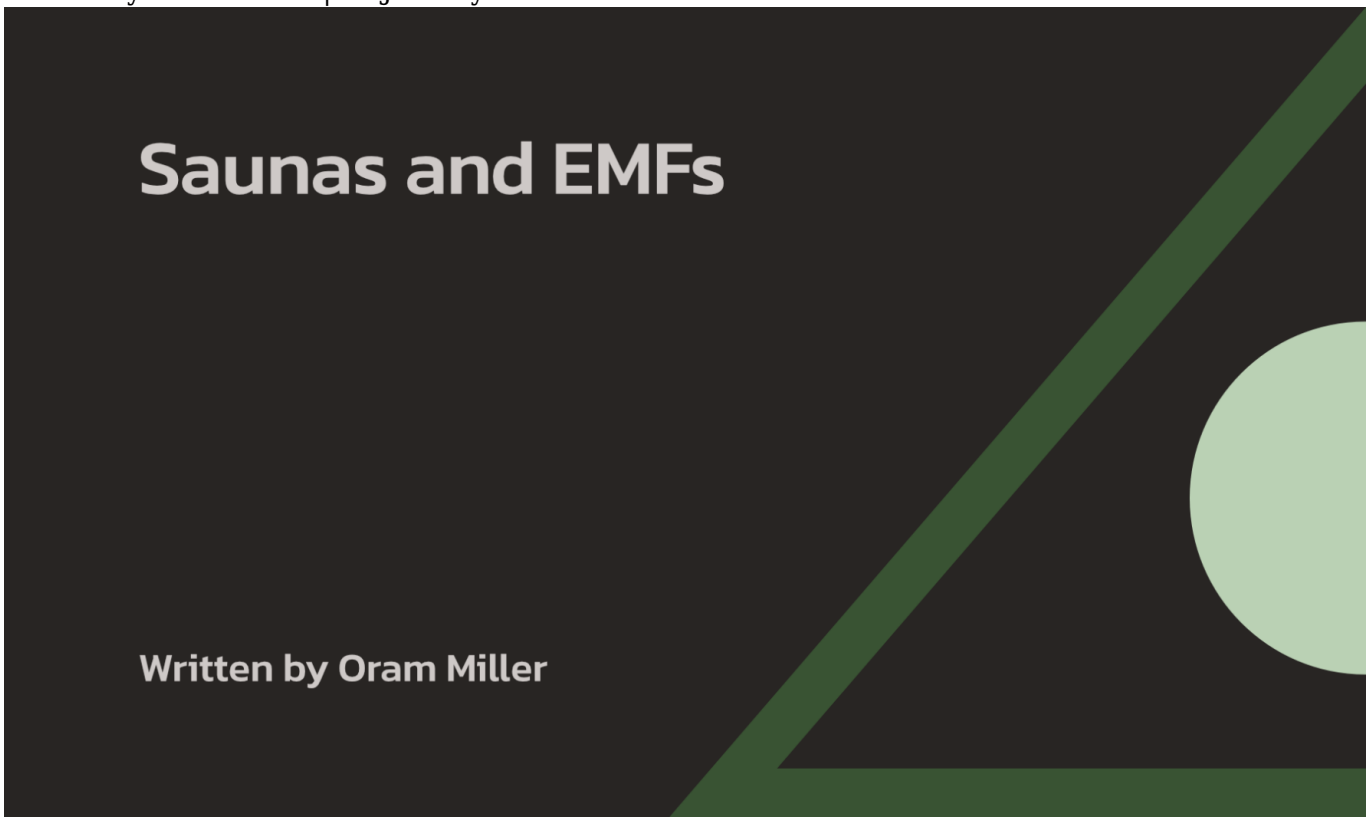
Saunas and EMFs

written by Oram Miller | 11 January 2021



Introduction to EMFs and Saunas

I am often asked about EMFs in saunas. As with any part of our lives that may be affected by EMFs, my response is to systematically go through the list of the four EMFs that we consider to be important in the building biology profession and see if any of them might be experienced when using the device in question, which, in this case, is sitting inside a sauna.

Electric Fields in Saunas — A Summary

Electric field EMFs have now been adressed in saunas by six manufacturers that I know of so far. These include:

- Heavenly Heat Saunas
- Radiant Health Saunas
- High Tech Health Saunas
- Sauna Space
- Clearlight Infrared Saunas
- Influence Saunas

Please see detailed information below about electric fields in saunas made by these six manufacturers.

A Brief Review of the Four Types of EMFs

The four types of EMFs we must consider are, in no particular order, AC magnetic fields, AC electric fields, radio frequency EMFs, and so-called “dirty electricity”. I cover these in my article, Introduction to EMFs, followed by four separate articles on each of the four types, linked to on the Articles on EMFs page.

To review, AC magnetic fields are caused by some, but not all, outside overhead and underground power lines, as well as three indoor sources: wiring errors, electric current on metal water pipes and other grounding paths, and point sources, such as motors and transformers.

