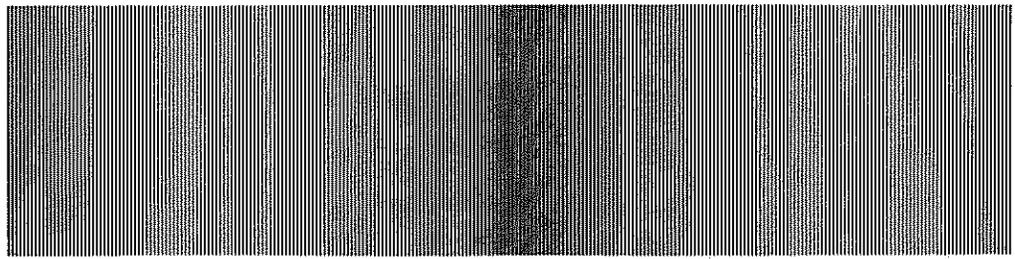


# MICRO WAVE NEWS



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## California Utility Wins EMF-Childhood Cancer Case

A 12-person jury has found that the San Diego Gas & Electric Co. (SDG&E) was not negligent in failing to warn its customers about the potential health effects of electromagnetic fields (EMFs). The plaintiffs, Ted and Michelle Zuidema, had alleged that their daughter, Mallory, developed a rare kidney cancer due to exposure to EMFs from SDG&E transmission and distribution lines. The Zuidemas have not yet decided whether to appeal the April 30 decision.

"The jury's decision just reinforced what most people think and what industry has been saying for a long time—that power lines don't have ill health effects," said Duncan Barr of the San Francisco firm of O'Connor, Cohn, Dillon & Barr, who represented SDG&E.

But one of the Zuidemas' lawyers, Michael Withey of the Seattle firm of Schroeter, Goldmark & Bender, contends that a broad interpretation of the defeat is not justified. "The jury did not resolve any of the thorny medical causation issues," he said, referring to the question of whether EMFs from SDG&E power lines had caused the Zuidemas' daughter to develop cancer.

In their suit, filed on May 29, 1991, in California Superior Court in San Diego, the Zuidemas claimed that Mallory, now five years old, developed nephroblastomatosis while still in her mother's womb—which later led to Wilms' tumors—from power line EMFs (see *MWN*, J/A91 and N/D92). At 26 months, Mallory had seven golf ball-sized tumors removed from her kidneys. Her cancer is now in remission.

(continued on p.7)

## Is IGF-II the Missing Link?

One of the mysteries surrounding the Zuidema case is why experienced lawyers chose a kidney cancer case to establish the EMF-cancer risk. After all, the best-known studies have linked EMFs to leukemia and brain cancer, but not to Wilms' tumors.

There may in fact be a connection, however tenuous. The bridge is IGF-II, insulin growth factor-II. This protein was linked to Wilms' tumors as early as 1985.<sup>1</sup> Indeed, on the witness stand, Dr. Bruce Beckwith, who has been described as SDG&E's star witness, agreed with Michael Withey, one of the Zuidemas' lawyers, that IGF-II "is probably very much involved in the pathogenesis of Wilms' tumor[s]."

Experimental data demonstrating the EMF-IGF-II link surfaced just a month before the trial. Ironically, it passed largely unnoticed because it was described in a patent and was not published in a scientific journal.

The patent says that a 15.3 Hz sinusoidal magnetic field under conditions of ion cyclotron resonance (ICR) could "significantly" increase the production of IGF-II in bone cells.<sup>2</sup> Over the last few years, a group under the direction of Dr. David Baylink at the VA hospital in Loma Linda, CA, has been working on

(continued on p.10)

## « Power Line Talk »

Dr. Genevieve Matanoski and colleagues at the Johns Hopkins University (JHU) School of Hygiene and Public Health don't see eye to eye with the EMF managers at the Electric Power Research Institute (EPRI). In announcing the publication of Matanoski's final report on leukemia among telephone linemen late last year, EPRI summed up the results this way: "Overall, this study shows no relationship between leukemia mortality and employment as a telephone lineman." EPRI went on to say that there were some elevated risks, but that none was statistically significant. The JHU researchers see it differently: "The data suggest an increasing risk with increasing exposure," they wrote in the abstract of their paper, published this spring in the *American Journal of Epidemiology* (see *MWN*, J/A91 and M/A93). In an interview with *Microwave News*, Matanoski said that EPRI had "understated" her results and she stressed that there does appear to be an EMF effect with a dose-response relationship when total lifetime EMF exposures are estimated—up to a sixfold increased cancer risk. In a press release issued by the journal, Dr. Patrick Breyse, one of Matanoski's collaborators, explained that "more study needs to be done." The JHU researchers caused quite a stir when, in November 1989, at the same time as they were finishing up their EPRI study, they announced that they had observed statistically significant elevated rates of leukemia, lymphoma and prostate cancer, as well as the first suggestion of an EMF-male breast cancer link, among young linemen who worked for New York Telephone (see *MWN*, N/D89 and M/A91). The analysis of the New York data was sponsored by a small grant from the National Institute of Environmental Health Sciences, not by EPRI. Nevertheless, that same month, EPRI President Richard Balzhiser wrote to utility executives that the New York results "are preliminary and clearly warrant further study" and that EPRI is "committed to pursuing this work objectively by providing support to outstanding researchers in the field such as Matanoski." Breyse and Matanoski are eager to pursue the New York results—which Matanoski herself called "remarkable." Indeed, these as-yet-unpublished findings have already prompted a number of others to look into the possible breast cancer risk (see *MWN*, J/A90, J/F91, S/O91 and J/A92). Matanoski said that she will soon submit a paper on the New York study for publication and that she hopes to secure funds to continue this work.

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People aren't really concerned about EMFs—they just say they are in order to block the construction of power line towers, according to Samuel Skinner, who recently became president of the Chicago-based Commonwealth Edison Co. "The real issue...is not EMFs. It is the towers...and the impact they have on real estate," he told *The News-Sun*, an Illinois daily located in Waukegan. Skinner, formerly President Bush's chief of staff and, before that, Secretary of Transportation, also said that there is "not one study that says that living next to power lines is a serious hazardous risk," according to the May 6 article. The Swedish study linking power line EMFs to childhood leukemia, completed last fall, raised more questions than it resolved, Skinner said. Thomas Hemminger, an environmental services manager at

Commonwealth Edison, clarified the utility's position for *Microwave News*. "We still don't know which aspect of EMFs is a causative agent—or if there is one," he said, adding that there has been no laboratory confirmation of the dose-response relationship between EMFs and cancer that was found in the Swedish epidemiological study (see *MWN*, S/O92). Nevertheless, several Illinois elected officials, citing health concerns about EMFs, have signed a petition to intervene in a Commonwealth Edison plan for a new power line. Attorney General Roland Burris, U.S. Rep. Philip Crane and state Sen. Adeline Geo-Karis have agreed to support Citizens Against Unsafe Electricity (CAUSE), a group based in Lake Villa that wants to reroute or bury the six-mile, 138 kV line that is planned to run past schools and homes between Antioch and Round Lake Beach.

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New York State will soon begin a reassessment of its EMF policy, including its interim 200 mG limit at the edge of power line rights-of-way, according to Dr. Dan Driscoll of the Department of Public Service. "We're very excited about this," Driscoll said, but he noted that many of the details of the plan have not been worked out. As it stands now, the Department of Health will review EMF research, and then the Public Service Commission (PSC) will decide whether to revise the standard. Each phase should take between six and nine months, Driscoll said, adding that other interested agencies will be invited to participate. The program was announced by Driscoll—who was recently named to the National Academy of Sciences-National Research Council's new EMF committee (see p.4)—at a May 13 town meeting in New York City sponsored by Assemblyman Richard Gottfried, chair of the Assembly Health Committee. Also at the town meeting were Dr. David Carpenter of the State University of New York School of Public Health and Dr. James Melius of the Department of Health. New York's 200 mG standard was adopted by the PSC nearly three years ago (see *MWN*, S/O90).

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U.S. utility executives see EMFs as their primary public policy concern, according to a new survey by Alexander & Alexander Services Inc., a New York-based international consulting and insurance firm that addresses risk management issues. No other environmental issue came even close: 88% of the risk managers said that EMFs from transmission lines and appliances were of "above average importance" and 59% said they were of "high importance." Alexander & Alexander noted that EMFs were raised in 201 court challenges to utility projects in 1992. A series of public opinion polls taken over the last few years by Cambridge Reports/Research International in Cambridge, MA, explains why the electric utilities are worried. In 1989, only 31% of adult Americans were aware of the EMF issue, but, by February 1993, the number had jumped to 63%. In addition, slightly less than half the people surveyed said that they would be "extremely worried" about the health, economic and aesthetic impacts of a new transmission line near their homes—approximately double the level of four years ago. What should the

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utilities do? Writing in the May-June issue of *Electric Perspectives*, published by the **Edison Electric Institute**, Gene Pokorny, the chairman of Cambridge Reports, advises utilities to continue "an open process of dialogue." On the other hand, *Electrical World*, a McGraw-Hill publication, has some different advice: "Stop talking about EMF." In a commentary in their March issue, the editors prescribe "a little benign neglect" because, they say, it is "irresponsible" to spend millions of dollars "on a phenomenon that almost every knowledgeable person now agrees has a very low probability of significant health risk."

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In its official report to the General Assembly, the **Connecticut Interagency EMF Task Force** set forth the policy it calls **voluntary exposure control (VEC)**. The strategy best answers the question of how an agency should "formulate policy in the face of such uncertain science," according to the report, released in March. The plan first surfaced in an October 13, 1992, letter from Department of Health Services (DHS) Commissioner

Susan Addiss to state Sen. Cornelius O'Leary (see *MWN*, N/D 92). VEC calls for "a pro-active program of providing information to the community about EMF and factors to consider if concerned individuals decide to reduce their exposure." The task force steered clear of "prudent avoidance," warning that it is "a difficult term to employ in public policy." The group explained in its report that prudent avoidance can be interpreted to apply both to individuals and to electric utilities, while VEC applies only to individuals. The report does not specify a role for utilities. The decision to recommend VEC was also influenced by an April 1992 study by the Connecticut Academy of Science and Engineering, which found that it would be "inappropriate" to adopt prudent avoidance (see *MWN*, M/J92). The task force, which was created in July 1991 (see *MWN*, J/A91) and is chaired by Dr. Peter Galbraith of the DHS, will continue to monitor scientific evidence on EMFs and will submit an update to the legislature by February 1995. For a copy of the task force's report, contact: Connecticut DHS, 150 Washington St., Hartford, CT 06106, (203) 566-8167.

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## **Sweden Weighs 2-10 mG Limit; Draft Proposal Due by Year's End**

By the end of the year, Swedish officials will circulate a draft proposal for a national magnetic field exposure limit for new power lines and substations, according to Stefan Villa of Sweden's newly formed National Electrical Safety Board. Villa said that the board is considering a standard of 2, 5 or 10 mG and is analyzing the costs associated with meeting each of these levels. If adopted, the standard would also apply to new residential buildings located next to existing power lines and substations.

A working group has also been established by the board to estimate the number of people in schools, day-care centers and residential buildings now exposed to magnetic fields from existing power lines and substations, as well as the cost of reducing these fields.

Electric utilities, government agencies and research centers are working with the board, Villa said. Any proposals made by the board will be widely circulated for comment among government agencies and other interested parties before a final decision is reached, Villa explained.

