITR - Exhibit C51-2

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October 7, 2005

British Columbia Utilities Commission
6th Floor, 900 Howe Street
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By E-mail: commission.secretary@bcuc.com

Attention: Robert J. Pellatt, Commission Secretary

Dear Mr. Pellatt:

Re: BCTC VITR Project – EMFs and Health Hazards
Intervenor _____, Kyong H. Nam

Attached please find Exhibit I – Presentation to BCUC Commissioners on EMFs, Exhibit II – Homes, Birds and Power Line EMFs, and Exhibit III – Letter to Mr. Bruce Barrett explaining how Health and EMF Experts made mistake in drafting Consensus Statement for Manitoba Clean Environment Commission.

Please take necessary action to present these to BCUC commissioners. You may contact me at (604) 946-9613.

Yours sincerely,

Original signed by:

Dr. Kyong H. Nam Ph.D. & P. Eng.
Intervenor _____

Copies to: BCTC
BCUC e-mail distribution list

Exhibit I

Presentation to BCUC Commissioners

Dear Commissioners,

My name is Kyong H. Nam. I have been living for more than 22 years at 1300 – 53A Street, in Tsawwassen right along HV power lines, which are the subject of the VITR project. We have raised 3 children starting from the ages of 6 to 14, which are very susceptible ages to the adverse effects of electro-magnetic fields ("EMFs"). I am a professional electrical engineer and have a Ph.D. degree in high power lasers. Although I am not an EMF expert, nor have I been involved in EMF research. However, I have ability to judge right from wrong on the basis of available information on EMFs.

Dear Commissioner, I would like to present two powerful testimonials on residential EMF (non-thermal) effects to your attention to show that I am not alone in worrying about EMF health hazards. (In this report, important statements are excerpted to convey the original information without bias.)

First, on July 12, 2005 the following motion was put forward to the UK House of Commons. "That this House recognizes that childhood leukaemia is the UK's biggest child-killer disease and that it is still on the increase; welcomes publication of the paper, 'Childhood cancer in relation to distance from high voltage power lines in England and Wales', known as the Draper Report, funded by the Department of Health; notes that the conclusion to the report states 'There is an association between childhood leukaemia and proximity of home address at birth to high voltage power lines and the apparent risk extends to a great distance than would have been expected from previous studies'; recognises that the proportion of the UK population now known to be at increased risk of childhood leukaemia from proximity to such lines is 10 times greater than previously demonstrated; endorses the call by the charity 'Children with Leukaemia' to introduce an immediate moratorium on the building of new schools and homes in the proximity of these lines and to increase funding for research into the relationship between electric and magnetic fields and causation of childhood leukeamia; and calls on the Government to take immediate action to help protect children's health." (47) (See note 47 to the Appendix attached.)

Second, on July 13, 2005, the French Members of Parliament proposed a law "related to the reduction of public health risks from mobile phone installations and apparatus." "Setting aside the existence of the worrying uncertainties of health consequences, there remains a real aesthetic problem. When you choose the place where you are going to live, the things that you see through the windows and from the terrace are a determining element. All attacks on this environment thus become an attack on the quality of life and the well being of the individual. It is a question of an attack of the most serious kind on the daily life of each person, at the heart of his home, that is to say on his most intimate life, that is to say at the same time his refuge, the place where he expects to find peace and serenity." ""These anxieties draw on the results of a certain number of research studies which bear on the effects of non-ionizing radiation on health, whether it is a question of low or high frequencies. The specificity of the waves radiated by mobile telephony is based, in fact, on a combination between high and extremely low frequencies. Now, extremely low frequencies (up to 300 Hz) have been classified in June 2002, after a good number of years of debate, in the category of 'potentially carcinogenic' by the WHO." "**There is a debate at the heart of the scientific community, it is the responsibility of the elected representatives of the nation not to wait for scientific certainty before taking measures to protect people, as we are invited by the Charter for the Environment, inscribed within our Constitution, which specifies, in article 1: "'Everyone has the right to live in a balanced environment which is favourable to their health' (**my emphasis)." (46)

Since the BCTC announced the VITR project 9 months before, I became a part time literature researcher to dig out information on power lines and health hazards. Oft-reported visible conditions that are linked to EMF exposure are memory loss, allergic reactions, insomnia, dizziness, forgetfulness, anxiety, nausea, skin

rash, chronic fatigue syndrome, stress, and high blood pressure along with many more serious invisible conditions like childhood leukemia. Our family has suffered from these conditions without knowing the cause for a long time. The latency periods of some EMF-caused diseases are 20 to 30 years. (1) Many people including our children who have lived or are living near to the power line are still in the latency periods and nobody knows what will happen in the future. These facts alone haunt us now in our home and to the yard day and night with anxiety and fear.

To minimize the potential damage to the health of our community members, including my family, I am presenting overwhelming evidence that BCTC's claims, that guidelines of the World Health Organization ("WHO") are protecting people, that power line EMF is safe, that undergrounding is safer and that the existing right of way is the only viable route for VITR project, are wrong and irresponsible, and I ask for your fair judgment.

"The ICNIRP (International Commission on Non-Ionizing Radiation Protection) guidelines were not formulated by scientists, but by technicians calculating how long it would take to heat a bag of sugar through one degree Celsius. **This absurdity is all that stands between us and the risk of life threatening or chronic disease** (my emphasis). The ICNIRP guidelines only measure the immediate and very short term thermal (heating) effect of radiation, not the long term biological effect, which is the main threat to health." (6)

Then how did the ICNIRP guidelines originate?

"In 1953 a study of workers at Hughes Aircraft Corp. found excessive amounts of internal bleeding, leukemia, cataracts, headaches, brain tumors, heart conditions, etc in those employees working with radar. This study resulted in the US military initiating the first investigation into the biological effects of microwaves with the aim to develop 'tolerance levels' for both single and repeated exposures. Since little research data existed at that time [that could be used in determining tolerance limits] it was decided that the known ability of microwaves to heat up tissue (thermal effects) would be the main criteria used in developing limits." (5) This decision gained favor with both the military and industry, and thermal-only criteria were quickly accepted by Western standard-setting organizations and Western governments, and the vast majority of research was directed at short term and high EMF exposure. After more than 50 years, the ICNIRP is still using these thermal only criteria in EMF guidelines, and the WHO has adopted these guidelines.

On the other hand, the Soviet Union and its allies adopted far stricter guidelines based on non-thermal effects. Thanks to the different political, economical and social structures, scientists in the Soviet Union were given far more democratic and academic freedom than their Western counterparts without industrial influences. While thermal effects are accepted by both Western and Eastern scientists, it was only Eastern scientists that expanded their research to include human health and non-thermal EMFs. Because it was the cold war age, Western countries totally ignored whatever achievements Eastern countries made in their EMF research and eventually EMF guidelines evolved into two camps: western and eastern. Now it seems that Western bureaucratic scientists who are involved in setting the ICNIRP and WHO's guidelines have their credibility so heavily on the line that it is hard to imagine ICNIRP/WHO guidelines will include non-thermal effects until the majority of them concede that they have been wrong or a complete turnover is achieved. **The effects of EMFs at non-thermal levels (non-measurable) accumulate with time and adversely affect the health of the people and animals, just as years of dripping water drill holes through hard rocks.**

Is there historical evidence that non-thermal residential EMFs are health hazards?

In 1961 Court Brown and Richard Doll reported that a new agent causing leukemia had been introduced first into Britain about 1920 and later into the United States and other countries. In 2000, S. Milham and E.M. Ossiander of the Washington State Department of Health reported the historical evidence that residential electrification caused the emergence of the childhood leukemia peak. "In the period 1920 to 1960, death from childhood leukemia between 2-4 years rose from base line of less than 2 per 100,000 to 8 per 100,000 among white children only." This shows a very close relationship with those Court and Brown found. (7)

I have found that there are undeniable study results that show transmission lines and residential EMFs more than 3-4 mG (milligauss) can cause health risks including childhood leukemia, adult brain cancer, and miscarriages. The following are a discussion of some important EMF research results.

The Environmental Protection Agency's 1990 evaluation of EMF cancer risks recommended that power-frequency EMFs should be classified as "probable human carcinogens," joining the ranks of such notorious chemicals as PCBs, formaldehyde and dioxin. The White House moved quickly to quell the controversy and eventually it was downgraded to "possible carcinogens" such as car fumes and coffee. In 1998, the National Institute on Environmental Health and Safety ("NIEHS") judged EMFs to be "possible human carcinogens" and three years later, the International Agency for Research on Cancer ("IARC") made the designation official. (11)

All major studies have found that the people living near to power lines and/or in the residential EMFs more than 3-4 mG have elevated risk of developing childhood leukemia and many other diseases. The studies include: the "Sweden Karolinska Institute study" (12); the EMF RAPID (Research and Public information Dissemination Program) of the US; the $60 million 6-year project conducted by NIEHS" (16); "Ahlbom et el of Sweden's pooled analysis based on 9 individual studies (19) Greenland et El of UCLA's pooled study with data obtained from 15 previous individual reports" (20); "California Department of Health Services (DHS) study" (23); "R.E.V.O.L.T. (Rural England Verses Overhead Line Transmission) study"(24); "REFLEX project (Risk Evaluation of Potential Environmental Hazards from Low Energy EMF Exposure Using Sensitive in vitro Methods) involving 12 research groups in seven European countries that required 52 months and more than $3 million" (26); "German's the Naila-Study" (27) and "the largest ever Draper study." (28)

The UK Childhood Cancer Study (UKCCS), led by eminent Sir Richard Doll had measurements and uniquely reported, "this study provides no evidence that exposure to magnetic fields associated with the electricity supply in the UK increases the risks for childhood leukemia, cancers of central nervous system, or any other childhood cancer." However one table in the same paper shows "children with leukemia were almost twice as likely as controls to live near one of these lines – a statistically significant difference." (17) Due to the eminence of Sir Doll, many like utility companies have used his 'no-risk' report as a bible.

In response to 'risk' reports, many countries, local governments and school boards have set EMF safe exposure limits 10 to 1000 times lower than ICNIRP/WHO's guidelines to protect their citizens, especially children.

Since the 1940s, the Soviet Union and its Eastern allies including China have set their national standards at very low levels, which are one tenth of the ICNIRP's guidelines, on the bases of scientific research results. The California House of Representatives introduced the Children's Electromagnetic Field Risk Reduction Act in 1993 to prohibit the construction and operation of new schools and childcare facilities, on property where the EMF exceeds an average 2 mG per day. (31) New York public schools require a level of less than 2 mG at 30 cm computer monitors. (32) UK NCRP Scientific Committee recommended new schools and houses should not built under existing HV lines or where ambient fields exceeds 0.2 uT (2 mG), and new power lines would not be built where they would produce EMFs exceeding 0.2 uT (2 mg). (33) After EMF

RAPID program, "US legislation now prevents new homes being built near power lines." (35) The Swedish government has established a safety limit for exposure to ELF magnetic field at 2.5 mG, and VLF magnetic field at only 0.25 mG." (36) "The Swiss government put into force a new Ordinance on the protection of the general public from EMFs" by setting installation limit values (ILV) at 10mG for power lines. (37) The Ontario school board recommended "Prudent Avoidance for our children, means no extended exposure over 2 mG or 0.2 uT." (38) The National Italian EMF limits were set at 30 mG for new homes and new lines. But "three Regions – Veneto, Emilia-Romagna, and Toscana – set exposure limits in 1999 and 2000 for power lines at 2mG for new installations near nurseries, schools, hospitals, houses and places where people spend more than four hours per day." (39)

In 2003, the California Department of Education (CDE) drafted a new policy. "For general purposes of analysis of for transmission lines, a 1 milligauss (1 mG) magnetic field target level at 95% loading is defined as the goal for all occupied class room" and "Magnetic field levels up to 2 mG may be acceptable for transitory exposures in out door areas that include parking lots." (40) Connecticut state legislators approved a bill that required burying the lines underground, or "if they must run above-ground, that there be adequate buffers from schools, houses of worship and residences within 300 feet of the power lines." (41) "The CPUC is requiring PG&E, the electric utility, to bury the line at a depth of 11 feet 'in all residential neighborhoods and by schools, daycare centers, senior centers, parks etc." (42) The National Council on Radiation Protection and Measurement (NCRP) has produced a report recommending that the maximum permitted personal EMF exposure level be reduced by a factor of 500 from 100 uT (1000 mG) down to just 0.2 uT (2 mG). (43)

According to June 15th 2005 news, the Dutch government decided to apply a real precautionary policy by setting a 0.4 uT (4 mg) exposure limit for new transmission lines, and banning construction of buildings and developments that would expose people to prolonged magnetic fields of 0.4 uT." (44) On July 10, 2005 Ontario Ministry of Labour Report recognized non-thermal effects and the present exposure limit may not protect certain individuals. (45) On July 13, 2005, the French Members of Parliament proposed a law "related to the reduction of public health risks from mobile phone installations and apparatus." (46) On July 12, 2005, the motion to stop houses being built near power lines was put forward to the UK House of Commons after Draper Report: (47.) "**Furthermore, most European countries, including the UK and Germany have prohibited the construction of transmission power lines near homes for many years"** (my emphasis). (48)

However in the countries, which do not follow the trend, there have been a variety of petitions to rectify the problems arising from the ICNIRP/WHO's inadequate practices and guidelines.