Of these four typical sources of magnetic fields, generally only the fourth type, point sources, are present in saunas. That would be due to electric current passing through the heating element to produce heat where the heating element acts as a point source. This results in a magnetic field that is strong close to the heater, but that magnetic field usually drops off in intensity rather quickly as you move away from the heater, within inches to a foot or so. See below for details.

Electric fields, which most people within the EMF safety community don’t even know exist, come from voltage, not current. Voltage is the pressure of electricity on so-called “hot” wires in plastic-jacketed, Romex-brand circuits in walls. It is measured at 120 Volts. You also have voltage in plastic AC power cords that you plug into outlets to power lamps and other appliances. This would include “hot” wires in circuits within a sauna carrying 120 Volt electricity to heating elements.

Electric fields extend out a distance up to six to eight feet from plastic-jacketed Romex circuits in walls and from plastic AC power cords that you plug in. Generally we don’t want to sleep or sit for long periods of time within this six to eight foot distance from plastic-jacketed circuits and power cords, particularly in bedrooms when we sleep. We usually shut off circuits in bedrooms or shield walls containing plastic circuits and we use shielded cords for lamps and other appliances that are plugged-in near beds at night.

While most saunas have low magnetic fields (often mistakenly assumed to be the only “EMF” that needs to be paid attention to), they also, unfortunately, have very *high* electric field EMFs, which is the main subject of this article.

Fortunately, several sauna manufacturers have now converted their entire product

line over to models that boast low and healthy AC electric field EMF levels along with low AC magnetic field EMF levels. This acknowledgement of electric fields along with magnetic fields by six sauna manufacturers is a major development for electrically hypersensitive (EHS) people and for all who use saunas. See below.

Radio frequency EMFs, a third type of EMFs, come from indoor wireless transmitters such as WiFi, Bluetooth, cell phones, tablets and laptops, as well as outside sources, such as smart meters, 4G and 5G cell towers, and radio and TV broadcast towers. Some saunas have WiFi and Bluetooth. If you are electrically sensitive, choose a model that allows you to disable those wireless transmitters or does not have them in the first place. Use a radio frequency detector to determine if your sauna transmits WiFi or Bluetooth and that it is truly not transmitting any RF signal when you attempt to disable it.

Finally, so-called dirty electricity (DE), a fourth type of EMF, is defined as magnetic and electric fields at frequencies *above* 60 Hz, which is the fundamental frequency of house wiring in North America. Most DE itself has a fundamental frequency above 2,000 Hz (2 kHz) with harmonics of that fundamental frequency following above that, each emitting its own magnetic and electric fields into the room. Some devices, such as solar panel inverters, have fundamental frequencies at even higher levels, such as 20,000 Hz (20 kHz). The magnetic and electric field components of those higher frequencies emit off circuits and plugged-in power cords throughout the house, affecting our health.

Besides solar panel inverters, other common household sources of dirty electricity can include dimmer switches, compact fluorescent lamps (CFLs), variable speed motors in newer energy-efficient furnaces, pool pump motors, power tools, and other sources. Most saunas do not contain components that cause significant levels of dirty electricity EMFs except possibly dimmer switches and certain lighting. See below for details.

Low AC Magnetic Field EMFs in Occupied Areas within Most Saunas

Now that we have reviewed the four types of EMFs that my profession recognizes, we can take a more detailed look at how many of them can appear in saunas. Saunas have electrical wiring that carries “line voltage” 120 Volt electricity. That usually flows on wires from a control box at the top of the cabinet down the wooden walls to heating elements throughout the sauna to deliver infra-red heat to occupants. Other components also exist in saunas, such as timers and other controls, and music and possibly video systems.

All wires carrying electricity within circuits and lamp cords have both current (flow)

and voltage (pressure) on them. Electric current causes magnetic fields, while voltage causes electric fields. This is discussed in detail, as noted above, in my article, Introduction to EMFs, as well as in the separate articles on Magnetic Fields and Electric Fields.

Circuits within a sauna, like circuits within the wall of a house, have hot wires that carry current from the main control box at the top down to heating elements. Return current then flows back from the heaters to the control box on the neutral wire of each circuit. As long as the return current that flows up the neutral wire in each circuit to the control box is equal to the current passing down the hot wire to the heating element, then the magnetic field around the neutral wire will be the same size as the magnetic field around the down-flowing hot wire, but the two fields move in opposite directions and thereby cancel.

When those magnetic fields are equal in size but opposite in direction and cancel each other, there will be no significant magnetic fields inside the sauna, at least not from the wiring. You will always have a localized magnetic field that extends out a couple of inches when hot and neutral wires are side by side within a circuit but are not twisted. When you twist the hot and neutral wires, even that small, localized magnetic field then disappears.

However, bear in mind that if the current loads are unbalanced, as happens with wiring errors in circuits in walls of homes, then no amount of twisting of hot and neutral wires in any circuit will eliminate the magnetic field that results from unbalanced loads. That is the definition of a wiring error, which occurs in the wiring in up to one-third or more of homes in North America causing hidden magnetic fields. (Want more clarification? Read the Wiring Error section in my Magnetic Fields article.) Wiring errors are not likely in a sauna, however.

