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Cell Phone Contracts Canceled; Health Research Program in Disarray

CTIA & WTR Accused of Mismanagement

Two major research contracts have been canceled and payments to other contractors have been halted because of a funding dispute that is raging around Wireless Technology Research (WTR) and the Cellular Telecommunications Industry Association (CTIA). Some in the industry accuse the trade group of siphoning off millions of dollars intended for WTR's research program. Others ask why WTR has barely begun investigating a possible brain cancer link after spending almost half of its entire \$25 million, five-year budget.

"It seems that the CTIA spent a lot of money on things like PR," said John Madrid, Toshiba's representative on the committee that oversees WTR funding. "There have been outrageous administrative costs," he told *Microwave News*. "If WTR had received all the money it was supposed to, it would not have a funding dilemma at this moment." According to Madrid, the CTIA has collected \$15-\$16 million for research, but WTR has only been given about \$12 million.

"We have \$800,000 in unpaid bills in pacemaker research alone," said WTR's spokesperson, Mike Volpe. In a May 21 letter, Dr. George Carlo, the chair of WTR, warned that "continuation of the current cash shortage threatens the viability of WTR itself."

Others question what has happened to the funds that the CTIA has given to WTR. "We cannot really account for the money WTR has spent," Ron Petersen of Lucent Technologies in Murray Hill, NJ, said in an interview. "That is why

(continued on p.14)

Jury Finds No EMF-Cancer Link, But Orders Utility To Pay \$760,000

The April 19 verdict in John Altoonian's lawsuit against Atlantic Electric held that electromagnetic fields (EMFs) had not caused his leukemia and that the value of his property had not been reduced by power line EMFs. Nevertheless, in the first damage award in an EMF personal injury case, the New Jersey Superior Court jury ordered the utility to pay \$762,524 to Altoonian and his wife, most of it for emotional distress.

Both sides have filed motions asking for a new trial. Oral arguments are scheduled for May 24, and a ruling could come soon thereafter.

After a ten-week trial, a jury deadlocked 3-3 on the central issue of causation. Judge Charles Previti then took a step that the *New Jersey Law Journal* (April 22) called "inventive and unprecedented": He recalled the six alternate jurors, who had been sent home, and swore them in as a new jury. After ten hours of deliberations, this second panel reached a verdict (see p.6).

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« Power Line Talk »

Over the last few years, lagging sales have taken a toll on the gaussmeter industry. In early May, after more than ten years in the business, **NoRad Corp.** in Carson, CA, closed its doors. "Sales of meters have been declining steadily since 1993 or 1994 and are now down approximately 75% from the peak," said Michael Hiles, former CEO of NoRad, who left a year ago to start Field Management Services Corp., an EMF consulting firm based in Los Angeles (see *MWN*, M/J95). On May 13, **Teslatronics Inc.** was bought by **F.W. Bell Inc.**, based in Orlando, FL. Steve Dakel, Bell's director of sales, told *Microwave News* that the company will incorporate Teslatronics' gaussmeters into its product line to fill its own need for low-cost devices for the consumer. "The Teslatronics meters complement our low-end portion of the gaussmeter line and enhance our market presence," Dakel said. He added that a large company such as Bell is better suited than a smaller one to withstand slow EMF meter sales since it offers a variety of instruments. Other manufacturers are devising their own strategies to deal with this slowdown. For example, **Enertech Consultants**, based in Campbell, CA, will try to stimulate sales in the U.S. by introducing two new devices—a transient meter and a waveform capture unit—according to Michael Silva, Enertech's president. Dr. Don Deno of **Electric Field Measurements** in West Stockbridge, MA, a pioneer in the gaussmeter industry, attributes the dip to recent medical journal articles that call into question evidence of an EMF-cancer link. But Karl Riley of **Magnetic Sciences International** in Tucson, AZ, argues that research alone is not to blame. "Sales are really a function of what the media do with the research," he said. "Reality doesn't necessarily govern the market—the media do." Riley cited two recent events that may have diminished public interest—the American Physical Society's statement and the PBS *Frontline* program, "Currents of Fear" (see *MWN*, M/J 95 and J/A95). The general public has become "complacent" in the absence of reports of potential health risks from EMFs, Joe Nowlan of **Walker Scientific Inc.**, based in Worcester, MA, said in an interview. "We're talking about something that is very frightening to the general public. If it scares them enough, they will react," Nowlan added. John Rosadini of **Dexsil Corp.** in Hamden, CT, agreed that orders have been down in the last few years, but there continue to be "hot spots" where sales are brisk—usually in communities where transmission lines are being built. Some in the meter business contend that the power companies themselves are partly responsible. Utilities that provide EMF surveys to customers have reduced some of the demand for meters, according to William Bean of **Wandel & Goltermann Inc.**, a German company with U.S. headquarters in Research Triangle Park, NC. The role utilities play, however, may run even a bit deeper. As one manufacturer noted: "Utility PR people continue to influence the media and have actually gotten much better at it."

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"Stop causing cancer in children!...People of the world unite against evil!" demanded a sign mounted on a 40-foot pylon in

Olongapo, **Philippines**, by Irish missionary priest Father **Shay Cullen**. In a photograph reproduced in newspapers around the world, Cullen was smiling above the banner, which urged supporters to contact Philippine President **Fidel Ramos** to protest the construction of a high-voltage power line adjacent to a home for destitute children. Cullen believes that EMFs from the line pose a significant health threat to the 26 children living at the Preda Foundation, his nearby sanctuary for victims of prostitution and drug addiction. The 230 kV cable was installed to provide backup power for a November summit of the Asia-Pacific Economic Cooperation, which will be attended by 18 heads of state, including President Clinton. The priest lived atop a small perch built on the pylon—equipped with a cellular telephone, fax machine and portable toilet—for two weeks in April. After he came down from his post, he gained backing from Philippine Senator Juan Flavio and Congressman Antonio Diaz. "I do not belittle the government's efforts to make sure the meeting goes without a hitch," Flavio said in the April 16 edition of the *Manila Times*, "but I want to know the effects of the cables on the health and environment of the people." Because the Preda Foundation is situated on the edge of a cliff, Cullen explained in a letter to *Microwave News*, the power lines are at the same height as three floors of the home. Cullen estimated that the children would be exposed to a field of 7.1 mG. He expressed concern, as this is well above the recommended safe exposure level of 2 mG specified in a draft report submitted to the U.S. National Council on Radiation Protection and Measurements (NCRP) last year (see *MWN*, J/A95). The priest's sentiments were echoed in a speech Diaz made to the Philippine Congress on April 29, in which he pointed out that, "Father Cullen and his staff have served the people for 27 years and have an international reputation for quality and honest service to the people and children of Olongapo." He then asked, "Can the same be said of the city government?"

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Now that the **RAPID** program has passed its midpoint, some observers are suggesting that EMF research may—or should—end with RAPID. They argue that in 1992, when it set up the program, Congress posed the question: Can EMFs affect human health? If the answer is "no," they contend, the research effort should be closed down. "Are we going to reach closure on the EMF problem?" asked Dr. **Peter Bingham**, the president of the Philips Laboratories in Briarcliff Manor, NY, and a member of the National EMF Advisory Committee (**NEMFAC**), at the April 29-30 NEMFAC meeting in Washington. Bingham hopes so, but Dr. **Tom Rozzell**, a NEMFAC member who is at the National Academy of Sciences, does not want anyone's expectations to be raised too high. "If you think you are going to solve this problem [in five years], you are deluding yourself," Rozzell stated. Dr. **Gary Boorman**, NIEHS' point man on RAPID, tried to stake out the middle ground. "It is not realistic to come to closure on EMFs, but I think we will be able to put some boundaries on the risk," he said. The job of evaluating health risks now lies with **Dan Vandermeer**, formerly of the NIEHS

and now a consultant to the institute. Vandermeer has recruited Dr. **Christopher Portier**, the head of NIEHS' Laboratory of Computational Biology and Risk Analysis, and together they are planning a series of workshops to be held next year when the results of the RAPID grants start to become available.

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On April 12, the Georgia Supreme Court agreed to hear an appeal by **Georgia Power Co.** and **Oglethorpe Power Co.** in the **Jordan** EMF–cancer lawsuit. An appeals court had overturned a jury verdict in the utilities' favor, ruling that it was improper for the power companies' experts to testify about a "scientific consensus" that EMFs had not caused Nancy Jordan's non-Hodgkin's lymphoma (see *MWN*, J/F96). Oral arguments are expected to be heard in June.

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In 1991, Dr. **David Korn** admitted to an **EPA Science Advisory Board** panel assigned to assess the agency's **draft EMF–cancer report** that he had not read the key papers on cellular and animal effects. Testifying on behalf of a group of utility companies, he concluded that the data on EMFs and cancer were "soft and noisy" and that any link was "extraordinarily speculative" (see *MWN*, J/F91). As *Scientific American* reported in its March 1991 issue, Korn, who at the time was the chairman of the President's National Cancer Advisory Board, had his "knuckles metaphorically rapped" at the meeting and was told by one committee member to "read the relevant literature before venturing any further opinions." Five years later, in the January/February 1996 issue of the *IEEE Engineering in Medicine and Biology Magazine*, IEEE's Committee on Man and Radiation (COMAR) revived the incident. The first section of "Unfounded Fears: *The Great Power-Line Cover-Up Exposed*" by Ruth Miller of Kansas State University, Manhattan—a two-part response to **Paul Brodeur's** third book on EMFs—included Korn's side of the incident. Calling the EPA draft cancer report that he had read in lieu of the original papers "an exhaustive summary of the published literature," Korn said he felt that he had been exposed to the strongest evidence the EPA could assemble on the subject. In his view, however, these data were "internally inconsistent, entirely based on epidemiological associations that were far from robust statistically, and simply not conclusive." Korn also questioned how Brodeur's book depicted the incident, pointing out that Brodeur had neglected to cite Korn's strong support for further studies. He went on to say that the existing data are not substantial enough to justify regulatory action but support of additional research "would represent an appropriate response by the federal government to this matter of major public controversy." Korn, who was dean of Stanford University School of Medicine from 1985 to 1995, stepped down from the cancer board in 1991. He could not be reached for comment.

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Another footnote to the **EPA cancer report**: In a November 30, 1992 letter, Dr. **Allan Bromley**, President Bush's science advisor, congratulated Dr. **William Gordon** of Rice University in Houston for his work on the Oak Ridge report on EMF health

hazards (see *MWN*, N/D90 and N/D92). Bromley had sought to counter EPA's conclusion of a possible cancer link. In the margin is a handwritten note from Bromley: "An excellent report even if it can't kill this monster!" Bromley has since returned to Yale University in New Haven, CT, where he is dean of engineering.

