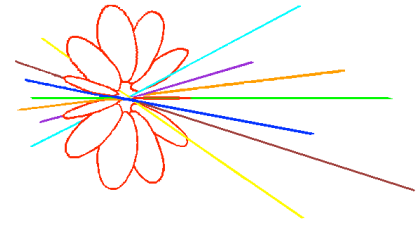


Environmental Assay Inc.

Wide-spectrum Environmental Services

Indoor Air Quality / Electromagnetic Fields



October 20/20

Bessie Mae
Metropolis

Dear Bessie,

Thank you for considering me for a consult, and please thank her who referred me to you when you get a chance.

As I reviewed the two reports submitted to you, I realized that both claim to be Building Biologists, the first supposedly long-time certificated, yet both seemed to give you a scripted “formula”, with bits and pieces cut and pasted from elsewhere.

For instance, the first fellow:

“Magnetic fields are directly correlated with electrical current and its use. These fields need the flow of current in order to exist. Most appliances that utilize electrical power will produce a magnetic field such as stoves, refrigerators, computers, etc. These items are considered "point sources" and their magnetic fields are typically limited from 1 to 2 feet from the source. Electrical wiring is also a source for magnetic fields when there is an imbalance in the current flow, that is, when current running in one direction does not equal the current running in the opposing direction. It is these situations that can cause elevated magnetic fields throughout a building and even outdoor spaces. Magnetic fields can penetrate most building materials and are not shielded by walls or floors.”

And then the second fellow:

“Magnetic fields are directly correlated with electrical current and its use. These fields need the flow of current in order to exist. Most appliances that utilize electrical power will produce a magnetic field such as stoves, refrigerators, computers, etc. These items are considered "point sources" and their magnetic fields are typically limited from 1 to 3 feet from the source. Electrical wiring is also a source for magnetic fields when there is an imbalance in the current flow, that is, when current running in one direction does not equal the current running in the opposing direction. It is these situations that can cause elevated magnetic fields throughout a building and even outdoor spaces. Magnetic fields can penetrate most building materials and are not shielded by walls or floors.”

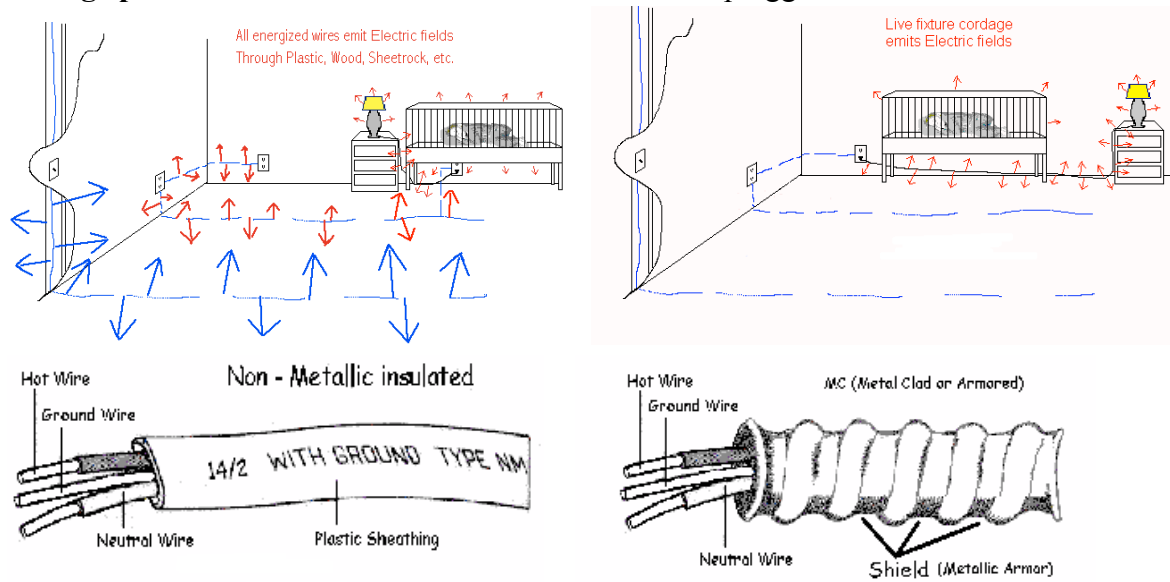
Their texts are nearly identical.

