

leading to expensive mitigation efforts, and, in some cases, to lengthy and divisive court proceedings. The costs of mitigation and litigation relating to the power line-cancer connection have risen into the billions of dollars and threaten to go much higher. The diversion of these resources to eliminate a threat which has no persuasive scientific basis is disturbing to us. More serious environmental problems are neglected for lack of funding and public attention, and the burden of cost placed on the American public is incommensurate with the risk, if any."

Clearly, the APS is very concerned about the consequences of people overreacting to unfounded fears—namely, the present cost of between \$1 billion and \$3 billion per year for mitigation and litigation and a possible cumulative future cost of more than \$250 billion if a proposed national standard of 2 milligauss is imposed.¹

Blank and Goodman have concluded that physicists are not aware of "relevant work in biology that contradicts their conclusion." However, the APS subcommittee is indeed aware of ELF-EMF-related work in biology, and agrees with most reviewers of this work that the biology does not support a conclusion that power-frequency fields of the magnitude encountered in residential and most occupational settings pose a hazard to humans. The subcommittee considered epidemiological studies, biomedical-biophysical experiments, physical mechanisms and mitigation and litigation costs, and it widely consulted the biomedical community, the APS division of biological physics, and the reports of about ten interdisciplinary (biological, medical, epidemiological and biophysical) review studies on the ELF-EMF issues.

None of those studies determined that society should spend funds on mitigating common ELF-EMF levels. For example, the American Medical Association concluded that "most studies of magnetic field effects in children, workers, and other populations do not meet accepted scientific criteria in terms of accurately measuring past exposure, identifying comparable test and control groups, and accounting for potentially confounding factors. Findings of studies are inconsistent in terms of whether a risk exists, what conditions might be related to exposures, and risk magnitude. Positive studies indicate, for the most part, that the associated relative risks are low."² Further, an interdisciplinary Oak Ridge study concluded that "there is no convincing evidence in the published literature to support

the contention that exposures to extremely low frequency electric and magnetic fields generated by such sources as household appliances, video display terminals, and local power lines are demonstrable health hazards."³ It also should be noted that the various interdisciplinary studies determined that there is a major problem of replicating the results of the positive studies.

Blank and Goodman also have concluded that the model of a cell used by physicists is highly simplified and not relevant to actual processes in cells that can be affected by EM fields. Physicists generally accept that the internal electrical fields caused by thermal oscillations and natural processes in the body are much larger than ELF-EMF-induced electrical fields in the body. This does not prove there are no other mechanisms that might cause cancer, although no such mechanisms have yet been found. Nor does the APS statement rule out this unlikely possibility.

As for Blank and Goodman's comments about Kelvin and Keyes's comments about continental drift, of course one can find examples of scientists having erred. In fact, I would also raise the issue of "cold fusion"; some 200 papers have claimed a positive finding, but not many scientists take them seriously. I see a parallel between ELF-EMF and cold fusion, in that in both cases there is a lack of a viable mechanism and of consistent empirical evidence in support of the hypothesis. I predict that the ELF-EMF experimental evidence will continue to crumble after further research.

Science is full of honest debates, but when we are confronted by the prospect of paying out billions of taxpayer dollars for mitigation and litigation purposes and of spreading widespread fear in the citizenry, we must exercise broader responsibility than wasting our research resources on small, very unlikely and hypothetical pathways to death.

References

1. For details and specific references, go to <http://www.calpoly.edu/~dhafemei> on the World Wide Web. For an up-to-date review of ELF-EMF issues, see J. Moulder, K. Foster, *Proc. Soc. Exp. Biol. Med.* **209**, 309 (1995).
2. American Medical Association, Council on Scientific Affairs, *Effects of Electric and Magnetic Fields*, Chicago (1994).
3. Oak Ridge Associated Universities, *Health Effects of Low-Frequency Electric and Magnetic Fields*, Oak Ridge, Tenn. (1992).

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Review and Reveal the Reviewers

To ameliorate such peer-reviewing problems as reviewer procrastination and asymmetrical application of the golden rule, I suggest two possible approaches that would incorporate desirable feedback procedures without necessarily sacrificing anonymity.

First, editors not only should strongly emphasize the importance of reviewers adhering to the requested two- or three-week review response time but also should inform reviewers that if a review is not received within a specified interval (four–six weeks seems more than generous), then (barring rare extenuating circumstances) that reviewer's name will be disclosed to the author of the manuscript. This tactic by itself would certainly reduce average review time.

Second, two lists of reviewer names should be published by each journal at the end of the year. The first list should contain the names of those reviewers who were dilatory (by the above criterion) during the year. The second list should contain the names of reviewers who met their obligations in timely fashion during the year. Publication of such lists at the same time of the year by many journals would enable journal editors to be better able to recognize and avoid using slow reviewers whenever appropriate. Even if the first approach outlined above were deemed too draconian, this second approach would certainly encourage reviewers to eschew tardiness.

In addition, I suggest that when an author submitting a manuscript is known to be a reviewer on the slow list, the reviewer for this manuscript be chosen from the same list! Such selection would also be desirable for manuscripts submitted by authors who have published in a given journal but have since rejected several requests from the journal to serve as a reviewer.

Widespread implementation of the above proposals might initially reduce the supply of willing reviewers, an undesirable result. But this is unlikely to be the case for the steady state once the procedure becomes well known and reviewer lists are routinely published. Although implementation might weed out some of the worst offenders, especially if they do not expect to ever publish again themselves, it should cause most slow reviewers to mend their ways and begin to meet their professional responsibilities with

courtesy and empathy, rather than apathy. It is remarkable what focusing a strong light on a given behavior can do to reverse ingrained bad habits previously shielded by a cloak of anonymity and perpetuated by an inadequate sense of accountability and responsibility.

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Textbook Follows the Rules

The review of our introductory textbook *Electric and Magnetic Interactions* (October 1995, page 70) states that we omitted Kirchhoff's rules. On the contrary, all of chapter 9 is devoted to Kirchhoff's loop and node rules. This fairly traditional treatment complements earlier chapters in which circuit behavior is analyzed at an atomic level directly in terms of the Coulomb interaction and the properties of metals, thus unifying electrostatics and circuits and providing a deep sense of mechanism for circuit behavior. For further information, go to <http://cil.andrew.cmu.edu/emi.html> on the World Wide Web.

RUTH W. CHABAY
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DisCERNing Man is Questionably Fast

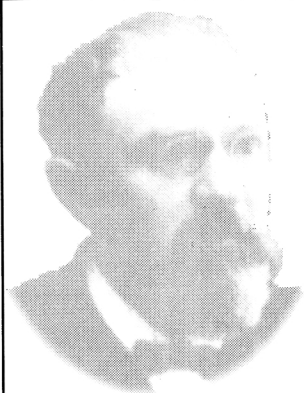
The saboteur at CERN (May 1995, page 61), who reportedly disconnected more than 5000 cables in two nights, must have indeed worked fast and diligently; lower mathematics show a rate of about one disconnect per 15 seconds. The real puzzle is how, on the same two nights, he also was able to remove "about 1300 electric components" and hide them, undamaged, at a rate of about one a minute.

CERN people must work hard. How did he do it?

LEONARD X. FINEGOLD
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Correction

December 1995, page 19—Cleveland was the site of the Case Institute of Technology (now Case Western Reserve University). ■



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