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The EMF **RAPID** program has awarded three new engineering contracts for research on methods of measuring and reducing EMF exposures. These are in addition to five related projects that were funded last year (see *MWN*, M/A95). The new projects will provide data needed for the final stages of the five-year program, including the extent to which EMF exposure affects human health, said DOE's RAPID Program Manager **Lynne Gillette**. Drs. **Luciano Zaffanella** and **Graham Kalton** of Energetech Consultants in Campbell, CA, received \$434,000 to assess personal magnetic field exposures of about 200 people. This is the first phase of a larger effort to estimate EMF exposures of the U.S. population. Dr. **Dan Bracken**, a consultant based in Portland, OR, will develop a model to predict human EMF exposures accurately, without taking personal measurements, under a \$138,000 contract. And **Tim Johnson** and **James Gauger** of the IIT Research Institute in Chicago got \$124,000 to describe and evaluate existing techniques for reducing EMFs, including their economic costs and environmental impacts.

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As EMF litigation continues to be a major concern for electric utilities, **Associated Electric and Gas Insurance Services Limited (AEGIS)** and the law firm of **LeBoeuf, Lamb, Greene & MacRae** are trying to address this fear. Together they are assisting AEGIS' more than 300 clients in the public utility industry. LeBoeuf, Lamb's legal and science databases are the cornerstone of the service, which, according to AEGIS' eight-page glossy brochure, "can save utilities and their in-house or outside counsel time and money when preparing for EMF litigation." Interested utilities must first get approval from AEGIS before they can meet with attorneys from LeBoeuf, Lamb. The firm is no stranger to EMF litigation, having been involved in the defense in a number of key lawsuits (see, for example, p.4 and *MWN*, J/F94, M/J94 and S/O95). Although the program was created for AEGIS clients, it is open to all utilities involved in, or anticipating, EMF lawsuits. **Stan Schuldiner**, senior counsel at Aegis Insurance Services Inc., a division of AEGIS, told *Microwave News* that the company's primary reason for providing the service to members and nonmembers alike is its overall concern about the course of EMF litigation. Last year, at a meeting of insurance executives held in San Francisco, **Mark Warnquist** of LeBoeuf, Lamb's Denver office predicted, "We should...expect a protracted battle over EMFs...[but] if we remain vigilant in defending EMF claims, we should continue to be successful" (see *MWN*, M/J95). More recently, however, Warnquist told *Microwave News*, "In the last year we have not seen the number of cases that we had expected." For more information, contact Stan Schuldiner at: Aegis Insurance Services, 10 Exchange Pl., Jersey City, NJ 07302, (201) 521-1200.

Judge Dismisses Cancer Lawsuit, Ruling that EMFs from Ground Currents Are Not Utility's Responsibility

A Florida court dismissed a major EMF–cancer lawsuit on May 6, ruling that Florida Power & Light (FP&L) was not responsible for EMFs from ground currents. Both sides agreed that most of the power frequency fields in plaintiff Leonard Glazer's home came from currents flowing through the plumbing system, and that less than 1 mG came from FP&L's power lines.

Ground currents will have major implications for other EMF lawsuits, claimed FP&L lead attorney Alvin Davis of Steel, Hector & Davis in Miami. "Most cases, unless the plaintiff lives right under a high-voltage line, are going to run into the same problem," Davis said in an interview. "This issue could just steer them right off the track."

Another FP&L lawyer, Mark Warnquist of LeBoeuf, Lamb, Greene & MacRae in Denver, commented, "It definitely has the potential to affect other litigation. Plaintiffs' attorneys are generally interested in cases where there's higher exposure, and that tends to correlate with a higher contribution from ground currents" (see box at right).

Howard Talenfeld of Colodny, Fass & Talenfeld in Ft. Lauderdale, one of Glazer's attorneys, admitted that if other courts took the same position, "It would certainly favor the industry in future litigation." But he emphasized that he expects the ruling to be overturned on appeal. Talenfeld told *Microwave News* that the utility must be held liable for any effects of ground currents. "FP&L manufactured the electric current," he said. "Any time you manufacture a product, I think you're responsible for it in its foreseeable uses."

Glazer's lawsuit was filed in January 1994. His wife Elsa had died of chronic myelogenous leukemia (CML) in 1988, and Glazer learned in 1992 that he had the same disease. Several power lines ran across the Glazers' property, where they had lived since 1969. Two distribution lines ran within 32 feet of where they slept (see *MWN*, J/F94, M/J94 and S/O 95). Talenfeld said in an interview that EMFs in the Glazer bedroom averaged about 2.5 mG—and at times exceeded 6 mG.

But, according to FP&L engineers, EMFs due to power lines amounted to only 0.19 mG in the Glazers' home. Talenfeld disputed the exact figure, but agreed that the total from power lines was significantly less than 1 mG. The other fields in the home were due to ground currents. On April 22, Circuit Court Judge Thomas Spencer in Miami granted an FP&L motion asking that its responsibility be limited to EMFs from power lines.

FP&L then filed a motion asking for dismissal of the entire case, pointing out that 0.19 mG is "less than one-tenth of the level of exposure which plaintiff's medical experts assert causes cancer." On May 6, the judge agreed and decided for the utility. Glazer's lawyers are appealing the ruling.

Who's Responsible for Ground Currents?

Ground currents arise when a household electrical system is grounded to conductive plumbing, and some of the return current escapes through the plumbing instead of the neutral conductor in the service cable.

"How can we possibly be responsible for the water line?" asked FP&L's Davis. "We didn't hook it up to the electrical system. The contractor did—as required by the county building code." He insisted that, "A utility company's liability ends at the point where they deliver power to a house."

Glazer's lawyers maintain that FP&L bears ultimate responsibility for EMFs from ground currents. "It's not right to say that the seller of a product is no longer responsible for it after it's in the hands of consumers," said Talenfeld.

Another Glazer attorney, Larry Marraffino of Marraffino & Roth in Boca Raton, noted that it is often difficult to identify the different sources of residential EMFs: "The fact that so much was due to ground currents was a fortuitous fact for FP&L that it took them \$150,000 worth of engineering to find out." Marraffino told *Microwave News* that FP&L had a duty to warn customers of the hazards of EMFs from *all* sources.

High Magnetic Fields Often Due to Ground Currents

How important are EMFs from ground currents in most homes? "In some cases they're not an issue, in others they're the dominant source," responded Fred Dietrich of Electric Research and Management Inc. in Pittsburgh. In an interview, Dietrich said that "the only good data" for any overall evaluation of their role was the *Survey of Residential Magnetic Field Sources*, better known as "the 1,000-home study," published by EPRI in 1993 (see *MWN*, J/F94).

"Ground currents can be very important," said Dr. Luciano Zaffanella of Eneritech Consultants in Lee, MA, who headed the 1,000-home study. Zaffanella told *Microwave News* that, in most houses, the contribution of the power line fields is predominant. "But if one looks at the 5% of cases that have more extreme levels, the ground currents become the principal factor." He also noted that EMFs from ground currents are more localized than power line fields. Thus, even in a house in which power lines are the more important source overall, within a given room ground currents may create a "hot spot."

Ground currents can be a direct result of the configuration of a house's electrical wiring—but Zaffanella pointed out that they can also be induced by appliances in the home, or even in a neighbor's home.

In a study published last year in *Bioelectromagnetics*—and cited in the *Glazer* case—Dr. Nancy Wertheimer, Ed Leeper and Dr. David Savitz found "a high and significant cancer risk" associated with the likely presence of ground currents (see *MWN*, S/O95). Dr. Philip Cole, an expert witness for FP&L, gave a deposition in which he criticized this as "merely a hypothesis-generating study," containing "at least three sources of bias or potential bias." As evidence of an increased cancer risk, Cole told *Microwave News*, "My judgment is that the study is worthless."

NAS-NRC Report Due in July

As we go to press in late May, the National Academy of Sciences-National Research Council (NAS-NRC) EMF report is being edited to include comments from reviewers.

The report, *Possible Health Effects of Residential Exposure to Electric and Magnetic Fields*, is currently due to be released in July, according to NAS-NRC staff. It was mandated by Congress in 1991 but was delayed by budget problems (see *MWN*, S/O91, S/O95 and J/F96).

“Florida law says a duty to warn applies whenever the public would *reasonably want to know* of a hazard,” he said. “The Glazers had no idea they were endangered by this, so they never got to choose to do anything different.”

But Warnquist countered that this theory would require utilities “to mount a massive investigation of almost everything that carries electrical current and warn of any possible effects.”

Lawyers and the Laws of Physics

FP&L court papers describe ground currents in water mains as “a highly variable and unpredictable phenomenon,” which Davis contended are not subject to a utility’s control. “The utility provides a neutral ground wire that goes back up the line,” he said, “and very often that’s the path that the return current takes.” But not always.

The path of the return current is determined by many different factors, Davis explained. For instance, most of the current in the Glazers’ pipes came from their neighbor’s electrical service rather than from their own. A neighbor’s home can be involved because electricity only flows into a water main if it can make a complete circuit, going out through one plumbing connection and back to the power line through another.

Talenfeld cited the circular flow of electricity to argue that FP&L cannot say that once it delivers power to a house, its job—and its legal responsibility—are over: “Not only does FP&L create the electricity in the plumbing lines—it comes back to them by virtue of the laws of physics.” Marraffino also argued that ground currents were a normal and inherent characteristic of residential power: “It’s predictable and expected in the delivery of electricity that a reasonable number of homes will have a problem with ground currents.”

FP&L told Judge Spencer that even if it were somehow responsible for ground currents, “FP&L could do absolutely nothing to reduce EMF levels from water mains, because FP&L has no authority or jurisdiction to do so.” But a new apparatus developed by the Electric Power Research Institute (EPRI) casts doubt on that assertion. EPRI’s Net Current Control (NCC) device (see *MWN*, M/A96) can be easily mounted on the service cable outside the home. Without any changes to plumbing or water mains, the NCC device forces return current to come back through the service cable’s neutral conductor. But an NCC device can cost as much as \$2,000, and Warnquist pointed out that since it was not available until recently, it would not affect the issues in the Glazer case. Talenfeld concurred, but remarked, “It certainly would affect people who are exposed to ground currents.”

