

Conscious Life Expo Health Panel
Living in a Toxin-Free Environment
February 10, 2013

Oram Miller, BBEC

Certified Building Biology® Environmental Consultant

Create Healthy Homes

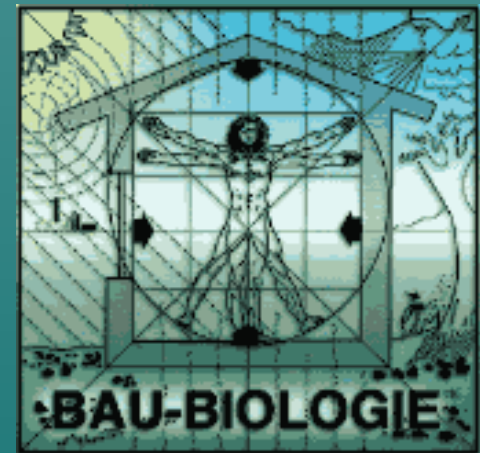
West Los Angeles, California

310.720.7686

www.createhealthyhomes.com

What is Building Biology®?

- ◆ The relationship between homes and human health
- ◆ Founded in Germany in the 1970s
- ◆ Brought to North America 25 years ago by Helmut Ziehe
- ◆ International Institute for Bau-biologie® and Ecology (IBE), Clearwater, Florida www.hbelc.org
- ◆ Over 120 Certified Building Biology® Environmental Consultants (BBECs) in USA and Canada



In Memoriam



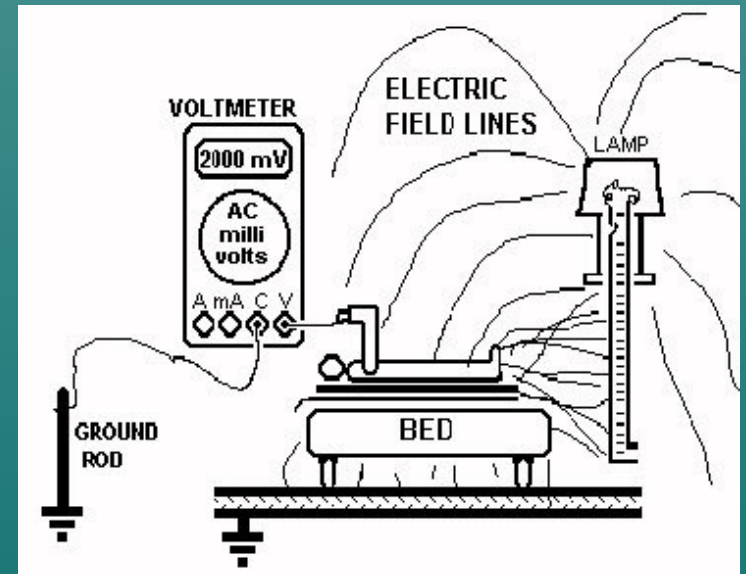
Helmut Ziehe

Founder, International Institute for
Bau-biology and Ecology

-2013

Goals of Building Biology®

1. Find and reduce sources of toxicity in the home or office -- IAQ, EMFs
2. Strengthen your tolerance to toxic influences *outside* the home
 - By reducing exposure to household toxins and creating an EMF-free sleeping environment

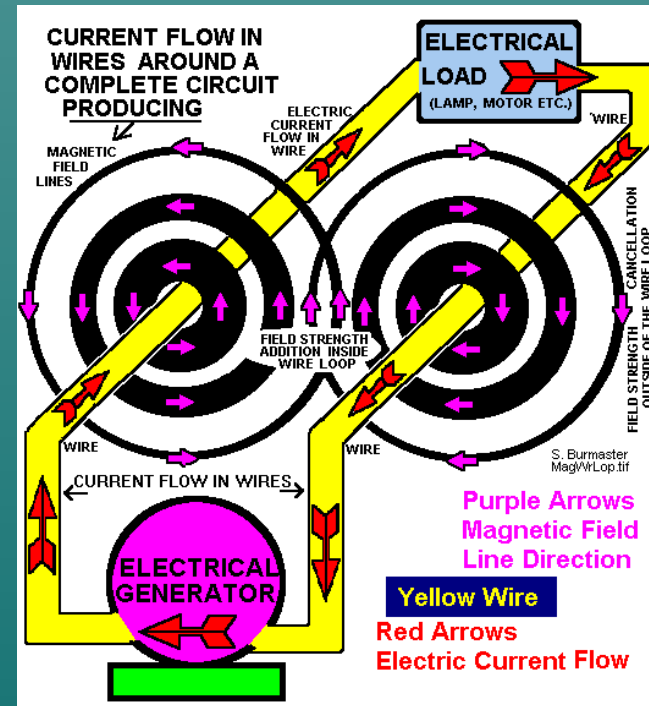


Courtesy Spark Burmaster, EE, BBEC

Building-Related Causes of Ill Health (continued)

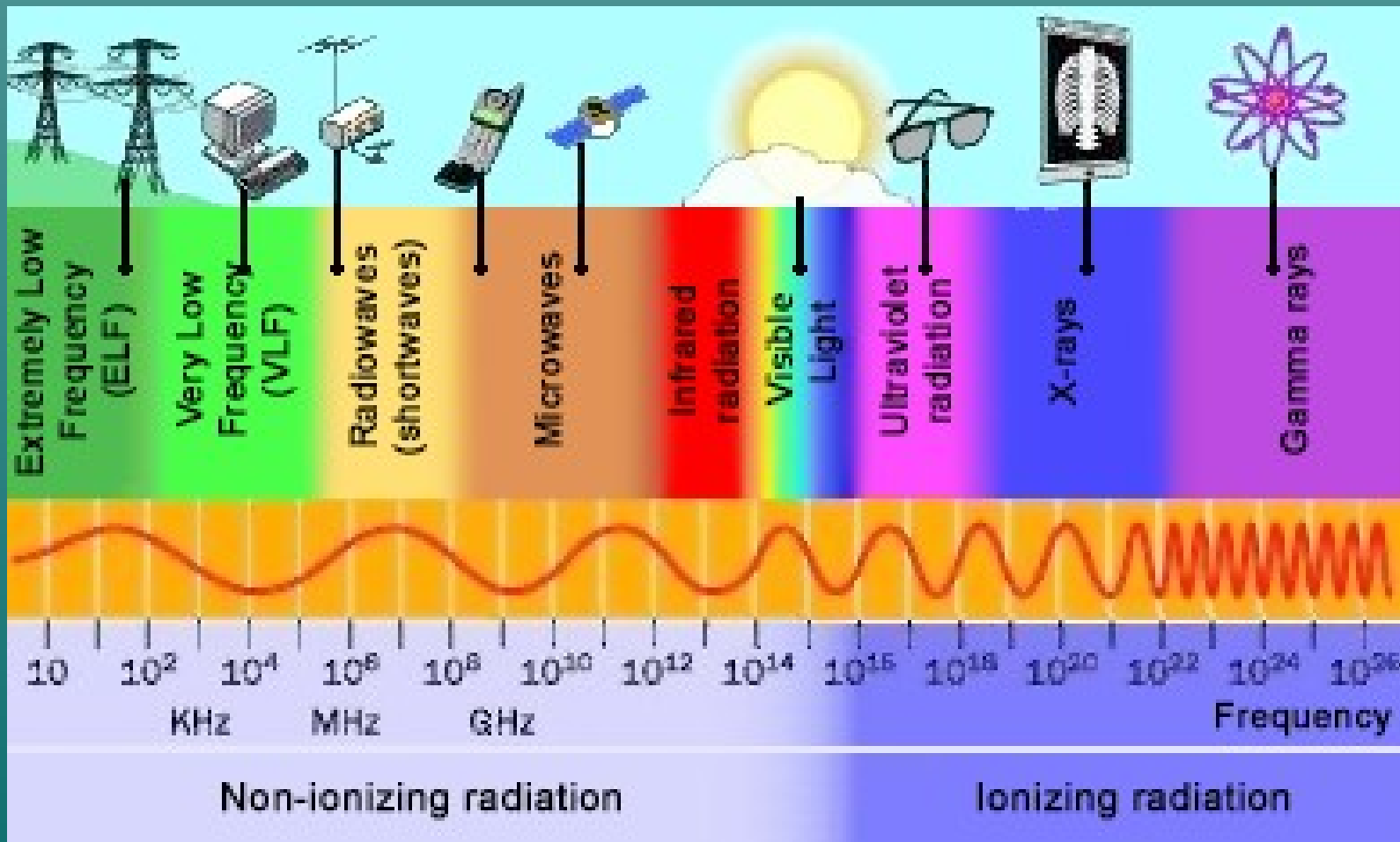
Four types of “EMFs”:

1. AC Electric Fields
2. AC Magnetic Fields
3. Radio Frequency (RF) Fields
4. “Dirty Electricity” from harmonic frequencies



Courtesy Spark Burmaster, EE, BBEC

Electro-Magnetic Spectrum



www.astrosurf.com

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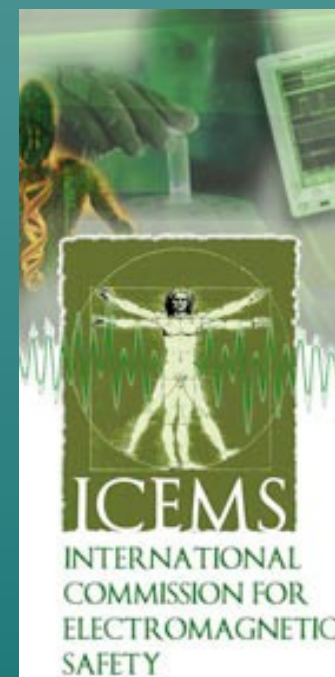
Electric & Magnetic Field (EMF) Exposure