"This is the request of a letter to the General Secretary of the U.N., Kofi Annan, that was **signed by 63 scientists and 65 patient organizations from 26 nations who represent over 40,000 electrosmog-damaged persons, as well as numerous private undersigning persons"** "Required is the dismissal of industrial representatives from the ICNIRP and their replacement by independent scientists who are willing to research the so-called non-thermal or biological effects of non-ionised radiation (electrosmog) on living creatures. Until now the ICNIRP has given itself a 'code of honor' stipulating that persons would be expelled from the ICNIRP should they research or acknowledge non-thermal or biological effects. (49) Freiburger Appeal of 2002, which was signed by more than 3000 European colleagues states, "We see the rising number of chronically sick patients also as the result of an irresponsible 'safety limits policy', which fails to take the protection of the public from the short and long-term effects of mobile radiation" "Please support. Stricter safety limits and major reduction of sender output and HFMR pollution on a justifiable scale." (51)

At present, Helsinki Appeal 2005 is collecting signatures to appeal to the European Parliament. It states, "The present safety standards of ICNIRP (International Commission of No-Ionizing Radiation Protection)

do not recognize the biological effects caused by non-ionizing radiation except those induced by the thermal effect. In the light of recent scientific information, the standards recommended by ICNIRP have **become obsolete** and should be rejected." "**We appeal to you as a member of the European Parliament to act promptly for the adoption of the new safety standard in the European Union."** (53) A letter to WHO from the V WSF (World Social Forum) recommended, "1. Considering the volume of scientific evidence about long-term low level intracellular effects from human exposure to Non Ionizing Radiation (NIR), more restrictive limits than those contained in ICNIRP guidelines, equal or lower than those included in the Switzerland's Guidelines must be implemented." (54)

The Irish Doctors Environmental Association (IDEA) Position on Electro-Magnetic Radiation is as follows. "The safe levels currently advised for exposure to this non-ionizing radiation are based solely on thermal effects. However, it is clear that this radiation also has non-thermal effects, which need to be taken into consideration when setting these safe levels." "1.As increasing number of people in Ireland are complaining of symptoms which, while they may vary in nature, intensity and duration, can be demonstrated to be clearly related to exposure to electro-magnetic radiation (EMR)." "2. International studies on animals over the last 30 years have shown the potentially harmful effects of exposure to electro-magnetic radiation." (55)

On August 2nd 2005, EMFacts reported "In three letters to government officials dated July 18, deputy Health minister John Abbott reveals his department takes the potential health risk of overexposure to electromagnetic fields (EMFs) seriously" (57) A Petition to remove Dr. Mike Repacholi, the General Coordinator of International EMFs is being signed for retraction of his statements to media that WHO would observe the precautionary measures. He did once on ELF EMFs and the other on Cellular phone in June in Ottawa. August 06, 2005 (58)

Among many legal or administrative judgments made against utility companies, only three are introduced below.

"One of the most famous and earliest cases occurred in Houston, Texas in late 1985. After parents brought suit, a Texas court ordered Houston Lighting & Power to pay more than $25 million to a local school district for 'callous disregard' of their children's health for siting a 345,000 volt line within 200 feet of school and playground. The court also ordered the utility to relocate the line, at an additional cost that may exceed $40 million." (61) B.C. Hydro has offered to pay a fair market price to landowners concerned about increased electromagnetic fields (EMFs) from a new 230 kV power line on Vancouver Island, although they claim there is no reason to believe the line poses a health risk." Since then the British Columbia Utilities Commission has ordered BC Hydro to stop all work on the line until a public inquiry could be held into the safety of the line and ordered it to extend its offer to buy the homes along the right-of-way until September 15. 1989." (61) On February 23, 1999 Quebec Superior Court Justice Jeanine Rousseau ruled that cabinet decrees in early 1998 that paved way for the power line were illegal, that work on the $104-million project must stop and that the citizen group that has been fighting the project for a year be awarded $70,000 to help cover its legal costs." (62)

The most recent review by members of ICNIRP's epidemiology committee stated, "on initial consideration, it is not obvious that EMFs would pose any hazard to human health, in particular, this radiation has insufficient energy to damage DNA directly, and therefore in principle should not be capable of initiating cancer."

On the contrary, Robert Kane the author of 'Cellular telephone Russian Roulette' Report wrote, "In fact, the scattering of ionizing radiation throughout biological tissue efficiently breaks the covalent bonds that are the basis for construction of organic molecules" "Clearly, by now we must all agree that it is not necessary to ionize a DNA molecule to disrupt one or more of the molecule's covalent bonds." "In essence the effects can be identical - the disruption of covalent bonds is essentially what destroys DNA molecules and genetic

information and leads to neo-plastic transformation of cells." (77) D. L. Henshaw reported, "We present the hypothesis that exposure to power frequency magnetic fields causes increased risk of childhood leukaemia via the disruption of the nocturnal production of melatonin in the pineal gland." "Melatonin is an antioxidant effective in protecting nuclear DNA, membrane lipids and possibly cytosolic proteins from oxidative damage." Here EMFs were implicated melatonin disruption and eventual DNA damages. Henry Lai was the first to show that power-frequency EMF can cause both single and double-strand DNA breaks and later REFLEX confirmed it. It seems more likely either disruption of molecule's covalent bonds or reduced melatonin production by low-level EMFs or both lead to DNA damages and eventual cancer initiation.

The above mentioned and other study results involving Canada, Denmark, Japan, Germany, Australia, Spain, Italy, France, Switzerland, Finland and Netherlands demonstrate convincingly that there is a strong statistical association between exposures to greater than 3-4 mG EMFs and an increased risk of contracting a number of deadly diseases including childhood leukemia. As more non-thermal EMF effects became known from the Eastern countries after end of the cold war, a trend has been set that many Western countries, local governments and school boards switch from ICNIRP/WHO guidelines to 10 to1000 times stricter guidelines. Some of them are Sweden, Switzerland, Italy, Netherlands, California etc. As recent as June 15, this year Netherlands adopted 0,4 uT (4 mG) as their safe EMF exposure limit. **This trend that ICNIRP/WHO's credibility is being chipped away is very important. Now collectively more than a quarter of the world population is enjoying the governments' protection. It seems highly unlikely that all the scientists, government officials and citizens behind such protections are wrong. As many countries do not allow building power lines near to homes and schools or vise versa, there is no room for power lines in our backyards in the air or underground. Attacking the peace and serenity of individual homes is violation of human rights entrenched in the Canadian Constitution.**

Dear Commissioner, you have to take initiative now.

For anybody who still has lingering doubt about EMF health risks, Exhibit II will give some insight of how BCTC has been polluting our community with electrosmog (non-ionizing radiation) that even birds do not like, and further planning to destroy fabric of our daily lives.

Sincerely,

Dr. Kyong H. Nam
Ph.D. P.Eng.

APPENDIX

1. Introduction.

The following is no way to be comprehensive report covering whole range of the research reports on EMFs and EMR (Electro-Magnetic Radiation). However, more emphasis is vested on none-thermal effects rather than thermal-effects, which have been considered by WHO as the only scientific base for adopting EMF safe exposure guidelines for more than 50 years. WHO is rejecting all of the epidemiological study results that connect EMF/EMR and childhood leukemia and other health effects with the reason that proper mechanisms cannot be found.

2. BCTC's claim that WHO's EMF guidelines are safe limits is outdated.

BCTC is claiming that the 120 mG EMF from the existing power line and 300 mG from the planned underground power line are safe because they are well within the 830 mG of WHO's EMF exposure limits. These were adopted from the International Commission on Non-Ionizing Radiation and Protection's (ICNIRP's) guidelines. They cover the frequencies from 0 to 300 GHz and apply to both the extremely low frequency (ELF) power line emission and the high frequency electro-magnetic radiations (HF-EMR) (2) Also the EMFs over a whole range of frequencies can have biological effects (3), such as child hood leukemia, DNA damages, and many adverse health symptoms. Some researchers suggest the important role of the repetitious transients and surges (4) that translate into mega cycle range, on the power frequency may contribute to health hazards. With these reasons, this report will include both EMF and EMR, and use EMFs for both ELF-EMFs and HF-EMR whenever there is no possibility of confusion.

3. ICNIRP and WHO's guidelines.

"In 1953 a study of workers at Hughes Aircraft Corp. found excessive amounts of internal bleeding, leukemia, cataracts, headaches, brain tumors, heart conditions, etc in those employees working with radar. This study resulted in the US military initiating the first investigation into the biological effects of microwaves with the aim to develop "tolerance levels" for both single and repeated exposures. Since little research data existed at that time [that could be used in determining tolerance limits] it was decided that the known ability of microwaves to heat up tissue (thermal effects) would be the main criteria used in developing limits." (5) This decision gained favor both with military and industry, and thermal only criteria were quickly accepted by Western standard setting organizations and Western countries.

After more than years, ICNIRP is using this 'thermal only' criteria in EMF guidelines and promote that as the best that science has to offer for an international standards, and many countries and organizations are urged to accept as their standards. WHO, BCTC, health Canada, Federal-Provincial-Territorial Radiation Protection Committee (FPTRPC) are some of them who accepted ICNIRP guidelines. However, their foundation has been unraveling since 1979 when non-thermal effects were reported as cancer and other health risks. It is worth note the following;

"The ICNIRP guidelines were not formulated by scientists, but by technicians calculating how long it would take to heat a bag of sugar through one degree Celsius. **This absurdity is all that stands between us and the risk of life threatening or chronic disease** (my emphasis). The ICNIRP guidelines only measure the immediate and very short term thermal (heating) effect of radiation, not the long term biological effect, which is the main threat to health" (6) The effects of EMFs at non-thermal levels (non-measurable) accumulate with time and adversely affect the health of the people and animals as years of dripping water drill holes through hard rocks.

4. Historical evidence that residential EMFs and EMRs are health hazards.

"Court Brown and Richard Doll noted in a paper published in 1961 that a new agent causing leukaemia had been introduced first into Britain about 1920 and later into the United States and other countries. A new peak in childhood leukemia deaths between the ages two and four had emerged in the UK in the 1920s, and in the 50 years starting 1911, leukaemia mortality at ages under 10 had increased an average of 4.5% per year." In 2000, S. Milham and Ossiander of Washing to State Department of Health reported the historical evidence that residential electrification caused the emergence of the childhood leukemia peak. "In the period 1920 to 1960, death from childhood leukemia between 2-4 years rose from base line of less than 2 per 100,000 to 8 per 100,000 among white children only." This shows very close relationship with those Court and Brown found. "No such peak was evident for black children in the same period, or for Japanese children, reported in other studies." (7)

Millham and Ossilander commented in their summary, "At ages 0-1, leukemia mortality was not related to electrification levels. At ages 2-4, there was a 24% (95% confidence interval (CI), 8%-41%) increase in leukemia mortality for a 10% increase in percent of homes served by electricity "The childhood leukemia peak of peak of common acute lymphoblastic leukemia may be attributable to electrification" (8)

1997 was a curious year in Sweden. "A look into the statistics on health care and other social security costs clearly shows that the problem started abruptly in the autumn of 1997. A further analysis reveals that several different characteristics of the health of the population also showed a sudden trend-break in that year" "Of special interest is the development of the number of long-term sick people (i.e. registered as sick for more than one year). From a record low level of around 40,000 in 1997 the number increased in just 6 years by 100,000, giving a total close to 140,000 long term sick." They noticed increases in many other health problems as load injury, depression, prostate cancer, traffic accident injuries etc in the same year. Small companies' employees did not show the same trends. They traced down what happened in 1977 in Sweden. "In August 1997 the first digital TV transmitter was launched. This autumn the first 'hot-spots' for mobile connection to the Internet were introduced." From the autumn of 1997, small transmitters for GSM 1800 were built in numbers and many large companies introduced wireless office phone systems including GSM-in-Office. "So from 1997 many employees became exposed to microwave radiation during all work hours." "All this data led to the suspicion that the degraded health in Sweden might be related to the sudden exposure to the microwave radiation at 1800 MHz." "We have noticed that the increase in the number of long-term sick people also fits very well with annual length of GSM speech time." (9) It is very hard to dismiss this as happened by chances.

5. Important study results on EMF and EMR non-thermal effects.

Instead of trying to include all of the studies showing positive relationships between diseases and EMFs or EMR, only those being thought to be more important are introduced briefly in chronological way.