Jury Finds No EMF–Cancer Link (continued from p.1)

Atlantic Electric announced that it was “very pleased” that the jury had decided it was not responsible for Altoonian’s chronic myelogenous leukemia (CML). But the utility, based in Pleasantville, NJ, described the award for damages as “disappointing and confusing,” and added, “We believe that the jury’s decision on this issue may have been influenced by sympathy for Mr. Altoonian’s illness.”

Altoonian did not return calls requesting comment. Last fall Altoonian told *Microwave News* that he had no health insurance and could not afford a \$300,000 bone marrow transplant that could keep him alive. The verdict does not yet clear the way for Altoonian’s operation—his attorney, William Wolf of Bathgate, Wegener & Wolf in Lakewood, NJ, said that it could be as long as 15 months before Altoonian sees any of the money, even if the jury’s decision is upheld. In an interview, Wolf called the utility “callous” for seeking to avoid immediate payment of the damages award.

Atlantic Electric EMF counsel Curtis Renner of Watson & Renner in Washington, told *Microwave News* that this award was “not supported by the testimony.” He emphasized the jury’s conclusion that EMFs had not caused Altoonian’s cancer, and called it “a strong verdict” on causation. “I’m not aware of any other case that’s been as comprehensive in terms of the scope of the science that the jury examined,” Renner said.

Both juries wrestled with the meaning of “proximate cause” as applied to the issue of EMFs and cancer. The second jury asked the judge for a dictionary so it could look up the words—but instead Judge Previti repeated his own legal definition, stating that EMFs must have been “a substantial factor in bringing about the injuries or damages.” The first jury had also asked for “proximate cause” to be defined again, and a few hours later sent the judge a note asking, “If a possibility exists that EMFs cause CML, is that enough to tip the scales?” According to attorneys for both sides, the judge indicated that the answer was “no.”

The second jury’s verdict may well have turned on testimony about the “Philadelphia chromosome,” a mutation that is thought to cause CML. Renner explained that the Philadelphia chromosome—a translocation of genetic material between two specific chromosomes—is known to be present in 95% of all those with CML, including Altoonian, and that “if you have it, it’s only a matter of time before you get the disease.” Atlantic Electric’s experts testified that 60 Hz fields do not have enough energy to bring about this kind of mutation.

In his motion for a new trial, Altoonian’s attorney countered that “the jury was misled by the testimony of the defendant’s experts and by the structure of the jury questionnaire” into focusing on the “totally irrelevant issue [of] whether EMFs had sufficient power to break a molecular bond and cause the Philadelphia chromosome.” Some of Altoonian’s expert witnesses referred to other ways that EMFs might lead to this defect, such as interference with genetic repair mechanisms.

One of Altoonian’s witnesses, Dr. Andrew Marino of Louisiana State University, Shreveport, argued that the mechanism of action is irrelevant in this kind of case. “The relevant issue is *whether* EMFs caused the cancer, not how they did it,” he said in an interview.

The Altoonian Jury's Verdict

Reprinted below are excerpts from the jury's April 19, 1996, verdict in *Altoonian v. Atlantic Electric*. "Plaintiff" refers to Mr. Altoonian; "defendant" refers to Atlantic Electric.

Was the [EMF] generated by defendant's underground transmission line...a proximate cause of Mr. Altoonian's [CML]? — 5 No, 1 Yes. Did the defendant intentionally inflict emotional distress on the plaintiff? — 6 No. Did the defendant negligently inflict emotional distress upon the plaintiff after his diagnosis of CML? — 6 Yes. Did the plaintiff suffer severe emotional distress as a result of defendant's conduct? — 1 No, 5 Yes.

What amount of money, expressed in a lump sum, would fairly and adequately compensate plaintiff for: a) noneconomic damages—injuries, pain, suffering, disability, loss of enjoyment of life: \$100,000; b) medical bills incurred: \$0; c) future medical bills: \$0; d) psychological treatment: \$20,000; e) past loss of earnings: \$149,000; f) future loss of earnings: \$348,524; g) Florida expenses: \$5,000; (h) ...the amount to which the plaintiff is entitled on his *per quod* [special damages] claim: \$0.

What amount of money...would fairly and adequately compen-

sate Mrs. Altoonian for: a) noneconomic damages—injuries, pain, suffering, disability, loss of enjoyment of life: \$100,000; b) psychological treatment: \$20,000; c) Florida expenses: \$0; (d) ...the amount to which Mrs. Altoonian is entitled on her *per quod* claim: \$0.

Did the conduct of the defendant in the placement of the subject underground transmission line and the resultant EMF exposure to the Altoonian property proximately cause a substantial depreciation [in] the value of that property? — 6 No. Are the plaintiffs entitled to recover punitive damages...? — 6 No.

What amount of money...would...compensate plaintiffs for any depreciation in the value of their property...? — \$0. What amount of money...would...compensate plaintiffs for: a) the loss of use of plaintiffs' property: \$0; b) any discomfort and annoyance sustained by plaintiffs as a proximate cause of the nuisance: \$20,000.

Did the conduct of defendant regarding its underground transmission line and the resulting presence of EMFs on the Altoonian property, constitute a private nuisance? — 6 Yes. Was said conduct of the defendant a proximate cause of the reduction in the value of plaintiffs' property...? — 1 No, 5 Yes.

Altoonian's other experts included Dr. Richard Clapp of Boston University, and, in written testimony, Dr. Peter Wright, who was affiliated with the Fred Hutchinson Cancer Institute in Seattle until his death in 1993. Judge Previti had barred Altoonian's lawyers from reading Wright's deposition to the jury, since Atlantic Electric's lawyers could no longer cross-examine the witness. But late in the trial, after the utility had rested its case, the New Jersey Supreme Court ordered that Wright's deposition be allowed into evidence after all.

Experts who appeared for Atlantic Electric included Dr. Edward Gelmann of the Vincent Lombardi Cancer Center at Georgetown University in Washington, Dr. David Golan of Harvard's medical school in Boston and Dr. Darwin Labarthe of the University of Texas Health Sciences Center in Houston.

Altoonian was diagnosed with CML in 1990, two years after he moved into a house in West Wildwood, NJ. A 69 kV power line ran under its deck, which Atlantic Electric admitted was outside of its right-of-way. At the start of the trial, the utility offered to pay \$8,750 in damages for this trespass. According to Wolf, time-averaged readings of EMFs ran about 25 mG inside the home, a level which Altoonian considered dangerous. This caused him to move to Florida, where he lived for about eight months. Altoonian filed his lawsuit in 1991. The line was moved off his property in 1992 and was later deactivated (see *MWN*, N/D93, M/A94 and S/O94).

Despite finding Atlantic Electric innocent of causing Altoonian's CML and of devaluing his property, the jury did find that the utility had negligently inflicted emotional distress on John Altoonian and on his wife, Sandra. Judge Previti had instructed the jurors that violations of a New Jersey law against "unnecessary radiation" exposures could form the basis for a finding of negligence. An engineer who testified for the Altoonians stated that when the utility moved the power line, it could have reconfigured the line at a relatively small additional cost so that EMF levels inside the Altoonian home would have been cut to 2 mG or less. Wolf argued that Atlantic Electric's fail-

ure to do so was a violation of its stated policy of "prudent field management," and could cause a reasonable person to suffer emotional distress.

"The line was relocated in accordance with prudent field management," insisted Atlantic Electric's trial counsel, Randolph Lafferty of Youngblood, Corcoran, Aleli, Lafferty & Stackhouse in Pleasantville. Lafferty told *Microwave News* that the utility spent \$250,000 to move the line, and that spending twice as much would have further reduced EMFs by only 10%. "That would *not* be prudent field management," he said, especially "in the absence of any known risk."

The *Altoonian* case was in the news last October when Atlantic Electric's lead attorney, Gerald Corcoran of Youngblood, Corcoran, withdrew from the case after receiving a series of death threats (see *MWN*, N/D95). The threats were also directed against attorney Tom Watson of Watson & Renner, and both attorneys blamed Altoonian—who denied responsibility. Watson remained on the case and sought contempt of court charges against Altoonian. According to Renner, those charges are still pending but no hearing date has been scheduled. Wolf said that he is not representing Altoonian on the contempt charges, and that Altoonian has been assigned a public defender. There have been no further threats since October.

In Atlantic Electric's motion for a new trial, it contends that the damage award should be set aside because the bulk of it was for lost earnings. The utility argues that "there was *no evidence* that John Altoonian's inability to work was related to 'emotional distress'"—rather than to his cancer. The motion also asserts that Altoonian's emotional distress was never proven to be "severe." However, when Atlantic Electric sought contempt charges against Altoonian last fall, it cited psychological profiles which concluded that he was "depressed, with profound and chronic feelings of anger" and had "signs of a burgeoning paranoid trend in his thinking," and which noted that "this profile is one that is usually associated with rather significant psychopathology."

Athermal RF Successfully Treats Chronic Insomnia; ELF Modulation Believed To Be Key to New Therapy

A Swiss–American team has firm evidence from double-blind clinical trials that nonthermal radiofrequency (RF) radiation can help treat insomnia, as well as anxiety disorders.

“We have found that a specific combination of extremely low frequency (ELF) amplitude-modulated signals is an excellent way to treat patients who have trouble falling asleep and staying asleep,” explained Dr. Boris Pasche of Symtonic USA Inc., the company that, with its Swiss counterpart, developed this low energy emission therapy (LEET).

Symtonic’s P40 therapeutic protocol—made up of four different modulation frequencies—produces “impressive results” among insomniacs, Pasche told *Microwave News*. Different sets of signals are used to treat anxiety, he said (see box below).

In a study of 106 insomniacs, conducted in La Jolla, CA, and Denver, Pasche and his colleagues found a statistically significant increase in total sleep time among those treated with P40, as compared to controls.¹ The study, published this May in *Sleep*, was designed in coordination with the Food and Drug Administration, Pasche said.

“Our subjects did not experience any serious side effects, and there was no indication of rebound insomnia, which frequently occurs with drug therapies,” he pointed out.

Another study by the team, on the effects of LEET on anxiety, found a significant reduction in symptoms among 15 patients who received the treatment, as compared to an equal number who were given a placebo. “The results indicate that LEET may have broad psychiatric applications,” Pasche said. The study—recently presented at the *Annual Meeting of the American Psychiatric Association*, May 6-10 in New York City—was carried out at Massachusetts General Hospital in Boston.