- ◆ Considered by industry and FCC to be relatively harmless
- ◆ A potentially significant health risk to everyone, like cigarettes in 1950s
- ◆ Most research comes from Europe
- ◆ Yet US is going wireless
- ◆ EMFs interfere with healing and treatment from health care practitioners
- ◆ Most people improve with reduction in EMF exposure



Credible Scientific Research, Primarily from Europe, Russia, Israel

- ◆ The International Commission for Electromagnetic Safety
www.icems.eu
- ◆ The Swedish Association for the ElectroSensitive
www.feb.se
- ◆ Powerwatch (UK) www.powerwatch.org.uk



FEB - The Swedish Association for the ElectroSensitive

Powerwatch

The BioInitiative Report



BioInitiative Report:

A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Fields (ELF and RF)

www.bioinitiative.org

The BioInitiative 2012 Report

1800 New Studies Since 2007

- ◆ Effects on Fertility
- ◆ Effects on Fetus - behavioural problems in teens
- ◆ Leukemia and Childhood Cancers
- ◆ Genotoxicity
- ◆ Stress Proteins
- ◆ Immune Function
- ◆ Autism and Alzheimer's Disease
- ◆ Brain Tumors and Acoustic Neuromas
- ◆ DNA as a fractal antenna

Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure

Power Density (Microwatts/centimeter ² - uW/cm ²)		Reference
0.5 uW/cm ²	Significant degeneration of seminiferous epithelium in mice at 2.45 GHz, 30-40 min.	Saunders, 1981
0.5 - 1.0 uW/cm ²	Wi-Fi level laptop exposure for 4-hr resulted in decrease in sperm viability, DNA fragmentation with sperm samples placed in petri dishes under a laptop connected via Wi-Fi to the internet.	Avendano, 2012
1.0 uW/cm ²	RFR induced pathological leakage of the blood-brain barrier	Persson, 1997
1.0 uW/cm ²	RFR caused significant effect on immune function in mice	Fesenko, 1999
1.0 uW/cm ²	RFR affected function of the immune system	Novoselova, 1999
1.0 uW/cm ²	Short-term (50 min) exposure in electrosensitive patients, caused loss of well-being after GSM and especially UMTS cell phone radiation exposure	Elitit, 2007
1.3 - 5.7 uW/cm ²	RFR associated with a doubling of leukemia in adults	Dolk, 1997
1.25 uW/cm ²	RFR exposure affected kidney development in rats (in-utero exposure)	Pyrpasopoulou, 2004
1.5 uW/cm ²	RFR reduced memory function in rats	Nittby, 2007
2 uW/cm ²	RFR induced double-strand DNA damage in rat brain cells	Kesari, 2008
2.5 uW/cm ²	RFR affected calcium concentrations in heart muscle cells	Wolke, 1996
2 - 4 uW/cm ²	Altered cell membranes; acetylcholine-induced ion channel disruption	D'Inzeo, 1988
4 uW/cm ²	RFR caused changes in hippocampus (brain memory and learning)	Tattersall, 2001
4 - 15 uW/cm ²	Memory impairment, slowed motor skills and retarded learning in children	Chiang, 1989
5 uW/cm ²	RFR caused drop in NK lymphocytes (immune function decreased)	Boscolo, 2001
5.25 uW/cm ²	20 minutes of RFR at cell tower frequencies induced cell stress response	Kwee, 2001
5 - 10 uW/cm ²	RFR caused impaired nervous system activity	Dumansky, 1974
6 uW/cm ²	RFR induced DNA damage in cells	Phillips, 1998

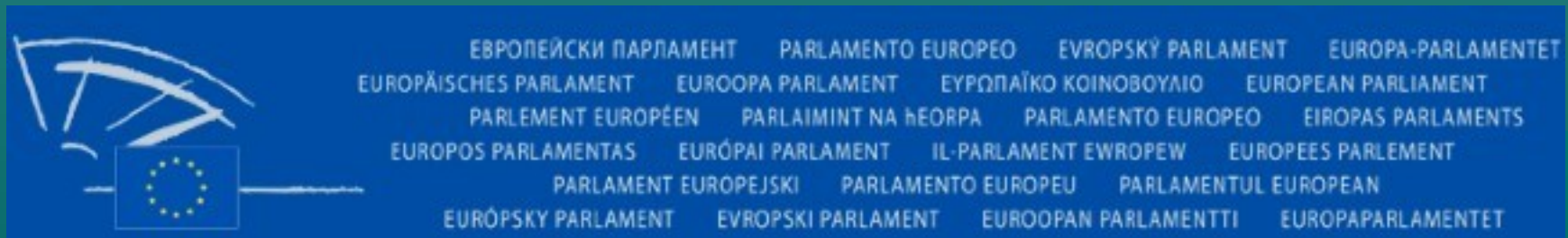
www.bioinitiative.org

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Actions by European Governments in Response to Bio-Initiative Report

“EU calls for urgent action on wi-fi radiation” – The New Zealand Herald, 9/16/07

- **“Europe's top environmental watchdog is calling for immediate action to reduce exposure to radiation from Wi-Fi, mobile phones and their masts (towers). It suggests that delay could lead to a health crisis similar to those caused by asbestos, smoking and lead in petrol.”**



“Council of Europe calls for dramatic reduction in EMF exposure”

The Council of Europe, which is the European Parliament's equivalent of our Consumer Product Safety Commission, issued Committee Resolution 1815 in May 2011.

It calls for sweeping changes in the way EMFs are measured and discussed with the public.

Potentially explosive increases in health care costs are forcing European governments, which pay for the health care of their citizens, to take action to head off a crisis already in the making.

Excerpts from the report follow:



Council of Europe

Oram Miller, BBEC

“Council of Europe calls for dramatic reduction in EMF exposure”

- “Non-ionising frequencies... appear to have more or less potentially harmful, non-thermal, biological effects on... the human body, even when exposed to levels that are below the official threshold values...”
- “There could be extremely high human and economic costs if early warnings are neglected...”
- “Take all reasonable measures to reduce exposure to electromagnetic fields...”
- “Reconsider the scientific basis for the present standards on exposure to electromagnetic fields...”

“Council of Europe calls for dramatic reduction in EMF exposure”

- “Put in place information and awareness-raising campaigns on the risks of potentially harmful long-term biological effects...”
- “Encourage research to develop telecommunication based on other technologies...”
- “Pay particular attention to ‘electrosensitive’ people who suffer from a syndrome of intolerance to electromagnetic fields and introduce special measures to protect them, including the creation of wave-free areas not covered by the wireless network...”
- “Undertake appropriate risk-assessment procedures for all new types of device prior to licensing...”



Council of Europe

“Council of Europe calls for dramatic reduction in EMF exposure”

- “Introduce clear labeling indicating the presence of... electromagnetic fields, the transmitting power or the specific absorption rate (SAR)... and any health risks connected with its use...”
- “Recommend the use of wired, fixed telephones at home...”
- “For children in general, and particularly in schools and classrooms, give preference to wired Internet connections...”
- “Pay heed to and protect ‘early warning’ scientists...”
- “Increase public funding of independent research...”

- [http://assembly.coe.int/Mainf.asp?](http://assembly.coe.int/Mainf.asp?link=/Documents/AdoptedText/ta11/ERES1815.htm)

[link=/Documents/AdoptedText/ta11/ERES1815.htm](http://assembly.coe.int/Mainf.asp?link=/Documents/AdoptedText/ta11/ERES1815.htm)

“World Health Organization (WHO) Classifies RF EMFs as Possible Cancer Risk”

- ◆ Resolution by the International Agency on Research on Cancer (IARC), May 31, 2011
- ◆ Reversal of previous position that cell phones were safe
- ◆ Exposure to wireless devices now "possibly" carcinogenic, Category 2(b)
- ◆ Similar to gasoline and DDT



Interphone Study Group

“...the results will still only be **partial results**, publishing the data on gliomas and meningiomas but not the other tumor types studied...”

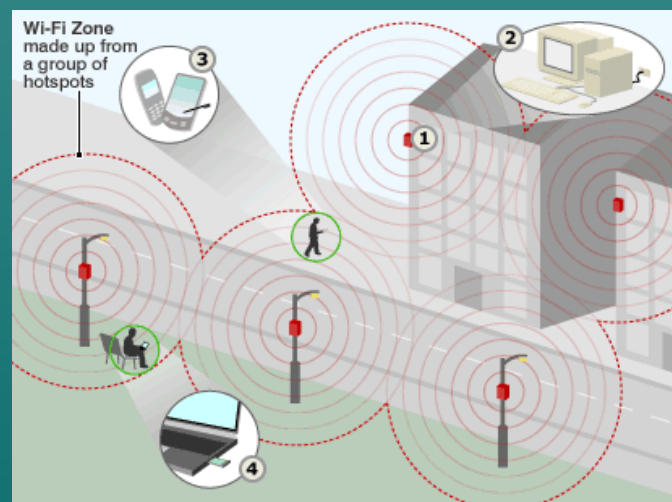
“Data collected on the 1,100 acoustic neuromas and 400 parotid gland tumors, or tumors that are closest to the ear, **will not be included** in the results...” (emphasis added)

– International EMF Collaborative Advisory on Forthcoming Interphone Brain Tumor Study (www.electromagnetichealth.org), May 13, 2010

Electromagnetic
Health.org

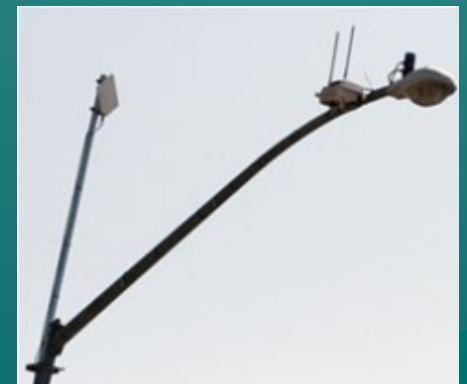
Radio Frequency Field Exposure

- ◆ Considered to be “**the largest human biological experiment ever**” - Salford et. al.
- ◆ Evidence of harm is increasing worldwide
- ◆ Wi-Fi removed from schools, libraries and hospitals in Russia, Israel, Switzerland, Austria, France