From my perspective:

Currents produce Magnetic fields surrounding the path of current, like sleeves surrounding the path,

progressively weaker the further they are from the source. Currents do not flow unless something is turned on. Power cords do not emit such fields except within a few inches from them, and only when in use. These fields can occur from 1) power lines, 2) plumbing currents, 3) wiring errors, and 4) motors / point sources. An additional detail is that items 1, 2, and 3 are **Line** sources (*long relative to human dimensions*) whose field intensity diminishes gradually with distance. Item 4 refers mostly to **Point** sources, whose field intensity drops off dramatically with distance, and is likely found near any appliance with a motor such as a refrigerator, exhaust fan, etc. Skipping all foreign standards, as neither of us live in foreign countries, the US IEEE (*Institute of Electrical and Electronic Engineers*) has determined it's "safe" to be exposed up to 9,040 mG (milliGauss). You read that right. Meanwhile research has shown signs of disease with **long-term** exposure of greater than 2 mG, and leukemia doubling with similar exposure above 4 mG. **All your exposures are below 2 mG**, except in the kitchen where the highest detected was 2mG, **so your level of concern should also be low**. You may think you spend a lot of time in the kitchen. Yet it would still not be long-term such as 10+ hours a day, 5 to 7 days a week. And coincidentally neither consultant said if a fridge (*which could have caused the field*) was nearby. **The Building Biology standard** quoted partially by the first individual, and more fully by the second, has graduated levels of "risk" (*different iterations of the standard change that to "concern" or "anomaly"*), but **is a recommendation for sleeping areas**, so it's not appropriate to quote its limitations elsewhere. The levels in your place are beyond your control because they are sourced externally. Yet the second individual suggested insertion of a dielectric in piping 10 feet beyond the building. He obviously did not grasp the concrete build of the Metropolis under his feet in its proper light.

Voltage produces Electric fields. Power cords that are plugged in are continuous sources.



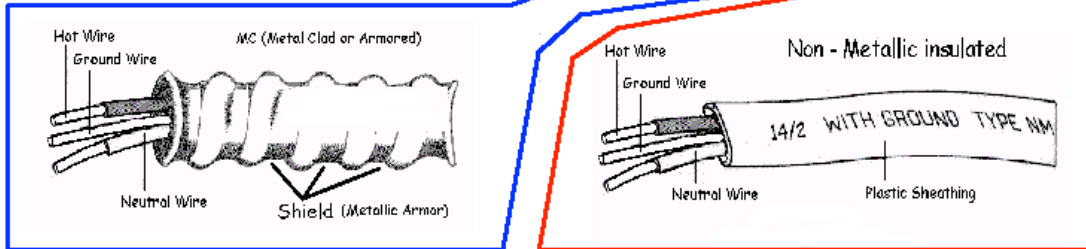
Shown above are electric fields due to Romex wiring above left, and BX wiring above right (*the latter being your place*). Note the similarity in the wiring, they are the same except the metallic cover of the one at right, mandated in most of the Metropolis (*a perhaps trivial fact not obvious to the second individual*). **Your takeaway should be to not have any power cords plugged in by the bedside**. Electric fields are "safe" per the IEEE to 5,000 V/m (*volts per meter*), yet research has shown possible irritation to some individuals, especially the sensitive population, at normal residential levels of 1 to 10 V/m. The following sketch shows the correspondence between V/m and BV (*Body Voltage*).

1 AC ELECTRIC FIELDS (Low Frequency, ELF/VLF)

Field strength with ground potential in volt per meter V/m
Body voltage with ground potential in millivolt mV
Field strength potential-free in volt per meter V/m