LEET is administered with a metal lollipop-like device placed directly against the roof of the mouth. Typically, the power is controlled so that the patient is exposed to specific absorption rates (SARs) of 0.1-100 mW/Kg in brain tissue, accord-

ing to computer calculations by Dr. Niels Kuster of ETH in Zurich, Switzerland. Kuster estimated peak SARs of up to 10 W/Kg in tissue near the LEET mouthpiece. No temperature changes were observed in the subjects’ mouths.

Pasche pointed out that the SARs from LEET are “markedly lower” than those from an MRI exam. Current ANSI and NCRP guidelines are based on a whole-body safe limit of 400 mW/Kg and a partial-body maximum of 8 W/Kg.

The Symtonic team has been awarded a series of patents over the last few years to establish proprietary rights to LEET, the most recent of which—issued in March—describes the P40 protocol.² Two different protocols that have been used for anxiety are also listed, but the patent does not cite a preference for one over the other. All of the signals use a carrier frequency of 27 MHz.

In the *Sleep* paper, Pasche and his colleagues found that after a dozen P40 treatments, applied for 20 minutes a day, three days a week, subjects slept on average more than an hour and a half longer each night. The amount of time required to fall asleep decreased significantly and the number of sleep cycles per night—determined by the number of rapid eye movement (REM) periods—increased by 30%. “This is the first treatment that has been found to increase the number of sleep cycles,” which is an important aspect of sleep quality, Pasche noted.

“We found no evidence to support the hypothesis that LEET therapy was associated with short-term increases in the incidence of malignancy or coronary heart disease,” concluded Pasche, along with Dr. David Amato of the Harvard School of Public Health in Boston, in a 1993 evaluation of the safety of LEET.³

The only side effect reported was a greater awareness of dreaming. “This could be part of the patients’ recovery process,” suggested Pasche, who holds a doctorate in biochemistry and a medical degree, both from the Karolinska Institute in Stockholm, Sweden. He is currently based in New York City, where he is discussing marketing for LEET with a number of large pharmaceutical companies.

This June, Pasche’s team will publish another study, which provides additional evidence on how different types of LEET affect sleep.⁴ Fifty-two healthy subjects received intermittent 42.7 Hz amplitude-modulated 27 MHz radiation (the P7 protocol). Each subject was monitored for 15 minutes during treatment and for 15 minutes while resting or sleeping afterwards. All of the participants received an active treatment on one visit and a placebo on another. The total sleep time was 20% longer after the therapy than after the sham procedure. And the subjects fell asleep sooner and achieved a deeper sleep after active treatment. This was also a double-blind study—that is, neither subjects nor researchers knew who was receiving what.

In their paper,⁴ Pasche and his colleagues reported that they had tested various modulation frequencies from 1 to 100 Hz, and that 42.7 Hz caused “a possible effect on the [electroencephalograph] that was more pronounced than for other frequencies tested.” Pasche noted that, “While the 42.7 Hz modulated frequency seemed to induce sleep, the P40 protocol, which

The Symtonic Modulations

According to Symtonic’s March 26, 1996, patent²:

- The P40 protocol for insomnia is “2.7 Hz for about 6 seconds, followed by about a 1 second pause, 42.7 Hz for about 3 seconds, followed by about a 1 second pause, 48.9 Hz for about 3 seconds, followed by about a 1 second pause.”
- Two protocols for anxiety are “1.4 Hz for about 40 seconds, 2.8 Hz for about 20 seconds [and] 3.4 Hz for about 15 seconds”; and “3.4 Hz for about 15 seconds, 14.6 Hz for about 4 seconds, 42.7 Hz for about 2 seconds, 48.9 Hz for about 2 seconds and 189.7 Hz for about 1 second.”

In general, Symtonic claims that insomnia can be treated using two or more ELF modulations from the following bandwidths: 1-5 Hz, 21-24 Hz, 40-50 Hz, 100-110 Hz and 175-200 Hz. For anxiety, the preferred bandwidths are 1-5 Hz, 14-17 Hz, 40-50 Hz and 175-200 Hz.

When using 42.7 Hz LEET to induce sleep (P7 protocol), the researchers would alternate between 3 seconds on and 1 second off, Pasche told *Microwave News*.

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was developed later, is more effective at restoring normal sleep in insomniacs without causing drowsiness.”

While it is not clear how LEET works, Pasche suggested that the signals could affect the release of chemicals linked to sleep, including calcium and melatonin. The patent cites work done in the 1970s by Dr. Ross Adey of the VA Hospital in Loma Linda, CA, and Dr. Carl Blackman of the Environmental Protection Agency in Research Triangle Park, NC, on the movement of calcium across the cell membrane by ELF amplitude-modulated RF radiation.

“Whether different waveforms and frequencies affect human sleep differently will need to be assessed in other studies,” Pasche cautioned.

Indeed, other types of signals could have a negative effect on sleep. For instance, a paper published earlier this year by Drs. Klaus Mann and Joachim Röschke of the University of Mainz in Germany found that sleep quality actually deteriorated among those exposed to pulsed microwaves mimicking signals from digital mobile radio telephones.⁵ These results were first announced two years ago (see *MWN*, M/J94).

1. Boris Pasche et al., “Effects of Low Energy Emission Therapy in Chronic Psychophysiological Insomnia,” *Sleep*, 19, pp.327-336, 1996. See also the letter by Pasche et al., “Diagnosis and Management of Insomnia,” *New England Journal of Medicine*, 323, pp.486-487, August 16, 1990.

2. Chang et al., “Method for Applying Low Energy Emission Therapy,” *United States Patent*, No.5,501,704, March 26, 1996. Previously, Syntonic was awarded the following patents: Charmillot et al., “Method of Treating Neurovegetative Disorders and Apparatus Therefor,” *United States Patent*, No.4,649,935, March 17, 1987; Charmillot et al., “Method of Treating Neurovegetative Disorders and Apparatus Therefor,” *United States Patent*, No.4,765,322, August 23, 1988; and Chang et al., “Method and System for Applying Low Energy Emission Therapy,” *United States Patent*, No.5,441,528, August 15, 1995.

3. David Amato and Boris Pasche, “An Evaluation of the Safety of Low Energy Emission Therapy,” *Comprehensive Therapy*, 19, pp.242-247, 1993.

4. Jean-Pierre Lebet et al., “Electroencephalographic Changes Following Low Energy Emission Therapy,” *Annals of Biomedical Engineering*, 24, pp.424-429, June 1996. This is a replication of an earlier study: M. Reite et al., “Sleep-Inducing Effect of Low Energy Emission Therapy,” *Bioelectromagnetics*, 15, pp.67-75, 1994.

5. Klaus Mann and Joachim Röschke, “Effects of Pulsed High-Frequency Electromagnetic Fields on Human Sleep,” *Neuropsychobiology*, 33, pp.41-47, 1996.

Surprising Results in First Cellular Phone Animal Study: Digital Signals Appear To Protect Against Brain Tumors

Could using a cellular phone actually protect you from developing a brain tumor? This is a possible implication of a long-term rat exposure study by Dr. Ross Adey of the VA Hospital in Loma Linda, CA. Adey found that rats exposed to microwave radiation designed to mimic signals from a digital phone had fewer and smaller central nervous system tumors than control animals.

“One may speculate that the digital microwave signals may be increasing the efficiency or rate of DNA repair, or perhaps both,” Adey told *Microwave News*. He was quick to point out, however, that his study was designed to test whether microwaves are tumor promoters, so he could not make any deductions about a possible beneficial effect.

Adey will present his results on June 13 at the *18th Annual Meeting of the Bioelectromagnetics Society (BEMS)* in Victoria, Canada. The five-year study was sponsored by Motorola Inc.

Rats were exposed to 0.58-0.75 W/Kg, 836 MHz radiation pulsed to match the North American Digital Cellular standard (a type of TDMA signal) for two hours a day, four days a week for 23 months. During the two-hour exposure period, the signals were turned on or off every 7.5 minutes, so the total mi-

crowave exposure was four hours a week.

Four groups of animals, each with approximately 60 rats, were used in the experiment. Prior to exposure and while still in their mothers’ wombs, two groups of rats were given a single dose of the carcinogen ENU. One of the ENU groups and one of the carcinogen-free groups were exposed to microwaves.

Only four of the rats that were dosed with both ENU and microwaves developed brain or spinal cord tumors, as compared to 13 among the ENU-only rats. Similarly, among the two groups of ENU-free rats, there were only two rats with central nervous system tumors among those exposed to the cellular phone radiation, as compared to seven rats among those that were not.

Adey’s results are a mixed blessing for Motorola and the rest of the cellular phone industry, according to one observer who asked not be identified. “There are two interesting points,” the source commented. “On the one hand, the data indicate that there was an interaction between the rats and the TDMA signal, apparently a protective effect. But, on the other hand, in the absence of a mechanism to explain this effect, we cannot assume that there will be a similar response for other power densities, other exposure regimens and other radiofrequency signals. The take-home lesson is that many more experiments are needed to better understand how modulated microwaves affect living systems.”

A second animal study using frequency-modulated (FM) microwaves similar to those from analog cellular phones is nearing completion at Adey’s lab.

Also working on the animal studies were Dr. Craig Byus of the University of California, Riverside, Dr. Niels Kuster of the ETH in Zurich, Switzerland, and members of Adey’s lab.

A spokesperson for Motorola declined to comment on Adey’s results before they are presented at BEMS.

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« Cellular Phone Notes »

The CTIA has taken its case for the ANSI/IEEE RF/MW radiation standard to the EPA. On May 21, CTIA President **Thomas Wheeler** met with EPA Administrator **Carol Browner** in an effort to convince her that her staff should back off from its objections to the ANSI standard. The EPA wants the FCC to adopt the limits recommended by the NCRP (see *MWN*, J/F 94). Along with many others in the industry, the CTIA had lobbied the FCC directly, but the commission has long maintained that it has no expertise in health issues and will take its cues from the federal health agencies, notably the EPA (see *MWN*, M/A96). In a May 17 letter, Wheeler warned Browner that, "It would be a serious mistake for the FCC to adopt either the older 1986 NCRP standard or a 'hybrid' standard," adding that "departing from the widely accepted ANSI/IEEE guidelines will create confusion and delay in deployment of new cellular and PCS technologies." For technical support at the meeting, Wheeler brought along Dr. **Eleanor Adair** of the John Pierce Laboratory in New Haven, CT. Sources said that Browner held her ground and continues to support the policies of her staff at EPA's Office of Radiation and Indoor Air (ORIA). "I found her insistence on the EPA position interesting," Adair told *Microwave News*. "It left little room for discussion." Browner's office had no comment on the meeting, but **Mary Smith**, the director of ORIA's Indoor Environments Division, said that the EPA was expecting more information from the CTIA and that there would probably be another meeting at the EPA—although not with Browner.