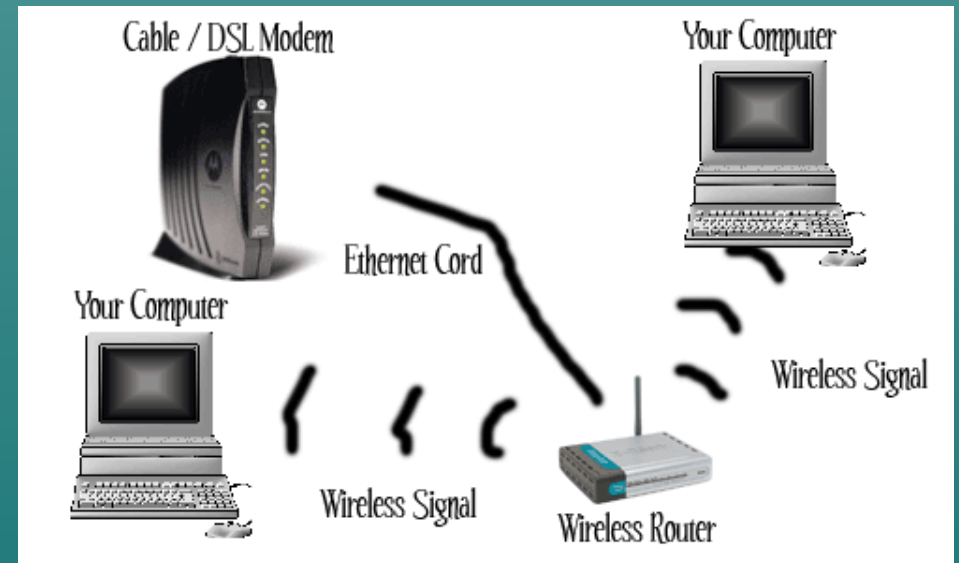
Sources of Radio Frequency Field Exposure

- ◆ Radio and TV broadcast towers
- ◆ Cell phone antennas
- ◆ City-wide Wi-Fi
- ◆ Wi-Fi routers in neighbors' homes and businesses



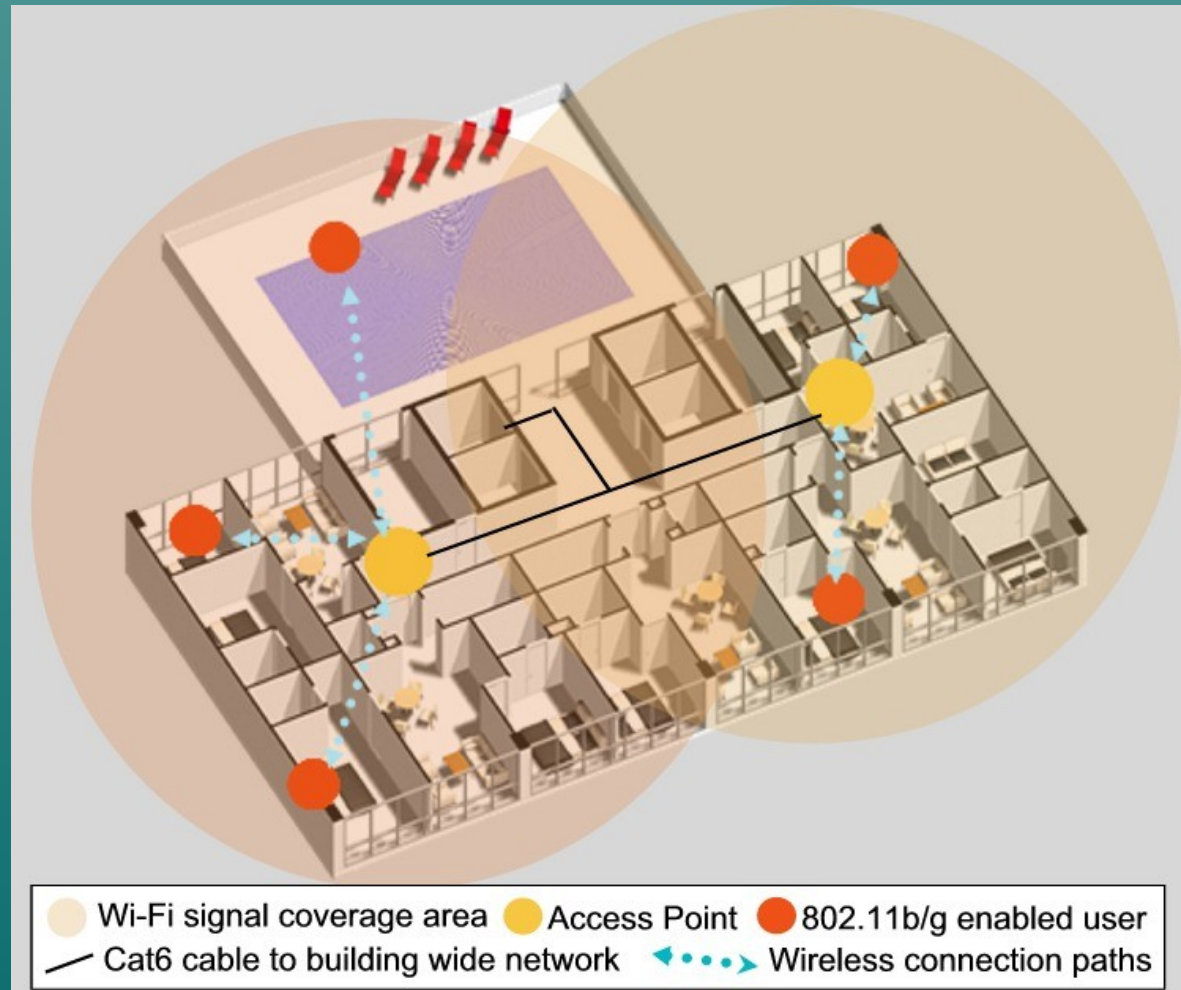
Sources of Radio Frequency Field Exposure (continued)

- ◆ Wi-Fi routers
- ◆ Cordless phone base station is “always on”
- ◆ Emits continuous pulsed digital carrier frequencies in standby mode



Sources of Radio Frequency Field Exposure (continued)

- ◆ Exposure from Wi-Fi router “nodes”



Sources of Dirty Electricity Exposure

- ◆ Electronic dimmer switches
- ◆ Compact Fluorescent Lamps (CFLs)
- ◆ Switched Mode Power Supplies

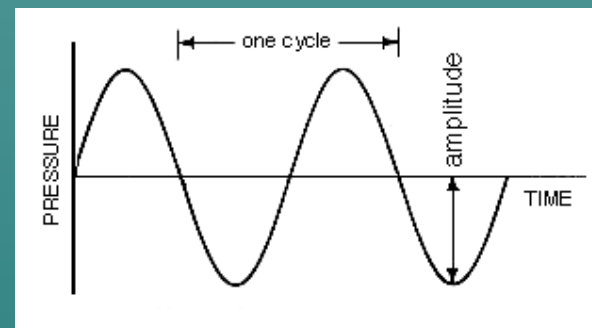


www.conrad.com

Radio Frequency Field Exposure

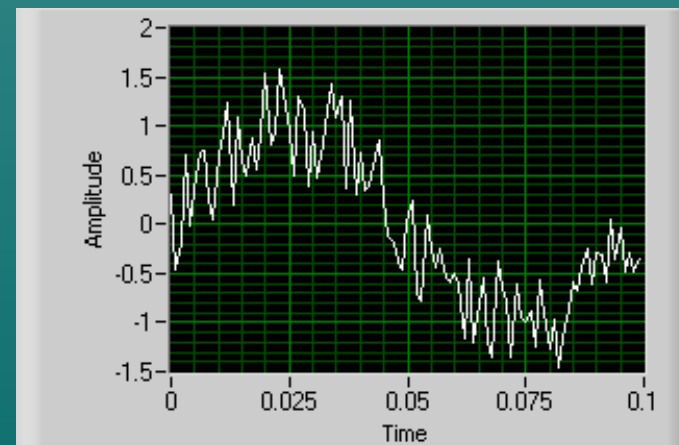
Harm comes from:

1. Frequency
 2. Power Output
 3. Distortion of Waveform
- ◆ Smooth analog wave form is best
 - ◆ Pulsed digital frequencies interfere with biological functions
 - ◆ Effects are cumulative



