

Electromagnetic Fields (EMFs) at the Olympia Farmers Market

My name is Samuel Milham. I'm a physician/epidemiologist and a 43 year resident of Olympia WA. I have studied the health effects of electromagnetic field exposure for over 20 years, and have authored over 100 peer reviewed scientific publications and a book called Dirty Electricity. I was the first to report an association between occupational exposure to electromagnetic fields and human disease.

I visit the market frequently and noticed a number of compact fluorescent lights (CFLs) in use there. In recent months I had found that exposure to all CFLs and regular fluorescent lights generates high currents (amperage) in humans. I use an off the shelf Fluke 187 or 287 true RMS meter for this measurement with an ECG patch over my sternum attached to one lead and the other lead to an outlet ground or true ground.

I measured the office at the market on July 10, 2015 with the fluke 187 and found that any fields coming from the lights were swamped by strong fields coming from the floor. Turning the light off made no difference, but my body amperage was 10 uA sitting with my feet off the floor, 68 uA standing with shoes on, and over 100 uA standing with shoes off. 18 uA contact current is considered carcinogenic by the Electric Power Research Institute (EPRI), an electric utility think tank. See Kavet et al attached, p 547.

I returned with the market closed and at night with an FW Bell gaussmeter, a Stetzer Microsurge meter, a fluke 199 B 2 channel

oscilloscope and an AM portable radio. I returned at night because of the large photovoltaic power system with an inverter room behind the San Francisco bakery stall.

Findings:

Magnetic fields:

Magnetic fields are caused by current flowing in a conductor. There are large areas of pavement in front of the restaurants on the west end of the market with magnetic field levels as high as 30 mG in front of Pithos Greek Cafe and Soba Japanese Restaurant. The magnetic field on the pavement was 18.1 mG, and my body amperage was 354.48 uA on Wednesday 7/22/2015 with the market closed. (see Figure 1)



Figure 1 Magnetic field on pavement and body amperage

At seat height, the levels are about 10 mG. The mens' bathroom has high levels of magnetic fields (>15 mG). The wall behind the San Francisco Bakery booth with the solar inverter mounted on the other side has magnetic fields over 300 mG with 15 mG in the work space. Magnetic fields above 4 mG are associated with leukemia in children and are considered to be a class II carcinogen by the World Health Organization. It is very unusual to find residential or office levels of magnetic field above 5 mG. The magnetic fields were slightly higher when the market was operating, as expected.

Amperage (current flow):

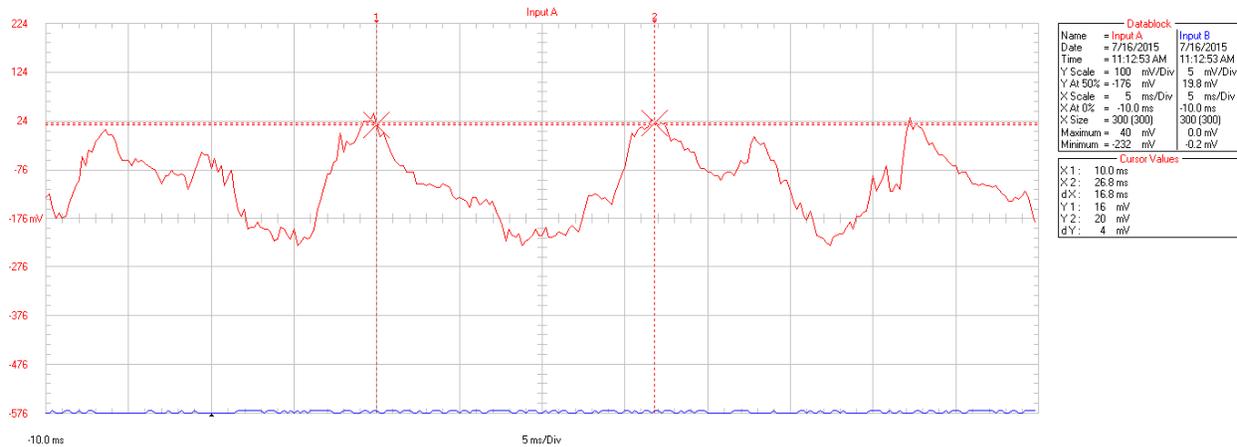
The amperage measured between an outlet ground and the metal corner support at the east end of the market at the produce stand was 3,354.8 μA with the market closed on 7/22/ 2015. Magnetic field was 0.2 mG and dirty electricity measured 3,240 units.



Figure 2 Amperage between outlet ground and metal support

Most market faucets have high current flow between them and the ground. The contact current was 110 μA between a true ground and the gas pipe at the Bavarian restaurant. In various places around the market touching the pavement with my hand would cause over 200 μA of current to flow through my body between the pavement and an outlet ground.

Electric Fields:



Olympia Farmers Market Bedding plant stand. Faucet sink to floor.

272 mV/500 ohms impedance = 544 uA. 18 microamperes is considered carcinogenic by Electric Power Research Insitute (Kavet et al)

This tracing was taken between a faucet and the ground with an oscilloscope. The voltage was 272 mV, and the distorted 60 Hz sine wave is of utility origin (16.8 ms between peaks).

The levels of high frequency voltage transients or dirty electricity measured in market outlets day and night, market open and closed were 700- 3,500. Levels over 50 make some people ill.

Conclusion:

With the exception of the localized magnetic fields from the solar inverter and its contribution to the dirty electricity levels, most of the market's EMF problems are of utility origin, due to their dumping nearly 80% of return current into the earth for substation return. In utility parlance, it is called stray voltage, but there is nothing stray about it.

Dairy farmers were the first to notice it years ago, because it makes cows sick and reduces milk production. As little as 10 mV peak to peak of stray voltage measured in the milk parlor floor will cause a drop in milk production. (see Hillman paper attached). When the grounded Wye grid was built in North America, all the current delivered returned to the substation in the neutral wires. Now the earth is the main conduit, and it causes the kind of problems seen at the market.

Rule 92D of the National Electrical Safety Code (NESC) states, "Ground connection points shall be arranged so that under normal circumstances there will be no objectionable flow of current over the grounding conductor" (1996).

Also, Rule 215B of the NESC Handbook states,

This rule prohibits the use of the earth normally as the sole conductor for any part of the supply circuit. ... Objections of the use of the earth as a part of a supply circuit are made from both safety and supply stand points (1996).

EPRI suggests that adding increased current carrying capacity to the neutral or a fifth wire could solve the problem.

Recommendation:

1. Operate the solar systems only when the market is closed..
2. Eliminate compact fluorescent lights, replacing them with incandescent bulbs.
3. Reduce the dirty electricity levels with capacitive plug-in filters.

4. Alert Puget Sound Energy and the Port of Olympia to the problem and ask them to resolve it.

Respectfully submitted,

Samuel Milham MD, MPH

2318 Gravelly Beach Loop NW

Olympia WA 98502

360 866-0256

sam.milham@gmail.com

Website: www.sammilham.com