Last September 30, Sweden's National Board for Industrial and Technical Development, NUTEK, announced that it would "act on the assumption that there is a connection between exposure to power frequency magnetic fields and cancer" (see *MWN*, S/O92). This policy was prompted by the release of Maria Feychting and Dr. Anders Ahlbom's study, and prior epidemiological studies, linking residential exposures to an increased rate of childhood leukemia. While the Electrical Safety Board—the government agency which took over responsibility for EMF guidelines on January 1—"does not believe that an absolutely certain correlation exists," Villa stated, "a correlation is sufficiently probable to warrant consideration and action in the form of further studies."

Earlier this year, the Swedish Institute for Radiation Protection, based in Stockholm, advised that the available research "speaks in favor of taking steps to reduce the fields"—but that these measures should have a lower priority than reducing exposures from sources such as radon and UV radiation. The institute argued that magnetic field exposures from new equipment and power lines should be reduced "provided [that] these solutions do not imply large inconveniences or costs" and that steps to reduce exposure from existing installations should be deferred unless fields exceed normal levels "by more than tens of times."

Rolf Lindgren, the EMF manager for the state power company, Vattenfall, predicted that "future regulations will most probably apply only to new electrical plants and houses."

## **International NIR Commission: Cancer Data Still Inconclusive**

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) has affirmed its position that research to date is insufficient to conclude that exposure to EMFs increases cancer risks.

In a statement released following its annual meeting, held in Neuherberg, Germany, May 7-12, ICNIRP concluded that, despite improvements in the methodology of some laboratory and epidemiological studies, "the data related to cancer do not provide a basis for health-risk assessment of human exposure to power frequency fields."

ICNIRP has thus endorsed the EMF guidelines it adopted on an interim basis in 1989 and published in 1990. They allow unlimited exposures of up to 1,000 mG and 5,000 mG for the general public and workers, respectively (see *MWN*, M/J89 and J/F 90). The guidelines were actually written by ICNIRP's predecessor, the International Non-Ionizing Radiation Committee of the International Radiation Protection Association (IRPA). In

1992, IRPA approved a new charter for ICNIRP, granting it greater independence (see *MWN*, J/F92).

At the meeting, the commission also approved limits for human exposures to static magnetic fields. These will be published in a future issue of *Health Physics*. ICNIRP said that it will continue to review the EMF-cancer literature periodically.

Rüdiger Matthes of the German Institute for Radiation Hygiene in Neuherberg has replaced Annette Duchêne as the commission's scientific secretary. Dr. Michael Repacholi of the Australian Radiation Laboratory in Yallambie, Victoria, continues to chair ICNIRP.

### **Legislators Seek Labeling of Appliances That Emit High EMFs**

In an effort to educate consumers and encourage appliance manufacturers to reduce EMFs, federal and state legislators have introduced bills requiring the labeling of products that emit high electric and magnetic fields. Virtually no appliances currently list such information, except video display terminals (VDTs) that comply with the Swedish low emission standards.

In Congress, the Electromagnetic Labeling Act of 1993 (H.R.1982) was introduced on May 5 by Rep. Leslie Byrne (D-VA). The bill would require manufacturers to put a label on appliances indicating the strength of the emitted electric and magnetic fields. "We wanted something that wouldn't be burdensome on industry but would provide consumers with information they could use to comparison shop," Julia Lyman, a spokeswoman for Byrne, told *Microwave News*.

The bill would apply to products that emit electric and magnetic fields of at least 100 V/m and 1 G, respectively, at a distance of one inch. The limits were set in response to recommendations by the Congressional Research Service, according to Michael Day, a legislative assistant to Byrne. He said that the measure would affect products such as microwave ovens, TVs, VDTs and refrigerators. He noted that Byrne is open to revising the 1 G threshold.

The bill, which has no cosponsors yet, has been referred to the subcommittee on energy and power of the House Committee on Energy and Commerce. H.R.1982 replaces H.R.1665, introduced by Byrne in April, which had set the electric field limit at 100 mV/m.

Meanwhile, New York state Sen. Suzi Oppenheimer introduced a bill (SB2858) on March 2 requiring that electric-blanket makers indicate the strength of the EMFs their products emit, as measured "at a range of less than one inch." The bill was prompted by Oppenheimer's concerns about long-term exposures to high magnetic fields, according to Steve Otis, Oppenheimer's legislative counsel.

"This legislation will give consumers the ability to make their own judgments about the electric blankets that they purchase," Oppenheimer said. Otis added that such a law would also give manufacturers an impetus to design electric blankets that emit low EMFs.

The bill was assigned to the Consumer Protection Committee on March 2. The senator introduced a similar measure last

year, which was still pending when the session ended.

In Pennsylvania, the Household Appliance Electromagnetic Field Disclosure Act (HB1610) was introduced by Rep. Bruce Smith on May 10. The measure would require that sellers of household products—including kitchen appliances, power tools, TVs, computers, electric blankets and hair dryers—post notices listing EMF emissions. A sign would indicate magnetic fields measured within one foot of the product and at a distance of three feet. The notice would also contain a warning that exposure to EMFs "may increase the risk of serious illness."

"It delivers the message that the farther away you are, the lower the EMFs," Smith said in a telephone interview, adding that his intent "is not to scare people, but to educate them." Smith said that his involvement with a citizens' group that is fighting a 268-mile, 500 kV line in the state "got him thinking about EMFs and appliances." HB1610 was referred to the Committee on Labor Relations on May 10.

For more on electric-blanket EMFs and health, see *MWN*, M/J90, J/F92, J/A92 and M/A93.

### **NAS-NRC EMF Committee**

The National Academy of Sciences (NAS)-National Research Council's (NRC) Board on Radiation Effects Research has announced the members of a committee to review the potential health risks from EMF exposures. The committee will focus on the effects of extremely low frequency fields—especially 60 Hz—on cancer, reproduction and development and learning. Where there are sufficient health data, the committee will do a risk assessment, and where there are gaps, a research strategy will be developed.

Congress mandated the NAS-NRC study in August 1991, appropriating \$600,000 for the task (see *MWN*, S/O91). Dr. Larry Toburen, the board's staff officer, told *Microwave News* that it took a long time to identify committee members and to negotiate the study plan with the Department of Energy, which is responsible for the project. Toburen predicts that the committee will complete its work in approximately two years.

Dr. Charles Stevens, a neurobiologist at the Salk Institute in La Jolla, CA, is the committee chairman and Dr. David Savitz, an epidemiologist at the University of North Carolina, Chapel Hill, is the vice-chairman. The other members are: Drs. Larry Anderson, Battelle Pacific Northwest Labs, Richland, WA; Daniel Driscoll, New York State Department of Public Service, Albany; Fred Gage, University of California, La Jolla; Richard Garwin, IBM Watson Research Center, Yorktown Heights, NY; Lynn Jelinski, Cornell University, Ithaca, NY; Bruce Kelman, Failure Analysis Associates Inc., Menlo Park, CA; Richard Luben, University of California, Riverside; Frederick Mosteller, Harvard University, Cambridge, MA; Russel Reiter, University of Texas, San Antonio; Malvin Ruderman, Columbia University, New York; Paul Slovic, Decision Research, Eugene, OR; Jan Stolwijk, Yale University School of Medicine, New Haven, CT; Maria Stuchly, University of Victoria, Victoria, BC, Canada; Daniel Wartenberg, Environmental and Occupational Health Sciences Institute, Piscataway, NJ; John Waugh, Massachusetts Institute of Technology, Cambridge; and Jerry Williams, Johns Hopkins University, Baltimore.

## EMF Exposure Assessment Beyond Time-Weighted Averages

To the Editor:

The observed association between wiring configuration and childhood leukemia published some 15 years ago (Wertheimer and Leeper, 1979) remains a landmark contribution to the scientific literature and the salient impetus to research into possible health effects from exposure to ELF magnetic fields. Since 1979 several residential epidemiological studies have been published, some of which support an association between magnetic field exposure and increased risk for certain cancers, and some of which do not. This lack of replicability, despite refinement of the proxy exposure metric, or so-called wiring code, is perplexing. Researchers in the EMF area seem quite willing to accept the wiring code as a surrogate for magnetic field exposure, even though it correlates only weakly with spot and long-term measurements of actual residential magnetic fields. In most epidemiological studies, measured magnetic fields in homes, when reported as the time-weighted average (TWA), do not correlate well with increased risk for disease.

TWAs and their surrogates have been used because they are easy to assess and because the TWAs fit into the concept of dose that has been successful in radiation biology and chemical toxicology. Despite the fact that we live in a complex environment of EMFs, epidemiological studies on the issue of possible EMF-related health effects have focused almost exclusively on implicit surrogates of the TWA or measured TWAs in the 50-60 Hz power line frequency band. Overall, the studies reporting an association imply that relative risk for leukemia increases at TWAs of 2-3 mG or greater.

We suggest that the time has come to seriously consider attributes of magnetic fields, in addition to the TWA, to which people are exposed. Short-term exposure to high flux densities is one example. Gauger (1985) has measured 60 Hz peak magnetic fields from household appliances and found a number of models of different hand-held electrical devices capable of generating 500-2,000  $\mu\text{T}$  (5-20 G) fields at their surface. While the transient induced currents resulting from such exposures would far exceed minimum levels held by some physicists to be detectable by biological systems, these exposures translate into a trivial contribution to the 24-hour TWA. Any number of field attributes other than 50-60 Hz peak flux density may also be important, including higher frequency components and the time rate of change.

We have recently measured the fields generated by a number of hand-held personal appliances, such as AC-powered massage units, electric razors and hair dryers, that can contribute to the everyday EMF exposure of individuals who use them. Among these appliances are many models that generate frequency components in the  $10^6$  Hz range, magnetic field flux densities exceeding 1 mT (10 G) at 60 Hz rms, and rates of change far exceeding 1,000 T/sec ( $10^7$  G/sec) measured at the surface of the appliance. Such appliances are used in contact with, or in close proximity to, the body and the resulting induced currents in the body 1) increase as a function of the magnetic field frequency; 2) increase as a function of the flux density at a given frequency; and 3) are proportional to the incident magnetic field time rate of change.

Based on these electrical appliance data, from our and other laboratories, we suggest that certain assumptions implicit in most of the epidemiological work to date should be questioned. These assumptions are 1) that the frequency of residential magnetic fields is exclusively in the 50-60 Hz range with negligible contributions from higher harmonics; 2) that residential magnetic fields are of relatively low flux density—e.g., below 50  $\mu\text{T}$  (500 mG); and 3) that the parameter of interest in determining dose from exposure to these fields is the TWA magnetic field flux density.

Of these assumptions, the first two, if valid, limit the magnitude of the induced electrical fields, and hence the currents, that residential

magnetic fields can produce in biological tissue. While the first two assumptions may indeed be valid as they apply to magnetic fields from power lines near the home, they are not applicable when considering magnetic fields from electrical devices used in close proximity to the body.