www.sfu.ca

Smooth Analog Signals –
Well Tolerated

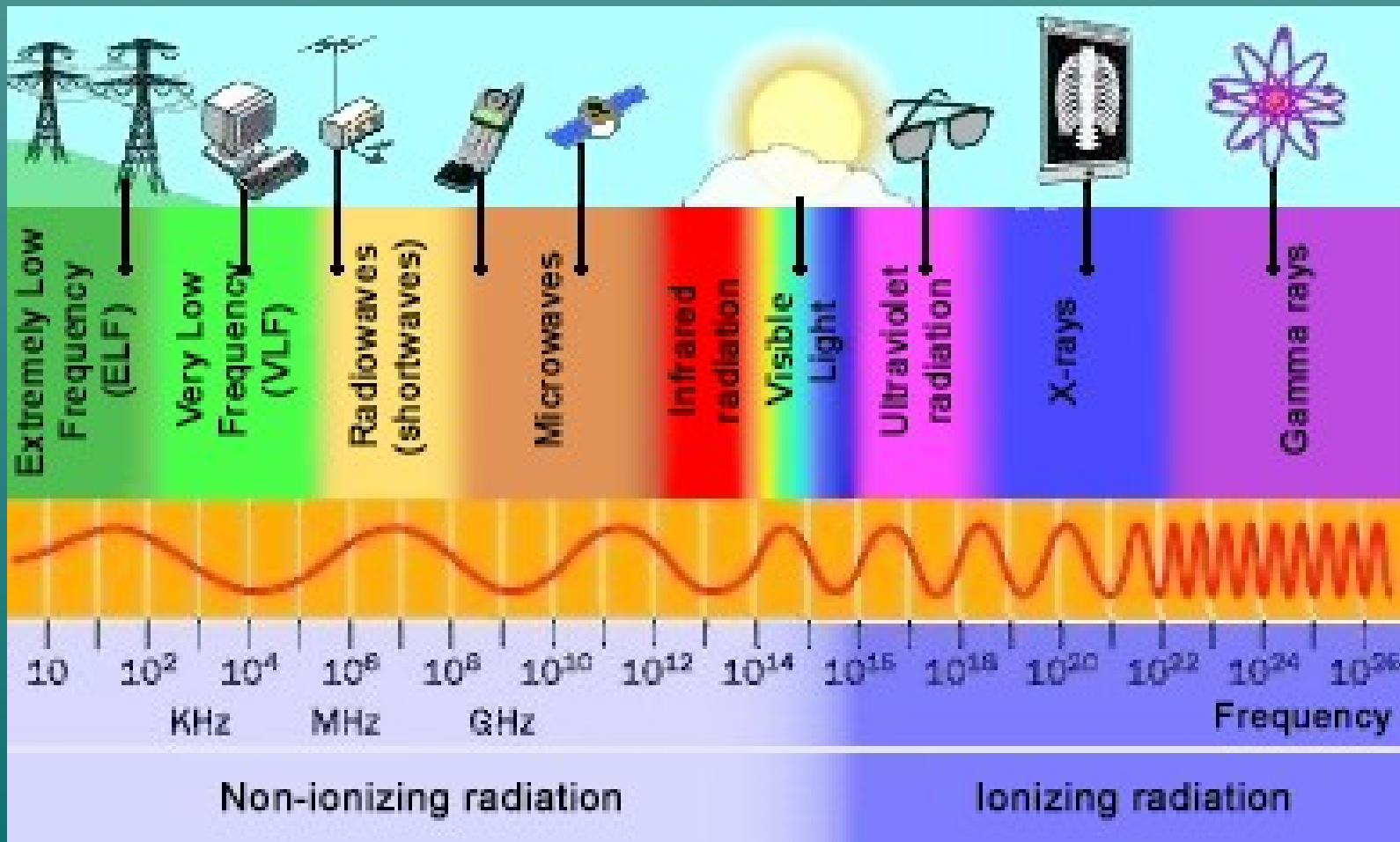


Zone.ni.com

Pulsed Digital Signals –
Not Well Tolerated

Oram Miller, BBEC

Electro-Magnetic Spectrum



www.astrosurf.com

Oram Miller, BBEC

“Membrane Sensitivity Syndrome”

Dr. George Carlo

Four biological “event windows:”

- 1. Ionizing Radiation:** X-rays, gamma and cosmic rays
-- Breaks DNA bonds
- 2. Electric and Magnetic Fields from house wiring**
(60 Hz)
- 3. Carrier frequencies** (microwave range) -- Cause thermal effects
- 4. “Information-Carrying Radio Waves”** at low frequencies (16 Hz; 219-230 Hz) -- Cause non-thermal effects

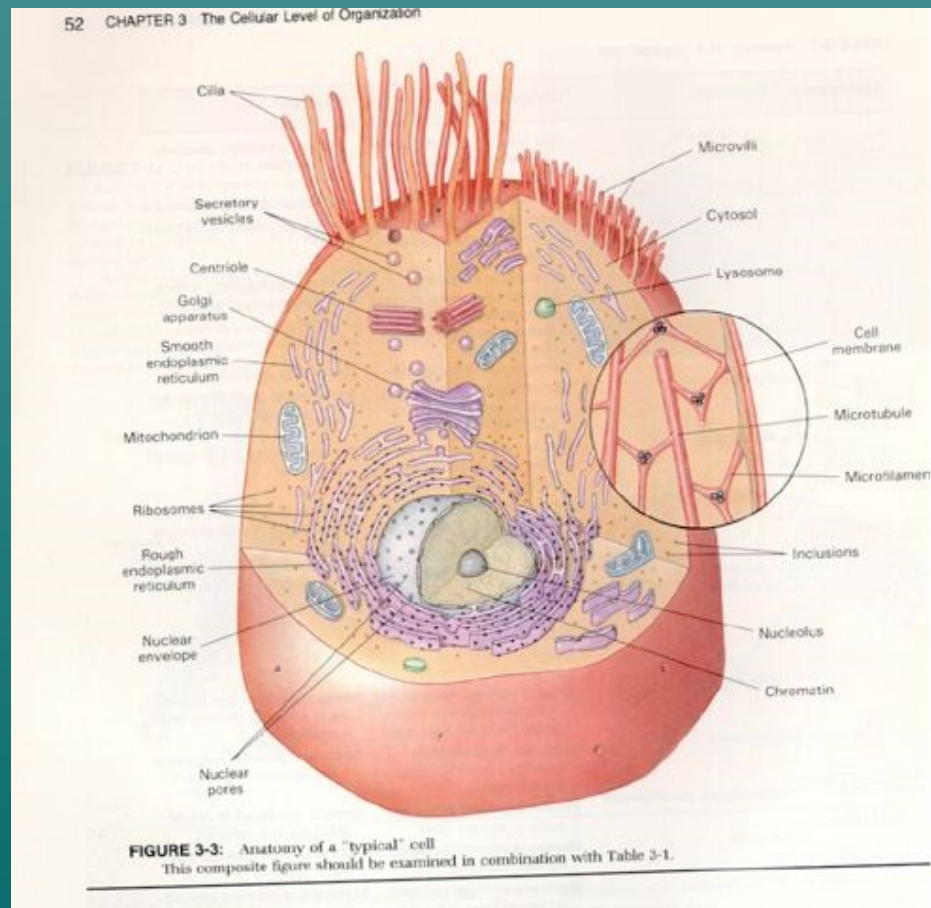
NO SAFE EXPOSURE LIMITS to low frequencies.

BIOLOGICAL EFFECTS ARE CUMULATIVE

“Membrane Sensitivity Syndrome”

Dr. George Carlo

Cell membrane affected by low-frequency EMFs



<http://homepages.cwi.nl/~gollum/SiC/PICT/CELL.jpg>

Oram Miller, BBEC

Health Effects of Radio Frequency (RF) Field Exposure

“In the past twelve years there have been **hundreds of studies** showing these non-thermal effects:

- ◆ DNA damage and non-repair
- ◆ Opening of the blood-brain barrier (toxins enter)
- ◆ Lowered immunity
- ◆ Decreased melatonin levels
- ◆ Effects on stress proteins (indicating cell damage)
- ◆ Formation of micro-nuclei (markers for cancer)
- ◆ Changes in calcium metabolism
- ◆ Changes in brainwave patterns seen on EEG”

-- Margaret Meade Glaser, EMR Network



Health Effects of Radio Frequency (RF) Field Exposure

“What Americans need to know, and are not being told, is that **three out of four independent** (non-industry sponsored) **research studies worldwide are showing biological effects from low-level, nonionizing radiation** similar to that used in wireless communications. These are called ‘nonthermal’... The telecom industry, and the FCC’s safe exposure guidelines, recognize only thermal ‘heating’ effects. That means that **exposure at intensity (power) levels below that threshold are officially being considered ‘safe’ while the research is suggesting otherwise.**”

-- Margaret Meade Glaser, EMR Network



Oram Miller, BBEC

Official FCC Safe Exposure Limits

Table 1. LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz

*Plane-wave equivalent power density

Conversion Table

milliWatts per square centimeter

microWatts per square meter

0.000,000,01 mW/cm²

0.1 μW/m²

0.000.000,1 mW/cm²

1 μW/m²

0.000,001 mW/cm²

10 μW/m²

0.000,01 mW/cm²

100 μW/m²

0.000,1 mW/cm²

1,000 μW/m²

0.001 mW/cm²

10,000 μW/m²

0.01 mW/cm²

100,000 μW/m²

0.1 mW/cm²

1,000,000 μW/m²

1 mW/cm²

10,000,000 μW/m²

10 mW/cm²

100,000,000 μW/m²

100 mW/cm²

1,000,000,000 μW/m²

1,000 mW/cm²

10,000,000,000 μW/m²

10,000 mW/cm²

100,000,000,000 μW/m²

www.safelivingtechnologies.com

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Comparative Chart on International Safe Exposure Guidelines

<u>1800 MHz Public Exposure Guidelines</u>	<u>PFD</u>	<u>Equivalent</u>	<u>c.f. speed</u>
	$\mu\text{W}/\text{m}^2$	V/m	m.p.h.
FCC (USA) OET-65	10,000,000	61	3000
ICNIRP (1998), WHO	9,000,000	58	2847
Belgium (exc Wallonia)	1,115,000	21	1002
Italy (sum of frequencies)	100,000	6	300
Russia, PRChina	100,000	6	300
Switzerland, Lichtenstein, Luxembourg	95,000	6	292
Belgium Wallonia	24,000	3	147
Typical 100m from a base station (0.2 to 6 V/m)	10,000	1.9	95
Vienna (sum GSM)	10,000	1.9	95
Italy (single frequency)	1,000	0.6	30
Salzburg 1998 (sum GSM)	1,000	0.6	30
EU-Parl, GD Wissenschaft, STOA GSM (2001)	100	0.2	9
Median level, 15 US cities 1977 (mainly VHF & TV)	48	0.14	7
Salzburg GSM/3G outside houses (2002)	10	0.06	3
Salzburg GSM/3G inside houses (2002)	1	0.02	1
Burgerforum BRD proposal, waking areas (1999)	1	0.02	1
Burgerforum BRD proposal, sleeping areas (1999)	0.01	0.002	0.1