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The headline on the front page of the April 14 *London Sunday Times* was certainly provocative: DANGER: MOBILE PHONES CAN "COOK" YOUR BRAIN. The *Sunday Times* was reporting on a draft proposal by a committee of CENELEC, the European standards organization, to exempt from compliance testing any hand-held phone with a power output of less than 20 mW. **Jonathan Leake** of the *Sunday Times* interpreted this to mean that 20 mW is the "safe limit," and, therefore, that any higher level is risky. From this perspective, the headline might make some sense—since phones in the U.S. and the U.K. routinely emit up to 30 times more than 20 mW. To bolster his claim, Leake cited confirmation from Dr. **Camelia Gabriel** of Microwave Consultants Ltd. in London. The story was picked up by other newspapers all over the world—sometimes with additional embellishment. At the *Advertiser* in Australia, an editor took the *Sunday Times*' logic one step further, telling his readers that the paper had "claimed most mobile phones on the market exceeded safe radiation levels." In a letter sent to, but not published by, the *Sunday Times*, Gabriel expressed her strong objections. "Had I been able to check the article before publication, I would have deleted or amended most of what was written," she wrote. Undeterred, Leake followed up with another story on April 21: SHIELD BLOCKS RAYS OF MOBILE PHONES. This story included a prediction by Dr. **Narendra Singh** of the University of Washington, Seattle: "It seems far-fetched but the mobile phone of the future may have to come with a supply

of antioxidants" for protection against microwave exposure. Singh was as dismayed as Gabriel. "I deny that I made such a statement" to Leake, Singh wrote to the editor of the *Sunday Times*. Singh's disclaimer also never made it into print.

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In the first legal test of the **Telecommunications Act of 1996**, a federal judge in Seattle has refused to overturn a small town's moratorium on new wireless communications towers. Under the law, state and local governments retain their authority to regulate wireless facilities—except on the basis of RF/MW safety levels (see *MWN*, M/A96). On February 13, 1996, five days after President Clinton signed the telecom act, the City Council of **Medina, WA**, adopted Resolution No.236, putting a hold on all new permits for six months in order to provide "a reasonable period of time" to study the "potential health risks associated with cell sites." Medina, a small town near Seattle with a population of 3,000, had received applications for antenna construction from five different companies. **Sprint Spectrum**, which wants to build a 100-foot tower, took the town to court. In a May 3 ruling, U.S. District Judge William Dwyer ruled that the Medina moratorium is a legitimate exercise of zoning power. Dwyer wrote:

There is nothing to suggest that Congress, by requiring action "within a reasonable period of time," intended to force local government procedures onto a rigid timetable where the circumstances call for study, deliberation and decision-making among competing applicants. The city [of Medina] is seeking to determine, among other things, whether tall antenna towers are still necessary for the purpose at hand. It is entitled to find that out.

The moratorium will expire on August 12.

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Drs. **Henry Lai** and **Narendra Singh** of the University of Washington, Seattle, have extended their study on the effects of 2450 MHz microwave radiation on the DNA in rat brains. They had previously reported an increase in single-strand DNA breaks (see *MWN*, N/D94) and have now found an increase in double-strand breaks. Writing in the April 1996 issue of the *International Journal of Radiation Biology* (69, pp.513-521), Lai and Singh noted that DNA breaks could lead both to cancer and to accelerated aging. "It is imperative that the effects of [RF/MW radiation] on DNA in brain cells be further studied and understood," they argued. Meanwhile, Dr. **Gary Williams** of the American Health Foundation in New York City has taken issue with the Lai-Singh paper on single-strand breaks. In a comment—with a reply from Lai and Singh—published in the most recent issue of *Bioelectromagnetics* (17, p.165), he charged that their data "are difficult to reconcile with current knowledge of physical or chemical damage to DNA." Williams, who was selected by the members of WTR to serve on their peer-review board, concluded that, "Considerably more research is required to establish whether microwave[s] interact with DNA in rat brain cells."

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David Reynard has dropped the lawsuit he filed in 1992 alleging that radiation from a hand-held cellular phone caused his wife's fatal brain tumor. Last year, a federal judge dismissed the case due to the lack of medical evidence on causation (see *MWN*, M/J92 and M/J95). Reynard is bitter about the outcome. "I'm real angry," he told *Microwave News* from St. Petersburg, FL. His attorney, **John Lloyd**, also of St. Petersburg, commented that, "I could not tell him to invest the money in an appeal and I could not afford it myself." Lloyd explained that the prospects for winning were not very strong. Lloyd had originally filed court papers to initiate an appeal of the May 1995 dismissal, but later decided to withdraw the suit against **NEC Corp.**

and **GTE Mobilnet of Tampa Inc.** The withdrawals were approved by the district and appeals courts in January 1996. Though filed in April 1992, Reynard's suit only gained widespread publicity in January 1993 after he appeared on CNN's *Larry King Live*. The news caused cellular industry stocks to plunge—but only temporarily. The media attention led to CTIA's decision to set up a wireless safety research program (see p.1 and *MWN*, J/F93).

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Although David Reynard has abandoned his lawsuit, a number of cases seeking to link cellular phone use to brain cancer are still pending (see *MWN*, J/F94, S/O94, N/D94, M/A95 and S/O95). One of these is a little-noted suit filed last August in a Texas state court by the widow and children of **Dean Vincent Rittmann Jr.**, who died of a brain tumor in October 1994. Ellen Debrow Rittmann alleges that her husband's tumor was caused by the four different cellular phones—manufactured by defendants **Ericsson Inc.**, **GE**, **Motorola Inc.** and **NEC Corp.**—that her husband used from September 1988 until he was diagnosed with a brain tumor in his right parietal temporal lobe in July 1994. The family, represented by O'Quinn, Kerensky, McAninch & Laminack in Houston, is also suing Rittmann's local cellular service providers. "I see [the Rittmann case] as a variation on a theme introduced in the Reynard case," said Norman Sandler, a spokesperson for Motorola, which is being defended by Fulbright & Jaworski in Austin. Sandler doubts that Rittmann's lawyers will do any better at establishing causation than John Lloyd did for Reynard. Fulbright & Jaworski defended EPRI against the claims brought—but later abandoned—by attorney Joseph Jamail on behalf of 11 children with cancer (see *MWN*, M/A95 and S/O95). Attorneys at O'Quinn, Kerensky are planning for a *Daubert* hearing later this year to address the problem of causation, among other issues.

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It should come as no surprise that the mobile phone market is exploding, but a new report by **Strategies Unlimited** in Mountain View, CA, on base station RF/MW equipment sales gives insight into just how fast the industry is growing. The research firm projects that in the year 2000 more than \$10 billion will be spent on **cellular and PCS base station** equipment. RF/MW equipment represents approximately 30-40% of a station's infrastructure costs. Dr. George Bechtel, the author of the report, told *Microwave News*. When expenses such as land and construction are included, the total cost will add up to more than \$30 billion in one year. Approximately 270,000 cellular and PCS base stations will have been built in the U.S. by the turn of the century—715,000 worldwide, according to Bechtel. In the year 2000 alone, 67,000 more base stations will be built in the U.S. and 150,000 others around the world. A majority of these will be extremely small—picocells, as Bechtel calls them—and placed, for example, inside buildings, hallways and subways. Strategies Unlimited also predicts that the share of digital subscribers worldwide will grow dramatically from 19% to 45% by the year 2000. For more information, contact Bechtel at (415) 941-3438, Fax: (415) 941-5120.

How Hawaiian Officials Decided PCS Antennas Are "Safe"

Reprinted below is an excerpt from "School Sites, State Haste Raise Questions" by Richard Borreca—the second article in a two-part series titled "Antenna Dilemma"—which appeared in the Honolulu Star Bulletin on April 17, 1996. Borreca reported that Hawaii state and local officials are being forced to act quickly to process "a flood" of digital PCS antenna and transmitter site applications, some of which are for public school property. PrimeCo Personal Communications, which requested a high school site, is owned by AirTouch Communications, Bell Atlantic, NYNEX and U.S. West.

Questions of safety also are raised—and generally quelled by the state health department.

"We have looked at information provided and made a preliminary determination that [the antennas] would not pose a significant health risk at those locations," said Bruce Anderson, the department's deputy director for environmental health.

He referred the safety question to Leslie Au, a toxicologist with the state's hazard evaluation and emergency response office. Au said there is no problem with putting antennas atop a 107-foot stadium light pole at Mililani High School, as requested by PrimeCo Personal Communications.

To arrive at his conclusion, Au took calculations provided by PrimeCo, a wireless phone company that plans to offer local digital phone service later in the year. He checked to ensure [that] the company used industry-approved formulas to figure out antenna power. Because the towers [had] not yet been fitted with the transmitters, there was no way to take actual measurements, Au said. "Our calculations confirmed...[and] indicated that anything at least seven feet away from the transmitting antenna itself would be in the safe zone. That high light pole provides a large margin of safety," he said in his report.

Au, however, acknowledged that cellular antenna technology is not his field of expertise. He is trained as a toxicologist and is the state's expert in determining if chemicals are hazardous.

Au also is a potential investor in the new digital phone technology. He, along with 30 others, [was] in a partnership that last year unsuccessfully attempted to purchase digital cellular phone licenses on the mainland. But Anderson said Au had no financial stake in the local firms holding cellular phone licenses. "I don't think it clouded his judgment in assessing the risks," said Anderson, when asked about potential conflicts of interest. He added: "I don't think Leslie would invest in a technology if he thought there was a health problem."

Au's stamp of approval was key to both the city and the state approval process[es].

Fix Found for Pacemaker EMI as Cell Phone Industry Group Focuses on "Potential Public Health Problem"

Dr. Roger Carrillo of Mt. Sinai Medical Center in Miami Beach, FL, has found a simple, off-the-shelf way to shield implanted cardiac pacemakers against interference from digital cellular phones. Meanwhile, Wireless Technology Research (WTR) and the Food and Drug Administration (FDA) have both announced that their own studies confirm earlier findings of an electromagnetic interference (EMI) problem.