There is ample evidence from both laboratory animal and human studies, including applications in clinical medicine (Sharrard, 1990), that episodic or periodic intermittent exposure to magnetic fields of sufficient flux density can give rise to readily measurable physiological effects. In human studies, for example, the effects of exposure on the cardiac interbeat interval (Cook et al., 1992) and on EEG (Lyskov et al., 1993) were more pronounced when subjects were exposed to an intermittent magnetic field as compared with exposure to a steady state field of the same flux density. In hamsters, 15 minutes of exposure to a 60 Hz magnetic field of 0.1 mT (1 G) appears sufficient to delay by two hours or more the subsequent night's periodic rise in the hormone melatonin (Yellon, 1991). Similar effects of short-term exposure have been reported for pulsed DC magnetic fields in the rat model (Lerchl et al., 1991). If considered on a TWA basis over 24 hours, such brief exposures to high flux density fields would fall into the category of "weak" magnetic field exposure—i.e. less than 1  $\mu\text{T}$  (10 mG). Perhaps then, the third of the above assumptions, that TWA best represents dose, should also be reevaluated, because it is clear from the above studies that TWA fails to characterize the relevant exposure parameters for the effects observed.

Other attributes of these exposures that may be important in determining physiological activity include measures of the peak magnetic field ( $B_{\text{max}}$ ), the time rate of change of the magnetic field (dB/dt) and the intermittent nature of some exposures. The TWA is a poor metric for such exposures.

In summary, there is now a great deal of relevant laboratory and human clinical data to support the hypothesis that TWA may not be the best magnetic field exposure metric. The time has come to look beyond the TWA metric in the effort to determine if a causal link exists between EMF exposure and risk of adverse health outcomes, including cancer.

Sincerely,

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## Schools and EMFs: Actions Around the Country

A move to measure and limit power line EMFs at schools is gaining force around the country—in California, Connecticut, Maine, New Jersey and New York. Here is a roundup of the latest developments:

- The **California Department of Education** has set up a task force on EMFs in schools, according to Duwayne Brooks, the department's assistant superintendent for school facilities planning. Brooks told *Microwave News* that the idea was raised by Martha McNeal, EMF program director at Pacific Gas & Electric (PG&E), who said that she had been receiving calls of concern from people in the community. The 20-member task force is made up of parents, teachers and representatives of utilities and state agencies, including the Department of Health Services (DHS). The task force has met three times since it was established in April and plans another session for June 3. At its last meeting, on April 29, the DHS and utility representatives discussed steps to identify schools that are near transmission lines: "This could be the first phase of a larger study which would identify the sources and field strengths... and ultimately provide mitigation protocols," according to the minutes of the meeting. In 1988, the Department of Education set interim guidelines for siting new power lines and schools (see *MWN*, M/J88). They call for minimum distances of 100 feet from a 100-110 kV right-of-way (ROW), 150 feet from a 220-230 kV ROW and 250 feet from a 345 kV ROW.

- Parents, teachers and PG&E officials are considering four alternatives to reduce EMFs at the **Montague Elementary School in Santa Clara, CA**, where a 115 kV power line runs less than 75 feet away. The options include raising the power line poles or burying the lines, according to Marilyn Pope, a concerned parent. Magnetic fields measured between 3.7 and 10.2 mG in the classrooms and up to 16 mG on the playground. Four classrooms have already been closed. A total of five teachers and one janitor have been diagnosed with cancer, but there are no indications that these numbers are abnormal. Pope also said that there are two children in the neighborhood with Wilms' tumors (see p.1). Both live near the same 115 kV power line that runs by the school, which one of the children attends.

- The **Montecito Union Elementary School in Montecito, CA**, has nearly finished a survey identifying the areas where EMFs are between 1 and 2.5 mG, according to Cindy Sage, an environmental consultant based in Montecito. A 2.5 mG limit was set by the school three years ago. The survey is designed to find magnetic field sources and to help determine how they can be reduced and at what cost. The school board has not yet announced whether it will adopt a school EMF task force's recommendation of a 1 or 1.5 mG limit, said Sage, who is a member of the task force. In 1990, the board voted to limit magnetic field exposures in classrooms and play areas to 2.5 mG by relocating playgrounds and marking those sections that had EMF hot spots. A survey at the time showed average fields of 5 to 30 mG along the north side of the school and fields of about 1 mG in most classrooms. Sage said that the fields were due to a combination of interior wiring, a 66 kV overhead power line, several buried power lines and a substation. The task force has asked Southern California Edison, based in Rosemead, to consider moving the substation to a less populated area nearby. In 1989, the DHS identified a group of six children in Montecito with leukemia or lymphoma, four of whom had attended Montecito Union (see *MWN*, M/A90 and S/O90).

- PG&E has agreed to raise and reconfigure a 60 kV line to reduce EMFs near the **Tam Valley Elementary School in Mill Valley, CA**, according to Mike Patrick, business manager of the Mill Valley School District. The project will cost about \$105,000 and will be paid for by

the school district. Administrators had planned to build some new classrooms in between the power line and existing buildings until a parent raised concerns about EMFs. Measurements later revealed magnetic fields of 6.1 mG on a playing field directly below the line and EMFs of up to 1.2 mG in classrooms, Patrick said. The school board considered putting the new classrooms elsewhere, but then decided that it would be easier to modify the power line. There have been no reported health problems at the school, but nearby, a Mill Valley resident whose wife was diagnosed with cancer did an EMF survey of homes in his neighborhood, sensitizing the community to the issue. Along a two-mile stretch of road, he found that "eight out of nine households with high EMF readings also had cancer," according to a feature article by Peter White that appeared in the *San Francisco Examiner's Image* magazine on March 14.

- School officials near **Santa Rosa, CA**, will pay PG&E more than \$20,000 to reconfigure a power line that runs by two elementary schools to reduce EMFs. They are concerned about recent studies that indicate that EMFs "can present a significant health concern," according to Ida Victorson, superintendent of the **Mark West Union Elementary School District**. Between 1982 and 1992, a total of six cases of cancer—three times the expected rate—were reported among students at the three schools in the district, according to DHS's Dr. Eva Glazer, who said that the cancer excess could be due to chance. Victorson stressed that school officials have not drawn a connection between EMFs and cancer at the schools. Two of the three schools in the district are located within 100 feet of a 230 kV power line owned by PG&E. The highest EMF reading in classrooms at the Mark West school measured more than 5 mG, while fields in other classrooms at Mark West and at the other school, San Miguel, were 4 mG or lower, Victorson said. School officials—who are also considering rewiring classrooms at the schools to mitigate EMFs—say they will try to get PG&E to pick up the cost of reconfiguring the line, particularly because it was sited after the schools had been built.

- Utilities in **New Jersey** agreed on April 20 to determine how many schools are within 100 feet of transmission lines of 69 kV or higher, according to the **State Board of Regulatory Commissioners (BRC)** in Trenton. "We've made a good start toward developing a solid base of information that will give us some answers on EMFs and if there is a level of risk to our schoolchildren," said BRC Commissioner Carmen Armenti. The state's four utilities said that they would begin assessing EMF exposures at the schools by early June. In an April 19 letter to Edward Salmon, president of the BRC, Paul Welch, chairman of the Committee for Safe Power Lines in Little Silver, pointed out that restricting the survey to transmission lines operating at 69 kV or above leaves out many schools in the state. Why not "check all schools near high current power lines of any voltage?" he asked.

- Following in the footsteps of **New York State Attorney General Robert Abrams**—who earlier this year got utilities to survey power lines near schools (see *MWN*, N/D92 and M/A93)—**New York City's Community Board No. 2** wants all city schools to be surveyed for EMFs. The board passed a resolution on March 18 asking that "EMF readings be done in *all* schools, day care centers, nursery schools, playgrounds and other facilities where children spend much time, whether or not they are close to power generation and distribution facilities." Meanwhile, the **Voorheesville School near Albany** is setting up a program to reduce EMFs exposures from sources other than power lines, such as VDTs and lights. Earlier this spring, the Niagara Mohawk Power Corp. agreed to remove or reconfigure two power lines within 70 feet of the school.

• On April 15, Maine state Rep. Conrad Heesch— who is active in the citizens group No Thank Q Hydro-Québec, based in Dryden— introduced two bills in an effort to obtain information about, and limit, schoolchildren's exposures to EMFs. But the plans were short-lived. Both measures were tabled by the Committee on Education on May 13. "It was very clear that utilities did not want to be asked by the legislature to do a survey," Heesch told *Microwave News*. But he said

## New Publications from EPA

\* *Electric and Magnetic Fields: An EPA Perspective on Research Needs and Priorities for Improving Health Risk Assessment* (Report No. EPA/600/9-91/016F), December 1992. This 56-page report from EPA's Office of Research and Development concludes that research on cancer, on biophysical mechanisms of interaction and on exposure assessment are top priorities for understanding EMF health effects. Research on the reproductive and nervous systems is assigned a medium priority, while research on immune system effects and control technologies is deemed a low priority. More specific recommendations are provided in the individual chapters of the report. When an earlier version of this document was released to members of the agency's Science Advisory Board in 1991, it drew sharp criticism for being broad and unfocused (see *MWN*, J/A91).

† *EMF in Your Environment: Magnetic Field Measurements of Everyday Electrical Devices* (Report No. 402-R-92-008), December 1992. Published by EPA's Office of Radiation and Indoor Air, this 33-page booklet is a primer on sources of EMF exposures, with tables that list magnetic field levels from dozens of common appliances. The variation of EMF levels among different models of the same type of appliance is striking. For example, magnetic fields measured 6 inches away from various hair dryers ranged from 1 to 700 mG, according to the booklet; measurements taken one foot away from electric mixers ranged from 5 to 100 mG. The EPA does not directly address the question of whether EMFs are, in fact, a health risk. The authors state simply that, "We really don't know if typical, everyday exposures to EMFs affect human health." They also warn that the booklet's focus on field strength may turn out to be misguided: "Future research is likely to reveal that the information given in this publication is only part of the story—that is the chance we take in providing a public information document this early in the study of a complex environmental health issue." The data for the comparisons of EMF levels were drawn from three sources: the September 1992 Interim Report of EPRI's *Survey of Residential Magnetic Field Sources*; a 1984 report prepared by J. R. Gauger of the IIT Research Institute (IITRI) in Chicago; and measurements collected by EPA staff.

† *Questions and Answers About Electric and Magnetic Fields* (Report No. 402-R-92-009), December 1992. This report is designed to "help EPA staff better understand and respond to questions from the public about electric and magnetic fields." The laundry list of questions includes: Are EMFs like X-rays? Why isn't the federal government setting a standard for EMF levels? What are cancer clusters? What is that metal electrical box on the corner of my lot?

\* Available from: EPA, Office of Research and Development Publications Center, Cincinnati, OH 45268, (513) 569-7562.

† Single copies of these reports are available from: EPA, Information Access Branch, Public Information Center, 401 M Street, SW, PM-211B, Washington, DC 20460, (202) 260-7751.

that the utilities have agreed to measure EMFs if a school requests it, and that they would report their findings to the state Department of Education. Legislative Document (LD) 1275 would have required electric utilities to measure magnetic fields at schools within 100 feet of transmission lines operating at 34.5 kV or above. The second bill, LD 1345, would have prohibited the construction of or expansion of a school on property where EMFs measure 2 mG or more.

• A citizens group has formed in Fairfield, CT, to fight the construction of a 115 kV power line that would run past a middle school, a boys and girls club and homes with small children, according to Karen Adams, president of the new organization, ALERT (Alliance to Limit Electromagnetic Radiation Today). People who live near the right-of-way received no notification about the line, which is being built by Northeast Utilities, according to Adams. The company was sued a year and a half ago by two Guilford residents who claim that their brain tumors are due to EMFs from a power line and substation owned by the utility (see *MWN*, J/F92).

