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Tumor-specific frequencies and ocular melanoma

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ABSTRACT

Specific kilohertz frequencies in the environment from variable frequency drives on electric motors at a liquid natural gas compressor and storage station on a natural gas pipeline seem to be associated with the development of a very rare cancer, ocular melanoma, at a high school and in individuals living or working in a neighborhood near the plant. Primary neutral-to-earth oscilloscope voltage waveforms and spectra measured near the high school were nearly identical to the ground voltage 2.3 miles away at the gas pipeline. Peak frequencies of 7440 and 19,980 Hz were found at both places. The electric utility practice of using the earth as a conduit for return currents facilitated this exposure.

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KEYWORDS

Frequency spectrum; ground current; ocular melanoma; primary neutral-to-earth voltage; variable frequency drive

Introduction

A number of times Milham has studied cancer clusters made up of a single type of cancer, where the incidence probabilities defy chance. Among these were three men with breast cancer in a small office (Milham, 2004), four cases of polycythemia vera on the same short street, eight non-Hodgkin's lymphoma cases in students in a small high school, and a cluster of childhood leukemia near a military radar facility (Milham, 1963). The obvious question is what sort of exposure could do this. All these clusters were associated with electromagnetic field (EMF) exposure. There is evidence that treating advanced cancers with very specific amplitude-modulated (AM)-EMF frequencies can be modestly successful (Zimmerman et al., 2012). Moreover, Blackman (2012) cautions that these signals may not always have beneficial consequences for humans or their environment. As an analogy, the energetic EMF frequencies of ionizing radiation used to treat cancers can also cause them.

In fall 2014, the authors of this paper were alerted to a cluster of ocular melanoma (OM) in a North Carolina high school, and to a television report of the cluster. Some of the cases and parents were contacted and interviewed by telephone.

A Google Earth photo of the school and a Google search revealed it was adjacent to a liquid natural gas (LNG) compressor and storage station on a 24-inch natural gas pipeline. (Figure 1)

The school is shown in the yellow circle and the LNG plant in the red circle. The red dot above the school was the residence of a case of OM who never attended the

school. The school was built in 2001; the LNG plant was built earlier.

We suspected that electrical pollution from the LNG plant might have caused the cluster. A phone call to the plant revealed that they had variable frequency drives (VFDs) on their 300 horse power electric motors. We both have had experience with animals and people becoming ill after exposure to EMF fields from low horse-power electric motors with VFDs (unpublished results).

The five cases of OM in the original cluster were all female; three former students at Hopewell High school and two women who lived near the school. What is really striking about them is how young they were. OM has an incidence of 5.1 per million in the general population with an average age of 55 and a slight male excess (Singh et al., 2011). Two of the students died at ages 27 and 28, and the one student survivor is age 19. The two non-student cases are ages 29 and 31. The current high school white student population is (1718 students \times 46% white) = 790. OM is rarely seen in non-whites. Since the school has been open for 13 years, the population at risk would be $790 \times 13 = 10,270$, assuming a stable school population. Multiplying this population by the OM incidence gives $10,270 \times 5.1/1,000,000 = 0.05$ cases expected. Since 3 cases occurred, the relative risk of OM in the students is $3/0.05$ or 60. That is, the 3 OM cases in the school student population were 60 times what was expected. However, since the incidence of OM in high school-aged children is much lower than 5.1 per million, the true risk is probably at least 100 times what



Figure 1. A Google Earth photo of the high school on the left and the LNG plant on the right.

would be expected. The two community cases mean that the etiologic agent is not limited to the school.

The Deputy Superintendent of the school district was contacted in November 2014. After nearly a year of negotiation we were ultimately denied access to the school. The LNG plant manager was contacted the week of 15 September 2015 to request admission to the plant. He referred us to the Director of Safety and Communications for the company. We made the same request, and never received permission to visit the plant.

Electricity service for the community is provided by a membership organization including public power communities in North Carolina, South Carolina and Virginia. This organization also provides management services to the state's two municipal power agencies – North Carolina Municipal Power Agency Number 1 and North Carolina Eastern Municipal Power Agency.

In the United States, electricity is distributed in a grounded Wye system with a wire connecting the neutral center tap of the transformer to the earth. All the electricity delivered has to return to the substation it came from, and when the grid was built, most of it returned on the utility primary neutral wire. Initially, most loads like incandescent lights and electric motors were linear loads, in that they did nothing to change the 60 Hz current powering them. With the development of cellular communication, computers, inverters, variable frequency motor drives, compact fluorescent lights and other nonlinear loads, the 60 Hz waveforms were deformed by the high frequencies which were added to the neutral return currents. High frequencies did not travel well on the neutral return wires, requiring a larger diameter wire to carry higher frequencies than 60 Hz. The inadequate neutrals heated up and caused building

fires. Building codes were changed to require more robust in-building neutral return wires, but the utilities, instead of adding increased neutral current carrying capacity to their wire neutrals, simply added additional down grounds all along their lines connecting their primary neutral wires to the earth. By 1998, about 70% of all electricity delivered, returned to the substation via the earth. Europe has a delta distribution system with all the delivered electricity returning to the substation via wires. The US National Electric Safety Code and most state public utility commissions have rules forbidding the use of the earth as a primary neutral return.