Building Biology Safe Exposure Guidelines

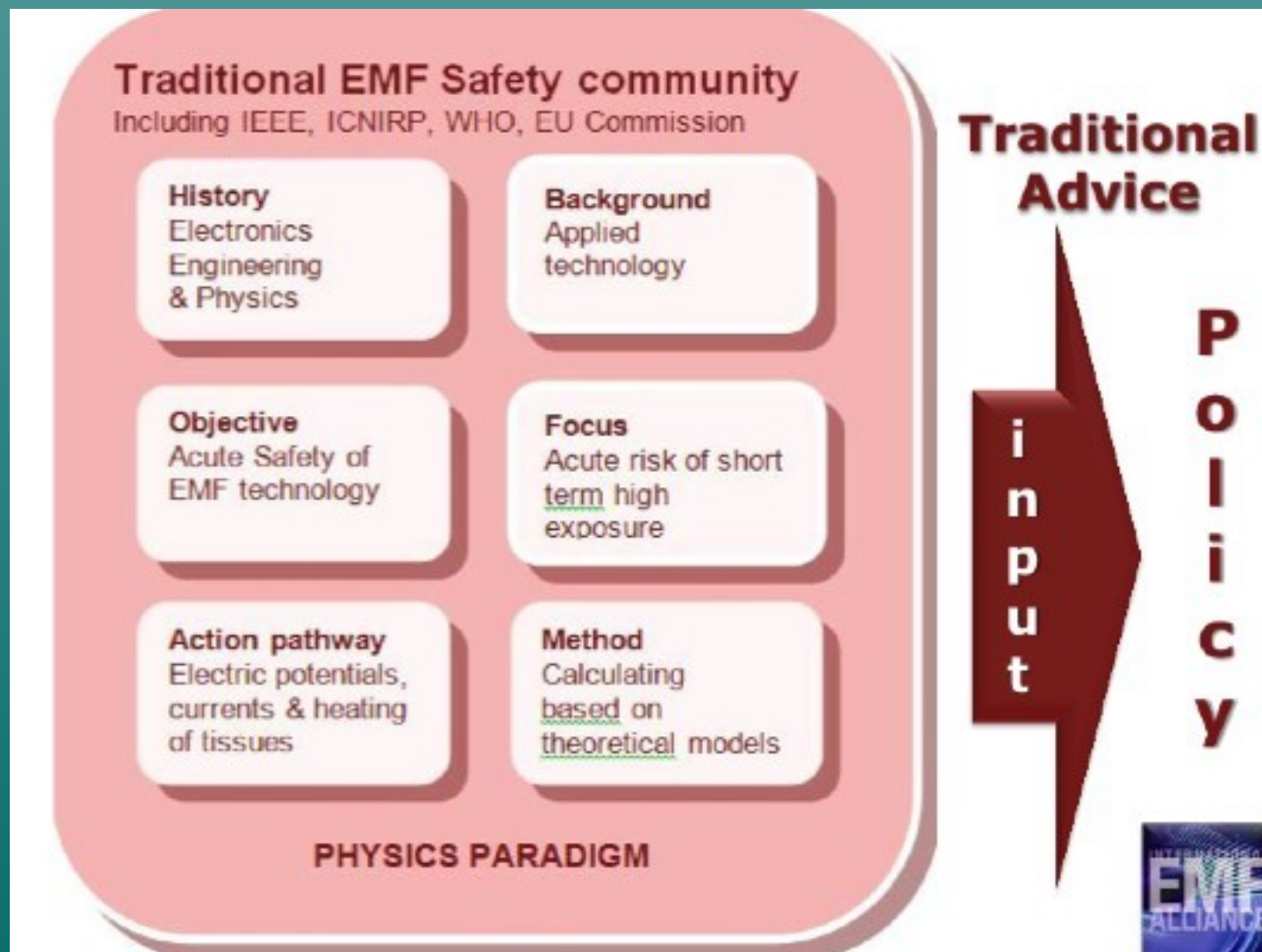
Building Biology Evaluation Guidelines for Sleeping Areas, SBM-2008, Page 1

Radiofrequency Radiation (High Frequency, Electromagnetic Waves)

No Concern Slight Concern Severe Concern Extreme Concern

Power density in microwatts per square meter ($\mu\text{W}/\text{m}^2$)	< 0.1	0.1 - 10	10 - 1,000	> 1,000
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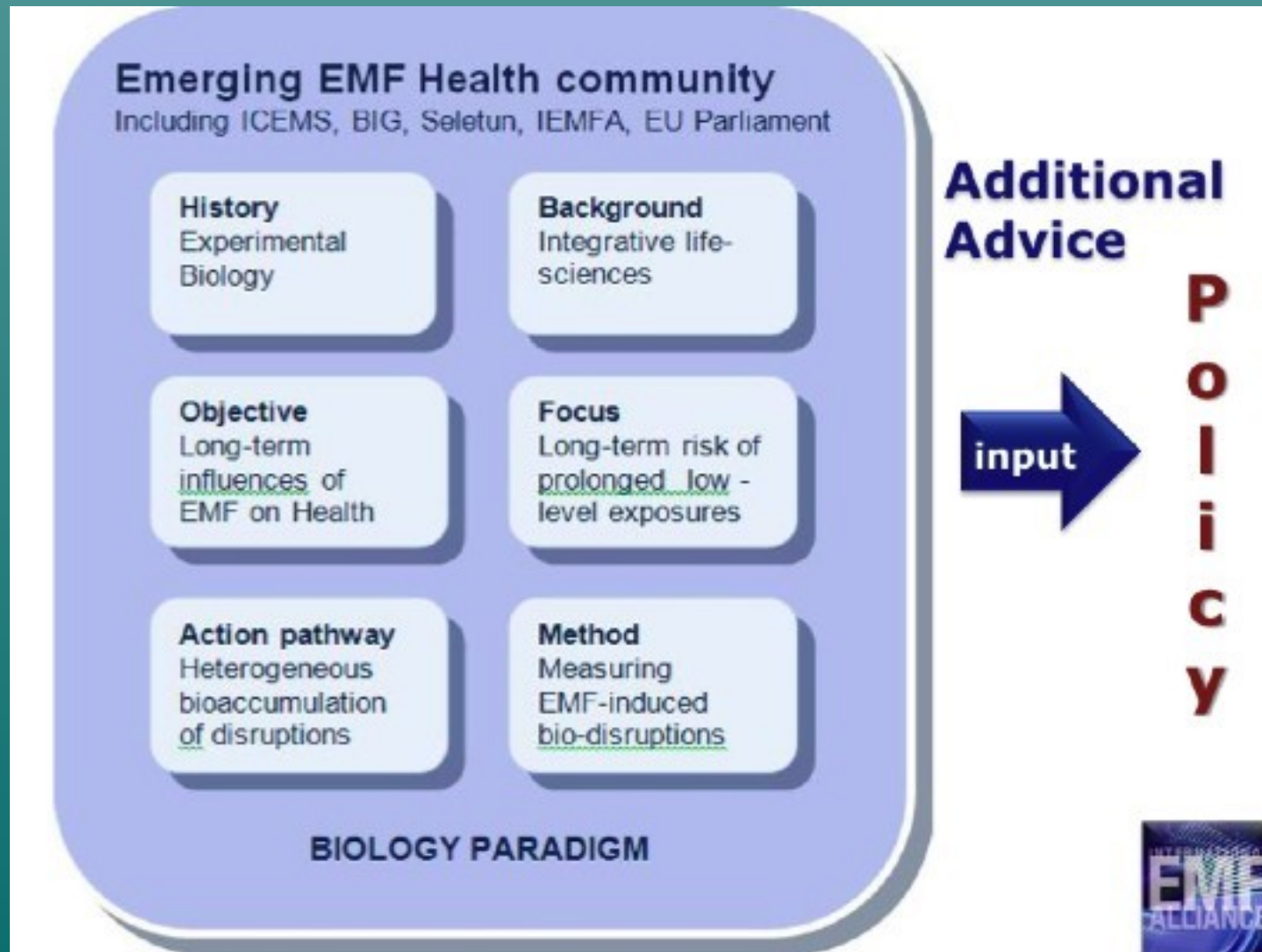
International EMF Alliance



www.international-emf-alliance.org

Oram Miller, BBEC

International EMF Alliance



Health Effects of Radio Frequency (RF) Field Exposure Summary

- ◆ Thermal (heating) and non-thermal (non-heating) frequencies cause biological effects
- ◆ Pulsed digital frequencies and distortion of the wave form cause biological harm
- ◆ Emerging EMF community is biology-based
- ◆ Effects drop off exponentially with distance away from the source
- ◆ Review “Cell Phone and Radio Frequency Risks” and “Articles on EMF” on www.createhealthyhomes.com

The Bottom Line

If you use a cell phone,
cordless phone, tablet or
laptop, ask yourself:

“How many cigarettes am I
willing to smoke today?”



turbohealthcare.com

Protect Yourself from Harmful Radio Frequency Field Exposure

- ◆ Reduce Use
- ◆ Increase Distance
- ◆ Speakerphone and texting
- ◆ Air tube earphone for cell phones and cordless telephones www.rfsafe.com, www.lessemf.com
- ◆ Place “snap bead” on earphone cord www.lessemf.com



Ferrite “Snap”
Bead



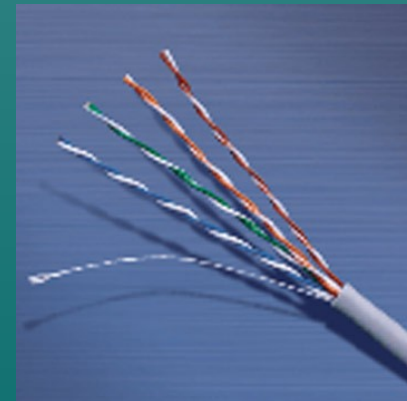
RF3 Air Tube Ear Phone

Protect Yourself from Harmful Radio Frequency Field Exposure

- ◆ Keep landline telephone and *use* it
- ◆ Corded telephones rather than cordless
- ◆ Hardwired network using Ethernet cables
- ◆ Disable Wi-Fi on router and computer
- ◆ Put iPad, laptop & cell phone in Airplane mode