1. "The Soviet Union did some interesting RF/MW research on behavioral aberrations that is unparalleled in the United States. It has been known for many years that low-intensity EMFs produce adverse effects on the autonomic and central nervous systems of humans and animals in strengths far too low to cause tissue heating." "Of additional interest with regard to long-term, low-level exposures was research done with Polish career military personnel in the late 1980s" " The military personnel, whose major exposures were from the radar/microwave frequencies, but with some 50-Herz exposures also involved, were found to have a six times higher cancer incidence than normality test subjects." (10)

2. Environmental Protection Agency's (EPA's) 1990 evaluation of EMF cancer risks recommended that power-frequency EMFs should be classified as "probable human carcinogens" such notorious chemicals as PCBs, formaldehyde and dioxin. The White House moved quickly to quell the controversy and eventually it was downgraded to "possible carcinogens" as car fume and coffee. "In 1998, an expert panel assembled by National Institute on Environmental Health and Safety (NIEHS) judged ELF EMFs to be "possible human carcinogens" and three years later, the International agency for Research on Cancer (IARC) made the designation official." (11)

3. In 1993, "Maria Feychtning of Sweden's Karolinska Institute looked at 127,000 children who lived within 50 meters big power lines for over 25 years and found twice the risk of leukemia." (12) "When historical calculations were used as exposure assessment for childhood leukemia with cutoff points at 0.1 and 0.2 microtesla (micro T), the estimated relative risk increased over the two exposure levels and was estimated at 2.7 (95% confidence interval (CI) 1.0–6.3) for 0.2 microT and over: p for trend = 0.02. When the upper cutoff point was shifted to 0.3 microT, the relative risk was 3.8 (95% CI 1.4-9.3); p for trend = 0.005. These results persisted when adjustment for potential confounding factors was made." (13)

4. In 1993, Olsen et el of Denmark selected "1707 children under the age of 15 with leukemia, tumor of central nervous system, or malignant lymphoma diagnosed in 1968 – 86 and 4788 children taken from the central population register." "RESULTS – A significant association was seen between all major types of childhood cancer combined and exposure to magnetic fields from high voltage installations of > or = 0.4 microT (odds ratio 5.6)" (14)

5. Green et el of Canada conducted "A case study based on 88 cases and 113 controls used different assessment methods to determine EMF exposure in the child's current residence" in 1999. "Risk estimates associated with magnetic fields tended to increase after adjusting for power consumption and potential and potential confounders with significant odds ratio (OR) (OR: 4.5, 95% confidence interval (CI): 1.3-15.9) observed for exposures > or = 0.14 micro Tesla (microT)." "CONCLUSIONS: The findings relating to magnetic field exposures directly measured by personal monitoring support an association with the risk of childhood leukemia. As exposure assessment is refined, the possibility role of magnetic fields in the etiology of childhood leukemia becomes more evident" (15)

6. In 1999, the Executive Summary of the EMF RAPID (Research and Public information Dissemination Program, the $60 million 6-year project, conducted by NIEHS concluded as follow. "The strongest evidence for health effects comes from associations observed in human populations with two forms of cancer: childhood leukemia and chronic lymphocytic leukemia in occupationally exposed adults. While the support from individual studies is weak, the epidemiological studies demonstrate, for some methods of measuring exposure, a fairly consistent pattern of a small, increased risk with increasing exposure that is somewhat weaker for chronic lymphocydic leukemia than for childhood leukemia." (16)

7. The UK Childhood Cancer Study (UKCCS) led by eminent Sir Richard Doll had measurements on 2226 matched case-control pairs (1073 for leukemias), and reported its findings on magnetic fields in 1999. The study mainly concentrated at the magnetic fields less than 0.2 uT and concluded that 'this study provides no evidence that exposure to magnetic fields associates with the electricity supply in the UK increases the risks for childhood leukemia, cancers of central nervous system, or any other childhood cancer' However, "one table in the UKCCS paper on EMFs and childhood leukemia listed 31 cases and 17 controls who lived near power lines for which historical-load data were available. Children with leukemia were almost twice as likely as controls to live near one of these lines – statistically significant difference." (17)

8. On 26th of Mar 2000 Mobile Phone Health Watch reported, "Our 20-year study proves there is link between mobiles and cancer risk of deadly tumors 'significantly higher' among soldiers exposed to microwave radiation, say scientists. A 20-year study of servicemen (in Poland) has established the strongest link yet between mobile phones and cancer." Exact statistics for the increased risk in the polish research will be available in 2005. (18)

9. In 2000, Ahlbom et el of Sweden conducted a pooled analysis based on 9 individual records from nine studies. "For the 3203 children with leukemia and 10 338 control children with estimated residential magnetic field exposures levels <0.4 micro T, we observed risk estimates near the no effect level, while for the 44 children with leukemia and 62 control children with estimated residential magnetic field exposures >/= 0.4 micro T. the estimated summary relative risk was 2.00 (1.27-3.13), P value = 0.002)" (19)

10. In 2000, Greenland et el of UCLA conducted a pooled study with data obtained from 15 previous individual reports involving 2656 patients and 7084 controls. "Summary estimates from 12 studies that supplied magnetic field measures exhibited little or no association of magnetic fields with leukemia when comparing 0.1-0.2 and 0.2-0.3 microtesla (microT) categories with the 0-0.1 microT category, but the Mantel-Haenszel summary odds ratio comparing >0.3 microT to 0-0.1microT was 1.7 (95% confidence limits = 1.2-2.3) Similar results were obtained using covariate adjustment and spline regression." (20) After Ahlbom and Greens' studies, in 2002 the IARC classified power frequency EMFs as a 'possible carcinogen – group 2B'.

11. In 2001, Schuz et el of Germany stated in his report "A population-based case-control study was used, covering with whole of the former West Germany. Residential magnetic fields were measured over 24 hr for 514 children with acute leukemia identified by the German Childhood Cancer Registry and 1301 control children taken from population registration files. Magnetic fields above o.2 microT were relatively rare in Germany (only 1.5% of the study population). Childhood leukemia and 24 hr median magnetic fields were only weakly related (OR = 1.55, 95% CI 0-.65-3.67) A significant association was seen between childhood leukemia and magnetic field during night (OR = 3.21, 95% CI 1.33-7.80)" (21)

12. In 2001, Daniel Wartenberg of New Jersey published a paper on meta-analysis of Residential EMF Exposure and Childhood Leukemia. "Meta-analysis is a statistical method designed to summarize and simplify a complex set of study results." "This paper reviews these previous meta-analysis and extends them by adding results from four studies published since the most recent analysis" The study period covers from 1987 to 2000. It summarized that "Overall, I see largely positive results with small to moderate effect sizes. The results are robust to study deletion but there is considerable heterogeneity. These summaries unlikely to be change by additional studies unless those studies are extremely large and produce markedly different results. If one choose to use these summary estimates for interpretation, given the widespread exposure to magnetic fields they suggest perhaps as much as 15-25% increase in the childhood leukemia rate, which is a large and important public health impact." (22)

13. On behalf of the California Public Utilities Commission (CPUC), three highly qualified epidemiologists who work for the California Department of Health Services (DHS) were assigned to review the studies about possible health problems from EMFs from power lines, wiring in buildings, some jobs and appliances. The important conclusion reported 2002 includes "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" NIEHS working group, IARC and the British NRPB all assesses EMFs as a 'possible' carcinogen for

childhood leukemia. "Thus, like the DHS panel, these other three panels were not much swayed by theoretical arguments of physicists that residential EMFs were so weak as to make any biological effect impossible." (23)

14. One of the early reports from R.E.V.O.L.T. (Rural England Verses Overhead Line Transmission) compared EMFs with other Hazards. It states, "Passive smoking is also accepted as a cause of lung cancer. The biological process is still not fully understood. The relative risk (RR) at 1.2 is below the level some epidemiologists accept as meaningful. EMFs have a stronger case except for the knowledge of nicotine, though that is offset by the lower exposure levels. The risk levels are also similar: about 10 per 100,000 non smokers get lung cancer per year, rising to about 12 among passive smokers: in Swedish studies about 3 per 100,000 children get leukemia per year, rising to 11 among those closest to power lines." (24)

15. In September 2003, Michinori Kabuto of the Japanese national Institute for Environmental Studies reported that he had found a close to fivefold elevated risk of acute lymphoblastic leukemia (ALL) among children exposed to magnetic fields of greater than 4 mG (>0.4 uT) in their bedrooms. "This finding, though based on a small number of cases, was statistically significant" (25)

16. 12 research groups in seven European countries (Germany, Austria, Spain, Italy, France, Switzerland and Finland) spent 52 months ending may 31, 2004 and more than approx. $3 million to conduct REFLEX project (Risk Evaluation of Potential Environmental Hazards from Low Energy EMF Exposure Using Sensitive in vitro Methods). They found and confirmed "ELF-EMF generated DNA strand breaks at a significant level at a flux density as low as 35 uT. There was a strong positive correlation between both the intensity and duration of exposure to ELF-EMF and the increase in single and double strand DNA breaks and micronuclei frequencies. Surprisingly this genotoxic effect was only observed when cells were exposed to intermittent ELF_EMF, but not to continuous exposure." "For both ELF-EMF and RF-EMF, the results of the whole genome cDNA micro-array and proteomic analyses indicated that EMF may activate several groups of genes that play a role in cell division, cell proliferation and cell differentiation." (26)

17. The Naila-Study of 2004 called for involvement of all doctors of medicine in the assessment of the risk posed by the radiation from nearby cellular transmitter antennas. 1000 patients between 1994 and 2004 were evaluated for the study. "The result of the study shows that the proportion of newly developing cancer cases was significantly higher among those patients who had lived during the past ten years at a distance up to 400 meters from the cellular transmitter site, which has been in operation since 1993, compared to those patients living further away." "In the years 1999-2004, i.e. after five years' operation of the transmitting installation, the relative risk of getting cancer had trebled for the residents of the area in the proximity of the installation compared to the inhabitants of Naila outside the area" (27)

18. Long awaited Draper report was finally released in June 2005. "The largest ever, publicly funded UK study into power lines and child cancer has apparently found that children under the age of 15 living within 100 meters of high-voltage power lines have nearly twice the risk of developing leukemia. Since children aged 0-5 are the most vulnerable their risk is likely to be even higher. This result from the Oxford Childhood Cancer Research Group study, headed by Dr. Gerald Draper, involves 33 years of data (1962-95) on 35,000 children diagnosed with cancer which was analyzed and compared with distance to the nearest high-voltage electricity transmission line (275/400KV). (28)

19. "On August 08, 2005, Hardell et el of Sweden reported "We performed a case-control study on the use of cellular and cordless telephones and the risk for brain tumors diagnosed 2000-2003. We

report the results for malignant brain tumors with data from 317 cases (88%) and 692 controls (84%). The use of analog cellular phones yielded odds ratio (OR) of 2.6 and a 95% confidence interval (CI) of 1.5-4.3, increasing to OR=3.5 and 95% CI=2.6-6.4 with a >10-year latency period. Regarding digital cellular telephones, the corresponding results were OR=1.9, 95% CI=1.3-2.7 and OR=3.6, 95% CI=1.7-7.5, respectively. Cordless telephones yielded OR=2.1, 95% CI=1.4-3.0, and with a >10-year latency period, OR=2.9, 95% CI=1.6-5.2. The OR increased with the cumulative number of hours of use and highest for high-grade astrocytoma." (29)

20. On September 05, 2005, EMFacts carried 'Power Watch analysis on that acoustic neuroma study' and 'Definitive Comments from the Central Brain Tumor Registry (USA)'. "British Journal of Cancer advance online publication 30 August 2005;doi: 10.1038/sj.bjc.6602764. Mobile phone use and risk of acoustic neuroma: results of the Interphone case-control study in five North European countries. The media widely and incorrectly reported that the largest ever study into mobile phone use and brain cancer showed no increase in the first 10 years of use." "The new study did find a 1.8 fold increased risk (CI 1.1-3.1), after 10 years phone use, acoustic neuromas developing in the side of the head where the mobile phone handset was usually held. So, it was quite wrong to Press release it as proving that mobile phone use is not associated with the development of brain cancer." The Central Brain Tumor Registry's comment was "The only cellphones studies which have not found an increase risk of acoustic neuroma are studies that did not have sufficient number of cases for a reasonable latency time to find a risk. All studies, including this one, that have a sufficient number of cases with over 10 years of exposure have found an increased risk of acoustic neuroma (up to 8+ fold risk increase, depending on the study)." (30)

6. EMF guidelines and actions taken that undermine ICNIRP / WHO's guidelines' credibility.

1. To respond to a growing body of scientific study results including the Karolinska's study, California House of Representatives introduced the Children's Electromagnetic Field Risk Reduction Act in 1993 to prohibit the construction and operation of new schools and childcare facilities, on property where the EMF exceeds an average 2 mG per day. (31)

2. New York public schools require a level of less than 2 mG at 30 cm computer monitors. 1993 (32)

3. UK NCRP Scientific Committee recommended new schools and houses should not built under existing HV lines or where ambient fields exceeds 0.2 uT (2 mG), new power lines would not be built where they would produce EMFs exceeding 0.2 uT (2 mg). These recommendations were blocked due to political and industrial interests in 1995. (33)

4. China set their limit in 1988 (UDC 614.898.5 GB 9175 –88) reducing ICNIRP limits by factor of 10 in field strength. "Russian (and Eastern) limits clearly reflects the conviction that long-term (hours or more) exposures at levels far below Western limits results in adverse health effects" from low-level exposure to RF energy. These include, for example, nonspecific problems (such as headaches, fatigability, irritability, sleep disorder, and dizziness)." On the bases of scientific research results, Russia set their national standards at very low levels which are one tens of ICNIRP EMF limits for 0 HZ – 300GHz range, and the limits have not changed since 1976. (34)

5. In 1999, the United States National Institute of Environmental Health Sciences (NIEHS) released its findings of EMF-RAPID Program. "It concluded that, while the scientific evidence was weak, epidemiological studies demonstrated a fairly consistent pattern of a small but increased risk of childhood leukemia with exposure to EMFs, with slightly less risk of adult lymphocytic leukemia. As a result, US legislation now prevents new homes being built near power lines." (35)

6. “After more than 25 years of intensive study, the health and safety conscious Swedish government has established a safety limit for exposure to ELF magnetic field at 2.5 mG, and VLF magnetic field at only 0.25 mG.” (36) December 1999.