Most sauna manufacturers are aware of at least the localized magnetic fields from straight, non-twisted circuits carrying current to their heating elements, which do draw a good amount of current when on. They twist their wires and then say their saunas have no or low EMFs. As long as there are no incorrectly connected wires causing unbalanced loads on hot and neutral wires in circuits within sauna walls, as happens with wiring errors in house circuits but is unlikely in a sauna, it is true that you won’t have AC magnetic field EMFs from sauna wiring.

High Magnetic Field EMFs Close to Heating Elements

However, you will always have localized magnetic fields close to heating elements themselves, even if circuits have no magnetic fields because hot and neutral wires are twisted (and loads are balanced on those hot and neutral wires). It turns out that

virtually every heating element, whether in a sauna or in a stand-alone room space heater, oven or electric range cooktop, will have a high magnetic field right next to it. Heating elements in saunas all produce heat by having an electric current pass through them, with the heat caused by the high resistance of the metal. Sauna manufacturers all know and acknowledge this.

These are all single paths for current to flow, but rather than being a copper wire, as with hot or neutral conductors in a circuit or lamp cord, a heating element is a wider piece of metal that has the property that it heats up when current flows through it (as do copper wires when more than the rated amount of current flows through them—breakers trip before that happens). Any single wire or heating element will have a very large magnetic field around it, depending upon the amount of current flowing through the metal element. The higher the current, the bigger the magnetic field. It requires high current loads to produce the amount of heat needed for sauna heating elements to do their job of delivering infra-red heat, so the field is usually high right next to the element.

In any wire or heating element, that magnetic field always rotates clockwise as viewed from behind, where the current originates. If you don't have another wire with an equal current load coming back at you, that magnetic field will extend out into living space. As explained above, in a circuit or lamp cord, however, you do have another conductor, called the neutral wire, right next to the hot wire carrying the same amount of current back from the electric load. That produces a magnetic field that spins counterclockwise, in the opposite direction of the clockwise field around the hot wire.

Since the epicenters of those two fields from the hot and neutral wires are right next to each other in circuits and lamp cords, the two fields are superimposed (almost) on top of one another and therefore cancel (providing that the amount of current returning on the neutral wire is the same as going out on the hot wire).

Heating elements are different from circuits in that they are almost always single paths. Therefore, there is no cancellation of its high magnetic field. The only situation I have seen where magnetic fields were cancelled in heating elements was on certain electric range cooktops where the return wire looped back on itself inside the spiraling heating elements. Some range manufacturers in the past used wide coils that had the outgoing hot and returning neutral wire embedded within the same wide coil. Newer models use thinner cooktop coils, with the element disappearing down into the range at the end of the coil's spiral to bring the current back to the starting point. That configuration, however, creates a big loop and a large magnetic field when cooking.

Likewise, three electric in-floor heating companies that I know of use this understanding of proximity of the return path to the outgoing hot path to minimize magnetic fields in their products. They incorporate what they call "dual conductor"

technology, where they run the return neutral wire in the same path as the outgoing hot wire. See the entry for Heating and Cooling Systems, then “Electric In-Floor Heat” on my website on the Product Web Links page to see these three in-floor electric heat manufacturers.

Returning to saunas, we notice that their heating elements act as so-called “point sources” of magnetic field exposure. The characteristic of a point source of magnetic fields is that the field level is very high right next to the source but that level drops off quickly over distance. Meaning, 90% of the reduction happens in the first few inches to a foot or so, depending upon the field strength at the source, with the remaining 10% tapering off over the second foot or so.

This means that when magnetic field measurements are taken right next to heaters in saunas, we always expect those readings to be high. That is why we tell our students and clients to instead measure where occupants actually sit inside a sauna. (The same is true where anyone sits, sleeps or stands in a room in relation to a space heater or other point source, such as the back of a refrigerator motor or a battery back-up power supply, sub-woofer or bank of plug-in transformers under a desk. This means we measure where the person is rather than where the heater, transformer or motor are.)

We therefore know that heating elements in saunas have magnetic fields when you measure close up, but that field should drop off within inches from the heater as you slowly move your Gauss meter away from the source. Granted, a sauna has tight quarters and it is hard to find a spot that is not immediately near one of these heaters, but you can generally get far enough away from them to be safe. Use your Gauss meter to find the right spot to sit or lay in your sauna.

Certification of Saunas by Third Party Laboratories

Many sauna manufacturers have gone so far as to have their saunas tested by certifying laboratories in Europe and North America that say the manufacturer’s products are “EMF-free”. That is laudable and we do appreciate the efforts of manufacturers to make their saunas as healthy as possible.

After all, that is what saunas are designed to do, to promote better health. Manufacturers know their customers are usually health-conscious people who appreciate knowing their sauna is healthy in every way.