Corded Telephone



CAT-5e or 6 Wiring

Protect Yourself from Harmful Radio Frequency Fields from Outside Your Home

- ◆ Look up location of cell and broadcast antennas
- ◆ www.antennasearch.com



Steelintheair.com



Longdistancecarriers.us

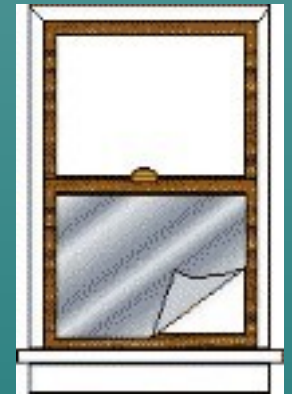
Protect Yourself from Harmful Radio Frequency Fields from Outside Your Home

Block RF from outside (cell towers, smart meters, radio & TV towers):

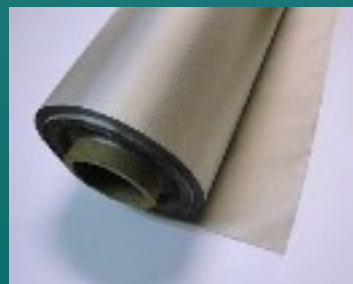
- ◆ RF reflecting paint
- ◆ Fabric, bed canopy
- ◆ Metal window screen or film on windows
- ◆ www.lessemf.com
www.safelivingtechnologies.com



Y-shield®
Paint



Scotch tint® Window
Film



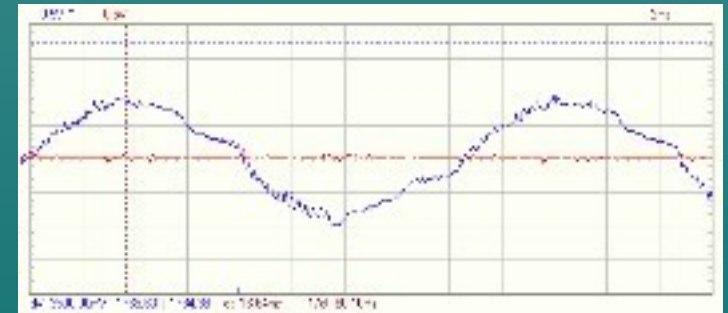
RF Shielding Materials & Fabrics



Bed Canopy

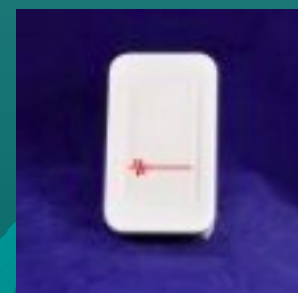
Protect Yourself from Smart Electric Meters

- ◆ Transmits data *once* per day
- ◆ Emits radio frequency signals several times per minute -- "beacon signal"
- ◆ Signal much less strong in Southern California than NorCal
- ◆ Fewer signals per minute
- ◆ Some experience health symptoms
- ◆ No evidence of "dirty power" with oscilloscope in SoCal (spikes at right are from dimmer switch)
- ◆ Opt Out (SCE, SDG&E -- LADWP pending)



Protect Yourself from Harmful “Dirty Electricity” Exposure

- ◆ Ideally reduce sources
- ◆ Avoid Compact Fluorescent Lamps
- ◆ Use full spectrum incandescent bulbs
- ◆ LED bulbs (“line-voltage,” non-transformer bulbs)
- ◆ Install straight on/off switches rather than dimmers
- ◆ Greenwave or Stetzer Filters (repair wiring errors first)



Chips, Pendants and Home Harmonizers

- ◆ Useful
- ◆ Not supported by building biology faculty (engineers)
- ◆ No change on EMF meters
- ◆ Research supports their use:
- ◆ Rat DNA, Less rouleau formation, Thermography
- ◆ Thousands of testimonials
- ◆ Do not use as exclusive means of protection
- ◆ Best to eliminate sources of EMFs
- ◆ Take a comprehensive approach

EMF Meters and Instruments

Magnetic Fields

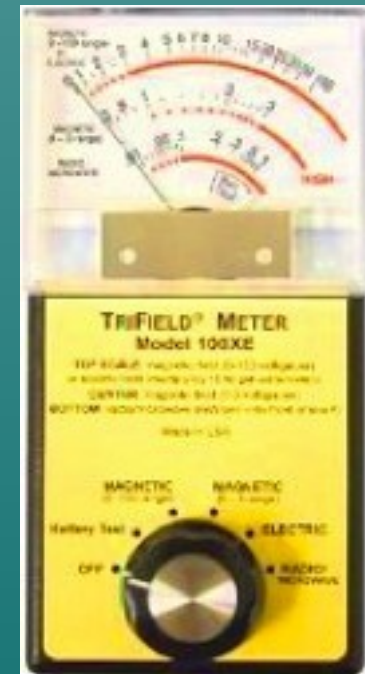
- ◆ Gauss Master (single axis)
- ◆ Tri-Field Meter (triple axis)
- ◆ Tri-Field not recommended for electric or radio fields (RF)
- ◆ “Buzz Stick”



Buzz Stick



Gauss Master



Tri-Field Meter

EMF Meters and Instruments

Electric Fields

- ◆ Body Voltage Meter
- ◆ Hand-held Meter



Body Voltage Kits

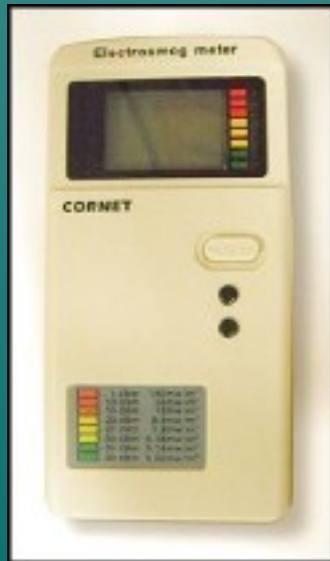


Hand-held Meter

EMF Meters and Instruments

Radio Frequency (RF) Fields

- ◆ Hand-held Meters
- ◆ Pay attention to frequency range



Cornet RF Meter



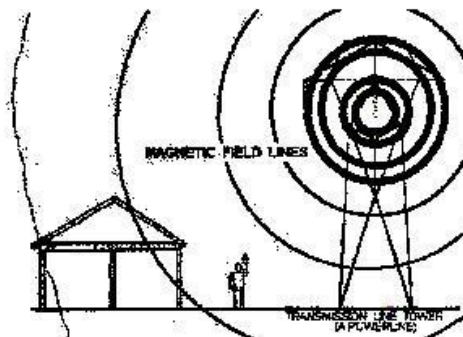
Gigahertz Solutions HF35C



3-Axis RF Meter

COMPARISON OF AC MAGNETIC AND AC ELECTRIC FIELDS

MAGNETIC FIELDS

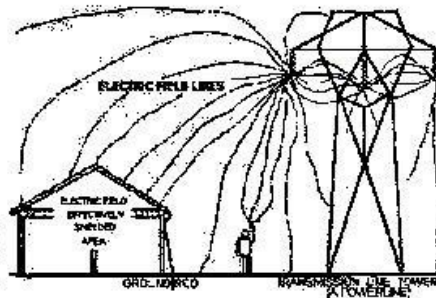


ARE THE ENERGIZATION OF THE SPACE AROUND ELECTRIC CURRENT FLOW

PRODUCED BY
ELECTRIC
CURRENT FLOW

DETECTED/ MEASURED BY:
GAUSSMETER/ AMP METER

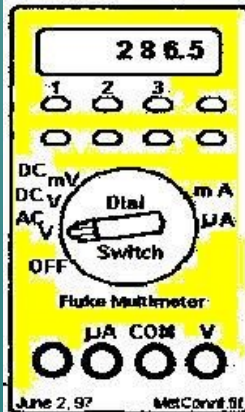
ELECTRIC FIELDS



ARE THE ENERGIZATION OF THE SPACE BETWEEN VOLTAGE DIFFERENCES

PRODUCED BY
VOLTAGE

DETECTED/ MEASURED BY:
VOLT METER



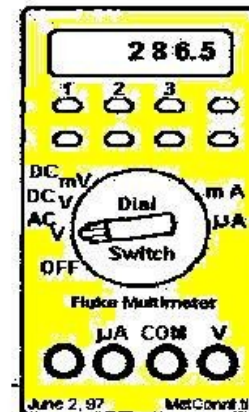
AC Magnetic Field
Sensor Coil

Set Meter Dial Switch
to AC Volts

AC Electric Current Flow
Amp Clamp On



Set Meter Dial Switch to Micro
Amps (uA) (for millamp measurements)



AC Electric Fields
Body Voltage
Probe



Set Meter Dial Switch
to AC Volts

28-Fs

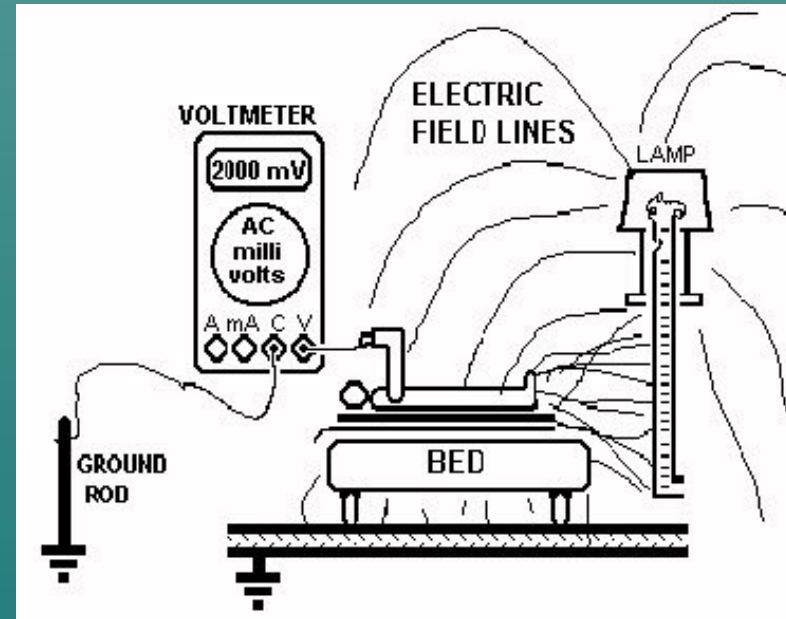


Courtesy
Spark
Burmester,
EE, BBEC

Oram Miller, BBEC

AC Electric Field Basics

- ◆ Produced by differences in electric voltage
- ◆ Measured with Volt meter (not Gauss meter)
- ◆ Similar to *pressure* in water hose (not flow)