In a presentation at the *45th Annual Scientific Sessions of the American College of Cardiology* in Orlando, FL, on March 24, Carrillo described how an electromagnetic filter developed over a decade ago can protect pacemaker users. In earlier experiments, Carrillo and colleagues had noted that a few pacemakers seemed resistant to EMI—and found that they were equipped with this type of filter. When the filters were removed, these devices were susceptible to EMI, indicating that the filters had made the difference. "It's not a very expensive piece of equipment," Carrillo said in an interview. "It costs less than \$20."

Dr. David Hayes of the Mayo Clinic in Rochester, MN, confirmed that pacemaker users may be at risk from digital cellular phone EMI on May 16 at the *17th Annual Scientific Sessions of the North American Society of Pacing and Electrophysiology (NASPE)* in Seattle. Reporting on a three-center study funded by WTR, Hayes said that interference occurred in 54% of the 975 pacemaker users who took part.

In a May 10 letter to FDA's Elizabeth Jacobson, WTR Chair Dr. George Carlo stressed the importance of working together "to address this potential public health problem." WTR is funded by the cellular phone industry (see p.1).

Carlo told Jacobson that WTR now advises pacemaker users who are dependent on the device to use an analog, rather than a digital, cellular phone; urges others to avoid placing the phone over or near their pacemaker; and counsels all those with pacemakers to avoid putting their phones in a breast pocket. These interim guidelines are the first specific recommendations issued by WTR, and go beyond its statement last November urging those with pacemakers to "exercise caution when using...digital cellular telephones."

Also at the NASPE meeting, FDA's Paul Ruggera reported that results from the agency's own bench testing were similar to those found by WTR: one-third of the 30 pacemaker models tested experienced EMI. Only two pacemaker models suffered interference at a distance greater than six inches, and the FDA indicated that it was working with the manufacturers to correct the problem. Based on this study, which examined three types of digital cellular phone technology, the agency concluded that the six-inch separation distance it has recommended remains adequate.

The EMI-resistant pacemakers studied by Carrillo are made by Pacesetter Inc., but Carrillo said that he is not endorsing one company over another: "I'm sure this filter is used by more than one manufacturer, because it's a common device—and I'm not saying that filters are the only answer." Other pace-

maker companies have sent him prototypes that use different techniques to avoid interference. "Let's make sure that all new models are equipped with some way of avoiding EMI," Carrillo stressed.

Carrillo does not recommend that people with nonresistant pacemakers have them replaced, but only that they observe certain precautions. Besides those supported by WTR, Carrillo also calls for using cellular phones with the ear farther from the implanted pacemaker. A summary of Carrillo's results was published in the *Journal of the American College of Cardiology* (27, p.15E, 1996). His research to date has been funded entirely by Mt. Sinai and physicians in private practice (see *MWN*, M/J95 and N/D95).

Hayes and his coworkers found that pacemakers from some companies were significantly more likely to be vulnerable to EMI, with the rate varying from 7% to 27% among manufacturers. As in earlier research, they found that analog phones had a much lower rate of interference than digital phones. Among the digital phones, the PCS 1900 type caused far less interference than any other. "There's no question that in the digital group, it's the least offender," Hayes told *Microwave News*. His study was carried out in collaboration with researchers at Tufts-New England Medical Center in Boston and at the University of Oklahoma Health Sciences Center in Oklahoma City.

The FDA also found a relative absence of interference from analog phones. Among the digital models, no EMI was found in testing of a GSM phone, though Ruggera noted that interference from such phones has been reported in Europe. GSM digital phones operate at the same 217 Hz modulation as the U.S. PCS 1900 device tested by Hayes, and Howard Bassen, head of the Electrophysics Branch of FDA's Center for Devices and Radiological Health in Rockville, MD, said that this could explain why both phones are far less likely to produce interference. "That modulation frequency is so high that it doesn't get into the pacemaker's detection circuitry," Bassen told *Microwave News*.

On May 9, 1996, WTR issued a progress report on its pacemaker EMI research that included the main findings of Hayes's study. "As the clinical trial passed the halfway point," the report stated, "WTR concluded that a risk of interaction between wireless telephones and implanted pacemakers existed."

"This is the first time that we've had the opportunity to both

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Soon you can visit *Microwave News* on the World Wide Web. You will find several key documents, including the full text of the EPA's 1990 draft report on EMFs (see *MWN*, M/J90) and our commentary on PBS' *Frontline* story, "Currents of Fear" (see *MWN*, J/A95). We have also included our tables of contents for every issue in the last two years. Find us at <<http://www.microwavenews.com>> after July 1.

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identify a health risk and simultaneously work toward solutions,” Carlo said in an interview. He noted that, “We’ve never seen a problem develop in a real-life situation,” as opposed to an experimental setting. But he stressed that it is important to find solutions “before it becomes a serious issue.” Carlo’s letter to Jacobson noted that, “There is nothing in the data thus far to suggest that bystanders with pacemakers would be at risk...from others who are using [cellular] phones.”

Motorola spokesperson Norman Sandler told *Microwave News* that, “Our position is that EMI is not a public health problem” for users of cellular phones. Sandler emphasized that the data presented at the NASPE meeting indicated that this type of EMI is preventable through simple precautions.

WTR announced that it would support research by Carrillo on the likelihood of EMI relative to distance and other parameters. Carrillo confirmed that he would be doing some work for WTR but declined further comment because of a confidentiality clause in the research contract. WTR’s Mike Volpe said that WTR is providing Carrillo with funds for a clinical trial of 100 pacemaker users, which is also designed to exam-

ine the effects of a phone’s modulation pattern.

Carrillo has agreed to serve as chair of WTR’s risk management committee on pacemaker EMI, and Volpe said that Carrillo will receive a minimum of \$100,000 for both this work and the 100-person study. The three-center study led by Dr. Hayes received \$353,000, and Volpe indicated that Hayes will receive an unspecified amount of additional funding.

Carlo said that by this July WTR will have spent about \$2.2 million on pacemaker research. WTR would not provide a breakdown of how that money was spent.

WTR plans for Carrillo to present initial results from the 100-person study at a symposium it will sponsor on July 16 in Washington. All those involved in phone/pacemaker interference will participate, including the FDA and researchers from the University of Oklahoma, according to Carlo. He will invite researchers from overseas as well, such as the Italian group led by Dr. Vincenzo Barbaro of the Istituto Superiore di Sanità in Rome (see *MWN*, J/A94 and M/J95). WTR will present the final report and recommendations from its pacemaker EMI research at the symposium.

NCRP Critical of Lobbying on RF/MW Radiation Health Limits

Members of a committee of the National Council on Radiation Protection and Measurements (NCRP) have been asked to stop using their NCRP affiliations when voicing personal preferences for the American National Standards Institute’s (ANSI) limits for human exposures to RF/MW radiation over those set by the NCRP.

The NCRP’s concerns stem from a lobbying campaign by two members of NCRP Committee 89-5, which is in the process of revising the council’s 1986 report on RF/MW radiation (see *MWN*, M/J86 and S/O95). In letters to the Federal Communications Commission (FCC), Drs. Eleanor Adair and C.K. Chou urged the commission to adopt the ANSI C95.1 standard over NCRP’s 1986 limits (see *MWN*, M/A96). Chou, who is at the City of Hope National Medical Center in Duarte, CA, is vice chair of committee 89-5.

In a March 14 letter to FCC Chairman Reed Hundt, Adair wrote that she could “already assure” him that the NCRP limits would closely resemble the 1992 ANSI standard (see *MWN*, M/A96). The problem is that the committee, which was set up last year, had only met twice and had hardly moved beyond organizational questions. Dr. James Lin, the chair of NCRP 89-5, estimated that the committee would take two to three years to complete its report.

In a March 27 letter, Lin, who is at the University of Illinois, Chicago, asked Adair to withdraw “your statement which gave the impression that you know what would be the outcome of the committee’s efforts.” Adair refused. In an April 4 reply to Lin, Adair said that retracting her letter to the FCC “would discredit my testimony in support of the FCC’s proposed adoption of the ANSI” standard.

At the end of May, Adair told *Microwave News* that she

was standing firm. “I will not write another letter to Mr. Hundt,” she said. Adair, who is a fellow at the John Pierce Laboratory in New Haven, CT (see p.18), has close ties to the cellular phone industry, which is lobbying the FCC to adopt the ANSI standard (see p.9). Chou declined to comment.

“I and others at the NCRP are very much concerned because this could undermine the process,” Lin said in an interview. Dr. Gregory Lotz, a member of the committee who is with the National Institute for Occupational Safety and Health (NIOSH) in Cincinnati, said that he was worried about “the credibility of the committee’s work,” noting that “strong statements by any member in advance may compromise our work.”

Lin said that there had been a “lengthy” discussion of the matter at the committee’s May 23-24 meeting, but that a final decision on any possible action has not yet been reached. “I indicated to our members that when we speak on these issues, we speak as individuals—not as committee members,” Lin said. Dr. Thomas Tenforde of the Battelle Pacific Northwest Labs in Richland, WA, played down the significance of Adair’s statements. “I suspect she wasn’t thinking about what she was saying,” he told *Microwave News*. Tenforde is the chairman of NCRP Committee 89, which has oversight over Lin’s committee. Nevertheless, Tenforde urged members of all NCRP committees to “cease and desist from this unfortunate practice” of commenting on NCRP reports before publication.

NCRP President Dr. Charles Meinhold declined to comment on the Adair letter. Meinhold is aware of the controversy, according to Tenforde.

Last year, when a draft NCRP report on the health risks associated with power frequency EMFs was leaked to the press, Meinhold sent out a number of advisories that the report was still an internal document (see *MWN*, J/A95).

Tenforde said the NCRP would not follow the same course of action in this case: “It would be overkill to go into press releases—it is not the same magnitude of a problem.”

Cell Phone Study: No Excess Mortality over Short Term

Users of hand-held cellular phones have similar mortality rates to those using two-piece phones, according to a study by Epidemiology Resources Inc. (ERI) in Newton Lower Falls, MA.

This is the "first hard information" on the effect of cellular phone use on mortality, Dr. Nancy Dreyer, one of the authors of the report, told *Microwave News*. However, she added that the paper is "still a preliminary finding, in that it looked at overall mortality only, not at specific causes of death."

Indeed, the ERI team itself pointed out two major limitations of its study. First, cellular phones have been in use for only a few years—probably less time than the latency period for brain cancer. And, second, because brain cancer is relatively rare, even a significant rise might well not show up in the overall mortality rate. The team conceded that, "These preliminary findings...do not directly address the issue of the relation between cellular telephone use and brain cancer."