How My Sauna Evaluation Journey Started

When I evaluated saunas for EMFs for my electromagnetically hypersensitive (EHS) clients years ago, I felt they should be safe using their “Low EMF” saunas. I was surprised when some of them told me they could not use their sauna because it made them feel worse, not better. I did my standard EMF measurements inside their sauna with it turned on and found that indeed, the magnetic field levels were low, as advertised (when measured where my clients would sit). That was expected. However, when I tested further, I found what I thought to be another type of EMF, in fact, to be the reason for their symptoms.

High AC Electric Field EMFs Found in Most Saunas

When I tested AC *electric* fields inside their saunas, my suspicions were indeed confirmed. The levels were sky high. What, again, are electric fields? They are the “E” of EMFs. Magnetic fields, which are what most people think of when they hear the letters EMF, are actually only the “M” of EMFs. Yet, you always have both electric and magnetic fields when you are near electricity. As I said above, magnetic fields come from current flow while electric fields come from voltage, which is electrical pressure, even if current is *not* flowing.

As I explain in my Introduction to EMFs and Electric Field articles, electric fields extend up to six to eight feet from the hot wire of plastic-jacketed, non-metalic Romex circuits in walls and in plastic AC power cords that you plug in, such as in bedrooms. When you shut off the breaker or breakers for plastic circuits in your bedroom or unplug lamp cords in rooms with metal-clad circuits, the voltage goes away, and so does the electric field.

I tell my clients to think of electric fields like water pressure in a garden hose. Opening the spigot is like flipping on the breaker. Up to 80 pounds of water pressure fills the hose to the nozzle at the end, but no water flows out until you pick up the nozzle and squeeze it. You feel the kick in your hand when you do, because of the pressure of water.

When you then let go of the nozzle and the flow stops, you again feel the kick in the hose because the pressure is still there right up to your hand. That is like turning the lamp off. That stops the flow of electrons and makes the light go out, but the full 120 Volts of electrical pressure is still on the hot wire in the plastic cord inside the lamp. Ask any electrician. You can still get a shock if you cut into the cord and touch the hot

wire to the neutral (which we recommend you *not* do). You will see sparks (which could burn your eyes and face) and you would trip the circuit breaker.

The Health Effects of Electric Fields

Electric fields caused by electrical pressure in plastic circuits and appliance cords extend six to eight feet out through sheetrock and the wire's plastic insulation, as I mentioned above. What are the health effects of being within this electrical field? The one place where we pay most attention to electric fields is where people sleep. Most beds are within six to eight feet of a wall with live plastic circuits. Most people also have plastic AC power cords to lamps, clocks and other appliances plugged in near the bed.

You are unknowingly exposed to electric fields all night, even if you have an extension cord running under your bed with nothing plugged into it or you charge your cell phone overnight next to your bed. This field expands and contracts 60 times per second as the polarity alternates from positive to negative 60 times per second. That happens with 60 Hertz (Hz) AC electricity that is delivered to your house by the electric utility (50 Hz in other parts of the world). The full six to eight foot electric field around all unshielded circuits and AC power cords literally changes polarity that fast.

When you sleep at night, all cells in your body contain charged ions inside and outside each of your trillions of cells. This constantly oscillating electric field causes these charged ions in your cells to be alternately attracted and repulsed from the circuits in walls and from bedside cords. This causes a disruptive, subtly agitating influence all night long that disallows deep sleep and full melatonin release by the pineal gland in the middle of the night. We awaken tired, aggravating fibromyalgia and a host of other symptoms. I discuss this in detail in my article on AC Electric Field EMFs, along with how to remedy this in your bedroom, including having an electrician install remote shut-off switches for circuits passing through your bedroom walls and floor.

In the daytime, most healthy people can handle being in an electric field environment whenever they sit at a table, couch, chair or desk with 120 Volt AC power cords nearby, within six to eight feet of your body. As long as our otherwise healthy clients remotely shut off circuits at night and reduce the other EMFs in their home, they can usually tolerate being near electric fields in the daytime when they need electricity without having to take extra measures.

The only place we really pay attention to electric fields in the daytime is at one's desk (and while using some brands of sauna). If your computer's AC power supply is not grounded, you will have very high and unhealthy electric fields when you touch your keyboard and mouse (assuming they are corded—we don't like cordless mice and keyboards because of the radio frequency EMFs they produce from Bluetooth). This

makes people tired without knowing why. Many laptop manufacturers and users think cords are ugly. We know they are beautiful because they keep you healthy. This is discussed in detail in the Electric Field section of my Safer Use of Computers article.

Electric Fields in Saunas

Now let us see how all this relates to saunas. This electrically sensitive client told me she could not be inside her sauna without having symptoms. I had helped reduce the magnetic, electric, RF and dirty electricity fields everywhere else in the house. The sauna, however, had 25,000 milliVolts of electric field exposure when I sat inside of it holding my body voltage meter. This is 25 times above what we consider to be the beginning of the extreme anomaly level in sleeping areas, which is 1,000 mV. Yet, that high a level of electric fields is common when one also touches an ungrounded laptop, or lays on an electric heating pad or motorized bed with an ungrounded, two-pronged plug and cord.