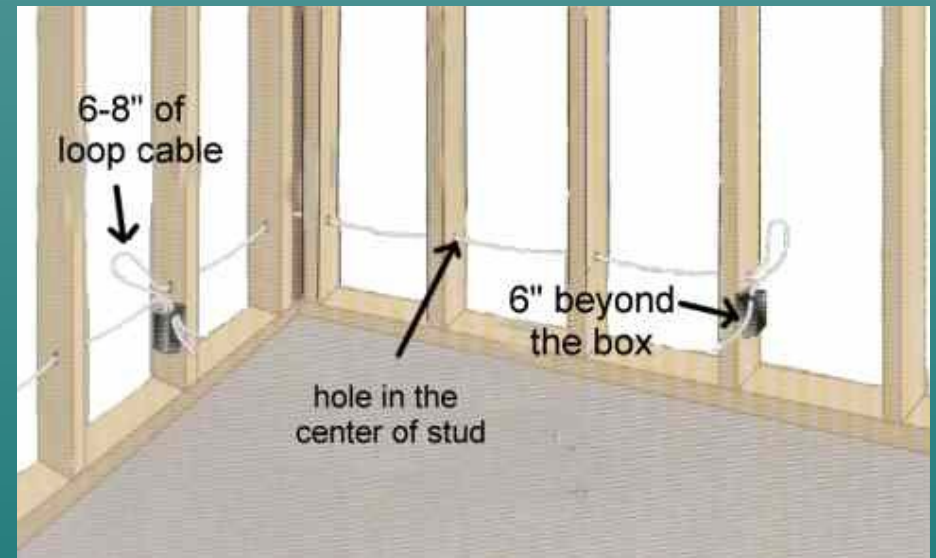
Courtesy Spark Burmaster, EE, BBEI



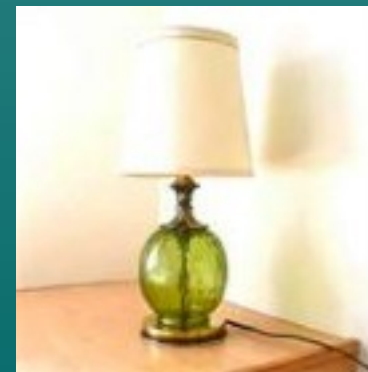
Oram Miller, BBEC

AC Electric Field Basics (continued)

- ◆ AC Electric field present even if current is not flowing (e.g., lamp is off)
- ◆ Extends up to 6-8 feet from un-shielded AC power cord or plastic-jacketed wiring in wall
- ◆ Decreases with distance
- ◆ Affects people while sleeping



Unshielded Romex Wiring



Bedside Lamp
Cord

www.etsy.com

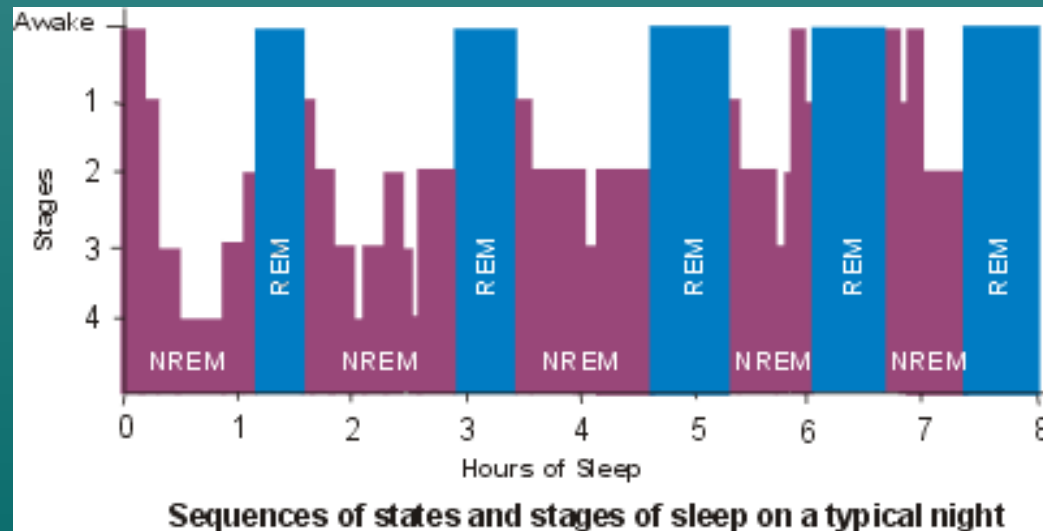
Sources of AC Electric Field Exposure (continued)

- ◆ Large electric field exposure from:
 1. Electric blankets
 2. Electric heating pads
 3. Water bed heaters
- ◆ Fields are present even when these devices are off but plugged in



Health Effects from Exposure to Electric & Magnetic Fields (continued)

- ◆ Exposure prevents deep, Stage Four sleep
- ◆ Reduces night time production of melatonin
- ◆ Causes allergies, asthma, rashes, chronic fatigue, fibromyalgia, sleep disorders
- ◆ Also hyperactivity, depression, headaches

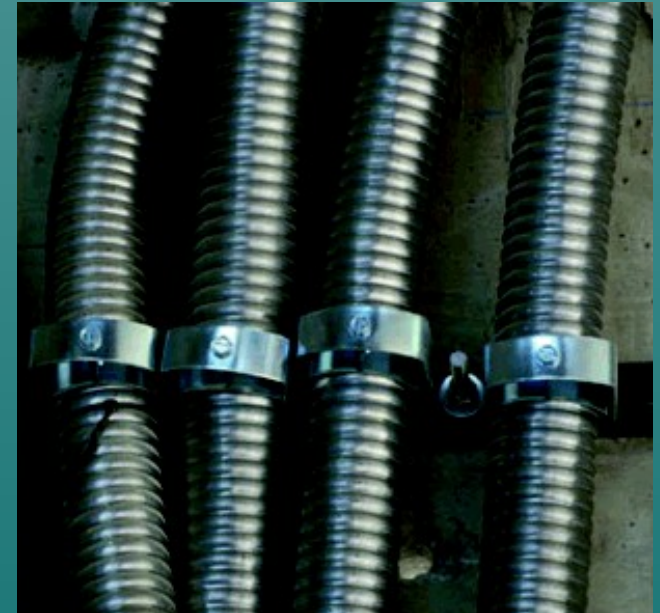


Improvements With Reduction of Electric and Magnetic Fields

- ◆ Deeper levels of Stage Four sleep
- ◆ Increase in normal night time melatonin production
- ◆ Results in:
 1. Increased vitality and alertness
 2. Reduction of muscle pain and stiff joints
 3. Increase in flexibility and range of motion
 4. Reduction of fatigue, allergies, depression, cancer
 5. Greater response to medical therapies

Reduce Electric Field Exposure

- ◆ Best to use flexible steel MC (metal clad) or rigid (EMT) cable for all circuits to avoid AC electric field exposure
- ◆ At least create an electrically clean sleeping environment by using MC cable for each circuit within 6-8 feet around, above, and below each bed and day use area (desk, easy chair)



Flexible Metal Clad Wiring

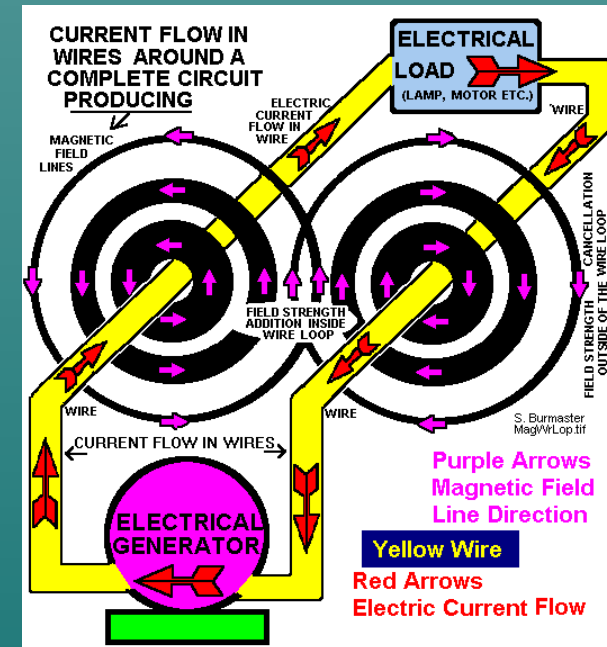
Reduce Electric Field Exposure (continued)

- ◆ Unplug all AC power cords 6-8 feet from bed
- ◆ Plug-in switches, shielded power strip
- ◆ Re-wire lamp with Mu-Cord (LessEMF)
- ◆ Demand Switches
- ◆ Avoid electric blankets, electric heating pads, water bed heaters
- ◆ Use battery-operated clock and flashlight
- ◆ Have the home professionally evaluated for EMFs



AC Magnetic Field Basics

- ◆ AC Magnetic Field exposure produced by current flow through a closed loop
- ◆ Occurs *only* when current is flowing
- ◆ Like *flow* of water through garden hose (not pressure)