7. “In February 2000 the Swiss government put into force a new Ordinance on the protection of the general public from EMFs” by setting installation limit values (ILV) at 10mG for power lines, transformers, sub-stations and railways. (37)

8. In suggesting EMF guidelines, Ontario school board stated “Prudent Avoidance for our children, means no extended exposure over 2 mG or 0.2 uT. The goal of Prudent Avoidance is to allow for school board workers to have the freedom to work in electric and electromagnetic fields as close as to ‘normal’ (background or below 2 mG) as possible.” Extended period of time means fifteen minutes or more. (38)

9. With the Prime minister’s Decree in 2003 the national Italian EMF limits were set at 30 mG for new homes and new lines. But “three Regions – Veneto, Emilia-Romagna, Toscana – set exposure limits in 1999 and 2000 for power lines at 2mG for new installations near nurseries, schools, hospitals, houses and places where people spend more than four hours per day. “ (39)

10. “Until 2003, the California Department of Education (CDE) regulated school proximity to electric transmission lines by simple distance setbacks” from the edge of respective power line easement. “100 feet for 50-133 kV lines, 150 feet for 220-230 kV lines, 350 feet for 500-550kV lines. In 2003, the CDE drafted a new policy. “If a school district decides to seek a variance from Title 5 setbacks, it must also comply with the new EMF target limits.” “For general purposes of analysis of for transmission lines, a 1 milligauss (1 mG) magnetic field target level at 95% loading is defined as the goal for all occupied class room and building space, lunch and assembly areas, and ‘teacher work stations’ such as playfields, tracks, and out door education areas. Magnetic field levels up to 2 mG may be acceptable for transitory exposures in out door areas that could include but are not limited to parking, walk-through areas for access to buildings, and landings” (40)

11. “In May 2004, Connecticut state legislators approved a bill that required burying the lines underground, or if they must run above-ground, that there be adequate buffers from schools, houses of worship and residences within 300 feet of the power lines.” (41)

12. The California Public Utility Commission (CPUC) has decided to take a fresh look at its EMF policies, and now “The CPUC is requiring PG&E, the electric utility, to bury the line at a depth of 11 feet ‘in all residential neighborhoods and by schools, daycare centers, senior centers, parks and similar public places.’ In addition, the CPUC is taking the ‘unprecedented precautionary measures’ of having the conductors configured to reduce EMF levels.” (42) August 2004.

13. “A US government agency, the National Council on Radiation Protection and Measurement (NCRP) has produced a report on the dangers of EMFs and concluded that they posed….a risk factor with significant societal consequences by reason of its pervasive nature and serious consequences for affected individuals. The report also went on to recommend that the maximum permitted personal EMF exposure level be reduced by a factor of 500 from 100 uT (1000 mG) down to just 0.2 uT (2 mG). (43) April 2005.

14. According the June 15th 2005 news, “The Dutch Ministry of Housing, Spatial Planning and the Environment is leading the way by applying a real precautionary policy by setting a 0.4 uT (4 mg) exposure limit for new transmission lines, and banning construction of buildings and developments

that would expose people to prolonged magnetic fields of 0.4 uT." Application of the new standards, 380KV requires 300-meter buffer on each side of the line (44)

15. Following a site inspection of a call center at which a worker developed cancer and electro-hypersensitivity, Peter Fuhry, a radiologist with the Ministry's Occupational Health Safety operations division has written an Ontario Ministry of Labour Report as follow. "A number of health effects have been linked to exposure to time varying electric and magnetic fields, and electromagnetic radiation which are generally called "Non-thermal effects'. These effects include cancer induction, cancer promotion, ALS, flu like symptoms, etc." "It is recognized by the minister that certain workers may be more susceptible to a given workplace condition-exposure and the exposure standards may not be sufficiently protective for those individual workers" (45) July 10, 2005.

16. In July 13, 2005, the French Members of Parliament proposed a law "related to the reduction of public health risks from mobile phone installations and apparatus." "Setting aside the existence of the worrying uncertainties of health consequences, there remains a real aesthetic problem. When you choose the place where you are going to live, the things that you see through the windows and from the terrace are a determining element. All attacks on this environment thus become an attack on the quality of life and the well being of the individual. It is a question of an attack of the most serious kind on the daily life of each person, at the heart of his home, that is to say on his most intimate life, that is to say at the same time his refuge, the place where he expects to find peace and serenity." "These anxieties draw on the results of a certain number of research studies which bear on the effects of non-ionising radiation on health, whether it is a question of low or high frequencies. The specificity of the waves radiated by mobile telephony is based, in fact, on a combination between high and extremely low frequencies. Now, extremely low frequencies (up to 300 Hz) have been classified in June 2002, after a good number of years of debate, in the category of "potentially carcinogenic" by the WHO." "Concerning those living nearby to antennas, one study carried out at the request of the Dutch government discovered anomalies in human organisms after a short exposure (3/4 of an hour) to a weak magnetic field (0.7 volts / metre), these effects were even more rapid and manifest for the frequencies used by the Universal Mobile Telephone System (UMTS). More recently, a Swedish study carried out within the framework of a vast enquiry led by the World Health Organisation (WHO) showed that from the age of 10 the use of mobile phones multiply by four, the risks of tumours in the auditory nerves. More recently still, the results of the European REFLEX research programme (12 teams of researchers in European countries) confirmed the effects of mobile telephone waves on the structure of DNA. To all this is added the health enquiry led by German doctors around a base station which conclude that there was a prevalence of cancer cases around this station. These are the four studies which have informed the nature of the advice and surveillance, put in place by the British government and presided over by Professor Stewart, which encouraged the British authorities to apply the principle of precaution in relation to users of mobiles" "One finds oneself, in effect clearly in the context where the principle of precaution must be applied. There is a debate at the heart of the scientific community, **it is the responsibility of the elected representatives of the nation not to wait for scientific certainty before taking measures to protect people, as we are invited by the Charter for the Environment, inscribed within our Constitution, which specifies, in article 1: "Everyone has the right to live in a balanced environment which is favourable to their health'** (my emphasis). " "The top level of people exposure to electromagnetic fields broadcast by equipments used by telecom networks or by radio-electric installations is set 0.6 volt a meter." (46)

17. On July 12, 2005, the following motion to stop houses being built near power lines was put forward to the UK House of Commons: "That this House recognizes that childhood leukaemia is the UK's biggest child-killer disease and that it is still on the increase; welcomes publication of the paper,

'Childhood cancer in relation to distance from high voltage power lines in England and Wales', known as Draper Report, funded by the Department of Health; notes that the conclusion to the report states 'There is an association between childhood leukaemia and proximity of home address at birth to high voltage power lines and the apparent risk extends to a great distance than would have been expected from previous studies'; recognises that the proportion of the UK population now known to be at increased risk of childhood leukaemia from proximity to such lines is 10 times greater than previously demonstrated; endorses the call by the charity Children with Leukaemia to introduce an immediate moratorium on the building of new schools and homes in the proximity of these lines and to increase funding for research into the relationship between electric and magnetic fields and causation of childhood leukeamia; and calls on the Government to take immediate action to help protect children's health." As of July 17, 2005. 39 UK MPs singed the motion. (47)

18. "Europe employs on average higher voltages than the US. Because of the physics, this means that European transmission power lines emit lower levels of magnetic fields than do US lines. **Further more, most European countries, including the UK and Germany have prohibited the construction of transmission power lines near homes for many years"** (my emphasis). "The US has no comparable restriction. As a result, only a negligible number of European homes experience high levels of ELF_EMF. However, such high-level exposures are common in the US. Accordingly, European conclusions on the low level exposure do not apply to the US." (48)

7. Petitions and comments on ICNIRP / WHO EMF guidelines.

There are many doctors, scientists, environmentalists and general public who put petitions or concerns about ICNIRP/WHO thermal effect only guidelines.

1. On January 28, 2001, it was reported that the case weighing 10 kilograms containing files for the U.N. General Secretary Mr. Kofi Annan regarding health damages caused by mobile telecommunication and other electromagnetic fields had been delivered to the U.N. main office. "The International Commission on Non-Ionizing Radiation Protection ICNIRP, a member of the World Health Organisation WHO and thus under the authority of the U.N. has to be recognized urgently. This is the request of a letter to the General Secretary of the U.N., Kofi Annan, that was **signed by 63 scientists and 65 patient organizations from 26 nations who represent over 40,000 electrosmog-damaged persons, as well as numerous private undersigning persons"** "Required is the dismissal of industrial representatives from the ICNIRP and their replacement by independent scientists who are willing to research the so-called non-thermal or biological effects of non-ionised radiation (electrosmog) on living creatures. Until now, the ICNIRP has given itself a 'code of honor' stipulating that persons would be expelled from the ICNIRP should they research or acknowledge non-thermal or biological effects. This 'ICNIRP-game', potentially dangerous to the whole mankind, has been uncovered last spring by the New Zealand Scientist Dr. N. Cherry. The relevant documents are in our hands. It is therefore not astonishing that the ICNIRP, respectively the WHO, continuously publish clean bills of health and false exposure limit values for mobile telecommunication, **if there is no research allowed where the effects really take place!"** "The present conditions in the ICNIRP strongly remind of the procedure in the case of the tobacco-trust that also had infiltrated the WHO. At that scandal on the latest the WHO had lost its credibility and their studies, statements and recommendations have to be treated with utmost precaution and distrust ever since." (49)

2. In September 2002 the Catania Resolution, agreed among 17 lead scientists from 7 countries after the international conference 'State of the Research for prevention on EMFs – Scientific and Legal Issues' states:

(a) "Epidemiologic and in vivo and in vitro experimental evidence demonstrates the existence of EMF-induced effects, some of which can be adverse to health.

(b) We take exception to arguments suggesting that weak (low intensity) EMFs cannot interact with tissue.

(c) There are plausible explanation for EMF-induced effects, which occur below present ICNIRP and IEEE guidelines and exposure recommendations by the EU.

(d) The weight of evidence calls for preventive strategies based on the precautionary principle." (50)

3. Freiburger Appeal of 2002, which was signed by more than 3000 European colleagues, stated "we can see, especially after carefully directed inquiry, a clear temporal and spatial correction between the appearance of diseases and exposure to pulsed high-frequency microwave radiation (HFMR)" "Our therapeutic efforts to restore health are becoming increasingly less effective: the unimpeded and continuous penetration of radiation into living and working areas, particularly bedrooms, an essential place for relaxation, regeneration and healing, causes uninterrupted stress and prevents the patient's thorough recovery." "We see the rising number of chronically sick patients also as the result of an irresponsible 'safety limits policy', which fails to take the protection of the public from the short and long-term effects of mobile radiation" "We will no longer be made to wait upon further unreal research results, which in our experience are often influenced by the communications industry, while evidential studies go on being ignored. WE find it to be of urgent necessity that we act now." "We appeal to those in the spheres of politics and public health. Please support stricter safety limits and major reduction of sender output and HFMR pollution on a justifiable scale, especially in areas of sleep and convalescence." (51)

4. In July 2004, Green Party of London stated, "It's a good thing that a parliamentary committee has at last recognized what the Green Party has been saying for years: phone masts are a potential danger, that we know relatively little about." "Moreover the 'international guidelines' on EMF levels – which the UK subscribes to – are very misleading." (52)

5. At present, Helsinki Appeal 2005 is collecting signatures to appeal to the European Parliament. It states, "The present safety standards of ICNIRP (International Commission of No-Ionizing Radiation Protection) do not recognize the biological effects caused by non-ionizing radiation except those induced by the thermal effect. In the light of recent scientific information, the standards recommended by ICNIRP have become obsolete and should be rejected. Especially children and other persons at risk should be taken into account when re-evaluating the limits." "**We appeal to you as a member of the European Parliament to act promptly for the adoption of the new safety standard in the European Union."** (53)

6. A letter to WHO from the V WSF (World Social Forum) was approved at the Seminar held in Porto Alegre, RS, Brazil on January 29th, 2005. Introducing just the first recommendation, "1. Considering the volume of scientific evidence about long-term low level intracellular effects from human exposure to Non Ionizing radiation (NIR), more restrictive limits than those contained in ICNIRP guidelines, equal or lower than those included in the Switzerland's Guidelines (ONIR, 814.710 of 23 December 1999), must be implemented." (54)

7. Irish Doctors Environmental Association (IDEA) Position on Electro-Magnetic Radiation is as follow. "The safe levels currently advised for exposure to this non-ionizing radiation is based solely on thermal effects. However, it is clear that this radiation also has non-thermal effects, which need to be taken into consideration when setting these safe levels." "1. As increasing number of people in

Ireland are complaining of symptoms which, while they may vary in nature, intensity and duration, can be demonstrated to be clearly related to exposure to electro-magnetic radiation (EMR)." "2. International studies on animals over the last 30 years have shown the potentially harmful effects of exposure to electro-magnetic radiation." February 3, 2005 (55)

8. 175 German doctors and country-wide lady doctors are combining together to put forward their observations of adverse health effects from pulsed high-frequency EMFs (microwave) to the Prime Minister Edmund Stolber. They have found the medical complaints of 356 people who have had long-term [radiation] exposure at far below the limit of thermal effects from mobile phone base station and DECT telephones. The people suffer from one, several or many of the following symptoms, like "sleep disturbances, tiredness, disturbance in concentration, forgetfulness, problem with finding words, depressive mood, ear noises, sudden loss of hearing, hearing loss, giddiness, nose bleeds, visual disturbances, frequent infections, sinusitis, joint and limb pains, nerve and soft tissue pains, feeling of numbness, heart rhythm disturbances, increased blood pressure episodes, hormonal disturbances, night-time sweats, nausea" July 10, 2005 (56)