I knew from my body voltage meter readings when I sat inside her sauna that the sauna's wiring was not grounded nor shielded. I assumed no manufacturer would have any reason to do that. The power cord to the outlet in the wall was grounded, but not shielded. The wiring inside the walls, however, was not grounded nor shielded, nor were the metal heating plates grounded. A local electrician here in Los Angeles who has become a certified building biologist opened the walls of the sauna at the client's request to see if he could replace the wiring with grounded, shielded metal-clad wiring (for the 120 Volt loads). He was willing to do that, but we couldn't find a way to ground the plates at the end of each wire. Without taking care of that piece of the puzzle, we would not have had success.

That is when I contacted the sauna's manufacturer, Raleigh Duncan in Oakland, California. His company makes Clearlight Infrared Saunas. I introduced myself as a building biologist with a highly electrically sensitive client who was a customer of his company and not able to use her sauna without symptoms. Raleigh was very gracious and listened carefully. We discussed the presumption that his saunas were low in EMFs, and I explained that we understood this but that that only applied to one of the four types of EMFs, namely magnetic fields. As I have done with many other manufacturers, I explained how electric fields are also present and that most people in the larger EMF community don't honestly know that electric fields even exist. Yet, they are the most common form of EMF (even more so than WiFi, cell phones and 4G/5G) and make a big difference in people's health when they are lowered where they sit, sleep and stand.

Raleigh trusted my profession's understanding of this unknown EMF and asked what he needed to do to lower electric fields in his company's saunas. I explained that all he needed to do was to have his engineers replace the existing plastic-jacketed wiring to his heating elements with grounded, shielded circuits to contain the electric fields

and to also ground the heating plates.

Much Lower Electric Fields in Newly Redesigned Clearlight Saunas

Raleigh's engineers redesigned his saunas to include grounded, shielded metal-clad wiring for most of his sauna's circuits and to ground his heating elements. He then invited a technician from Healthy Building Science, the San Francisco-based consulting firm headed by fellow building biologist, Alex Stadtner, to test his newly redesigned saunas. A technician came to ClearLight's production facilities in Oakland and measured electric fields with both a Gigahertz Solutions NFA1000 three-axis electric field meter as well as a body voltage meter. Both showed much lower electric fields than I had measured in my client's sauna without the shielded wiring. The readings in the shielded sauna were 1.5 to 2.7 Volts/meter and 571 milliVolts. This was significantly improved from the 20,000 milliVolts I had measured in my client's Clearlight sauna before the design change. The magnetic fields were also still low, as they had been earlier.

You can see photos of these readings on the Clearlight website in the article entitled, Why are Low EMF and Low ELF Infrared Saunas Important?. That page is accessed from the FAQ tab on the menu of their home page. For the record, Raleigh calls magnetic fields "EMFs" and he calls electric fields "ELFs" on his website. Technically speaking, magnetic fields and electric fields are *both* "Electromagnetic Fields" (EMFs), and the magnetic and electric fields generated by 60 Hz AC electricity, which is what we are dealing with here, are both in the "Extra Low Frequency", or ELF, band, which ranges from 30 to 3,000 Hz. So both terms technically apply to both magnetic and electric fields from 60 Hz house wiring.

I am grateful to Raleigh for listening to our recommendations and for changing the design of his sauna line to incorporate grounded, shielded metal-clad wiring to reduce electric fields and to ground his heating elements. His saunas are now low in *both* AC magnetic and electric fields, which is great for all of his customers, electrically sensitive or not. We no longer measure the sky-high electric field levels of 20,000 milliVolts that we saw before. Yes, the wiring is twisted (and the current loads are balanced), resulting in low AC magnetic fields (when you are not close to heating elements).

All saunas that I know of have achieved that. But that is only half the picture with EMFs. Raleigh was one of the first sauna manufacturers to change his wiring and ground his heating elements to keep electric field EMFs low, as well. See below to see my analysis of how Clearlight saunas compare to other manufacturers relative to electric field levels when sitting inside of them.

It All Started With Reducing Electric Fields in Heavenly Heat Saunas

My experience with this whole issue of working with sauna manufacturers to reduce electric fields in their products actually started with Bob Morgan at Heavenly Heat Saunas, pre-dating my work with Raleigh Duncan at Clearlight by a few years.

Many years ago, I had heard from a local building biologist who had worked extensively with Bob that his Heavenly Heat saunas were low in magnetic *and* electric fields. I knew most sauna manufacturers had mastered how to keep magnetic fields low, which, again, they thought was all they needed to do to minimize EMFs. All heating elements have magnetic fields, as discussed above, but most saunas have low magnetic fields when measured more than a few inches away from heating elements.

Bob Morgan knew about electric fields from my building biology colleague, but to her knowledge he had not made any changes to his sauna's wiring. That was my tip off that the actual electric field levels in his saunas could have actually been higher than he thought they were if he was measuring them the way I suspected he was.