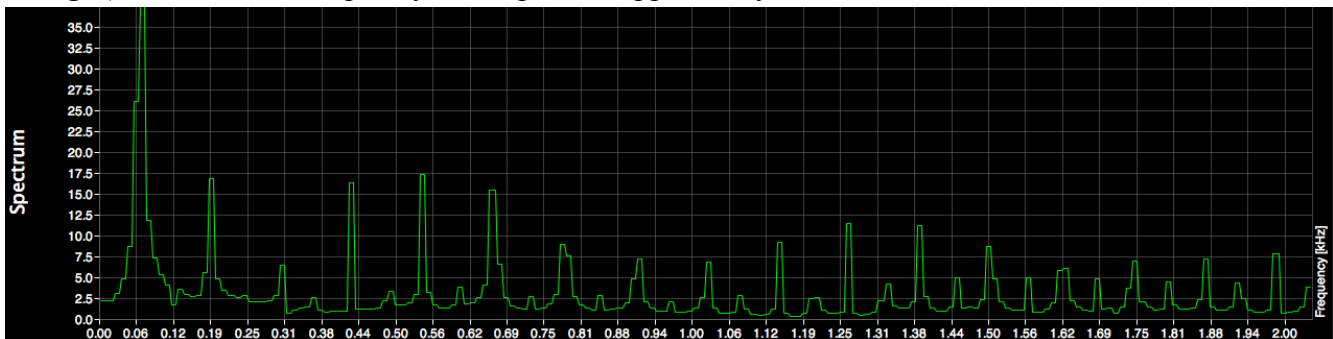
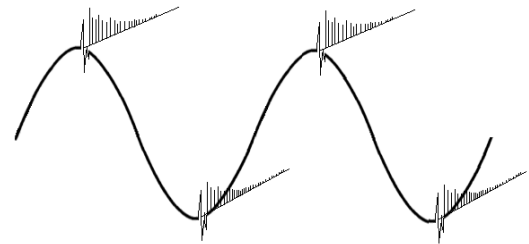
No Anomaly NOT Attainable	Slight Anomaly	Severe Anomaly	Extreme Anomaly
< 1	1-5	5-50	> 50
< 10	10-100	100-1000	> 1000
< 0.3	0.3-1.5	1.5-10	> 10

Values apply up to and around 50 (60) Hz, higher frequencies and predominant harmonics should be assessed more critically.
 ACGIH occupational TLV: 25000 V/m; DIN/VDE: occupational 20000 V/m, public 7000 V/m; ICNIRP: 5000 V/m; TCO: 10 V/m; US Congress EPA: 10 V/m; BUND: 0.5 V/m; studies on oxidative stress, free radicals, melatonin and childhood leukemia: 10-20 V/m; nature: < 0.0001 V/m



While Electric fields can be quantified in either V/m and BV, depending on what type of meter the consultant is using, in the Metropolis where Armored wire is used and where you live, it's moot to measure Electric fields, since these will only occur near point sources, a fact lost on both consultants.

Harmonics are produced by non-linear / non-smooth use of Current. This involves CFLs or any other fluorescent lighting, dimmers, computers, etc. These produce trains of harmonics spanning the audio spectrum and ranging to the RF spectrum, if the current demand is intense enough. The sketch below right displays the pattern produced by a single device onto the voltage and current when in use. The proper manner to quantize them (*put them into meaningful terms*) is not in GSU or mV, the latter as promoted by the two individuals, with the included recommendation to install “filters.” These are a smoke-and-mirrors juggling act before an uninformed consumer. Had you bought my book, **ELECTRIC HOSTAGE**, available on my web site, you'd have thrown them both out without payment, if only for this. The proper manner to quantize Harmonics is with a spectrum analyzer, child's play for the agile consultant, and to evaluate each harmonic relative (*in strength*) to 60 Hz, the frequency of the power supplied to you.