• A plan to relocate the Children's Museum of Rhode Island has been put on hold because of concerns about power lines at the proposed site, according to a May 18 article in the *Providence Journal-Bulletin*. Museum officials have begun to "back away" from the plan because of "concerns about the...EMFs generated by the 115 kV power lines," the article states.

## EMF—Childhood Cancer Case (continued from p.1)

The Zuidemas sought compensatory damages of \$136,000 to cover the cost of Mallory's past medical bills and \$50,000 in losses they say they took on the sale of their house. They also asked for an unspecified amount for pain and suffering. The family moved from their San Diego home in 1990 after discovering magnetic fields of 4.5-20 mG. The house sits 15 feet from a 12 kV distribution line and 80 feet from the right-of-way for three 69 kV lines, one 138 kV line and one 230 kV line.

After deliberating for four hours, the jurors voted 11 to 1 that the evidence—as of 1987—linking magnetic fields and childhood cancer was speculative and that the utility therefore had not had a responsibility to warn its customers. The jurors were not asked to resolve the question of causation, because they had cleared the utility on the issue of negligence. They also found, by a 10 to 2 margin, that EMFs from SDG&E power lines did not pose a nuisance on the Zuidemas' property.

Aaron Simon of the Oakland, CA, firm of Kazan, McClain, Edises & Simon, who worked with Withey, explained that the trial turned on two questions: Was SDG&E negligent in failing to warn its customers about the potential health threats of EMFs by January 1987, when Mallory was conceived? And, did EMFs from the utility's power lines cause or promote Mallory's cancer?

During the trial, the Zuidemas' lawyers sought to prove SDG&E's negligence by showing that the utility had recognized that EMFs were a potential health threat. They pinned their argument on an August 21, 1986, report by John Dawsey of SDG&E's environmental affairs department, which concluded, in part: "Although it has not been convincingly demonstrated that either occupational or community exposure to 60 Hz electric or magnetic fields is associated with cancer, the possibility cannot be disregarded and should be seriously considered, given the present data."

According to Withey, "SDG&E had information, but didn't

## Closing Arguments in Zuidema v. San Diego Gas & Electric Co.

Reprinted below are excerpts from the closing arguments in Zuidema v. San Diego Gas & Electric Co. (SDG&E). The court reporter's transcript has been edited for length and clarity.

### Michael Withey, Esq., for Zuidema

After all is said and done, it comes down to basic human decency. We cover our mouth when we sneeze or cough, we tell our spouse or our coworkers I've got a cold, stay away from me. If we are aware of danger, possibility of harm, we warn people, watch out for that swinging door, look out for that pothole in the road. Simple human decency, good old-fashioned values. Caring for others....

So the heart and soul of this case after all the testimony, the blowups, the overheads, the scientific lectures, it all boils down to a simple question. What do you think SDG&E should have done in 1986 by the end of that year based on what they knew or should have known? If you think SDG&E officials should have said something to its customers to let [them] know about the potential risk of power line magnetic fields, then we ask your verdict for negligence and nuisance. But if you think what they did was fine, that's all you would expect from a company, that it was okay for them not to inform their customers about what they knew and had concluded, then your verdict should be for the defense....

It is...undisputed that SDG&E's top EMF scientist reviewed the literature—Mr. Dawsey—on power line [EMFs] and cancer, and he concluded that the possibility that 60 Hz [EMFs are] associated with cancer should be seriously considered and not disregard[ed]....

If Mr. Dawsey believed it should be taken seriously, is it unreasonable for this jury to believe yes, it should have been taken seriously[?]. So the question you have to ask is was it worth taking [the] risk of informing people, perhaps creating some alarm, in exchange alerting people to the nature of the risk, the consequences of which are enormous, as only the Zuidemas know so well....

Was EMF a substantial factor in [the] increase of...IGF-II, Insulin Growth Factor-II, and IGF-II receptors that all experts agree promote Wilms' tumor and nephroblastomatosis[?]. Now, if you find this to be the case, then your verdict should be for the plaintiffs, more probable than not, by a preponderance of the evidence....

And the evidence was also unrebutted that laboratory experiments conducted at the very outstanding Loma Linda University labs where Dr. Ross Adey works and Dr. John Fitzsimmons and Dr. David Baylink work...show the combined magnetic fields of low intensity and frequency...as low as 15 mG, increase both IGF-II and their receptors....

And we recall the testimony that [Mallory Zuidema's] exposure[s] at the 4 to 20 mG levels were higher than many of the exposures in the occupational studies which also showed an EMF cancer link....

What was the defense? First, no Wilms' tumors were shown in any studies. We've dealt with that. They weren't separated out, but they were here. Because the evidence as a whole support[s] that... power line magnetic fields promote childhood cancers.... Secondly, the defendants say that Dr. Beckwith in his National Wilms' Study... has his pulse on Wilms' tumor, and that there is no evidence that power lines increase that risk.... But [Dr. Beckwith]...never asked the question...whether they had lived close to power lines. And never gathered that data. That's what a scientist does, gather data. Not to have opinions based on data they haven't gathered... And then thirdly, the testimony was some vague, loose theory that because power consumption has gone up in the last 15 years, one would expect to see [more] Wilms' tumors and other cancers... Not a single defense witness testified to the key issue of whether increase in power consumption has actually increased the magnetic fields that people are exposed to in their houses....

### Duncan Barr, Esq., for SDG&E

[T]his is a case really about common sense....

...I asked Mr. Withey, what...were the safety guidelines? And he told us 1,000 mG.... The Zuidema home never got over 20 or 22....

...I believe it is very clear that there has never been anything presented to you to suggest that there is some kind of Wilms' tumor [EMF] connection.... Dr. Beckwith told us...there was a higher incidence [of Wilms' tumors]...among African-Americans than there was among whites.... But there was no difference if those people were in Africa or in the [U.S.]. Use your common sense. Where [are] the most [EMFs]?... He said there is no difference...in someone living in the middle of New York City or if they are living out on a farm. The incidence is still the same.... If there was any relation with [EMFs] and Wilms' tumor, you would never find that kind of data. Never....

But the most important aspect of this, ladies and gentlemen...is when we have to warn.... There is no duty to warn of potential health effects if it is based upon scientific and medical evidence which is speculative, conjectural or tentative....

...Not a single [epidemiological] study or word about 60 Hz and under 50 mG in magnetic fields, not one ever came to the conclusion that somehow or another there was this health risk....

We have...all of these depositions.... They were taken all over the [U.S.].... Where is Dr. Savitz? Where is Wertheimer? Where is Leeper? Peters and London are in Los Angeles. Mr. Withey talked to you about Ross Adey... Where are they?... [T]he plaintiffs, even if [any of these people] wouldn't come here to testify, could have taken their deposition[s] under oath....

The Zuidemas didn't do anything wrong. They got drawn into this thing as unfortunately as anybody could be drawn into anything.... If you believe... what... these lawyers are telling you—and... they have a very, very great interest in winning this case—if you believe what they are saying, then this is the worst conspiracy that this country has ever seen. It involves hundreds of public health agencies. It involves thousands of utility companies. It involves the World Health Organization. It involves hundreds, if not thousands, of universities. It involves thousands of scientists and medical doctors. It involves consumer organizations such as Ralph Nader and others. Because [none] of these entities... has ever suggested that there be a warning....

...It is what would the reasonable person, in this case, the reasonable utility company, knowing what it knew, having the information it had, what would it have done or not done. No one else in the world did this. And don't let Mr. Withey say this is the only people who had this information. All of his BEMS and BRAGS people had it.... And not anyone anywhere has ever suggested that a Wilms' tumor was affected by [EMFs]. No one has come to the conclusion that is more than tentative or conjectural... that EMFs have something to do with health effects. The only people in the world that have suggested that are these three lawyers and [their] hired guns....

Use common sense. That's all I ask you to do. [SDG&E] is as much a part of this community as your police department, your fire department, your blood bank and your general hospital. It is a community asset. And if you are going to be asked to vilify them... to call them people who don't care about the death of small children, it needs to be done in a way and with evidence that is more powerful and more convincing than the scraps and bits and pieces that have been presented to you, and you should have heard from the people who wrote the studies if, in fact, these studies showed anything....

## ***The Expert Witnesses and Their Fees\****

### **For *Zuidema*:**

Abraham Liboff, PhD	Oakland University, Rochester, MI	\$1,750/day
Bruce McLeod, PhD	Montana State University, Bozeman	\$1,750/day
Samuel Milham, MD, PhD	Retired, Washington State Department of Health, Olympia	\$1,500/day
David Ozonoff, MD	Boston University School of Public Health, Boston, MA	\$400/hour
Wayne Spruce, MD	Children's Hospital, San Diego, CA	\$500/hour
Peter Wright, MD	The Poly Clinic, Seattle, WA	\$350/hour

### **For *SDG&E*:**

Bruce Beckwith, MD	Loma Linda University, Loma Linda, CA	\$200/hour
Dan Bracken, PhD	T. Dan Bracken Inc., Portland, OR	\$130/hour
John Graham, MD	Cedars-Sinai Medical Center, Los Angeles, CA	\$350/hour
Seymour Grufferman, MD, PhD	University of Pittsburgh School of Medicine, Pittsburgh, PA	\$350/hour
Robert Olsen, PhD	Washington State University, Pullman	\$150/hour
Vikas Sukhatme, MD, PhD	Harvard University Medical School, Boston, MA	\$225/hour

*\* The number of hours billed by each witness was not readily available.*

act on it. They have a duty to warn if they have information on potential risk." At the trial, Barr said that the utility did act on Dawsey's report by continuing to study the problem. He argues that, even today, the evidence linking power line EMFs and cancer is tentative. (For excerpts of the lawyers' closing arguments, see box at left.)

A separate but related dispute between Trial Lawyers for Public Justice (TLPJ) and the Electric Power Research Institute (EPRI) has been put on hold, according to Simon, who is a member of TLPJ. During the discovery phase of the Zuidema case, TLPJ asked for the release of documents that demonstrate that EPRI, which is funded by utilities including SDG&E, had tried to avoid sponsoring studies that would show an EMF health risk (see *MWN*, N/D92). As far as EPRI is concerned, however, the case is closed, according to spokeswoman Barbara Klein. Judge Ben Hamrick of Judicial Arbitration & Mediation Services Inc. in San Diego granted, with certain exceptions, EPRI's request for a protective order to shield its documents. Simon said that the issue would be pursued in future litigation—either by the Zuidemas, if they appeal, or in the next EMF case.

On the issue of whether EMFs from SDG&E's power lines had caused or promoted Mallory's cancer, Withey said that the Zuidemas' lawyers' "ability to argue causation depended largely on the admissibility of evidence on EMF health effects." California Superior Court Judge Judith Haller ruled that, according to her interpretation of state laws governing "hearsay," expert witnesses on both sides of the case could not discuss the conclusions of studies that were published after January 1987, except during cross-examination. Withey noted that many of the post-1987 studies—especially the 1992 Swedish reports (see *MWN*, S/O92)—are the most compelling in establishing an EMF-cancer link.

Dr. Abraham Liboff, a biophysicist at Oakland University in Rochester, MI, who testified on behalf of the Zuidemas, said that his "views on magnetic fields and cancer were never expressed properly at the trial because of the unique filtering process mandated by the judge."