Sure enough, my suspicions turned out to be correct. When I called and asked him politely how he measured his electric fields, he told me he did so by using an older version of a popular combination EMF meter, which is what I had suspected. I informed him that in our profession's opinion, that particular meter was not necessarily sensitive enough to accurately measure electric fields at levels that we have always believed are safe, especially for electrically sensitive people.

I have discussed the issue of what we consider to be the relative insensitivity of that combination EMF meter, the Tri-Field 100XE, when measuring electric fields at length in the Electric Field section of my article, EMF Meters and Instruments. I have

also observed the vast improvement in Alpha Lab's new Tri-Field combination meter, the TF2, at measuring all three EMF fields. I love the TF-2 and carry it with me on my home EMF assessments. I recommend it to my clients because it is the most affordable, accurate consumer-grade three-axis Gauss meter on the market particularly for measuring magnetic fields (because it measures them in three axes). It also measures electric *and* radio frequency EMFs far more accurately now than it's predecessor, the 100XE, did. Kudos to Alpha Labs for making such a great EMF combination meter in the TF2. (The Cornet Tri-Mode High + Low Frequency Meter (ED88T Plus) is also a good combination meter in the same price range as the TF2.)

In Bob's case, he already had experience working with building biologists before meeting me and knew how important electric fields were. He immediately said, okay, what do I do? I suggested he first purchase a good quality GigaHertz Solutions electric field meter, which he did. That showed him how high the electric field levels in his saunas actually were from his company using ungrounded, plastic-jacketed 120 Volt circuits to his heaters, just as all other manufacturers were using back then. Remember, at the time, no sauna manufacturer had yet converted to shielded metal-clad circuits (that I knew of). Bob became the first, at my urging.

I explained to Bob in great detail what his engineers needed to do to remedy the situation. He passed the information on to them and told me they immediately understood what to do. They re-designed the wiring by switching to grounded, shielded metal-clad electrical circuits and they grounded the heating element plates, just as Raleigh's engineers did a few years later with his Clearlight saunas (see above). Bob's engineers at Heavenly Heat also replaced the grounded AC power cord to the outlet in the wall with a *shielded*, grounded cord.

As a result, Bob's Heavenly Heat saunas have some of the lowest AC electric field levels I have ever measured inside a sauna. Their AC magnetic field levels are also low, provided you are not sitting right next to any heating element. I used my

NFA1000 to take these measurements, which measures both three-axis AC magnetic and three-axis electric fields in free-standing mode, and I also used a body voltage meter as a second way to measure electric fields.

All readings were low, as seen in the photos on the right. The top photo shows my NFA1000 meter sitting inside my client's Heavenly Heat sauna that has Bob's re-designed shielded wiring. The second photo shows a low electric field reading of 1.5 Volts/meter (V/m) on that meter set to free-standing electric field mode. That reading of 1.5 mV is precisely the beginning of the slight anomaly level for sleeping areas, according to my profession's Building Biology Evaluation Guidelines. That represents a very low and safe electric field level in either the daytime or at night when sleeping, even for an electrically hypersensitive (EHS) person.

The third photo shows the electric field level inside the Heavenly Heat sauna as measured by the body voltage method. The digital multi-meter shows only 65 milliVolts (0.065 Volts), further confirming a very low and safe electric field environment. We want sleeping areas to be below 100 mV (0.10 Volt) on the body voltage meter. We are happy to have electric field levels that low in day and evening time, even for electrically sensitive people, when electricity needs to be on. Using shielded wiring helps accomplish that, which Bob and others have done in their saunas.

The fourth photo shows low magnetic field EMF readings of 0.88 milliGauss (mG) in Bob's Heavenly Heat sauna (away from heating elements). Any magnetic field EMF reading below 1.0 mG is considered safe by our profession for most people.

One important difference to keep in mind when comparing the electric field readings at right with the same readings in the Clearlight sauna shown on the website linked to above is that the home where the Heavenly Heat sauna was located, shown in the photos on this page, has a metal-clad circuit in the wall behind the sauna. This was the home of an electrically sensitive client of mine who asked me to consult on the

remodeling of her home to keep EMFs low prior to her moving in. We had the electrician replace the plastic Romex circuit in the wall behind the sauna with a shielded, metal-clad circuit. We did this because I knew how sensitive she was and how high the electric field would be from that plastic circuit when she sat in her sauna, especially when the sauna had shielded wiring and low electric fields on its own.

Therefore, the shielded electrical circuit in the wall behind the Heavenly Heat sauna you see in the photos to the right is a main reason why the electric field readings are so low in that sauna compared to the Clearlight sauna shown on the Why are Low EMF and Low ELF Infrared Saunas Important? page on Clearlight's website, which are slightly higher (though they are nowhere near as high as they initially were before I worked with Clearlight to redesign their wiring). The other reason is Bob's use of a shielded AC power cord in his Heavenly Heat saunas.

Radiant Health Saunas Likewise Have Low Electric and Magnetic Fields

I later became aware of a third sauna manufacturer, Randy Gomm of Radiant Health Saunas, who had also redesigned his saunas to keep electric field EMFs low. Randy has paid attention to EMFs, as stated in his own recovery story on his company's website, accessed by clicking here. He states that he designed his heating elements to keep magnetic fields low where a person would sit inside one of his saunas.