The original electric motors had simple on/off switches or may have had switches for high, medium and low speeds. The development of VFDs allowed motor speed to be infinitely varied. VFDs generate electrical pollution which adversely affects electric equipment. We have observed that the use of VFDs on small, low horsepower motors is associated with drastically reduced milk production in dairy cattle (Hillman et al., 2013) and is associated with serious illness in humans (personal experience). Many dairy cows have died and those deaths have been associated with exposure to fields generated by VFDs less than 10 HP (personal experience). The LNG plant has VFDs on 300 HP motors.

Method

On 25 September 2015, we were accompanied by Joe Wagner, an OM case who formerly worked as a cable installer in the area. We drove around the school and the LNG plant area with an AM radio tuned between stations listening for static patterns, and surveyed

several roads near the school and the plant. We also visited the neighborhoods of the two non-school OM cases, one near the school and one near a restaurant on one of the area roads. We used a two-channel Fluke 190 oscilloscope to capture voltage waveforms between the primary neutral wire at a power pole near the main entrance to the high school and a ground probe 50 feet away parallel to the school entrance road (Figures 2 and 3). We also captured the voltage waveforms between two ground probes 50 feet apart parallel to an LNG pipeline south of the LNG plant (Figures 4 and 5) and 2.3 miles from the school.

Results

There was substantial AM radio static in the areas we studied, indicating high-frequency electromagnetic pollution in the air at kilohertz frequencies. This is sig-

nificant, because another case of OM has been recently reported by Joe Wagner, in a policeman whose territory was in the same area that Mr. Wagner worked in as a cable installer.

The waveforms and their spectra in the primary neutral-to-earth ground at the school and the voltage in the earth at the pipeline are shown in Figures 2–5. The waveforms at both places are highly distorted utility 60 Hz waveforms with 16.8 ms between peaks. Remarkably, the spectra at both places are nearly identical with the same peak frequencies of 7440 and 19,980 Hz. In our experience, the spectra are as individual as fingerprints or DNA, proving beyond any doubt that the electrical pollution at the school and in the earth at the pipeline had the same source, most likely the VFDs at the LNG plant. In our experience this level of high-frequency electrical pollution in the earth and grid causes a wide spectrum of morbidity and mortality in

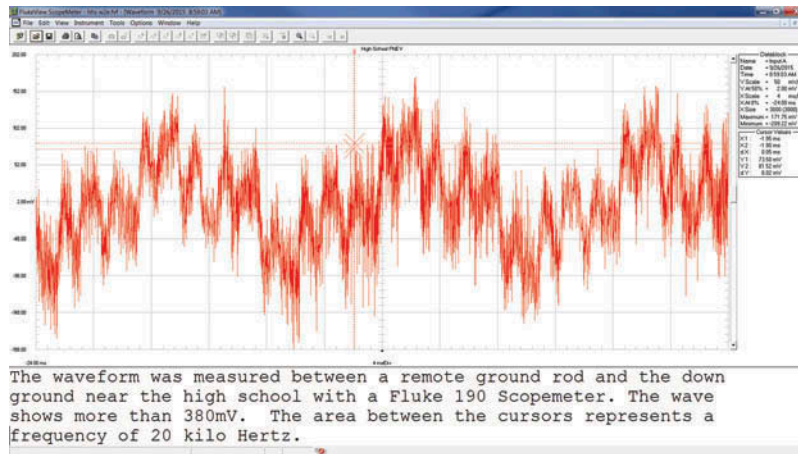


Figure 2. Oscilloscope waveform taken near the school.

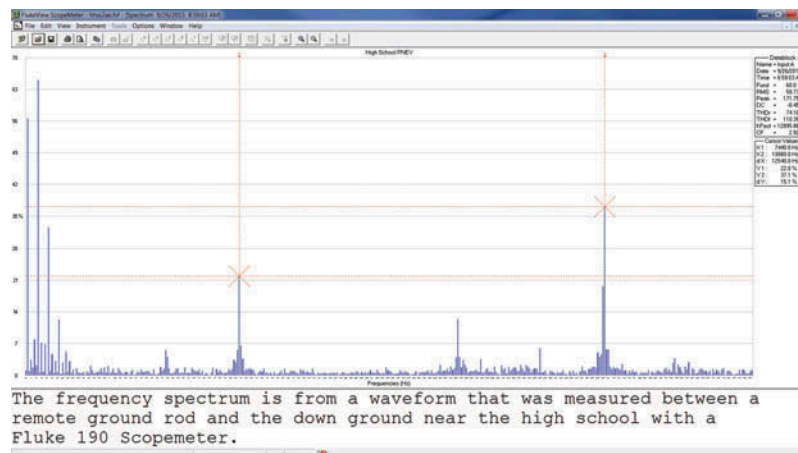


Figure 3. Oscilloscope frequency spectrum taken near the school.