But SDG&E's Barr said that he, too, was hurt by the judge's restrictive order, noting that his expert witnesses were not allowed to cite studies that refute an EMF-cancer association. He added that, even though jurors had not been asked to rule on

the cause of Mallory's illness, "if they had determined for one minute that power lines had a role...they would have nailed us."

The Zuidema case was closely watched by lawyers across the country because it was the first EMF-cancer lawsuit to go to trial and it has the potential to set a precedent for future litigation. Tom Watson of the Washington firm of Crowell & Moring, which represents the vast majority of utilities in EMF cases, said in a telephone interview that he was not surprised by the jury's verdict and added that plaintiffs' lawyers "should take the ruling as a message."

Dixon Montague of the Houston firm of Vinson & Elkins also was not surprised by the decision, but he interpreted it differently: "The Zuidemas lost because they were confined to the facts available before 1987—not to what is known today." Montague won a lawsuit against Houston Lighting & Power in 1985, forcing the utility to remove a high voltage transmission line from school property at a cost of \$8.6 million (see *MWN*, N/D85 and J/A88).

In a statement released after the trial, the Edison Electric Institute in Washington argued that, "The issue of whether there are adverse health effects from electric and magnetic fields should be resolved in the laboratory and not in the courtroom."

Lawyers for SDG&E predicted that the case will not change the way industry handles the problem of EMFs. "SDG&E will continue to [fund] EMF research, while communicating openly with its customers," said Greg Barnes, an SDG&E attorney. The utility is reported to have spent more than \$2 million defending the Zuidema case, but Art Larson, a spokesman for the company, said that he could not confirm this amount. (A list of expert witnesses on both sides of the case and their fees appears above.)

But the Zuidemas' attorneys, who see the case as the beginning, rather than the end, of EMF personal injury litigation, said that the body of evidence linking EMFs and cancer is growing, and that it is only a matter of time before a jury finds it compelling. "The burden is on utilities now to prove there isn't an association [between EMFs and cancer] and the public is going to put them to the test," said Frederick Schenk of the San Diego firm of Casey, Gerry, Casey, Westbrook, Reed & Schenk, local counsel for the Zuidemas.

The Zuidemas have 60 days from the time Judge Haller enters the judgment to appeal.

enhancing the production of IGF-II with the application of EMFs in order to accelerate bone healing. Baylink is credited as the "inventor" on the EMF-IGF-II patent.

"If IGF-II is required for promotion of a tumor, then logically anything that increases IGF-II could lead to the promotion of that tumor," Dr. Robert Fitzsimmons, a member of Baylink's lab, said in an interview.

Dr. Vikas Sukhatme of Harvard Medical School in Boston, another of SDG&E's expert witnesses, told *Microwave News* that three factors undermine the EMF-IGF-II-Wilms' link: (1) kidney cells are very different from bone cells; (2) a 15.3 Hz signal is different from the fields associated with 60 Hz power lines; and (3) the EMF effect on IGF-II is relatively small—a twofold increase compared with the up-to-tenfold increase identified in patients with Wilms' tumors. Overall, Sukhatme said that he was "very, very skeptical" about the EMF link to Wilms: "To extrapolate from the data we have now is way out." He made similar points while testifying at the Zuidema trial.

Dr. Jim Ryaby, the director of research at OrthoLogic Corp. in Phoenix, which has the exclusive rights to Baylink's patent, is also skeptical: "The translation of findings in the bone system to any potential activation of abnormal cellular growth in other systems like the kidney is extremely speculative."

And Baylink himself feels there is little justification for the EMF-IGF-II-Wilms hypothesis. "It's a big jump to even suggest there is a cancer link," he said in an interview. Fitzsimmons is wary about extending his laboratory findings to environmental EMFs. "It's hard enough to get reproducible results under controlled conditions," he said.

On the other hand, Dr. Abe Liboff of Oakland University in Rochester, MI, who testified on behalf of the Zuidemas, believes that the IGF-II link has merit. "IGF-II not only plays a role in normal growth, but its overexpression has been linked by different investigators to a variety of different cancers, including

brain and breast tumors," he said in an interview.

Liboff did not testify on the IGF-II link even though Fitzsimmons had tuned his exposure system to meet conditions of ICR, a technique Liboff has long championed for boosting biological activity. Dr. Peter Wright, a consultant for the Zuidemas, did address IGF-II on the witness stand, as well as IGF-II receptors. The receptors are important because, last year, Fitzsimmons presented a paper<sup>3</sup> in which he reported that 15.3 Hz fields could increase IGF-II receptors, without mentioning elevated IGF-II levels. The first direct reference to IGF-II appears in the March 1993 patent.

As Sukhatme explained under cross-examination at the Zuidema trial, IGF-II receptors and IGF-II "are two different molecules, two different genes, two different chromosomes. We're talking apples and oranges. One is the lock, one the key. The key is the IGF-II molecule, the lock is the IGF-II receptor."

When asked about the IGF-II results outlined in the patent, Aaron Simon, another attorney representing the Zuidemas, said: "Would this information about IGF-II have been helpful? Certainly. Would it have made a difference at the trial? I don't know."

1. A.E. Reeve et al., "Expression of Insulin-Like Growth Factor-II Transcripts in Wilms' Tumor," *Nature*, 317, pp.258-260, 1985, and J. Scott et al., "Insulin-Like Growth Factor-II Gene Expression in Wilms' Tumor and Embryonic Tissues," *ibid.*, pp.260-262.

2. *Method for Increased Production of Growth Factor in Living Tissue Using an Applied Fluctuating Magnetic Field*, U.S. Patent No.5,195,940, March 23, 1993.

3. R.J. Fitzsimmons et al., "EMF-Stimulation Increased IGF-II Receptors in Bone Cells," paper P-233, presented at the *First World Congress for Electricity and Magnetism in Biology and Medicine*, June 14-19, 1992, Lake Buena Vista, FL. Previously the group had reported an IGF-II effect induced by a capacitively coupled electric field, see: R.J. Fitzsimmons et al., "Low-Amplitude, Low-Frequency Electric Field-Stimulated Bone Cell Proliferation May in Part Be Mediated by Increased IGF-II Release," *Journal of Cellular Physiology*, 150, pp.84-89, 1992.

## HIGHLIGHTS

### **MW Technician Awarded \$2 Million in Default Judgment**

A technician whose eyesight was damaged by microwave (MW) radiation from an illegal satellite transmitter has won a \$2 million judgment—but collecting the money could prove difficult. The defendant in the case, Multicomm Telecommunications Inc., has declared bankruptcy, forcing attorneys for the injured technician to look to Multicomm's parent company, the Amway Corp., and its insurers for payment.

Keith Angstadt, an employee of Mutual Broadcasting System Inc., based in Arlington, VA, was injured on May 31, 1990, when, during the course of routine rooftop maintenance work, he was accidentally exposed to 6 GHz microwaves from a satellite uplink. Angstadt's lawyers filed suit, charging that Multicomm, located in Salt Lake City, and its president, Raymond Rask, who installed the device, were responsible for Angstadt's eye injuries (see *MWN*, N/D92). At the time of the incident, Rask was also a vice president of Amway.

On April 28, Arlington County Circuit Court Judge Benjamin Kendrick ruled that the defendants were liable, but the finding was by default because Rask had previously failed to show up for court dates and provide information Angstadt's lawyers had requested during discovery.

At a May 4 hearing on Angstadt's compensation, Kendrick granted him \$350,000 in punitive damages—the maximum under Virginia law—and \$1,650,000 in compensatory damages. Less than two weeks later, in an effort to collect the money, attorneys for the technician filed a claim against Amway, which is based in Ada, MI.

Angstadt's lawyers, Roy Mason and Natasha Wesker of the Baltimore firm of Mason, Ketterman & Morgan, told *Microwave News* that the May 4 hearing took place under "highly unusual" circumstances. They explained that the defendants' lawyer, John McGavin of the Fairfax, VA, firm of Lewis, Trichilo, Bancroft and McGavin, withdrew as counsel midway through the hearing, and that Rask did not return for the afternoon session, leaving no one to defend the suit. Kendrick made the damage awards after hearing about six hours of arguments from

Angstadt's lawyers, Mason said.

So far, representatives for Multicomm and Amway have remained silent. McGavin, who had represented Rask and Multicomm on behalf of Multicomm's insurer, the Atlantic Mutual Insurance Companies, headquartered in Madison, NJ, declined to comment, as did Bert Hultink, legal counsel for Amway.

In addition to the claim against Amway, which was filed on May 17 in federal court for the eastern district of Virginia, Mason and Wesker said that they also might file lawsuits against the National Union Fire Insurance Company of Pittsburgh and Atlantic Mutual, which sold policies to Amway in the amounts of \$23 million and \$1 million, respectively. Multicomm, as an Amway subsidiary, was covered by both policies, Mason charged.

In the original suit, filed on January 22, 1992, Angstadt's lawyers charged that Rask and Multicomm had "acted with reckless disregard for the safety of others" when they illegally converted a receiving antenna into a "dangerous" transmitter. They said that Rask had used a faulty waveguide, which caused "hazardous levels of microwave radiation to leak." Rask rigged the device after Multicomm was denied a permit by the Federal Communications Commission, which was concerned that the proposed antenna might interfere with the Pentagon's transmitting equipment.

Doctors at the Johns Hopkins University medical school's Wilmer Institute in Baltimore, who examined and treated Angstadt after the accident, determined that the retinas of his eyes had sustained 5 mW/cm<sup>2</sup> of continuous wave radiation for two 15-minute periods. They said that he had "suffered more microwave exposure than any human being ever studied by scientists," according to Mason. Angstadt is now color-blind and lacks night vision (see *MWN*, S/O91).

Expert witnesses who submitted depositions on Angstadt's behalf included: Dr. Burton Edelson of George Washington University in Washington, Dr. Stuart Fine of the Scheie Eye Institute in Philadelphia, David Janes of Risk Analysis in McLean, VA, and Mary Johnson and Henry Kues, both of the Wilmer Institute.

Dr. Bill Guy, a consultant based in Seattle, and Dr. Budd Appleton, a consultant in St. Paul, MN, had been scheduled to provide testimony for the defendants, Mason said.

Other defendants named in the original suit—including the landlord of the building where the accident occurred and the manufacturer of the equipment—were dropped from the case before the trial by Angstadt's lawyers because they "weren't really the culprits," Mason said. Amway had also been excused from the list but was named again in the recent collection efforts.

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## NAS-NRC Finds GWEN Poses Minimal Public Health Risk

The U.S. Air Force's (USAF) Ground Wave Emergency Network (GWEN) poses a "minimal or nonexistent" public health risk, according to a new report by the National Research Council (NRC), an arm of the National Academy of Sciences (NAS) in Washington.

The NAS-NRC's GWEN committee, which was chaired by Dr. Thomas Tenforde of the Battelle Pacific Northwest Labs in Richland, WA, estimated that "the excess risk of cancer...associated with exposure to GWEN fields is less than one additional death over a 70-year period for persons living within 10 km of the entire system of GWEN sites."

The GWEN communications system is designed to withstand the electromagnetic pulse (EMP) from a nuclear explosion. If and when completed, it will consist of about 86 ground stations across the country operating at 150-175 kHz—each with a peak output power of approximately 2,000-3,200 W. In standby mode, the transmitters would only broadcast 1% of the time.