I measured 1.3 mG when I placed my NFA1000 Magnetic and Electric Field meter inside a Radiant Health Sauna right at the spot where you would sit with your back against the back wall. I measured 0.7-0.8 mG at the center of the bench, and 0.9 mG near the side wall. These are acceptably low magnetic field readings for most people,

especially with your back away from the wall. Again, all heating elements have magnetic fileds close to heating elements.

What is important to us is that Randy also states that he designed his saunas to have low *electric* fields (which he calls an “Extremely Low Frequency (ELF) Electrical Field (EF)”). I measured a very low and safe 18 milliVolts (mV) when my client sat inside his Radiant Health Sauna and held the metal cylinder of my body voltage meter. I also measured 0.8-1.2 Volts/meter using my Gigahertz Solutions NFA1000 in free-standing mode, which are also considered to be very low electric field levels. Bear in mind that the apartment that this client lived in also had metal-clad wiring in its walls. Therefore, the background electric field level in the room was already low because the circuits in the walls were metal-clad, not plastic Romex.

Three More Sauna Brands Now Also Have Low Electric Field EMF Levels

I am pleased to say that since working with Bob Morgan and Raleigh Duncan and learning of Randy Gomm’s saunas, I have learned of three more manufacturers who have incorporated grounded, shielded metal-clad wiring and grounding of their heating elements to reduce electric fields. They acknowledge on their various websites that they have low magnetic fields (often referred to as “EMFs”), and most importantly to us, that their saunas also have low *electric* fields (often referred to as “ELFs”).

However they choose to name them, I am very glad that a movement seems to be growing within the sauna industry to incorporate an understanding of both magnetic *and* electric fields through the use of metal-clad wiring and the grounding of heating elements. Congratulations to all these manufacturers for doing so. We hope more follow their lead.

I personally worked with the team designing and testing the wiring and grounding of components for of one of these additional sauna companies, that is, Influence Saunas. I have also become aware of two more manufacturers who have learned of this trend and have themselves incorporated grounded, shielded metal-clad wiring and grounded heating elements. Those two companies are High Tech Health Saunas and Sauna Space. Many of those new companies have even gone so far as to have those low magnetic and electric field levels verified by outside testing agencies (see below).

Obviously members of the industry pay attention to what each other is doing. It appears that when they see a new feature that their colleagues are using that makes sense and provides a benefit to customers, they incorporate it into their own design. That seems to be what has happened here.

I am honored to have been involved at the start of this change in the industry and to be able to continue to participate in this change with other manufacturers. It is a very necessary trend that is much appreciated by those of us in the building biology profession and by our many electrically sensitive clients.

Electric Fields in Saunas — My Review of How Each Manufacturer Rates in Terms of Electric Field Levels

As mentioned at the beginning of this article, electric field EMFs have now been adressed in saunas by six manufacturers that I know of so far. These include:

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- Randy Gomm at Radiant Health Saunas
- Erik Johnson at High Tech Health Saunas
- Sauna Space
- Raleigh Duncan at Clearlight Infrared Saunas
- Robyn Openshaw at Influence Saunas

I recommend these saunas in the order listed above. The first four have the lowest electric field levels in my experience and opinion. They are very similar in their low level of electric fields. I have personally measured Heavenly Heat, Radiant Health and Sauna Space models, and I have reviewed the test results for High Tech Health Saunas. I have also personally measured a Clearlight sauna. All six companies have accomplished low electric field levels by using metal-clad wiring and by grounding the heating elements (or placing a grounded grate in front of the elements).

The electric field levels that are measured sitting inside saunas made by the first four manufacturers are lower than you would experience when sitting in front of a wall with plastic-jacketed Romex wiring that lies behind where the sauna is located. I say this because I measured Heavenly Heat, Radiant Health and Sauna Space saunas all in homes with metal-clad wiring in the walls behind and around the sauna. In addition, the test results reported for High Tech Health Saunas appear to be as low as I measured in the other three saunas, indicating measurements were done in an environment devoid of external electric fields. If outside electric fields were present, the reported levels inside the sauna would not have been as low as they were tested to be.

The other two saunas, by Clearlight and Influence, while not having electric field levels quite as low as the first four models, still have low and healthy electric field levels for most people. The electric field levels measured in these two saunas are commensurate with electric field levels that you would experience if you sat in a chair two feet in front of a wall with plastic, Romex wiring in of it, whether you were inside

a sauna or not. I verified that myself sitting inside a Clearlight sauna in a home wired with plastic Romex circuits. Likewise for readings obtained by a colleague of mine in an Influence sauna.

Thus, the electric field levels that my colleagues and I measured inside Clearlight and Influence saunas are the same as you would experience if you sat inside any of the first four saunas listed above (with the lowest electric field levels) that you then placed into many homes wired with plastic, Romex circuits in the wall behind the sauna. This is because electric fields from Romex wiring in walls and floors pass right into a sauna.