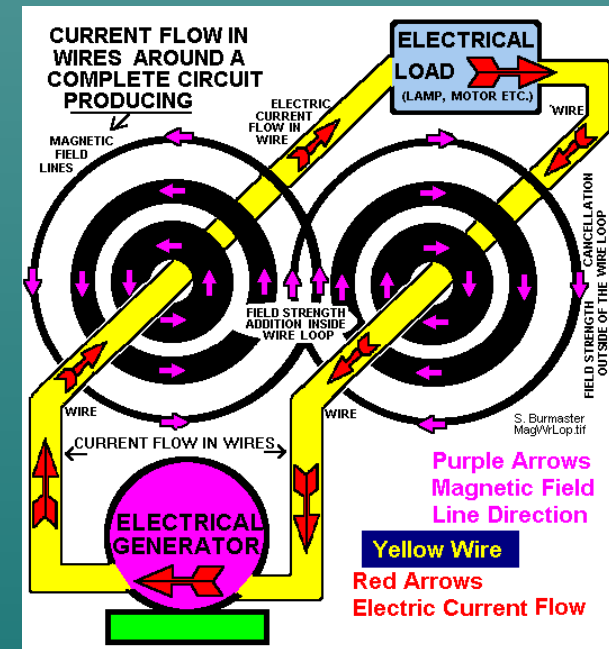
Courtesy Spark Burmaster, EE, BBEI



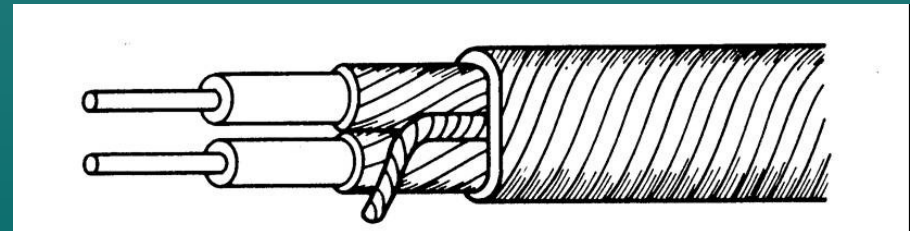
Oram Miller, BBEC

AC Magnetic Field Basics (continued)

- ◆ Decreases with distance from the source
- ◆ Extends only 2-4 feet from typical point sources
- ◆ Can extend 6-10 feet from current on grounding system
- ◆ Occurs when wires are separated (hot from neutral)
- ◆ Fields are cancelled when wires run together

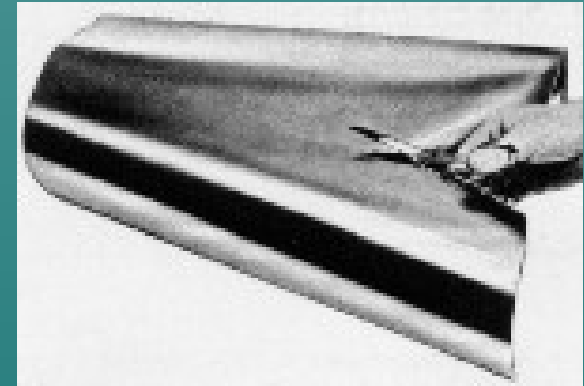


Courtesy Spark Burmaster, EE, BBEI



AC Magnetic Field Basics (continued)

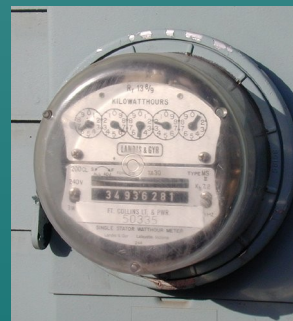
- ◆ Shielding is difficult
- ◆ Requires special materials, such as Mu Metal
www.lessemf.com
- ◆ Best to eliminate or move several feet away from source
- ◆ “Distance is your friend”



Mu Metal

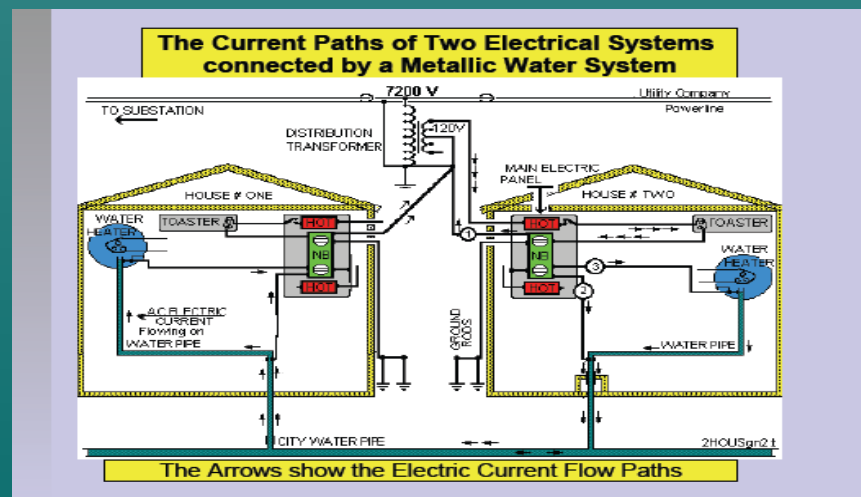
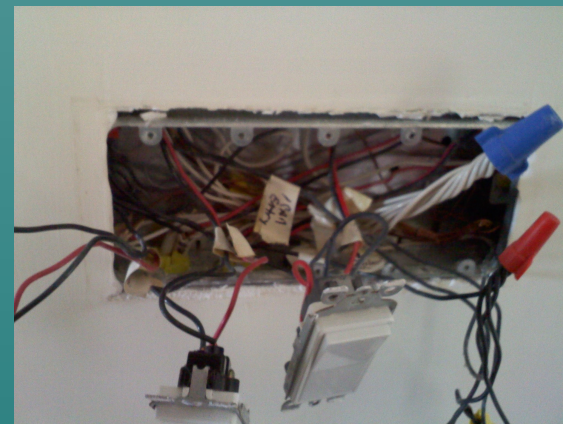
Sources of AC Magnetic Field Exposure

- ◆ Four major sources of AC magnetic fields in homes:
 1. Overhead outside power lines, especially high tension power lines – wires are widely separated
 2. Point sources: motors (refrigerator), transformers (black box, also inside stereo, TV, clock radio), electric meter, breaker panel



Sources of AC Magnetic Field Exposure (continued)

- ◆ Major sources in homes (continued):
 3. Wiring errors in branch circuits – parallel paths; Knob & Tube wiring – wires are separated
 4. Current on the grounding system. Enters from neighbors' homes on incoming water pipes (also on some cable TV and phone lines) – parallel paths

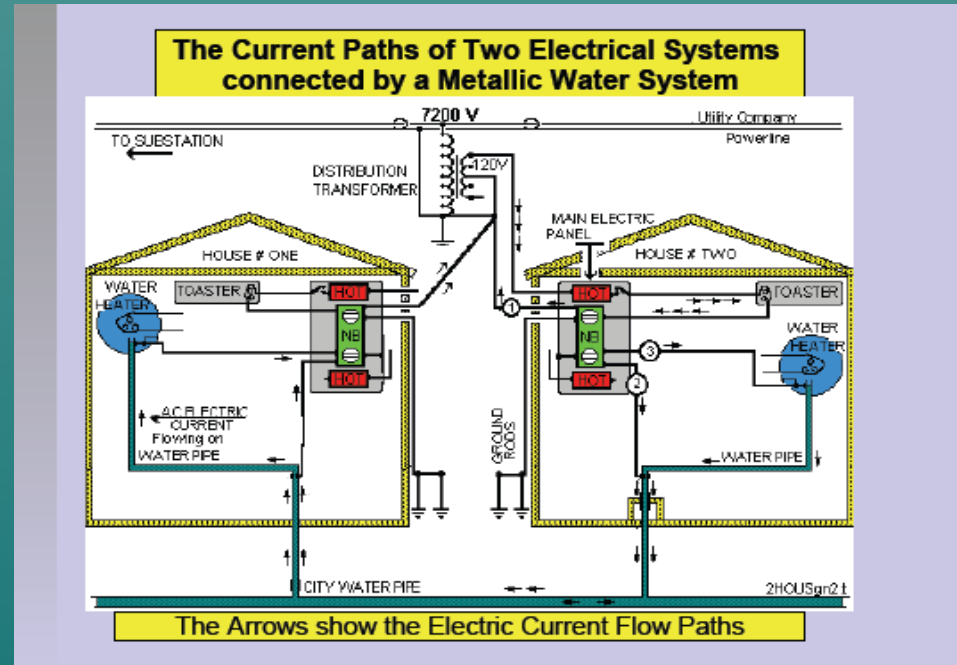


Courtesy Spark Burmaster, EE, BBEC

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Sources of AC Magnetic Field Exposure (continued)

- ◆ Electricity takes all available paths
- ◆ Not *only* the path of least resistance
- ◆ Similar to a stream taking all available paths to flow down a mountain



Courtesy Spark Burmaster, EE, BBEC



Oram Miller, BBEC

Service Drop Configurations



Poor Meter and Panel Location:
Next to Occupied Space.
Worse Case: Sleeping Area.



Better: Meter &
Panel on Garage
Far Wall.



Best: Meter & First Panel
Away from House.
Central Point
for Feeds to Well
and Out Buildings.



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Reduce Magnetic Field Exposure

- ◆ Do not live near high tension power lines
- ◆ Do not sleep near meter and breaker panel
- ◆ Do not sleep or sit on other side of a refrigerator or TV
- ◆ **“Current should only flow on intended paths (insulated wires) and not on grounding paths”**

- M. Spark Burmaster, EE, BBEC

Reduce Magnetic Field Exposure (continued)

- ◆ Transformer for halogen track lighting away from beds or sitting areas
- ◆ Do not sleep over fluorescent light fixtures
- ◆ No motorized beds



Halogen Track Lighting

Oram Miller, BBEC
Certified Building Biologist®

Create Healthy Homes

Los Angeles, California

310.720.7686

www.createhealthyhomes.com