The committee took a novel approach to assess GWEN risks because there was too little data on radiofrequency (RF) radiation health effects to do a "traditional" assessment. The upper bound risk— $3.6 \times 10^{-6}$  excess cancer cases per year—was calculated by extrapolating from the "basically negative" reports among those living near radio and TV antennas. "Our working hypothesis was that the public health surveillance system would detect a doubling of background cancers if there was a cancer risk" from RF radiation, Tenforde told *Microwave News*.

Committee member Dr. Michael Ginevan, a biostatistician with Step Five Corp. in Washington, said that the twofold worst case risk estimate "seemed reasonable." He added that he and the two epidemiologists on the committee, Dr. Jan Stolwijk of Yale University in New Haven, CT, and Dr. Maureen Henderson of the Fred Hutchinson Cancer Research Center in Seattle, favored a range of 1.5 to 3.

Other epidemiologists told *Microwave News* that they were skeptical that the health surveillance system would detect a twofold excess in the absence of a detailed study. "I'm not sure what it would take, but the increase would have to be pretty obvious—say tenfold," said Dr. Raymond Neutra, the acting chief of the California Department of Health Services' Environmental Health Investigations Branch in Emeryville. "I've given a lot of thought to this issue because of the Sutro Tower situation," he added. A few years ago, elevated cancer rates were identified in San Francisco neighborhoods near the tower, from which the city's TV and FM radio stations broadcast (see *MWN*, M/A89). Similarly, Dr. Tim Aldrich, the director of North Carolina's Cancer Surveillance Unit in Raleigh, said that, "It takes a hefty increase to be picked up." He guessed that only a fivefold or greater excess would be routinely detected.

There are almost no epidemiological studies of people living in the shadow of radio and TV stations. Indeed, the committee noted that this lack of data is "surprising" and argued that such studies would be a good investment. One exception, a 1987 study by the Hawaii Department of Health that found higher than

## HIGHLIGHTS

expected rates of cancer among Honolulu residents living near broadcast towers (see *MWN*, M/J87), was discounted as "very weak" by the committee. Tenforde said that the committee had asked a number of European radio stations, broadcasting in the 154-234 kHz band, about possible health impacts and had not heard of any problems.

The GWEN risk assessment was quite controversial within the academy, and the release of the report was delayed for months. "Many more rounds of reviews were needed than first anticipated because of the approach taken in the risk chapter," said Dr. Keith Florig of Resources for the Future in Washington, who served on the committee. The delays were prompted by concerns that the report might imply a health risk from radio and TV antennas, according to knowledgeable sources. In a December 30, 1992, letter to the USAF, NRC Chairman Dr. Frank Press wrote: "We urge that readers keep in mind that the committee does not assign risk to exposure from commercial broadcast installations."

The NAS-NRC report was requested in 1990 by Reps. Lewis Payne (D-VA) and Les Aspin (D-WI); the USAF was barred from continuing to build the GWEN system until it was completed (see *MWN*, M/J90 and N/D90). Aspin is now Secretary of Defense and will decide the fate of the program. On March 31, 1993, Rep. Barney Frank (D-MA) introduced H.R. 1555, which would force the secretary to terminate the GWEN system.

Last year, there were suspicions that GWEN signals were causing EMI (see *MWN*, N/D92). In 1987, the USAF issued draft and final environmental impact statements for GWEN (see *MWN*, M/J87 and N/D87).

Copies of the report, *Assessment of the Possible Health Effects of Ground Wave Emergency Network*, are available for \$33.00 each, plus \$4.00 for shipping, prepaid, from: National Academy Press, 2101 Constitution Ave., NW, Washington, DC 20418, (202) 334-3313 or (800) 624-6242.

## Scientists Tackle Taos Hum

A low-frequency humming "sound" has been annoying many residents of Taos, NM, for more than two years. Some people who hear it complain that it causes headaches, sleeplessness and irritability. Others say they cannot hear it but can feel it. No one, it seems, knows what it is.

At the request of Rep. Bill Richardson (D-NM), a team of researchers—from the University of New Mexico (UNM) in Albuquerque and from Sandia National Laboratories, Los Alamos National Laboratory and Phillips Laboratory at Kirtland Air Force Base—has begun an intensive effort to identify the hum. In late May, eight of the scientists went to Taos in an attempt to measure or to record the phenomenon.

"So far, we have no best guess," explained Sherry Robinson, who edits *Quantum*, UNM's research magazine, and who accompanied the researchers to Taos. "We're still calling it a 'sound,' but that's mostly because no one knows what to call it," Robinson told *Microwave News*. In fact, sound waves have now been all but eliminated, she said. The researchers set up a sophisticated microphone where the hum could be detected, but they noticed nothing unusual. "We are left with electromagnetic radiation and seismic disturbances," Robinson said. The data col-

lected are still being analyzed, and a preliminary report is expected by the end of June.

The team may have identified the frequency of the hum. Using a signal generator and a speaker, they re-created it for Bob and Catanya Saltzman, Taos residents who can hear the hum and who have accused the military of causing it. The researchers slowly lowered the frequency to find where it sounded the most like what the Saltzmans hear. At around 70 Hz, Catanya said, "That's it," according to Robinson. Bob picked 64 Hz. Another person who can hear the hum said that the re-creation sounded right at 32 Hz, which, Robinson noted, is a subharmonic of 64 Hz.

The Taos hum may not be unique. Similar complaints about low-level sounds have been investigated in the U.K. since the 1970s, members of the research team noted.

Press reports have suggested everything from equipment at the local sewage treatment plant to the Second Coming as possible explanations. *Newsweek* (May 3) raised the theory that slow movement along an earthquake fault could produce a steady, grinding hum. Other publications have cast suspicion on power lines and weapons testing. Bob Saltzman told the *Taos News* (February 25) that he suspects government experiments with infrasound used as a nonlethal weapon or as a way to track stealth aircraft.

Richardson was the first government official to point a finger at the military. At a February 22 town meeting in Taos, he said a Department of Defense (DOD) project—probably an Air Force project—was the likely source of the noise. In March, Sen. Pete Domenici (R-NM) asked Defense Secretary Les Aspin whether any DOD project could be responsible. John Deutch, an under secretary of defense, responded. "My staff has reviewed our defense activities in this area and has concluded there is no program, classified or not, which would cause this hum," Deutch wrote in an April 5 letter to Domenici. Deutch was no less unequivocal at a public briefing on May 12.

Richardson sticks by his accusation. "It is still appropriate to consider the federal government, particularly DOD and the Department of Energy, as suspects," said Richardson's press secretary, Stu Nagurka. He noted that Richardson had initially heard a rumor that a classified DOD project was responsible for the Taos hum and had asked the staff of the House intelligence committee, on which he serves, to investigate. "Some information reached the congressman that DOD is a likely culprit," Nagurka said, adding that several individual projects were raised as possibilities.

At the Taos town meeting, Richardson cited a radar testing facility at Kirtland Air Force Base and low-flying helicopters or airplanes as possible sources of the hum. Nagurka told *Microwave News* that other DOD projects are also candidates but that he could not provide any more details. *Newsweek* noted that the Navy uses extremely low frequency (ELF) radiation for submarine communications. One such system, known as Project ELF, operates at 72-80 Hz, with transmitters in Wisconsin and Michigan (see *MWN*, Mr84 and J/F90).

UNM's Robinson said that the investigation "is an earnest and good faith effort. The scientists involved consider it a personal and professional challenge." She maintained that no source had been ruled out. "DOD can't say 'It's not us,' when nobody knows what it is," she concluded.

## The RF Problem

Non-ionizing electromagnetic radiations from radar, television transmitters, communication systems, microwave ovens, industrial heat treatment systems, medical diathermy units and many other sources permeate the modern environment. There is increasing anxiety that even at relatively low power densities, these radiations can affect biological organisms adversely. Since 1940 the growth in radiation sources has been phenomenal, and is continuing at an accelerated rate.

The EPA could have introduced its recent *Radiofrequency (RF) Radiation Conference*<sup>1</sup> with this warning. Actually, it was issued by a White House advisory committee, known as ERMAC,<sup>2</sup> more than 20 years ago in a call for a national research program on RF radiation risks. The research never was done and today we are paying the price.

If RF technology "permeated" the environment in 1971, how do we describe what is going on now? Back then, there were no cellular phones, no personal computers, no MRIs, and far fewer radars, microwave ovens and satellite uplinks. The wireless revolution will add to the RF smog as pocket phones proliferate and as computers and fax machines are fitted with radio transmitters.

Public anxiety has grown along with RF technology. Years of siting battles over broadcast antennas, cellular phone towers and weather radars—and the escalating power line controversy—have made EMFs and RF radiation the objects of a national phobia. Concerns over police radar and hand-held cellular phones are the latest to emerge.

Larry King showed how deep the fear runs when he put David Reynard on television and cellular phone health risks became front-page news from coast to coast. For the moment, Motorola and McCaw have dispelled fears of brain tumors with categorical, if insupportable, assurances of safety.

What must be done? Practically everybody at the EPA conference urged the adoption of an RF standard to counter public mistrust. Janet Healer of the National Telecommunications and Information Administration—a charter member of the ERMAC committee—put it most succinctly: "It's imperative for EPA to act; even something on a 3 by 5 'Post-It' would be helpful."

Most of those begging for a national standard are really asking the EPA to adopt the 1992 ANSI/IEEE RF guidelines. But Dr. Samuel Koslov, another member of the ERMAC committee, who recently retired from the Johns Hopkins University Applied Physics Lab, cast doubt on that approach. "The problem is that we are dealing with something we don't know much about," he said at the close of the first day of the conference. "The real issue is not whether EPA should set a standard, but whether EPA will produce the research that will allow for a standard."

The EPA has never endorsed the ANSI standard over the last 20 years. Marty Halper, director of EPA's radiation studies division, banned his staff from taking part in the most recent revision. "The group did not deal with all the data—specifically the nonthermal effects," he told us during a break at the conference. "As long as the public sees the ANSI/IEEE committee as being biased, its usefulness is limited," he said.

Clearly, some do see indications of bias. Dr. Mary Ellen O'Connor of the University of Tulsa, OK, president-elect of the Bioelectromagnetics Society and another ERMAC alumna,

questioned the way certain papers that show health effects below the threshold deemed safe by the ANSI/IEEE committee were ignored: "Is it really because these studies have not been replicated? Is it really because the studies have not been published? Why is it that if a study falls below that [threshold], it is called 'interesting and in need of further work'?"

EPA's Dr. Joe Elder projected a list of six<sup>3</sup> of these "interesting" studies under the title "Unresolved Issues." They raise disquieting questions as to whether RF can affect cancer, pregnancy, vision and behavior. Most of these findings are years old, yet no one explained why they have not been repeated or refuted.

The reason is, as always, the lack of research funds. A good example of the sorry state of RF research is an Army investigation into the effects of lead poisoning on the reproductive health of artillery crews.<sup>4</sup> To the Army investigators' surprise, the control group selected for the study had lower sperm counts than those exposed to lead. It turned out that the controls had been exposed to RF at microwave frequencies. Thus, through blind luck, the Army did what practically no American had ever done: an RF epidemiological study, albeit a small one. The study passed unmentioned at the EPA conference—primarily because no one had heard of it.

Can a standard that leaves so many unanswered questions gain public credibility? It cannot, and therein lies the heart of the RF problem. The most potent criticism of the ANSI/IEEE standard is coming from the military. At last summer's World Congress, an Army colonel cast doubt on the adequacy of the standard. And more recently, an internecine feud has been brewing between two factions of the Air Force over the need to recognize nonthermal effects, which the ANSI/IEEE committee largely ignored in its guidelines. If the military can find fault with the standard, imagine what a motivated advocacy group could do with a little technical and legal expertise.