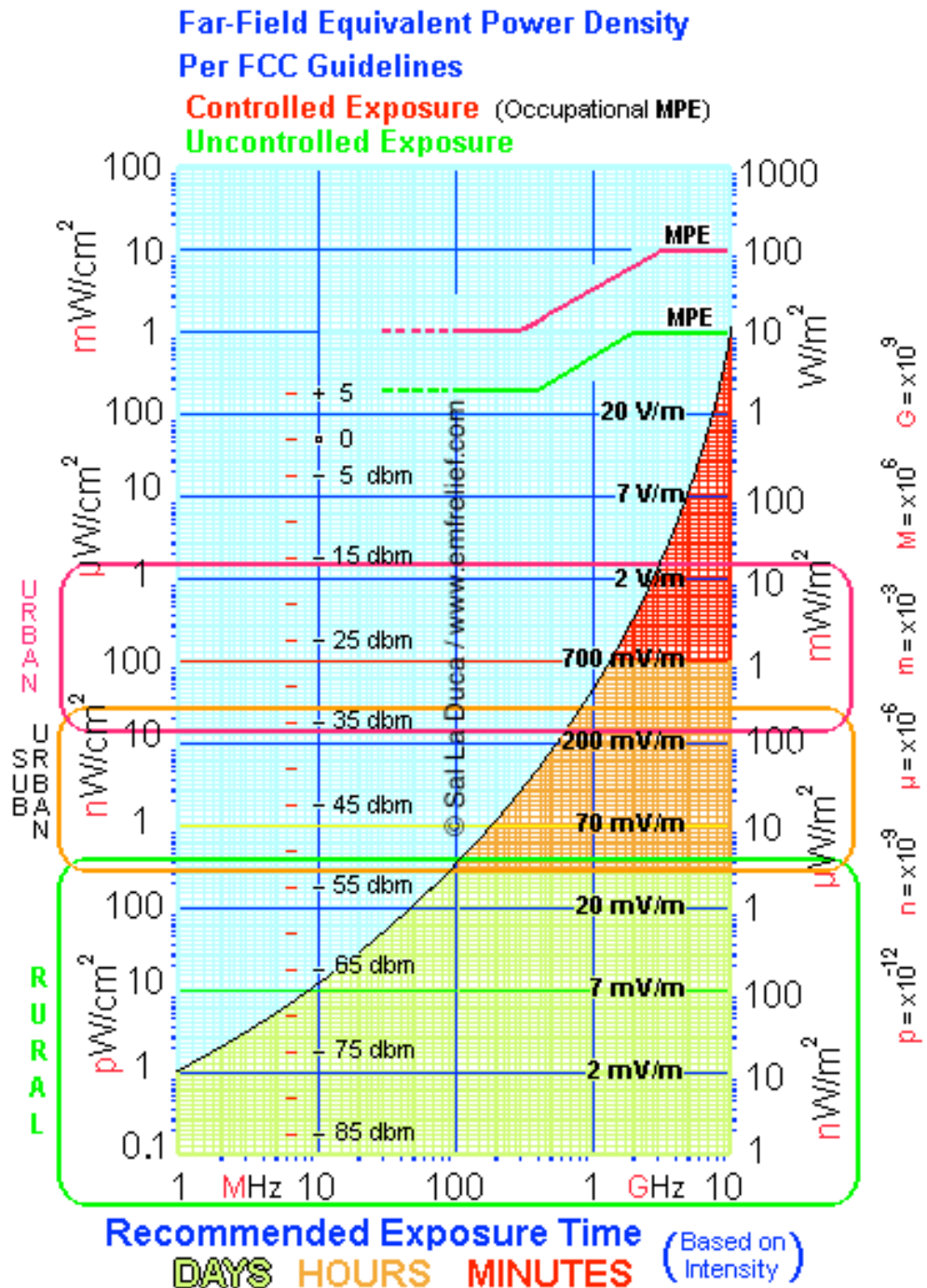


Shown above is the audio spectrum to 2 kHz (*1 kiloHertz, in this case 2,000 Hz or cycles per second*) of a train of harmonics. As shown, the highest harmonics at a relative height of 15.0 or so (*four separate*

ones vertically) are about 50% of the 60 peak at the extreme left at 37.5 (again vertically). Normally Harmonics to about 5% are tolerable (meaning all those above should be much lower), and as above these would be quite irritating. There is no way to relate reality to either individual's "measurement," especially since their meters are designed to exclude the most energetic harmonics, being those below about 4 kHz, and also being those most irritating. **Calling Harmonics "dirty electricity" is a marketing gimmick.**

Radio Frequency exposure relevance varies with frequency, and proximity to the source. Exposure from a mobile phone is dramatically different to that from a WiFi router or cellular antenna.

Additionally, since most RF energy is presently Pulsed, and this would be detected as a Peak, it should almost follow that the more peaks there are, the more possible "damage" one could possibly suffer. This would be detected by measuring the Average, in that more peaks would raise the average. A fact to consider is that the **Building Biology standard quoted by both individuals considers only peak value, and from a single source.** We no longer exist in a world with a single source, so in two respects the "standard" is deficient. The third weakness of the "standard" is that it does not differentiate



between frequencies, and quoting two measurement ranges (*0.27 MHz to 3.0 GHz, and 2.4 GHz to 10 GHz*) does not provide comparable values, especially since the two consultants afterwards quote study recommendations that have no frequency designation. Studying the above graph, and the values given you in the reports, you can draw horizontal lines at appropriate places, but that gives you no clue as to what is really happening, intensity-wise, frequency-wise, or relevance-wise.