Remember, Romex circuits are present in most homes in North America. Most of you reading this article right now probably live in one. How do you know what type of wiring you have in your walls and floor? You have to measure electric fields in your rooms with an electric field meter (I recommend using a body voltage meter, such as from LessEMF or Safe Living Technologies.)

To summarize, if you live in a home that already has metal-clad wiring, which shield againsts electric fields, and/or you are electrically sensitive, you might prefer one of the first four saunas. But if your house has plastic-jacketed Romex wiring in walls and you are not particularly electrically sensitive, *any* of six saunas listed above will be quite safe and healthy for you from an electric field standpoint.

It is important to point out that other saunas not on this list can have high electric field levels that are not tolerated well by electrically sensitive individuals. They are also possibly not ideal for healthy people to use for extended lengths of time, either, in our experience. Electric fields can be similar to using an electric heating pad when plugged in and turned on, which can measure in the tens of thousands of millivolts. See my article on Electric Fields.

When electric field levels are reduced in saunas, then electromagnetically hypersensitive (EHS) people can spend time in them. Saunas rewired with metal-clad wiring and grounded heating elements are also healthier for everyone. Even when asymptomatic people sit in high electric field environments for extended lengths of time, they can sometimes feel tired and drained. This is the opposite effect sauna manufacturers want their customers to experience when sitting in their products.

We invite other sauna manufacturers to contact us to learn about electric fields and to provide an even healthier product than they already do by addressing this missing piece of the puzzle, that is, electric field EMFs. It is relatively easy to switch to grounded, shielded metal-clad wiring for 120 Volt electric loads, and you also need to ground your heating elements, or ground a metal grate in front of the heaters. We strongly invite you to work with us to help make that happen in your design and join the other manufacturers who have made this a priority and changed their sauna design.

Finally, here are links to pages on these sauna company's websites with technical information on EMFs and reports from independent testing aganecies:

- Heavenly Heat — FIR Heaters
- Radiant Health EMF + VOC
- High Tech Health — The Dangers of EMFs and High Tech Health — Understanding EMFs
- Sauna Space
- Clearlight — Why Are Low EMF and Low ELF Infrared Saunas Important?
- Influence Saunas — Infrared Saunas & EMFs — Should You Be Concerned?

Radio Frequency (RF) Fields in Saunas

Turning to a third type of EMF, radio frequencies, the only source of this type of EMF inside a sauna would be from the sound system if it had WiFi or Bluetooth. Many saunas now do have these communication technologies. You need to be able to disable WiFi and Bluetooth in the sound system of any sauna you buy, particularly if you are electrically sensitive. Contact the manufacturer to discuss this option and test for the presence of radio frequency EMFs yourself with a good quality radio frequency (RF) meter such as from Safe Living Technologies once the sauna is delivered to make sure they are not present.

Dirty Electricity Fields in Saunas

Finally, last but not least, let's consider dirty electricity (DE). The only source of this type of EMF in saunas, as far as I am concerned, would be in their lighting and dimming modules. LEDs, which are the type of bulb usually used in saunas, are getting cleaner, so they should not be a source of DE these days (unless you have an older model), but they could be. If dimming technology in the lighting of the sauna is the culprit, or the bulbs emit DE, perhaps shut the lights off when you sit in the sauna.

To determine if your sauna is producing any DE, you can check for that by first unplugging it from the wall outlet. Then plug in a Stetzer or Greenwave Electromagnetic Interference (EMI) Microsurge Meter into the outlet that you plug your sauna into. See what the baseline DE level is for the circuits in the room. Then plug the sauna in without turning it on. See if the DE reading goes up. If not, proceed to turn on the sauna but don't fire up the heating elements yet. Does the DE level increase? What happens when you turn on the sauna's LED lights? Do the readings go up? If so, what are the DE readings when you turn the lights back off?

Finally, fire up the sauna and see if the DE increases. If the DE levels do not increase when you awaken the sauna and fire up the heaters, then it does not have components that produce DE. If the DE levels go up and you cannot reduce them by shutting off the lights, you could see what happens when you plug one or two Stetzer

or Greenwave filters into the same outlet (using a grounded Wall Tap Three-to-One Adapter if you need to) that you plug the sauna into. If you use a wall tap, these are rated for 15 Amps, however, you should still plug your sauna directly into the wall outlet, not into the wall tap. I would not advise that you plug the sauna into the pass-through outlet on the bottom of a Greenwave filter.

The only other possible source of DE in your sauna could be a dimmer switch or certain types of lighting in the same room or elsewhere in the house, as DE can float around the house on electrical wiring from one circuit to another and be picked up by an occupant sitting inside a sauna as the DE comes into the sauna from higher frequency voltage transients flowing on circuits in the wall that jump onto the wiring coming into the sauna. If the outlets in the room show high DE levels using a plug-in DE meter, you can insert one or more DE filters, as mentioned in the previous paragraph.

We have completed our survey of EMFs and saunas.