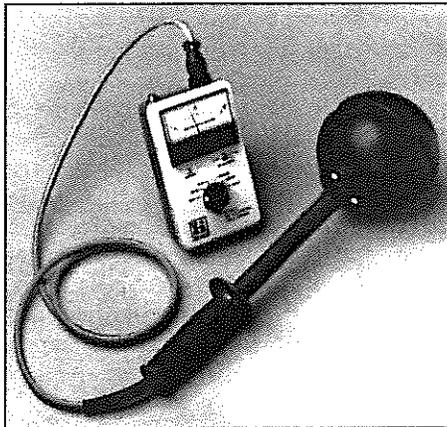
The cellular communications companies escaped serious harm last winter, but they and other RF users may not be so lucky the next time. And there will be a next time. The only way to quell the public's growing distrust is to answer the obvious question: What is a safe level of RF exposure?

1. Environmental Protection Agency (EPA), *Radiofrequency Radiation Conference*, April 26-27, 1993, Bethesda, MD. In this context, RF includes the microwave radiation band and covers 10 kHz-100 GHz.

2. Electromagnetic Radiation Management Advisory Council (ERMAC), *Program for Control of Electromagnetic Pollution of the Environment: The Assessment of Biological Hazards of Non-Ionizing Electromagnetic Radiation*, December 1971.

3. C.K. Chou et al., "Long-Term, Low-Level Microwave Irradiation of Rats," *Bioelectromagnetics*, 13, pp.469-496, 1992; H.A. Kues et al., "Increased Sensitivity of the Non-Human Primate Eye to Microwave Radiation Following Ophthalmic Drug Pretreatment," *Bioelectromagnetics*, 13, pp.379-393, 1992; H. Lai, "Research on the Neurological Effects of Non-Ionizing Radiation at the University of Washington," *Bioelectromagnetics*, 13, pp.513-526, 1992; L.G. Salford et al., "Permeability of the Blood-Brain Barrier Induced by 915 MHz Electromagnetic Radiation, Continuous Wave and Modulated at 8, 16, 50 and 200 Hz," *Bioelectrochemistry and Bioenergetics*, 30, pp.293-301, 1993; S. Szmigielski et al., "Accelerated Development of Spontaneous and Benzopyrene-Induced Skin Cancer in Mice Exposed to 2450 MHz Microwave Radiation," *Bioelectromagnetics*, 3, pp.179-191, 1982; S. Tofani, G. Agnesod and P. Ossola, "Effects of Continuous Low-Level Exposure to

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Radiofrequency Radiation on Intrauterine Development in Rats," *Health Physics*, 51, pp.489-499, 1986.

4. T. Weyandt, *Evaluation of Biological and Male Reproductive Function Responses to Potential Lead Exposures in 155 mm Howitzer Crewmen*, Fort Detrick, Frederick, MD: U.S. Army Biomedical Research & Development Laboratory, Technical Report 9124, 136 pp., January 1992.

## UPDATES

### COMPATIBILITY AND INTERFERENCE

**Rethinking PEDs in Aircraft...**In mid-May, the largest U.S. carrier, American Airlines, finalized new rules that will prohibit passengers' use of all portable electronic devices (PEDs), including laptop computers and CD players, aboard aircraft that are below 10,000 feet. "This essentially covers takeoffs and landings," airline spokesman Tim Smith told *Microwave News*. In addition, the use of devices that are designed to transmit or receive signals—including cellular phones, AM and FM radios and portable televisions—will be prohibited at all times after a plane has left the gate. While this part of American's policy is not new, it had been "somewhat vague," Smith said. The new restrictions will be worked into the airline's operating procedures by July. Many airlines have been reexamining their policies on PEDs in the wake of press reports early this year about disruptions of airplane navigation and communications systems due to the in-flight use of PEDs (see *MWN*, M/A93). Meanwhile, a newly formed committee of the Radio Technical Commission for Aeronautics (RTCA), which is based in Washington, has begun the task of reevaluating the risk posed by EMI from PEDs. Since an earlier RTCA panel completed a thorough report on this issue in 1988, the new group, Special Committee (SC) 177, will focus on consumer electronics introduced in the last few years and will "determine testing criteria to be applied to PEDs so that they can be carried on board aircraft," according to the minutes of the group's first meeting. The panel will also consider newer aircraft technologies, such as electronic flight instrumentation, said SC177's chairman, John Sheehan of Phaneuf Associates Inc., an aviation consulting firm in Washington. Sheehan has been retained by the Cellular Telecommunications Industry Association to work for more liberal rules concerning cellular phone use aboard airplanes while on the ground. Frank White, chairman of the earlier RTCA committee, said that the proliferation of PEDs in the last five years justifies a new study. He pointed out, for example, that portable CD players—which have been mentioned often in the recent reports of airplane EMI—were just hitting the market when his panel completed its work. Harold Moses, RTCA's assistant technical director, added that, "The questions [about EMI] have persisted since the first report was issued." He also said that the FAA did not take up the earlier committee's recommendation that the use of PEDs not be allowed during takeoffs and landings (see *MWN*, N/D88). The FAA left the ultimate authority for regulating PEDs with the airlines—a responsibility they now say they do not want. American's Smith explained that the airline industry favors uniform rules on the use of PEDs. SC177 has met four times so far this year and is scheduled to have an interim report available for the FAA by October. A final report should be completed by mid-1994, Moses said.

EMP

**Effects on Medical Devices...** Many types of electronic medical equipment would be damaged by an EMP from a single nuclear bomb detonated more than 1,000 miles away, but most of these devices can be protected by taking simple precautions, according to two recent papers in *Military Medicine*. Commander Robert Vandre of the Walter Reed Army Medical Center in Washington, working with Janie Blanchard of Bechtel in San Francisco, Janis Klebers of JKL Associates in Springfield, VA, and Dr. Frederick Tesche, a consultant based in Dallas, tested seven different obsolete devices with pulses ranging from 10 kV/m to 100 kV/m at the Army's AESOP (Army EMP Simulator Operations) facility at the Harry Diamond Labs in Woodbridge, VA. At 100 kV/m, four units were immune, while an electrocardiograph failed—and an electrosurgical unit failed at 42 kV/m. A respirator exposed to 100 kV/m “would sigh once and then continue normal operation,” according to the research team. But, when the devices were unplugged, they all escaped unscathed. The vulnerability of newer types of equipment, which have more electronic circuitry and are therefore at greater risk from EMI, was estimated with computer models. The researchers found that approximately 65% of 17 types of devices would be damaged or destroyed by a nuclear EMP. In a second paper, they outline specific measures, which, they argue, would allow approximately 88% of unplugged equipment to survive an EMP. In 1989, the American Medical Association recommended that EMP-resistant medical devices be developed (see *MWN*, J/A89). Vandre and coworkers' papers, “Electromagnetic Pulse (EMP), Part I: Effects on Field Medical Equipment,” and “Part II: Field-Expedient Ways to Minimize Its Effects on Field Medical Treatment Facilities,” appear in the April and May 1993 issues of *Military Medicine*, 158, pp.233-236 and pp.285-289, respectively. (For more on U.S. Army contracts on the effects of EMP on medical devices, see *MWN*, J/F86 and J/A87; for more on the effects of other types of EMI on medical devices, see *MWN*, N/D85, M/J88, S/O88, M/A90 and J/A91; for more on EMP safety at Army labs, see *MWN*, M/J90.)

INTERNATIONAL

**Cancer Cluster in Sweden...** Ten cases of cancer have been reported among employees at the mechanical engineers' building at Lund University in Lund, Sweden. Dr. Leif Floberg, a professor at the university, attributes the cluster to EMFs. Magnetic fields in the building's restaurant were as high as 400 mG, while EMFs in the library were 50 mG, Floberg told *Microwave News*. Maximum magnetic fields in lecture rooms and laboratories ranged between 8 and 46 mG. Floberg said that four of the ten people had died, and that, of these, three had been exposed to “high magnetic fields” from equipment that emitted EMFs—but, he added, there are no precise estimates for their exposures. More than 160 people work in the mechanical engineers' building. Floberg calculated that there should be one case of brain cancer every 60 years in the building; instead, there is one case each year. Power lines and electrical equipment in the basement of the building are the sources of the high EMFs, Floberg said. He recommended that this kind of electrical equipment be

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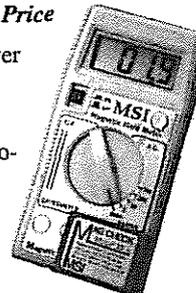
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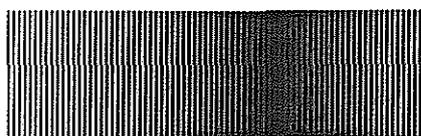
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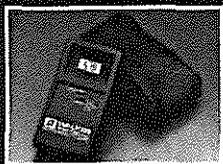
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"moved outdoors at an acceptable distance from the building." Last year, a Swedish electrical worker won a workers' compensation claim that attributed his brain tumor to on-the-job exposures to EMFs (see *MWN*, N/D92). Three cancer clusters among office workers have been under investigation in the U.S. (see *MWN*, M/A93).

**MEETINGS**

**Circle of Friends...**In 1990, a number of Bioelectromagnetics Society (BEMS) members who had become increasingly disenchanting with the organization's policies got together in an effort to make their opinions known. The group, which calls itself the "Circle of Friends," includes Drs. Eleanor Adair, David Erwin, Bill Guy and Martin Meltz. This year, the Circle of Friends is having its own meeting, complete with scientific sessions and social events, in Kalispell, MT, near Glacier National Park, on August 7-8. Adair told *Microwave News* that the group has no long-range plans and that—contrary to rumors that have been circulating—the meeting does not represent "a break with BEMS." She added: "I have no idea in the world that we will set up another society."

**PEOPLE**

Dr. Genevieve Matanoski has been named the chair of the EPA Science Advisory Board's Radiation Advisory Committee. Matanoski was the chair of the subcommittee that reviewed the EPA EMF and RF cancer report....Dr. Larry Toburen is the new staff officer of the National Academy of Sciences-National Research Council's (NAS-NRC) Board of Radiation Effects Research. He takes over from Dr. Dennis Mahlum, who has returned to the Battelle Pacific Northwest Labs in Richland, WA; Toburen comes to the NAS-NRC from Battelle....Ron Petersen of AT&T Bell Labs has been elected, and Dr. Marvin Ziskin, the director of Temple University's Center for Biomedical Physics, has been reelected, to the National Council of Radiation Protection and Measurements (NCRP)....Dr. Sam Koslov has retired from his post as the assistant director of the Johns Hopkins University Applied Physics Lab in Laurel, MD. ...After 17 years as a member of Dr. Ross Adey's lab at the VA Hospital in Loma Linda, CA, Dr. Asher Sheppard has become a full-time consultant on EMF and RF issues; he is now based in Redlands, CA. Sheppard continues to be an associate editor of *Bioelectromagnetics*....Frank Young, formerly with EPRI, has joined Energetech Consultants in Campbell, CA, to manage research, instrumentation and software development, as well as the company's scientific consulting services.