9. On August 2nd 2005, EMFacts reported that "Canadian Deputy Health Minister questions link between cancer rates and electricity." "In three letters to government officials dated July 18, deputy Health minister John Abbott reveals his department takes the potential health risk of overexposure to electromagnetic fields (EMFs) seriously." " 'The matter of exposure to EMFs and the potential link to health issues, including cancer, is of public concern in Newfoundland and Labrador' Abbott writes. 'As it is important that the provincial government be knowledgeable about the research being conducted and any regulatory change being considered by the federal government to minimize the impact of EMFs on the health of the population'" "Current guidelines rely on a 1998 report by the International Commission on Non-Ionizing Radiation Protection, which according to the Sierra Club of Canada, are 'among the worst (guidelines) in the world.'" (57)

10. A Petition to remove Dr. Mike Repacholi as General Coordinator "International Electromagnetic Fields is being signed. "Dr. Mike Repacholi does change the position for media reports. He believes that he can say whatever he wants when under pressure and that he can retract it later." He did once on EMFs and the other on Cellular phone in June in Ottawa. "At the risk of pointing out the obvious, our criticism of WHO's EMF project has nothing to do with science per se - both what the science tells us and, just as importantly, what it doesn't tell us." "As we noted in the commentary, many national governments have looked at the same body of scientific data and have promoted precautionary policies. These include China, Italy, Switzerland and Russia. In addition expert panels in England, Germany and Russia have issued advisories discouraging children from using mobile phones" "As we stated time and time again, the WHO should err on the side of public health, not the interests of the wireless industry." August 06, 2005 (58)

11. Wien (OTS) – The Vienna Doctor's Chamber (Wiener Arztekkammer) warns expressly against excessive mobile phone use especially by children. The reason for this is the recently presented "Reflex Study' (Reflex-Studie) in which a definite genotoxic effect of mobile phone radiation was seen. The first consequence is that the Doctor's Chamber (Arztekammer) has now drawn up a catalogue of guidelines, which stipulates specific rules of behaviour for use of mobile phones." "One part of study tests was carried out on human promyelocytes, a preliminary stage of the cells of blood formation. A mutation of such cells can as a further consequence lead to leukaemia and similar illnesses of the blood forming system. The results from these studies can be summarized I one sentence; 'There is indeed a genotoxic effect in human cell culture from mobile phone radiation at a strength that is supplied by every GSM mobile phone.' Previous earlier animal experiments already showed a dose-dependant genotoxic effect under high frequency radiation. Further, in the brains of rats increased functionless nerve cells were found after two hours of mobile phone

radiation. Two corroborative epidemiological studies showed a three – to four – fold increased risk of auditory nerve cancers after ten years of mobile phone use. With the now presented reflex Study, a cell-biological relationship has been proven for all these results. Eric Huber, Speaker for Environmental Medicine for the Doctor's Chamber **'If medications delivered the same test results as mobile phone radiation one would have to immediately remove them from the market"** (my emphasis). "Huber: 'We must assume that children are more sensitive towards high frequency radiation that adults since the skull bines are thinner and the children's child-like cells show an increased rate of division, in which they are more sensitive to genotoxic effects.' This is why they have decided to follow the example of the British Ministry of Health and the Danish Health Council, and to also warn against excessive mobile phone use, especially by children, in Austria." August 12th 2005 (59)

8. Notable results of EMF litigation and disputes.

1. "In Australia, construction of a proposed substation was denied due to concerns over EMF health risks. The utility pursued a legal appeal, but the case was resolved only when the utility agreed to ensure that magnetic fields from the substation's feeder lines would not exceeds four mG on adjacent properties. The four-mG exposure level was identified as a possible threshold for health risks to children." (60)

2. "A Georgia court denied a utility's condemnation of a property for construction of a transmission line based in part on EMF health claims. The ruling concluded that 'there is a higher incidence of childhood leukemia in relation to proximity of children to high power transmission lines' and 'the science is no longer unsettled' with regard to the increased incidence of childhood leukemia relative to electromagnetic fields." (60)

3. "One of the most famous and earliest cases occurred in Houston, Texas in late 1985. After parents brought suit, a Texas court ordered Houston Lighting & Power to pay more than $25 million to a local school district for 'callous disregard' of their children's health for siting a 345,000 volt line within 200 feet of school and playground. The court also ordered the utility to relocate the line, at an additional cost that may exceed $40 million. (61)

4. "Another significant case was in Florida in the summer of 1989. A Florida judge ruled that children may not play in a Boca Raton schoolyard, which borders on high voltage power lines. The suit was brought by three local parents who sought to close the Sandpiper Shores school because of potential EMF health hazards. The judge noted that children have 'no choice' about going to school and therefore EMF exposure at school is an involuntary risk: 'A 1% chance that there is substantial danger is unacceptable.'" (61)

5. The Bonneville Power Administration of Oregon has passed a moratorium on siting playgrounds in transmission line right-of-way. 1992 (61)

6. "Farmers and other land owners are fighting the New York Power Authority (NYPA) over the 345 kV Marcy-South transmission line." "The property owners want the NYPA to establish a 2,400 foot right-of-way limiting magnetic field exposure to 0.5 mG. They are seeking $63 million in damages, the utility has offered $400,000." 1982-1989 (61)

7. "B.C. Hydro has offered to pay a fair market price to landowners concerned about increased electromagnetic fields (EMFs) from a new 230 kV power line on Vancouver Island, although they claim there is no reason to believe the line poses a health risk. 90% of those eligible have indicated an interest in the purchase offer. Since then the British Columbia Utilities Commission has ordered

BC Hydro to stop all work on the line until a public inquiry could be held into the safety of the line and ordered it to extend its offer to buy the homes along the right-of-way until September 15. 1989." (61)

8. "On October 9, 1990 the town council of East Greenwich, RI, banned all new power lines above 60 kV for three years. The ordinance came about in response to widespread citizen concern about the EMFs from proposed 345 kV and 115 kV lines." "This is the first moratorium on power line construction in the US." (61)

9. "The Lake County Commission has forced the Tennessee Valley Authority to reroute a 161 kV line residents felt was going to pass too close to their residences." 1992 (61)

10. "In 1990 opposition mounted by the Monmouth County, New Jersey branch of Rage (Residents Against Giant Electric), a group of citizens concerned about the cancer hazard posed by power-line emissions, forced the Jersey Central Power & Light Company to abandon a plan to construct a pair of 235 kV transmission lines through the towns of Red Bank, Middletown, Holmdel, Hazlet and Aberdeen." (62)

11. In 1991, Chicago Mayor Richard Daley denied Commonwealth Edison permission to erect 345 kV line downtown on the grounds that the electromagnetic fields given off by the line might endanger the health of people who live or work in its vicinity." (62)

12. "In 1991, a thousand landowners, business owners and local governments petitioned the Michigan Public Service Commission to halt the project on the grounds that it was unnecessary and would pose a hazard. The Commission ruled against them in the fall of 1992. However, in January 1993 a Calhoun County circuit judge ruled that the utility had not proved that the line was necessary and that the utility could not condemn privately owned land for the project." (62)

13. "In the village of Lincolnwood, a suburb north of Chicago, a study showing magnetic fields of more than 7.5 mG 100 feet from a Commonwealth Edison right-of-way has prompted Village officials to demand that utility take steps to reduce the magnetic fields to a maximum of 1.5 mG at the setback line of any building in the right-of-way." 1992 (62)

14. "On September 30, 1992 officials of Sweden's National Board for Industrial and Technical Development formally announced that they intended henceforth to act on the assumption that there is a connection between exposure to power frequency magnetic fields and cancer, in particular childhood cancer." (62)

15. In 1993, "Over 100 residents in Prince George, B.C., have managed to convince BC Hydro to alter its original plans for a 65 kV line through their neighborhood. The new plan partly buries the lines and moves them to the non-residential side of the street." (62)

16. "Recent decision by New York's highest court allows property owners to seek compensation for losses in property value due to perceived risks from power line EMFs whether or not those risks are proven. The judge stated 'whether the danger is scientifically genuine or verifiable fact should be irrelevant to the central issue of its market value impact'. This ruling brings in line with rulings in several other states, including California, Florida and Kansas." 1993 (62)

17. "The regional government of Madrid has issued new regulations prohibiting the construction of new buildings and residential areas near power transmission lines, as well as aiming to eliminate the existing ones over metropolitan area of Madrid." 1998

(62)

18. "The government is not above the laws it makes. That principle is at the heart of a stunning court judgment issued on February 23, 1999 that put an immediate halt to work on a massive Hydro-Quebec transmission line through the Eastern Townships. Quebec Superior Court Justice Jeanine Rousseau ruled that cabinet decrees in early 1998 that paved way for the power line were illegal, that work on the $104-million project must stop and that the citizen group that has been fighting the project for a year be awarded $70,000 to help cover its legal costs." (62)

19. "April 19, 1996: A Cape May County Superior Court jury of six deliberated more than 10 hours over two days and concluded that Atlantic Electric, a Pleasantville utility, was unintentionally negligent for inadvertently locating a 69 kilovolt underground line on John and Sandra Altoonian's property. The Jury awarded the Altoonians a total of $762,524." (63)

20. Excerpt form 2002 decision paper from the Planning & Environmental Court of Queensland (Australia) state, "(g) The existing overhead 11 kV feeder lines connected to the station (other than any 11 kV feeder line in Sewell Road) shall be reverse phased (or alternatively configured) to the nominated junction of each feeder line as shown on Drawing Number 5 to achieve the minimum Average Magnetic Flux Density levels that are reasonably practicable with the objective of achieving where reasonably practicable an Average Magnetic Flux Density not exceeding 4 milligauss at any of the Location identified to paragraph (k) (iv), (v) and (vi). (h) At any of the Locations identified in paragraph (k) (i), (ii) and (iii) the Average Magnetic Flux Density caused by the substation, the feeder lines connected to the substation or any distribution transformer, shall not exceed (4) milligauss except:. (i) during a declared state of emergency." (64)

9. Possible and suggested mechanisms that influence the development of cancer.

1. The review of the articles of the Russian and Ukrainian researchers on a biological action of HF EMF of non-thermal and extremely low intensity states, "Many facts testify, that EMR of the non-thermal intensities have specific mechanisms of action on biological systems, which considerably differ from thermal action (heating of a tissue). The modern EMR standards take into account only power level of EMF, though frequency range, modulation, polarization, degree of coherence, structure of a field can be the active factors too. The physiological state of the man is not less important."

On the basis of the considered works in the review the following conclusions are made:

(e) The frequencies of 109 - 1012 Hz are similar to natural frequencies of oscillations in albuminous molecules, DNA, RNA, oscillations of membranes and other parts of the cells, conformation transitions in enzymes that creates an opportunity of resonant absorption of HF EMF.

(f) The organism as a whole can have own resonant frequencies: from a single living cell up to an entire person.

(g) HF EMF, modulated by low frequencies close to rhythms of a brain, heart, internal bodies, have the amplified action. Modulation by infra-frequencies in a range of 5-16 Hz renders strong negative influence on the men and animals.

(h) The EMF absorption in the acupuncture points is many times more effective, than in other sites of a skin, and this energy through Chinese meridians system acts on the internals and an organism as a whole.

(i) At the moment of a cell division the genetic information becomes "open", chromosomes are mobile and they are much more accessible to influence of EMF. The external resonant field can cause an expression of genes bound with a cancer and change the program of development of a cell.

(j) The manifestation of EMF effects depends on an age, state of health: the able-bodied adults have the minimal sensitivity; embryos, children, elderly people, the patients with the latent mental and physical frustration test significant influence, down to lethal outcome.

(k) A combination with other damaging factors: an ionising radiation, toxicants, geomagnetic anomalies, stresses considerably strengthens action of HF EMF.

(l) The accumulation of mismatches in work of the cells at a chronic or quasi-periodic irradiation results in disturbance of biorhythms, dispersion of attention, indistinct phases of dream and wakefulness; a man is not capable to be restored.

(m) There is an influence of HF EMF through hormonal system, immune system with amplification and accumulation of effect; through catalysts of cell respiration and biosynthesis. It happens to connect these reactions non-specific, them difficultly correlate with the fact of an irradiation of non-thermal intensity HF EMF.