In the paper, which appeared in the May issue of *Epidemiology* (7, pp.303-305, 1996), Dreyer and her coauthors stressed that they could only identify short-term effects. This could be a serious drawback, as a team from the National Cancer Institute (NCI) pointed out in a paper in the *Epidemiologic Reviews* (17, pp.382-414, 1995). "The introduction and widespread use of cellular telephones are very recent phenomena," the team noted. "Only if cellular phones influence a late stage in carcinogenesis would it be likely that epidemiologic studies could detect an effect at this time."

The ERI authors based their findings on the billing records of 256,000 customers of a large U.S. cellular telephone carrier with active accounts as of January 1, 1994. To qualify for inclusion, a customer had to have had at least two complete billing cycles (November and December 1993). Dreyer conceded that this was a short time period, but described this cutoff as "just a strategy to get a sample of people to study." She added that,

"It's better than one month, but not as good as three or four." Of this cohort, 149,000 had accounts for two years and 63,000 for three years. Like the entire cohort, these two subgroups did not show any difference in mortality between users of hand-held phones and users of two-piece phones.

"You can criticize any surveillance program by saying it's too soon," Dreyer said. "I look at this in terms of responsible product stewardship." She added that a study is being planned in which the cohort group would be twice as large and for which cause of death would be included. Dreyer confirmed that brain cancer is the focus of concern, calling it "the hypothesis that's driving this study overall."

Dreyer reported that further studies may be put on hold due to a funding problem (see p.1). In addition, the new telecommunications act classifies customer lists as private, preventing the continued collection of data. If the law is not amended, Dreyer says, "We can't go forward."

In an accompanying editorial, Dr. Patricia Buffler, dean of the School of Public Health at the University of California, Berkeley, wrote that the results of the study "offer some reassurance, specifically that a large increase in mortality is not associated with radiofrequency exposures over the short term." However, she allowed that the findings merely represent "a first look," neither proving nor disproving that cellular phones pose a threat to users' health.

Dr. Kenneth Rothman, the lead author of the paper, is also the editor of *Epidemiology*. Dreyer said that Rothman had not participated in the peer-review process and that the journal does not disclose the authors to the reviewers. "Sometimes reviewers think they know who wrote the article," she said, "but they're not right as often as they think they are."

Two methodology papers, "Assessment of Cellular Telephone and Other Radiofrequency Exposure for Epidemiologic Research" and "Utility of Telephone Company Records for Epidemiologic Studies of Cellular Telephones," were published in the May issue of *Epidemiology* (pp.291-298 and pp.299-302).

"MICROWAVE NEWS" FLASHBACK

Years 15 Ago

- Mice exposed to benzopyrene and microwaves show accelerated development of both spontaneous and chemically-induced cancers, according to Dr. Stanislaw Szmigielski of the Center for Radiobiology and Radioprotection in Warsaw, Poland.
- A House subcommittee led by Rep. Albert Gore (D-TN) announces that RF sealers and heaters present serious health risks and seeks new research and standards for the devices.
- China adopts a provisional 50 $\mu\text{W}/\text{cm}^2$ non-ionizing radiation standard for occupational exposures.

Years 10 Ago

- A British destroyer was sunk by an Argentinian missile in the 1982 Falklands war because its communications system interfered with its warning radar, reports a London tabloid.

- The NCRP recommends a 200 $\mu\text{W}/\text{cm}^2$ limit for public exposures to RF/MW radiation at 30-300 MHz.
- Miscarriages are more common among women who use electric blankets than among those who do not, according to a study by Dr. Nancy Wertheimer and Ed Leeper.

Years 5 Ago

- State legislators in Michigan, Rhode Island and Tennessee propose temporary moratoriums on power line construction, citing health concerns.
- People working near electric conductors in office buildings may be exposed to EMFs as high as 3,000 mG, according to Richard Tell of Richard Tell Associates in Las Vegas.
- Dr. Allan Bromley, science advisor to President Bush, denies that he quashed an EPA report that concluded that EMFs are a possible human carcinogen.

Lucent is upset.” Petersen caused a stir when he told *RCR*, a trade newspaper, that, “The [cancer] research project is really nonexistent. There’s nothing there” (see p.15).

WTR confirmed it had spent about \$12 million by the end of 1995, but would not say how much of that had gone to cancer research or to research contracts in general.

Two contracts for dosimetric measurements were abruptly canceled by WTR in April on orders from the CTIA. Dr. Om Gandhi of the University of Utah, Salt Lake City, and Dr. Kenneth Foster of the University of Pennsylvania, Philadelphia, were each developing techniques to estimate how much of the energy radiated by a cellular phone is absorbed by the head. The cutoff brought both studies to a halt.

“WTR pulled the plug on April 17 without warning,” Foster told *Microwave News*. In 1995 Foster was awarded a \$300,000, two-year grant for dosimetry experiments (see *MWN*, N/D95). He said that just days before the WTR action, the university terminated his spending authority after administrators realized that the school had not received a single check. “This whole thing has been a big setback,” Foster said.

Gandhi’s award was announced with fanfare in December 1993, but the contract was not signed for another 18 months (see *MWN*, J/F94 and S/O95). In late May, Gandhi said he had received only one-quarter of the \$185,000 that had been pledged.

WTR has also stopped payments to Epidemiology Resources Inc. (ERI) of Newton Lower Falls, MA, according to company president Dr. Nancy Dreyer. ERI is carrying out a major epidemiology study for WTR (see p.13). When asked if her funding might be restored in the future, Dreyer answered, “I would like to know that, too.”

Volpe acknowledged that WTR has experienced “interrupted funding” since the first of the year. “Because of inadequate financial support,” he said, WTR has been forced to favor certain projects, such as pacemaker research (see pp.11-12). “The WTR program remains on track,” Volpe insisted, adding that Dreyer’s funds will be restored at some point in the future, and that no further contracts will be canceled.

Tim Ayers, CTIA vice president for public relations, maintained that, “The cash flow to WTR is on schedule. We’re on schedule, plan to stay on schedule and will meet the \$25 million commitment.” Ayers conceded that, “You may get different opinions from others. But we consider that we’re on schedule.” When asked why WTR had run out of money, Ayers said only, “They didn’t.”

In fiscal 1994, the CTIA spent more money on public affairs for its health effects program than it gave to WTR, according to the trade group’s own budget documents. The next year, the CTIA spent \$677,000 on public affairs out of funds that it had collected for health and safety work. For fiscal 1996, close to \$1,000,000 was budgeted for an additional category called “CTIA-allocated expenses.” Toshiba’s Madrid said, “I have no idea what that means.”

Senior CTIA officials did not respond to a request for an interview about the spending of WTR research monies.

“When it became clear that all the money wasn’t going to WTR,” said a source close to the situation, “some manufacturers who are not CTIA members refused to pay their assess-

ments.” This source agreed with Madrid that there is at least \$2 million that the CTIA collected but failed to pay to WTR.

But Lucent’s Petersen said that “there are a lot of questions” about how WTR spent the money it *did* receive. “The manufacturers are not satisfied with the pace of the research,” he said. “We are not getting answers. Our questions are sometimes not even being acknowledged.” When another senior industry official was asked where WTR’s \$12 million went, the response was, “That’s a good question.”

“There are some within the industry who want WTR to produce quick results to vindicate wireless products,” Volpe told *Microwave News*. “That is not what WTR is about.”

Volpe provided the following general breakdown of WTR spending through the end of calendar year 1995: \$2.3 million for toxicology; \$2 million for epidemiology; \$2 million for scientific outreach; \$1.8 million for dosimetry; \$1.2 million for work on pacemaker interference; \$800,000 for general support; \$600,000 for ongoing surveillance; \$300,000 for CTIA’s certification program; \$200,000 for WTR’s peer-review board; \$114,000 for work on antenna base stations; and \$60,000 for risk management research. Volpe explained that each category includes all related spending—combining research contracts, consultants’ fees and WTR’s own expenses. He declined to be more specific.

In addition, Volpe said that in the same period WTR spent \$420,000 out of its CTIA monies for litigation expenses.

The canceled contracts with Gandhi and Foster were part of the certification program, designed to assure that new cellular phones comply with Federal Communications Commission (FCC) regulations. “CTIA asked WTR to suspend work” on this program, CTIA President Thomas Wheeler wrote in a May 7 letter. One source attributed the need for the cut to CTIA mismanagement.

Madrid put it differently: “WTR was set up to do brain cancer research. The CTIA is spending money in other areas that some manufacturers don’t believe that we agreed to.” Petersen and some other manufacturer representatives have been critical of expenditures on issues like pacemakers. Madrid, however, stressed that, “I have no concerns about how WTR spends its money. My concerns are with what goes on at the CTIA.” He noted that to criticize WTR’s spending could raise questions about industry interference in the direction of the research effort.

Volpe argued that the cancellation of WTR’s certification work does not call its independence into question: “The WTR charter expressly forbids the industry from meddling in how WTR spends research funds.”

Wheeler stated in his letter that the fiscal 1997 budget “eliminates non-bioeffects activities from the manufacturers’ assessment, but not from that of the carriers.” This was confirmed by Madrid. Up to now, health and safety expenses have been split equally between carriers and manufacturers.

According to Madrid, Wheeler conferred with manufacturers on May 20 and promised to give WTR quarterly payments of \$1.4 million on a regular schedule. Participating in the discussion were representatives from Ericsson, Hughes, Lucent, Mitsubishi, Motorola, NEC, Nokia, Nortel, Qualcomm and Toshiba, among others.

FROM THE FIELD

Clippings from All Over

"The scientist can afford to be skeptical much longer than the person concerned with protecting public health."

—Dr. Keith Baverstock, co-coordinator of the World Health Organization's International Thyroid Project, quoted by Michael Balter in "Children Become the First Victims of Fallout," *Science*, p.360, April 19, 1996

"If there was a health effect from cell phones, because of their popularity it would be a major public health concern."

—Dr. Arthur (Bill) Guy of Wireless Technology Research (WTR), quoted by Tom Paulson in "Cell Phones Are Found To Disturb Pacemakers," *Seattle Post-Intelligencer*, p.A12, May 17, 1996

"The [cancer] research project is really nonexistent. There's nothing there. The emperor has no clothes."

—Ronald Petersen, non-ionizing radiation protection manager at Lucent Technologies Inc. in Murray Hill, NJ, quoted by Jeffrey Silva in "True Goals of WTR Questioned by Industry," *Radio Communications Report (RCR)*, p.33, May 6, 1996 (see p.14)

[Craig McCaw] has difficulty absorbing lengthy written documents and usually avoids them. That leaves time for him to do what he prefers anyway, which is to think and to stand back and take in the big picture.