**RADAR**

**Florida ALS Cluster...**In South Patrick Shores, the small Florida community where a Hodgkin's disease cluster was uncovered two years ago, eight people have developed amyotrophic lateral sclerosis (ALS). Rep. Jim Bacchus (D-FL) has asked federal officials to investigate the cluster and examine the possibility that a nearby air traffic control radar—which fell under suspicion when the Hodgkin's cases came to light (see *MWN*, J/F

92)—played a role. All eight people who developed ALS, which is commonly known as Lou Gehrig's disease, had lived within a few blocks of one another, at distances ranging from 3/4 of a mile to 2 miles from the radar, according to Marilyn Meyer, a reporter for *Florida Today*, a paper based near Melbourne. The cases date from 1980 to the present. In an April 4 special report, Meyer wrote about six people who had developed ALS, estimating that this was close to 17 times the expected number. Meyer then learned of two more cases in the neighborhood, which has about 2,000 residents. Her initial feature focused on drinking water contamination—the local water supply was known to have high levels of trihalomethanes in the late 1970s and early 1980s—and on other possible toxic chemical exposures. A subsequent article (May 20) discussed the radar. In response to Meyer's investigation, Bacchus asked the Agency for Toxic Substances and Disease Registry (ATSDR), part of the U.S. Public Health Service, to investigate. Bacchus's press secretary, Dan Sallick, told *Microwave News* that ATSDR will complete a "health consultation" soon. This will be a reexamination of information on possible environmental contaminants that was gathered when the Hodgkin's cluster was being investigated. According to ATSDR's final report on that investigation, completed in June 1992, there were also elevated rates of breast cancer and cervical cancer among women in the community. Further details were not provided, however, and the agency concluded that "the data do not indicate that humans are being exposed to levels of contamination that would be expected to cause adverse health effects." A full-blown "health assessment" of the ALS cluster will only be undertaken if something new comes to light, according to Mike Greenwell, a spokesman for ATSDR in Atlanta. Bacchus has asked the IEEE to suggest an expert on electromagnetic radiation health effects who could assess any radar risks, but, according to Sallick, whether the radar is in any way linked to these clusters "is a question we may not know the answer to for decades." ALS is a degenerative disease of the nervous system that has no known cause. A 1986 study found that the incidence of the disease was higher among people who worked in electrical occupations (see *MWN*, S/O86).

**VDTs**

**EMF Report Shelved at OTA...**The Congressional Office of Technology Assessment (OTA) has decided not to release a review of the possible health effects of VDT EMFs. The report, commissioned by the OTA in late 1991, was written by Dr. Indira Nair of Carnegie Mellon University (CMU) in Pittsburgh. It "is now on the back burner," Karen Bandy, a senior OTA analyst, told *Microwave News*. Bandy explained that Nair's report was going to be part of a larger OTA effort on computers and communications technologies, but that "it never quite worked out" and would now be used for "OTA background." In a telephone interview, Nair said that she was disappointed by OTA's decision, but that she plans to publish several papers on her findings. A 1989 OTA report on power frequency EMFs by Nair and her CMU colleagues was very influential in developing public policy—it popularized the concept of "prudent avoidance" (see *MWN*, J/A89).

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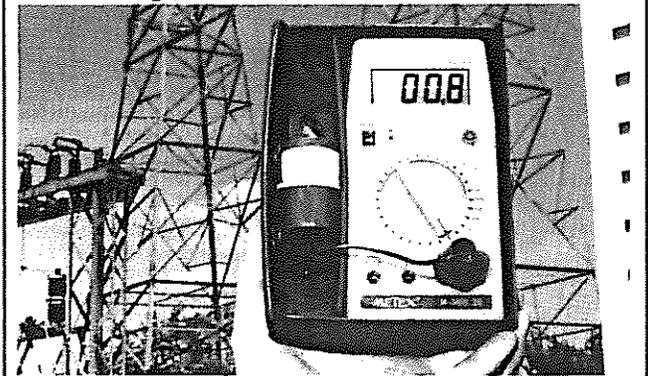


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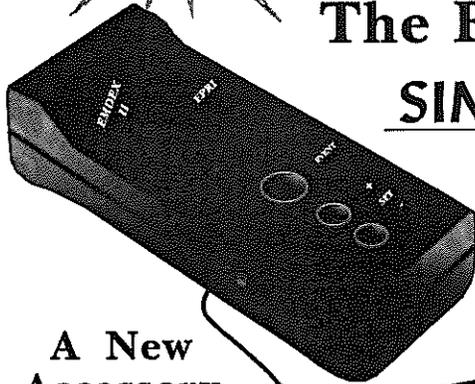


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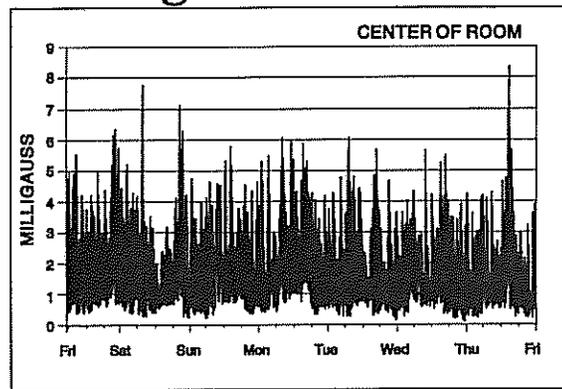
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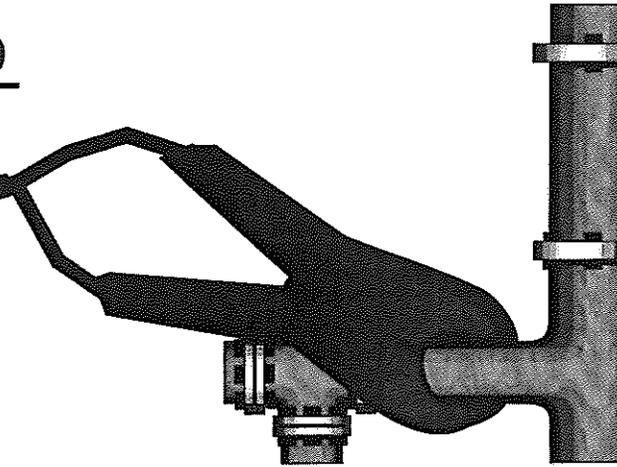
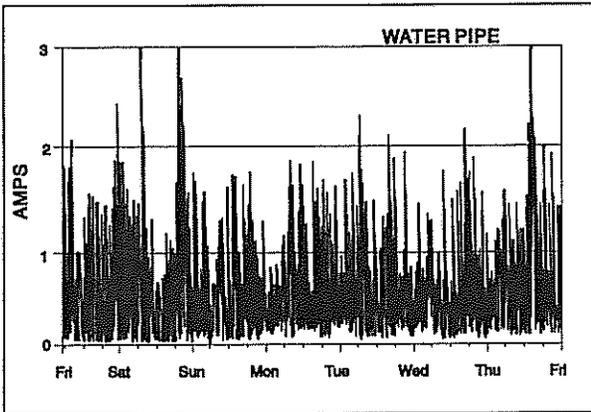


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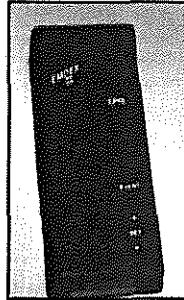
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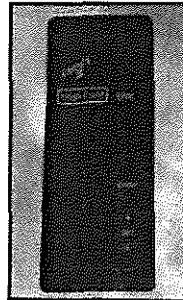
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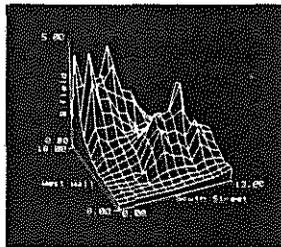
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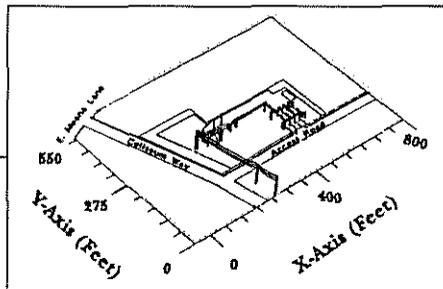
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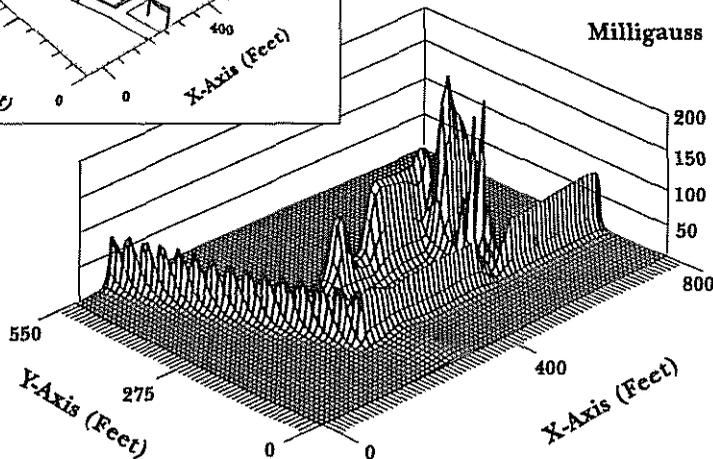


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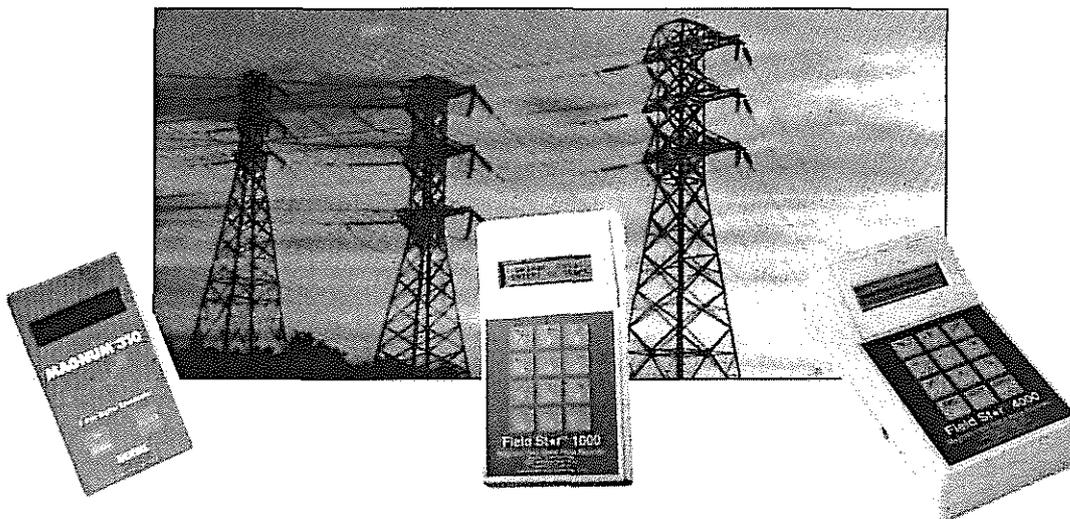
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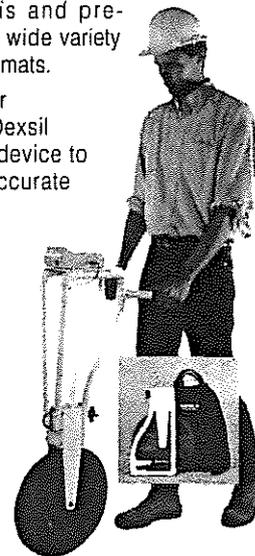
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