(n) The appearance of narcotic dependence (by making of endorphins) is possible under a regular irradiation by HF EMF." (65)

2. On December 3rd, 1999, BBC reported "Professor Henshaw's work suggests a mechanism which might explain any increased risk of leukaemia near the pylons. He says that the electrical field affects particles in the atmosphere, drawing them into the area around the pylons. These particles include those linked with cancer, such as benzene or the radioactive gas radon. Therefore, people close to power lines may have an increased exposure to such particles, which might increase the risk of developing cancers, he said." (66)

3. In 2000, Article 'Pseudo-iron deficiency in a French population living near HV transmission lines states, "The diminution of iron levels may have been due to the intensity of the EMFs but also to the cumulative dose and to the number of hours of exposure per day. We also observed individual susceptibility, as a low iron level was not observed in all of the members of the same family, and in the same individuals the iron level varied during this time. This is not unique to the Coutiches population. Since the beginning of this study we have seen other subjects who live in proximity to high-voltage lines (e.g. in Bolezeele, another northern French village) with sometimes the same iron profile in the population near the EMFs. We speculate that EMFs may modify iron metabolism in populations subjected to 0.2 uT (2 mG) or more with a high bone marrow incorporation of the iron (that would explain the low iron level) and a rapid utilization for the metabolism of hemoglobin, sometimes with non-incorporation of 59Fe in the liver. There is currently no data about modification of iron metabolism in patients living near EMFs. These spurious results plead for a larger study to confirm our observations" (67)

4. On November 16, 2002, "ELF-EMF Damage Mice Ovarian Follicles" study reported, "Dr Cecconi said that little had been done to study the potential role for ELF-EMF on the development of mammalian reproduction so their study was designed to see whether ELF-EMF could affect ovarian follicle development in mice. They exposed isolated mouse ovarian follicles that were at the pre-antral development stage for five days to ELF-EFM at 33Hz or 50Hz frequencies. On day five, only around a third of the follicles exposed to 33Hz and half of those exposed to 50Hz developed antral cavities compared with 80% of controls. 'We don't know yet why this happens but our results indicate ELF-EMF may affect the regulatory mechanism controlling the somatic (non-germ) cells in the follicle.'" (68)

5. D.L. Henshaw reported, “We present the hypothesis that exposure to power frequency magnetic fields causes increased risk of childhood leukaemia via the disruption of the nocturnal production of melatonin in the pineal gland. Its principal source in man is as the chief secretory product of the pineal gland. This follows a marked circadian rhythm, the majority production occurring at night regulated by non-rod, non-cone receptors in the eye sensing the absence of light. Melatonin is remarkably non-toxic and has been found to be a radical scavenger and antioxidant, more effective than either vitamins C or E. The hormone has been found to protect cells, tissues and organs against oxidative damage induced by a variety of free radical generating agents and processes.” “Melatonin is an antioxidant effective in protecting nuclear DNA, membrane lipids and possibly cytosolic proteins from oxidative damage. The melatonin hypothesis. Stevens (1987) noted that breast cancer was a disease of modern life associated with industrialization. He proposed that the use of electric power might increase the risk of breast cancer. The risk arose from reduced production of nocturnal melatonin brought about by exposure to two principal agents, namely light-at-night, LAN from domestic as well as street lighting and magnetic fields associated with the electricity supply. Strong support for LAN affecting breast cancer risk has come from experiments in animals. Support in humans comes from the observation of reduced hormone-related cancer rates in the blind and partially sighted and increased breast cancer rates in nightshift workers (e.g. Hahn 1991, Feychting et al. 1998, Hansen 2001). Magnetic field suppression of melatonin. There are now at least 12 studies in human populations examining whether exposure to power frequency magnetic fields reduces or otherwise disrupts the nocturnal production of pineal melatonin. One study does not support this notion, although the study sample was small. For the remaining 11 studies, while some show a weak effect of melatonin disruption, others show clear effects including a dose response relationship for magnetic field exposures as low as 0.2 Î¼T or lower (e.g. Davies et al. 2001, Burch et al. 2002).” “Childhood leukaemia and melatonin. The potential importance of melatonin suppression to leukaemia risk arises from the observation that the hormone is highly protective of oxidative damage to the human haemopoietic system. Vijayalaxmi et al. (1996) administered 300 mg of melatonin to four healthy volunteers. Immediately, and one and two hours later, blood samples were taken and irradiated with 1.5 Gy 137Cs gamma radiation. Compared with blood samples taken immediately, those taken at two hours had significantly decreased (50 - 70%) chromosome aberrations and micronuclei. The authors concluded that the observations may have important implications for the protection of human lymphocytes from genetic damage induced by free radical-producing mutagens and carcinogens. The authors investigated the mechanism of melatonin protectiveness in terms of both direct scavenging in the cell nucleus of radiation-induced free radicals, including the hydroxyl radical and action at the cell membrane and in the cytosol to trigger activation of existing DNA repair enzymes and/or activation of a set of genes that lead to de novo protein synthesis associated with DNA repair (Vijayalaxmi et al. 1998). In a further experiment, Vijayalaxmi et al. (1999) irradiated mice with 8.15 Gy gamma radiation untreated and pre-treated with 125 and 250 mg melatonin. In the untreated mice, 45% were alive after 30 days, but 85% were still alive in those pre-treated with 250 mg melatonin. Melatonin has also been shown to be highly protective of oxidative damage to the fetus in animals and there is a sizeable literature on this subject (e.g. Wakatsuki et al. 1999, 2001). In women, Okatani et al. (1998) showed the efficient maternal-fetal transfer of melatonin near term. The relevance to childhood leukaemia stems from compelling evidence that the initiating event(s) in acute lymphoblastic leukaemia (ALL) appear to take place in utero (Greaves 2002). Epidemiological and experimental tests of this hypothesis. The seven-fold increase in childhood leukaemia aged 1- 4 last century in England and Wales (ONS 2004) may implicate in its aetiology LAN, and melatonin disruption and therefore magnetic fields. The protectiveness of melatonin to the haemopoietic system could be the negative ions provided longevity and other health benefits. But the rats, instead, died prematurely. May 2004. (69)

6. Seattle Post-Intelligencer reported on February 7, 2004, “Goheen recalled an experiment done years ago by researchers in San Francisco. They placed rats in a negative-ion chamber close to the air generator, intending to prove that have caused the damage and they found evidence of ozone toxicity. But because the negative-ion air generators do not directly produce much ozone, it was still not clear what had killed the rats. Now, a few decades later, Goheen thinks he has found the smoking gun. It is the rats themselves that are producing the ozone in response to the electromagnetic field, or EMF. “We'd been looking in the wrong place,” Goheen said. Scientists looking for the health effects of EMFs were looking for toxic chemicals or changes inside the body, he said, when the likely culprit was in the air surrounding the body. There's no reason why people exposed to the same strong EMFs, Goheen added, will not do the same thing – generate their own personal, toxic cloud of ozone. In the experiment, published in the current issue of the journal “Bioelectromagnetics,” three rats were exposed in close proximity to a device producing 10 kilovolts -- about what negative-ion air freshener’s produce. The ambient level of ozone in the air before the device was turned on was about 10-20 parts per billion (ppb). When the electrical device was switched on, Goheen and his colleagues reported ozone levels spiked as high as 200 ppb -- about twice the “chronic” level allowed by federal regulators in a workplace setting. Public health experts believe immediate damage or acute health effects from a single exposure to ozone will not occur until the concentration reaches about 5,000 ppb. Goheen also cautioned that the rats had to be placed much closer to the electrical device than would be the case for most people and their ion air generators. But he and his colleagues think their findings should at least prompt scrutiny into this new potential link between EMFs and health. “Experiments (showing few or no health effects) have so far focused mainly on the direct biological effects of EMFs,” Goheen and his colleagues wrote. What they have shown is that the adverse health effects may result from this indirect and unexpected “self-produced” cloud of ozone created when a body is exposed to the field. Goheen and his co-workers said they think the ozone is produced from a reaction between oxygen and the electrons. It does not happen when the cage is empty of the rats, he noted, but can be produced if the cage floor is filled with water that is electrically grounded. “Our bodies, of course, are mostly grounded water,” Goheen noted.” (70)

7. Regulators of EMFs have been saying for years ‘If it doesn’t burn you, it is safe’, and ‘There are no conceivable mechanism that could explain how EMFs with energies below the thermal threshold could have any effect.’ Omega-News of 15/02/05 reported about the paper by Dr. Mae-Wan Ho, Director, Institute of Science in Society. “There is little doubt that weak electromagnetic fields (EMFs) with energies below the level of random thermal fluctuations can affect living organisms; although the precise physical mechanism for such ‘non-thermal' EMF effects has remained elusive. I have suggested that weak EMFs interact primarily with the high degree of electro-dynamic coherence of living organisms and cells, in which proteins and other macromolecules intimately associated with water form a dynamic liquid crystalline continuum throughout the body. Recent research findings suggest that the electro-dynamic coherence of living organisms depends on collective phase transitions of the associated ‘interfacial' water in response to internal and external EMFs; and it is that which coordinates and regulate living processes. That is why weak EMFs can have numerous biological effects.” (71)

8. February 24, 2005 Omega-News carried “Cherry on safe exposure levels.” “Let me explain briefly the short term effects: I am talking just on non thermal effects:

   (o) In exposure to EMF neurons loose calcium ions (=Ca2+), then, neurotransmitters (whose production depends on these ions) drop. What we feel may be loss of short-term memory, confusion, headaches etc. Melatonin level drops too, so insomnia is on the way... Thromboxane causes tiny clots that may elevate blood pressure a little, but may also block some narrow vessels. These changes are reversible, and as soon as exposure is terminated,

body cells would come back to normal in minutes to hours. Some damage to brain cells remains, as exhibited in rats by Hold et al (1998) in the UK, published in an article by James Clark and David Derbyshire in the Daily News, on July 16, 1998.

(p) Peripheral blood is by definition in the extremities, but no other places in the body are safe from clots that may stuck somewhere in narrow vessels, brain included.

(q) Protooncogens are genes involved in cell division (such as myc, fos and many others). Normally they are expressed when the cell is going to divide. If the gene is induced to express itself by exposure to EMF, on and on, it may enhance mutations in it, and eventually may lose control, or it may lose its promoter (control part of the gene) by a break then it will push to non-stop cell divisions, namely, cancer. It was a surprise that EMF could induce expression of such genes. When a protogene is (unnecessarily) expressed, it may get more mutations, some of which would not be repaired, and be on the way to loose control, i.e. become an oncogene. If you just visit Kensworth, damages would be (mostly) recovered, but the longer you stay there, the longer you are exposed, and the chance is going up to get more damage in genes accumulated. Damage in genes stays. if DNA is damaged, cell division is arrested (by gene named p53 (of the tumour suppressing genes) until DNA is repaired. If damage is beyond repair this gene would lead the cell to a planned suicide (apoptosis).

(r) Protooncogenes are genes, i.e. part of the DNA, found on different chromosomes. Every gene has its promoter, and structural coding part. In the promoters there are sequences that react to EMF, as published by a team of Columbia U, in NYC (Lin et al 2001).

(s) I am studying the activities of about 30 of the oncogenes, but there are many more (I have the whole table). They code for proteins that are the active in cell division. There is Internet collection of the mutants found in cancer patients. You can get them and even rotate them and see the 3D structure of their proteins. Last but not least: In exposure of human cells to 2.4 µW/cm2 Marinelli et al (Nov. 2004) got DNA breaks in 2h. About 5 µW/cm2 was carcinogenic in humans (experienced by staff and family members Americans in their embassy in Moscow in the "Cold War" see Project Pandora). **The thermal emissions allowed for human exposure by ICNIRP or higher than that by NRPB has nothing in common with reality**" (my emphasis). (72)

9. "It is highly likely that Professor Cherry was the first Environmental Health scientist in the world to research and publish strong evidence that:

(a) Electromagnetic fields and radiation damage DNA and enhance cell death rates and therefore they are a Ubiquitous Universal Genotoxic Carcinogen that enhances the rates of Cancer, Cardiac, Reproductive and Neurological disease and mortality in human populations. Therefore there is no safe threshold level. The only safe exposure level is zero, a position confirmed by dose-response trends in epidemiological studies.

and

(b) Solar and Geomagnetic Activity is a Natural Hazard causing serious human health effects through modulation of extremely small natural electromagnetic radiation (0.1pW/cm²), the Schumann Resonance signal, that is detected by the human brains and alters the melatonin output which causes modulation of many human health effects including cancer, cardiac, reproductive and neurological diseases and mortality.

The robust scientific evidence that justifies these claims is available on this web site. You can read the background of Professor Cherry here." (72)

10. The reason that epidemiologists often appear to be ambivalent about emphasizing the link between EMFs and childhood leukemia is that no one knows how the fields can trigger or promote cancer. Take for example, the most recent review by members of ICNIRP's epidemiology committee. "On initial consideration, it is not obvious that EMFs would pose any hazard to human health," they wrote. "In particular, this radiation has insufficient energy to damage DNA directly, and therefore in principle should not be capable of initiating cancers." The chair of this committee is none other than Anders Ahlbom, who has done more than anyone else to legitimize the EMF–leukemia link. It is true that power-frequency EMFs do not have enough quantum energy to break a chemical bond, but that does not mean that they cannot damage DNA. What too often goes unmentioned is that at least half a dozen research labs have reported an increase in the number of DNA breaks among cells exposed to power-frequency EMFs. That is still a big step away from understanding how EMFs can damage DNA, but it does tell us that DNA is susceptible to EMFs and it gives us clues as to where to look for the underlying mechanisms. Henry Lai was the first to show, back in 1997, that power-frequency EMFs can cause both single and double-strand DNA breaks. In his talk in London, Lai listed five published studies from other labs that have also documented EMF-induced DNA damage. At the same time, he also acknowledged that five other labs had failed to see a similar effect. Lai then took the next logical step. He attempted to reconcile the conflicting findings. He outlined a model in which magnetic fields lead to the production of free radicals, molecules that can damage DNA. Using this hypothesis, he was able to explain why at least two of the labs had failed to see the DNA breaks following EMF exposure. Lai sees a measure of consistency where others see only mess of conflicting results. Few physicists have devoted much time to trying to explain what EMFs may be capable of doing. Some theories have been proposed, but much more work needs to be done. Mechanisms of interaction have always been a tough problem. We have long accepted that cigarette smoke and asbestos are potent carcinogens, but only recently have we come to understand the way they do their dirty work. And there is still much to learn about even these "well-established" carcinogens. (73)

11. **There's much to learn about the causes of DNA damage and about much else.** On the last day of the London meeting, David Gee of the European Environment Agency reminded the audience that "misplaced certainty about the absence of harm" has caused a lot suffering over the years. He urged everyone to have a little "more humility" and a little "less hubris" about what we think we know about the way nature works. Previous talks by Eric Wright of the University of Dundee and Munira Kadhim of the UK Medical Research Council were perfect illustrations of what Gee was talking about. Over the last ten years, Wright and Kadhim have nurtured a paradigm shift on how ionizing radiation can affect DNA. Simply put, they have shown that what was once thought to be highly improbable does in fact happen —if one knows how and where to look. They outlined three very surprising observations: First, ionizing radiation can damage unexposed cells. Wright explained that by using a sharply focused radiation beam, one could see genetic effects among cells that are outside the target area. That is, DNA that was not hit by any radiation still showed clear evidence of damage. This has become known as the "bystander effect." The DNA breaks must have occurred by some mechanisms other than a direct attack on DNA chemical bonds. The precise mechanism of action is still murky, but some type of communication among the cells is likely at work. Second, exposing the parts of the cell where there is no DNA to ionizing radiation can still result in DNA damage. And third, radiation effects sometimes only become apparent a long time after exposure. Kadhim has found that irradiated cells that appear to be normal can lead to offspring which, some generations later, have a higher than expected rate of spontaneous mutations. This is known as radiation-induced genomic instability. Kadhim has also found that ionizing radiation effects do not always follow a simple linear dose-response relationship. She has sometimes observed more pronounced effects at low exposures than at high ones. "What is going on at high doses is completely different from what is going on at low doses," she said. However heretical all these findings may seem, they are now part of the mainstream science of radiation biophysics.