In short, I believe both individuals failed you.

The little information I've provided should give you a more proper understanding of what is happening.

I casually read in the second report that you own a Cornet meter. This gives you some perspective, although possibly not as accurate as more expensive meters. It can nonetheless be used to identify areas where the fields are stronger or weaker, and relative achieved measures after any reduction efforts.

Kind regards,

Sal La Duca

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Very, Limited Glossary

In any discussion of energy, frequencies, and EMF (Electromagnetic Fields) there is a need for Scientific Notation, to make sense of very large or very small numbers.

The most common multipliers used are:

pico (p) = $\times 0.000,000,000,001$ (or $\times 10^{-12}$)

nano (n) = $\times 0.000,000,001$ (or $\times 10^{-9}$)

micro (μ) = $\times 0.000,001$ (or $\times 10^{-6}$)

milli (m) = $\times 0.001$ (or $\times 10^{-3}$)

kilo (K) = $\times 1000$ (or $\times 10^3$)

Mega (M) = $\times 1000,000$ (or $\times 10^6$)

Giga (G) = $\times 1000,000,000$ (or $\times 10^9$)

Some of the more common foundational units are:

Cycles per second (cps) or Hertz (Hz),

Gauss (G) a unit of magnetic field,

Tesla (T) – the European unit of magnetic field, $100 \text{ nT} = 1 \text{ mG} / 1 \text{ milliGauss}$

Volts (V) – a unit representing electric potential, $1 \text{ V} = 1000 \text{ mV} / 1000 \text{ milliVolts}$

Amperes or Amps (A) – a unit of current flow. $1 \text{ A} = 1000 \text{ mA} / \text{milliAmps}$

Radio Frequency is generally considered to begin around 30,000,000 Hertz or 30 MHz, although the AM Broadcast bands in the 540 kHz to 1.7 MHz are also designated as “Radio.” In genuine RF, the Electric field is the prominent component in the Far-field, and that is what all RF meters detect. They then provide internal calculations to arrive at various ways to display the data, as mV/m, V/m, $\mu\text{W}/\text{m}^2$, mW/m^2 , W/m^2 , mW/cm^2 , etc. The chart provided within this document allows a few depictions to be quickly changed to another, simply by looking at the same horizontal position at the other scale(s). Near-field measurement is quite complex as the Electric and Magnetic components need to be measured separately, with specially designed instruments, and is beyond the scope of this document.

Harmonics are produced by non-smooth electrical phenomena, some of which are repetitive. **Transient phenomena**, such as lightning, also produce a wide-band presence of harmonics, even though they are not repetitive. The firing of spark plugs produces the same effect on a smaller scale. Turning a light switch on or off, produces the same effect on a much smaller scale.

Units of **Magnetic** field are generally expressed in **mG** (milliGauss) or **nT** (nanoTesla).

Units of **Electric** field are generally expressed in **V/m** (Volts / meter), **mV/m** (milliVolts / meter). As an example, for a 7200 V electric primary suspended 30 feet in the air (*a typical height*), the electric field directly below would be Volts divided by the height. Since 30 feet (30^3) is approximately 10 meters (10 m), the relationship becomes $7200 \text{ V} / 10 \text{ m}$, or 720 V/m or about 700 V/m .

When an electrically conductive structure is exposed to a field of any kind with relative motion to the structure, what occurs is Transformer Action / Action at a distance / Induction, which causes internal and external currents and voltages to the structure. When the source is not physically moving but the components (*voltage, current*) are changing, and their reach extends onto a conductive structure, the relative motion criteria is satisfied.

Humans meet the “conductive structure” criteria. Although the discussion is centered on power lines, inside an automobile similar events occur, in that the alternator produces an Alternating (*changing with respect to time*) Magnetic field, in the process of generating power. This magnetic field in most cases extends into the passenger compartment.

Discussion of EMF also inevitably involves **Wavelength**. Since EMF travel at the speed of light or about 186,000 miles/second, the wavelength is $186,000 / \text{frequency}$. For 60 Hz it is about 3100 mi. The term Microwaves then pertains to frequencies whose wavelength is small, such as faster than 1 GHz. A microwave oven for instance, using about 2.45 GHz would have a wavelength of about 4 inches.