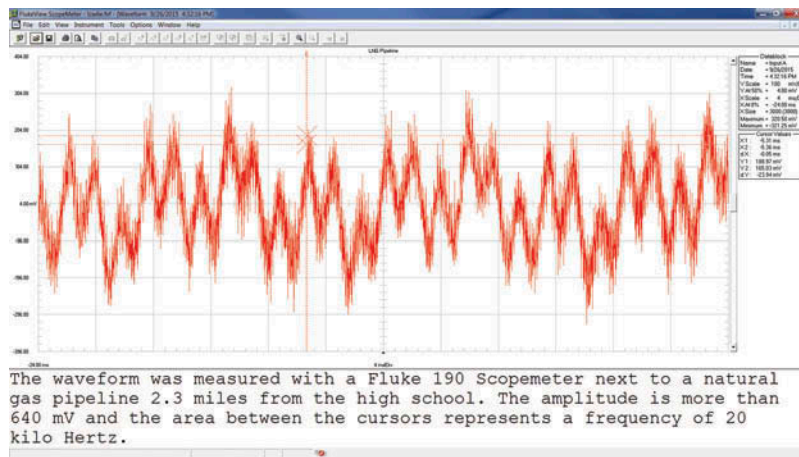


Figure 4. Oscilloscope waveform taken 2.3 miles from the school next to a natural gas pipeline.

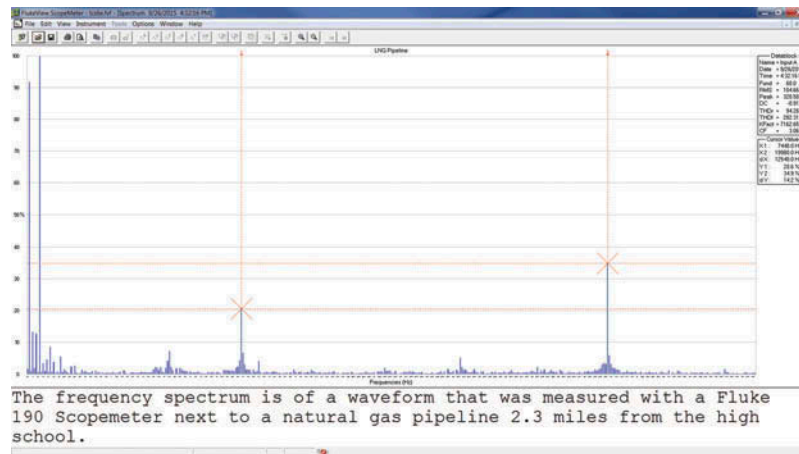


Figure 5. Oscilloscope frequency spectrum taken 2.3 miles from the school next to a natural gas pipeline.

animals and people exposed to it. At highest risk will be the LNG plant employees, teachers and students at the school, and people who live and work near the pipeline. The OM cases are the tip of an iceberg of mortality and morbidity in those who have been exposed. During our visit to *the area*, we learned that the brother of one of the fatal OM school cases who also attended the high school was diagnosed with leukemia.

One of us (DS) knows the Russians and their EMF research, and has anecdotal evidence that during the Cold War they knew which frequencies caused which symptoms and which cancers. His work with dairy cattle and rural families has led him to believe that specific EMF frequencies cause specific cancers. SM came to the same view through EMF epidemiology.

Suggestions for solving the problem and follow-up

- (1) The VFDs on the motors at the LNG plant should have filters designed by the manufacturer installed on them. The manufacturers know about the electrical pollution generated by their VFDs and usually have the filters already attached to VFDs marketed in Europe. The European Union has stricter rules on electrical pollution, which are not in effect in the United States.
- (2) The electric utility should add an oversized neutral between the LNG plant and the utility substation. Other filters may have to be installed at the plant to comply with the Institute of Electrical and Electronic Engineers IEEE-519 standards. The

IEEE 519 limits total harmonic distortion to 5% for voltage and 20% for current.

- (3) The high school should be examined electrically and made to comply with IEEE-519 standards.
- (4) Morbidity and mortality surveillance of current and former high school staff and students should be conducted, with a special focus on early detection of OM.

Conclusion

We believe that specific kilohertz frequencies in the environment from VFDs on electric motors at a liquid natural gas plant caused a very rare cancer, OM, in the neighborhood of the plant. The electric utility practice of using the earth as a conduit for return currents facilitated this exposure. Other single cancer clusters should be examined similarly.

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Declaration of interest

The authors report no conflict of interest. The authors alone are responsible for the content and writing of the paper. Travel expenses were paid by a small grant from Professor Martin Graham to SM.

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