"There is now strong evidence from studies in a number of different cell culture systems that [the bystander effect and genomic instability] are real," wrote John Little of Harvard University in a recent review article. Fifteen years ago the late Ross Adey, one of the world's leading EMF researchers, described how cells regulated their growth and survival by exchanging information. "Cells in body tissue initiate weak electrical and chemical signals by which they can 'whisper together' in a private language necessary for normal health of the tissue," Adey wrote in 1990. "*If this normal pattern of communication is interrupted, unregulated cell growth may result*" [his emphasis]. Cancer is often defined as unregulated cell growth and could well result from such garbled exchanges of information. Much remains to be learned about this "private language" and how EMFs can interfere with "conversations" among cells. The day after Wright and Kadhim had outlined these once-unexpected genetic effects, Russell Foster presented his own perhaps even more startling breakthrough. Foster works with visible light and has discovered that, in addition to the well-known rods and cones, there is a third type of photoreceptor in the human eye. This novel photoreceptor regulates circadian rhythms and, in turn, may play a crucial role in cancer development. (A quick aside on how scientists handle new ideas: Foster commented that he had had a very hard time publishing his findings on this new photoreceptor. He could not get his paper through peer review. His scientific colleagues —the very people who are trained to have an open mind in their search to understand the world around them— were closed to his discovery. In this case, happily, Foster persevered and got his papers into print. But let there be no doubt that the deck can be stacked against those who venture against the prevailing dogma.) If we are still learning crucial aspects of what is surely one of the most studied parts of the human sensory system, how do we take seriously claims that EMFs cannot affect us? After hearing from Foster, Kadhim and Wright, some advice from Socrates, later offered by David Gee, seemed particularly apt: "Wisdom is to know that you don't know." (74)

12. On June 6, 2005, Diem E. et el published in PubMed "Cultured human diploid fibroblasts and cultured rat granulosa cells were exposed to intermittent and continuous radiofrequency electromagnetic fields (RF-EMF) used in mobile phones, with different specific absorption rates (SAR) and different mobile-phone modulations. DNA strand breaks were determined by means of the alkaline and neutral comet assay. RF-EMF exposure (1800 MHz; SAR 1.2 or 2 W/kg; different modulations; during 4, 16 and 24h; intermittent 5 min on/10 min off or continuous wave) induced DNA single- and double-strand breaks. Effects occurred after 16 h exposure in both cell types and after different mobile-phone modulations. The intermittent exposure showed a stronger effect in the comet assay than continuous exposure. Therefore we conclude that the induced DNA damage cannot be based on thermal effects." (75)

13. August 1, 2005 Omega-News reported Winker et el article as, "Environmental exposure to extremely low-frequency electromagnetic fields (ELF-EMFs) has been implicated in the development of cancer in humans. An important basis for assessing a potential cancer risk due to ELF-EMF exposure is knowledge of biological effects on human cells at the chromosomal level. Therefore, we investigated in the present study the effect of intermittent ELF electromagnetic fields (50 Hz, sinusoidal, 5'field-on/10'field-off, 2-24 h, 1 mT) on the induction of micronuclei (MN) and chromosomal aberrations in cultured human fibroblasts. ELF-EMF radiation resulted in a time-dependent increase of micronuclei, which became significant after 10 h of intermittent exposure at a flux density of 1 mT. After approximately 15 h a constant level of micronuclei of about three times the basal level was reached. In addition, chromosomal aberrations were increased up to 10-fold above basal levels. Our data strongly indicate a clastogenic potential of intermittent low-frequency electromagnetic fields, which may lead to considerable chromosomal damage in dividing cells." (76)

14. Robert Kane the author of ‘Cellular telephone Russian Roulette’ Reports relating radiofrequency (RF) energy exposures to humans seem inevitably to note distinctions between ionizing and non-ionizing radiation. For those not formally trained as scientific researchers, and even for non-physicist bioeffects professionals, there persists a notion that this demarcation, ionizing versus non-ionizing, establishes some barrier separating hazardous from non-hazardous exposures. The common argument holds that since x-rays and ultraviolet rays are ionizing radiations known to cause various kinds of cancers that it must only be ionizing radiation that causes cancer. The truth of the matter is that researchers do not know that the ionizing capability of the radiation is the causative mechanism. Ionization as it is referred to in this context means the liberating of an electron from an atom. Only electromagnetic radiation of sufficient energy can liberate an electron from an atom. For metals, such as gold or copper, the concept of ionization energies is straightforward and describes the effect of absorption of photons within the material. However, in biologic systems comprised of complex organs, cell structures, and extensive molecules such as DNA the restriction of disruptive effects via ionization is entirely removed. In short, maintaining and professing a belief that only ionizing radiation holds a capability to damage tissue is of itself without scientific foundation. In fact, the scattering of ionizing radiation throughout biological tissue efficiently breaks the covalent bonds that are the basis for construction of organic molecules. It may well be this effect and not the inherent ionizing capability of a particular frequency or wavelength that gives rise to initiation or promotion of cancers. It is somewhat like a bullet shot into a concrete room and ricocheting from the walls, ceiling and floor. Each time the bullet hits a surface it loses a little energy while continuing to bounce about until the energy is fully spent. For a high-energy photon scattering through living tissue, each of the multiple contacts leaves behind some energy that can destroy the bonds that form the molecules. The distinction between ionizing and non-ionizing loses all meaning for biological applications. The ionization potential refers to the photoelectric effect whereby an electron is liberated from an atom or dissociated from an atom in an ionic molecule and is accomplished via a single photon absorption event. By contrast, of interest for biological applications is the energy necessary to disrupt one or more covalent bonds of which the biological system is comprised. For example, covalent bonds in human tissue may be disrupted at energy levels hundreds of times lower than necessary for ionization. In the presence of an exogenous energy source of sufficient magnitude sequential photon absorption may lead to continually increasing excited energy states until bond disruption occurs. No such comparable mechanism or effect is available for ionization since the allowed energy states do not provide for sequential photon absorption to achieve ionization. It is like the old saying, “you cannot get there from here.” Well, for the ionization argument it is true. RF energy does not let you get to ionization. But, most important is that ionization never has been the threshold. Clearly, by now we must all agree that it is not necessary to ionize a DNA molecule to disrupt one or more of the molecule’s covalent bonds. For the instance of covalent bond disruption in complex molecules the energy may be provided by means other than single photon absorption. And since that is accepted the ionizing/non-ionizing argument becomes inconsequential. Single atoms have well defined and distinct energy bands that allow only specific energy states for the electrons. In order to ionize, eject an electron, it is necessary to provide a photon having sufficient energy to move the electron from an allowed energy state to a completely free state in one step. Multiple photon absorption is not permitted. This is the basis for the photoelectric effect - i.e. ionization. Atoms in close proximity to one another establish a more complex system of allowed energy states. As atoms move close together the probability density functions indicate that there is some overlap and energy band shifting occurs. That is, additional allowed energy states are created due to the proximity of multiple atoms. For complex macromolecules, such as human DNA comprised of many thousands of interrelated atoms, the allowed energy states form a virtual continuum. The complex energy state structure of macromolecules provides for a significantly different energy absorption and dissipation profile. This energy state structure is so dissimilar from the single atom picture that it makes it impossible to apply the ionization argument.

RF energy absorption in biologic tissue takes place via an energy conversion process. Photon energy is converted to phonon energy better known as heat energy. Phonon energy is more familiarly observed as vibrational, translational, or rotational motion of atoms constrained by their covalent bonds. The absorbed energy may either reside at the absorption site, in which case the site is said to be in an excited state, or the energy may be dispersed through the system. If RF energy is incident at a rate that is greater than the energy dispersion rate then subsequent photon absorptions at any particular site, which has experienced a prior absorption event, will lead to a change in energy state to a second higher allowed energy level. Succeeding photon energy absorptions may continue up to the point where the covalent bond ceases to exist by virtue of the increasingly excited energy state. Although the energy conversion process yields heat energy - phonon energy - there need not be any measurable temperature variation. In fact, the very use of the distinctions between thermal and non-thermal, or athermal is another "red herring." Since all energy absorption is thermal by nature there is, strictly speaking, no such thing as non-thermal or athermal energy absorption. Instead, when speaking of energy absorption it may be more appropriate to speak of measurable or not measurable temperature rise. In either case there is an increase in thermal energy whether it be on the order of pico-joules (immeasurable by typical thermometric means) or milli-joules.

RF energy photons are particularly suited for deep penetration into human tissue. Infrared, visible light, and ultraviolet radiation does not penetrate human tissue to any appreciable extent. However, the penetration capabilities of RF radiation put it in the same category as x-ray radiation, which is also a deep penetrating energy. This penetrating characteristic of x-ray radiation and RF radiation provides that a single photon of x-ray energy may scatter through the tissue or molecule and disrupt many, many covalent bonds even without liberating an electron from an atom (in other words an ionizing event is not required) while RF radiation may be less extensive in bond disruptions until exposures are encountered that overcome inherent energy dispersion mechanisms. In essence the effects can be identical - the disruption of covalent bonds is essentially what destroys DNA molecules and genetic information and leads to neo-plastic transformation of cells. Although a single x-ray photon may destroy molecular bonds RF energy can affect damage by multiple photon absorption. For example, a cell phone emits about 8.9 x 1021 photons per second per square centimeter at the surface of the human head. For those unfamiliar with the scientific notation of that number, its magnitude appears more dramatic when written in standard notation as, 900,000,000,000,000,000,000 photons per square centimeter per second. Consider, then, that the energy from each and every photon absorbed will disturb the equilibrium of the system while the energy is being diffused and dispersed. Biological systems, and in particular the human brain do not have the capability to handle the massive dose of photon energy coming from such radiation absorption. Under normal circumstances, when not exposed to high doses of RF energy, the body compensates for naturally occurring damages. During high dose RF energy exposures the biological protection and repair mechanisms may be overwhelmed and irreparable disruptions, caused by the radiation, lead to widespread submicroscopic damage including permanent DNA damage. It will serve as little comfort to know that exposure to cell phone towers provide an RF energy dose only slightly lower at about 7 x 1018 photons per square centimeter per second (7,000,000,000,000,000,000) and that is at a distance of a few hundred feet from the tower." (77)

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Figure 1. For many decades, these homes in our community have been caged in by the electrosmog from transmission and power lines. The BCTC was not satisfied with this aesthetic contribution, so that they are planning to present us with higher poles and much stronger electrosmog for the next 60 years.

Fig. 2. Such beautiful mid-autumn gardens are only a nuisance to the BCTC. They are trying to take such trees down and tear apart the ground with bulldozers.

Bristol artist Wins Bombay Sapphire Prize 2004

Image: Diana Porter Photography
Richard Box from Bristol is the winner of the Bombay Sapphire Prize 2004 – the world's biggest award for artists, designers and architects working with glass. With a prize value of £20,000, this prestigious annual award that rewards and promotes excellence in contemporary glass was presented on 20th October. Working with the Leverhulme Trust at the Bristol University physics department, Richard Box designed an inspirational installation called Field. It was created by planting 1,301 fluorescent light tubes into the earth underneath an overhead power line covering an area of 3,600 square meters. The electromagnetic fields from the power cables above lit the tube lights to create this unique image.

Figure 3. Electromagnetic fields (EMFs) cannot be seen or felt, but many of their effects can. Magnets, compasses, motors and MRIs all show the effects of EMFs. This picture shows the effects of EMFs from the power lines above, lighting up many fluorescent light bulbs without electric connections.

Studies done by the NRC of Canada demonstrate conclusively the harmful effects of electromagnetic radiation on living organisms, in particularly birds, which are excellent bio-indicators. They found that bird feathers acted as dielectric receptors. Birds that had been plucked under anesthesia showed no reaction to radiation until the 12^{th} day, when their feathers started to grow back. In Nijerk, Netherlands, it was found that a canary bird did not sing and was pecking its skin and losing feathers. After the cage was protected from EMFs, it started singing and ceased losing feathers within ten days.

There have been reports on sparrows' disappearance from the cities where electromagnetic pollution is very high. The EMF effects on birds have been observed in relation to the distribution lines in our community. The following series of figures clearly show that birds somehow feel the effects of EMFs, and seek to avoid same.

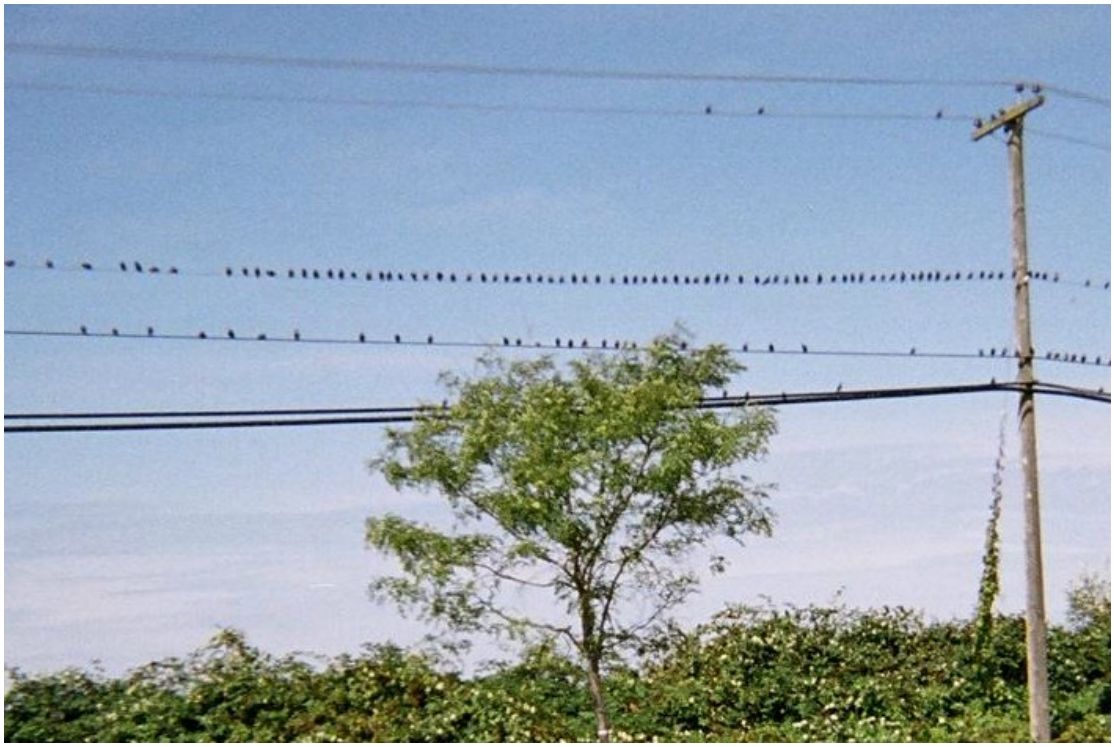

Figure 4. Many birds are perching on the ground wire in the middle and somewhat less on the other lines (communication lines), while only 3 chose the distribution lines at the top. (Could they be BCTC representatives?)

Figure 5. In less than a minute, two of the BCTC representatives flew away. Perhaps they could no longer pretend they felt fine.

Figure 6. The last BCTC representative flew away. Meanwhile, the many TRAHVOL representatives stayed put, wondering what will happen next.

Figure 7. These birds preferred crossarms to the distribution lines. They stayed a bit longer on the arms than on the distribution lines.

Fig. 8. Again, many birds are sitting on the crossarm of the transmission structure in our backyard. It was observed that one bird began approaching one of the lines, stopped around 2 feet from the line, and suddenly flew away. During many days of observation, none of them tried to sit on any of the transmission lines.

Figure 9.

Figure 10.

Figure 11. The foregoing three figures (9-11) show again that birds do not like distribution lines, which are the top three lines. The fourth highest line is the ground wire, on which most birds have perched.

Figure 12. Swallows sitting on the ground wire.

Fig. 13. Crows also chose the ground wire, not power lines

Figure 14. At another location, crows have chosen a communication wire, not the power lines.

These pictures show the ability of birds to detect and avoid EMF-emitting power lines. I have never seen even one bird sitting on the transmission lines in our backyard for the last 22 years. When I tried to take the picture in Fig. 6, it seemed that a bird was repelled by some force from the transmission lines. I cannot think of anything else except for the EMFs from the line. If birds cannot stand EMFs even for a brief moment, how can human beings endure them over 60 years? The BCTC's plan to bury a set of lines and leave another set in the air under the rationale that EMFs are safe may seem logical to some, but callous, shortsighted and irresponsible in reality.

Migrating birds have been raised as an issue with the overhead lines along Highway 17 or Delta Port road, the most logical option route. However, migrating birds normally fly at much higher altitudes than normal transmission lines, except for landings on and takeoffs from their sanctuaries. In addition, those sanctuaries are not close to the routes mentioned. Finally, they all have the ability to detect and avoid power line EMFs. Therefore, any claim that the welfare of migrating birds should be one of the deciding factors in objecting to using the Highway 17 and Delta Port road routes is highly tenuous.

Anyone who is still in doubt about low-level EMF health hazards because the power companies say otherwise should read Exhibit III, a letter to Bruce Barrett, the project manager of the BCTC, who chose not to respond to same.

Dr. Kyong H. Nam, Ph.D. P.Eng.

Exhibit III
March 29, 2005

Mr. Bruce Barrett
Project Manager,
B.C. Transmission Corporation

Dear Mr. Barrett:

I am a Tsawwassen resident living near high voltage transmission lines. I think you have received both of my previous letters written to the Honorable Richard Neufeld, the Energy Minister of B.C.[1]

If you have studied my letters and the references I supplied, you should understand the depth of my concerns about the health of my family, my fellow citizens and myself. I have been informed that the BCTC will not pursue the transmission line upgrade plan through the existing right-of-way in the Tsawwassen residential area. This could have been a fantastic moment were it not for your subsequent statement that the existing line would remain in place for up to 15 years, and that EMFs are not a substantiated risk.

According to the draft of the Vancouver Island Transmission Reinforcement Project (VITR Project) prepared by BC Hydro Engineering, the HVDC system in Arnott Substation in Delta, B.C. is nearing the end of its service life, the AC/DC conversion equipment is obsolete and the submarine cable transmission system is beyond its design service life. I assume the overhead line is also near to or beyond its design service life even if it was not mentioned. Is it safe to the public to prolong service of the existing line system for another 15 years under such poor conditions? Or did BC Hydro Engineering exaggerate the situation simply to win public approval for the VITR Project? You yourself mentioned that the existing system, at 120mG (under the power line), puts out 50% more EMFs than the planned upgrade system. 120mG is 4800% times more than the recommended safe level of 2.5mG endorsed by the Swedes. If you planned to upgrade the existing system because of its old age, does it not make sense to remove this old and dangerous existing system once a replacement is built at a different location?

Your statement that EMFs are not a substantiated risk is unwarranted unless you completely ignore the "non-thermal effects" of extremely low frequency EMFs, as ICNIRP/WHO worshippers do. From my research of EMF literature, I am confident in saying that the CNIRP/WHO exposure guidelines are completely unsafe, are being eroded everyday, and will never hold in the long run.

Because you seem to be a strong believer in the ICNIRP/WHO's prestige and in the authority of their EMF exposure guidelines, I will give you one example (which happened in Canada) among many of how the prestige of the office and/or name of person or organization can render mistakes unnoticeable and make subsequent research results untrustworthy. On November 15, 2000, the Manitoba Clean Environment Commission (CEC) received a request

[1] My first letter was about three convincing reports, selected from many, that connect EMFs and EMRs to cancer and miscarriage. The second letter showed why the ICNIRP/WHO EMF exposure guidelines should be avoided and the precautionary principle be taken for projects related to EMFs and EMRs. If you wish for me to resend either one, please do not hesitate to ask.

from the office of the Minister responsible for Manitoba Hydro to undertake an investigation of the potential human health-related effects that might be associated with EMFs from transmission and distribution lines. The Commission convened an experts' workshop to discuss the human health effects of EMFs and draw conclusions. The workshop, headed by Dr. Jack Mandel, Vice President, Exponent Health Group Inc., concluded as follows.

> "After considering the state of the current research, as summarized by Dr. J. Mandel at the EMF Workshop of January 2001, the health and EMF experts felt that the weight of evidence is compelling. There is a definitive pattern of consistency and statistical strength in the findings of well designed studies (epidemiological and laboratory) over the past 30 years, particularly recently published studies (including the UK study directed by Sir Richard Doll) that support the conclusion that there is no demonstrable effect on human health from EMFs."[2]

Is this conclusion made by health and EMF experts something a layman like me should dare not question? At any rate, I will point out three things that may weaken the credibility of this report.

First, the report did not consider the reason why Russia, China and several Eastern block countries have adopted the much lower EMF exposure guidelines than that of the ICNIRP/WHO. Perhaps this is because the experts' perception that Western countries are more advanced in studying EMF effects than Eastern countries made them overlook the underlying facts and completely ignore the non-thermal effects of EMFs repeatedly claimed by the above-mentioned countries.

Second, the report did not mention anything about the findings of Maria Feyching of Swedens Karolinska Institute in April/May 1996, which looked at 127,000 children who lived near big power lines for over 25 years and found twice the risk of leukemia. The writers probably knew of such important findings, but dismissed them as insignificant. I find it quite unlikely that the expert group knew nothing of a report made almost five years before Jack Mandel's report.

Third, the expert, Dr. Jack Mandel, supported Sir Richard Doll's position that there is no causal relationship between EMFs and cancer. However, Doll's report was later criticized as inaccurate. "The UKCCS [U.K. Children's Cancer Study] was published in the December, 1999, issue of *The Lancet.* Surprisingly, the same issue of *The Lancet* published a commentary that, in effect, said that the UKCCS was badly designed using outdated methodologies. This criticism has been born out, as the *British Cancer* study published 10 months later used the UKCCS's own data to find a relationship between EMF and Cancer."[3] Professor Nick Day, the lead researcher for the UKCCS study, concluded that

> "In summary, the 99.2% of children residing in homes with exposure levels <0.4 [Mu]T had estimates compatible with no increased risk, while the 0.8% of children with exposures >=0.4 [Mu]T had a relative risk estimate of approximately 2, which is unlikely to be due to random variability. The explanation for the elevated risk is unknown, but selection bias may have accounted for some of the increase."[4] (0.4[Mu]T in MKS is the same as 4mG in CGS)

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[4] From the site: http://www.powerlinefacts.com/British%20Journal%20of%20Cancer%20Abstract%20of%20Meta-Analysis%20of%20Cancer.htm

The inaccuracy of Doll's report was not even suspected by many because of his colorful achievements in linking smoking with cancer.[5]

As mentioned above, numerous important facts supporting the conclusion that low-level EMFs cause human health risks were completely ignored in Mandel's report because those might not be the things the experts were looking for. Because of his name value, Doll's incomplete research results were used like the Bible in Mandel's report. Because there are no Canadian EMF exposure guidelines and because of the prestige carried by certain experts, Mandel's inaccurate report seems to have been used as a precedent guideline by many Hydro companies in Canada. Mandel's report even included the outrageous opinion of Dr. Harry Johnson, a workshop member and department head of Imaging Physics & Radiation Protection, CancerCare Manitoba, who stated that "the ICNIRP Guidelines are overly conservative, and [Dr. Johnson] does not advocate the acceptance of ICNIRP guidelines for use as exposure limits for the public in Manitoba" without even referring to the source. Mandel's report constitutes only a fraction of the cases of arrogance that have produced inaccurate research results. It is my opinion that the bureaucratic or political scientists and technicians of the ICNIRP and WHO will fight hard to keep their exposure guidelines intact because many of them have placed their reputations on the claim that there is no link between low level EMFs and cancer. I hope you and your colleagues are not like them.

At any rate, BCTC's move was, to some degree, noble and courageous. However, if you are still thinking that 10% of ICNIRP/WHO exposure guidelines (which are based on inaccurate reports as stated above) are safe and the guidelines will hold in the long run, I would like to remind you that you and your colleagues have to follow the first rule of the Code of Ethics of the APEGBC:

> "Professional Engineers and Professional geoscientists shall hold paramount the safety, health and welfare of the public, the protection of the environment and promote health and safety within the work place."

As an exposed victim, I hope the BCTC decision to abandon the upgrade plan through residential area becomes the precedent for utility companies in Canada, such that high voltage transmission lines are never planned, built or upgraded in proximity to human residences. Your controversial upgrade project awakened so many people to study about EMFs and now they have found out for themselves that magnetic fields greater than 3mG are a health hazard. Consequently, these affected people want to see the service of the existing system be combined with the new system, and see the unsafe existing lines taken out. This is the most logical way for the professional engineers and geoscientists to follow, especially when we weigh the benefits of keeping the old system and guarding public health.

You have an ethical obligation to keep the affected members of the public safe. As such, we demand that you, as professional engineers and geoscientists who are involved in this project, support our stand. If you do not, it is clear sign that you and your people do not care to observe the first rule of Code of Ethics of APEGBC mentioned above.

At any rate, you will be hearing more about this in the near future.

Sincerely,

Kyong H. Nam, Ph.D (High Power Lasers)

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[5] See: http://www.preventcancer.com/losing/other/doll.htm