—Andrew Kupfer, "Craig McCaw Sees an Internet in the Sky," *Fortune*, p.64, May 27, 1996

The Air Force has demonstrated a capability of countering air-defense systems by damaging their components through the use of "extremely" high-power microwaves, according to Secretary of Defense Perry's recently released 1996 Annual Report to the President and Congress. The report also reveals "there are similar programs for protection of

land vehicles and ships."

—Gerald Green, "Air-Defense Countermeasures Demonstrated Using Extremely High-Power Microwaves," *Journal of Electronic Defense*, p.15, May 1996

Melatonin, the hormone of the pineal gland, is currently the subject of much ill-informed publicity and speculation in the entertainment media worldwide. Several books on the subject have made grossly exaggerated claims for its value, portraying it as a panacea and as an "anti-aging" treatment. These claims are distortions of current knowledge of the physiological functions of melatonin and its therapeutic potential.

—Dr. J. Arendt, professor of endocrinology at the University of Surrey in Guildford, U.K., and author of *Melatonin and the Mammalian Pineal Gland*, in an editorial, "Melatonin: Claims Made in the Popular Media Are Mostly Nonsense," *British Medical Journal* (U.K.), p.1242, May 18, 1996

"There's no doubt the controversy has exploded in the last two years. Eight or ten years ago people never commented. You just sold the houses under the power lines and they may have had a little bit of a grizzle about it. Now people are much more informed and ask themselves questions like: How are we going to be compensated? How will we be able to sell out? Certainly, none of the prudent or wise or informed will buy them. Women with children are scared. They don't want them playing in the backyard."

—Gerald Foley, a real estate agent in Keilor, Australia, who says that 90% of home buyers reject houses near power lines, quoted by Veronica Ridge in "High Voltage Living," *The Age* (Melbourne, Australia), p.3, April 17, 1996

Letters to the Editor

EMI to Medical Devices from Cellular Antennas

March 22, 1996

To the Editor:

We would like to make a comment on your article "California PUC Advises Against Cellular Antennas near Schools and Hospitals" [see *MWN*, N/D95]. In particular, we would like to comment on the issue of siting cellular antennas on or near hospitals.

The hospital administrations, medical boards and biomedical engineering departments are generally consulted in the siting of antennas and these people are surely in the best position to judge any health effects.

There is, however, one issue that should be considered when siting cellular antennas on or near hospitals and that involves the electromagnetic interference (EMI) to medical electrical equipment.

The U.S. Food and Drug Administration (FDA) issued a voluntary standard¹ specifying that medical electrical equipment should be immune from EMI in fields up to 7 V/m within the frequency range 450 to 1000 MHz. The International Electrotechnical Commission (IEC) has published a standard on electromagnetic compatibility for medical electrical equipment² in which it states that an immunity level of 3 V/m shall apply for the frequency range 26 to 1000 MHz. However, it is stated in this standard that the 3 V/m immunity level may be inappropriate because the physiological signals measured may be substantially below those induced by a field strength of 3 V/m.

In recognition of the fact that safety-of-life medical electrical equipment requires a higher level of immunity, the IEC has issued a draft standard for infusion pumps and controllers,³ which states that an immunity level of 10 V/m shall apply for the frequency range 26

to 1000 MHz.

We have conducted extensive testing of the potential of cellular telephones to interfere with the operation of medical electrical equipment and consulted with manufacturers of that equipment. Our conclusion is that medical electrical equipment should not be exposed to levels above 1 V/m from mobile radio installations.

We ensure that protection is provided by, first, designing our antenna installations with a rule that no area that is likely to have sensitive medical electrical equipment will have a field strength of greater than 1 V/m. This can be achieved by transmit power control and suitable antenna design and positioning. Second, we confirm that the 1 V/m criterion is adhered to through measurement at the site.

Typical measured field strengths in hospital wards range from 6.7-67.5 mV/m (equivalent power densities of 0.012-1.2 nW/cm²) per digital carrier or analog channel leading to total field strengths in the range 13.4-580 mV/m (0.048-89 nW/cm²). The total field strength depends on the number of digital carriers (typically 2 to 4 per sector) or analog channels (typically 32 per sector) present, and an enhancement factor of 3 dB (numerical factor of 1.4 for field strengths and 2 for power densities) has been included to account for possible reflections.

Yours sincerely,

Ken Joyner, PhD
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John Causebrook, PhD
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FROM THE FIELD

1. FDA, Bureau of Medical Devices, *Electromagnetic Compatibility Standard for Medical Devices*, Pub. No.MDS-201-0004, October 1, 1979.
2. IEC, *Medical Electrical Equipment, Part 1: General Requirements for Safety, 2. Collateral Standard, Electromagnetic Compatibility—Requirements and Tests*, No.IEC 601-1-2, 1993.
3. IEC, *Draft First Edition 19, Medical Electrical Equipment, Part 2: Particular Requirements for Safety of Infusion Pumps and Controllers*, Draft No.IEC 601-2-24, 1994.

Adey on NCRP Draft EMF Report

April 12, 1996

To the Editor:

Your quotation from the report of the Australian Senate Economics Committee hearing of November 7-8, 1995, attributes the following remarks to Dr. Michael Repacholi, chief scientist at the Royal Adelaide Hospital, consultant to the World Health Organization (WHO) and chair of the International Commission on Non-Ionizing Radiation Protection (ICNIRP), regarding the draft NCRP report of the Committee on Extremely Low Frequency Electric and Magnetic Fields [see *MWN*, J/F96]:

It is a report of some committee members....in the media's mind

it has become an event because some committee members have wanted to put this information out for whatever purpose. In science it cannot be justified in any way. I would strongly recommend that the committee ignore that report because it is a nothing report.

Please be advised that Dr. Repacholi's remarks are a total fabrication. The draft conclusions and recommendations of the NCRP are the unanimous conclusion of every member of the NCRP committee. They are the result of more than a year's intense deliberation by the committee in arriving at unanimity. Moreover, all deliberations were conducted in confidence. At no time has Dr. Repacholi been privy to the lengthy and painstaking discussions that led the committee to its final position.

One can only hope that such lying in high places will receive its just deserts. Echoing Winston Churchill's historic utterance, "The mills of God grind exceeding slow, but they grind exceeding sure."

Sincerely,

Ross Adey, MD
Chairman

NCRP Committee 89.3 on Extremely Low Frequency EMFs
Research Service, Veterans Administration Hospital
11201 Benton St., Loma Linda, CA 92357

UPDATES

INTERNATIONAL STANDARDS

IEC Preparing EMF Meter Guidelines...An International Electrotechnical Commission (IEC) working group has reached consensus on a draft standard for gaussmeter accuracy. Developed for meters that operate from 15 Hz to 10 kHz, the draft includes criteria for instrument specifications, calibration techniques and immunity to electromagnetic interference, according to Dr. Martin Misakian, who heads the group. The guidelines will govern overall performance from 1 mG to 300 G for magnetic fields and from 1 V/m to 50 kV/m for electric fields. Misakian, of the National Institute of Standards and Technology in Gaithersburg, MD, was also in charge of writing the 1994 IEEE Standard 1308, *Recommended Practice for Instrumentation: Specifications for Magnetic Flux Density and Electric Field Strength Meters—10 Hz to 3 kHz*. The IEC working group based its first draft on the IEEE standard, but later included a protocol on how to take measurements, Misakian said in an interview. The draft has already been criticized by one meter manufacturer for not addressing magnetic field measurements below 1 mG. "There is a tendency for physicists and engineers to be skeptical that half a milligauss here or there can possibly mean a thing, although most scientists would agree that no firm 'safe-dangerous' threshold has been established," Ed Leeper of Monitor Industries in Boulder, CO, told *Microwave News*. "We can't just ignore meter performance below some arbitrary level." Misakian responded that meters will yield accurate measurements of fields below 1 mG, provided that the IEC's calibration techniques are followed correctly. The standard will be reviewed by the IEC Technical Committee 85 in September in Dresden, Germany, and, if approved, will then go to the IEC national committees for ratification. Misakian is the only American in the 15-person

working group, which has members from France, Germany, Hungary, Italy, Japan, Russia, Sweden, Switzerland and the U.K. One observer noted that different national interests among IEC members could delay final approval of the standard.

MALE FERTILITY

NIOSH on Army Radars...Men exposed to RF/MW radiation from military radars do not face an increased risk of infertility, according to a NIOSH study by Dr. Steven Schrader. He found similar sperm levels in 33 soldiers who worked with signal corps radar, in 57 who had potential lead exposure from firing howitzers and in 103 controls. The results conflict with those of a 1992 study in which intelligence officers who worked with radar were found to have higher infertility rates than soldiers in the other two groups (see *MWN*, M/J93). Schrader also worked on the earlier study, which was led by Dr. Timothy Weyandt, now retired from the U.S. Army's Biomedical R&D Labs in Frederick, MD. Schrader told *Microwave News* that the different types of radar used in signal corps and intelligence may account for the conflicting results, but that a comparison would be impossible since RF/MW measurements were not made. NIOSH's Dr. Gregory Lotz determined that the signal corps officers' RF/MW exposures were low, based on their responses in questionnaires about radar use. In both studies, sperm levels were the same for controls and howitzer operators. But while Weyandt did not measure lead exposures among the artillerymen, Schrader did—and found none. In a paper presented on April 27 at the *21st Annual Meeting of the American Society of Andrology* in Minneapolis, Schrader noted that the conflicting fertility results indicate the need for more research on the potential effects from radar. "From a scientific point of view, I would like to find out why the results were so different," he

said in an interview after the meeting, but added that such a study is unlikely due to lack of interest from the Army.

MEDICAL APPLICATIONS

Prostate Shrinker Okayed... On May 6, the FDA approved the Prostatron, which uses microwaves to kill excess prostate tissue—following the recommendation of its Medical Devices Advisory Committee (see *MWN*, N/D95). “This device provides another alternative for men who are unable, or do not wish, to have surgery for enlarged prostate,” FDA Commissioner Dr. David Kessler said in a written statement. “While not a cure, it effectively treats the symptoms.” The manufacturer, EDAP Technomed Group in Cambridge, MA, has agreed to study patients for a year to assess possible long-term effects of treatment with the device. The Associated Press reported that Prostatron therapy will be immediately available at the five hospitals that tested it. The company continues to decline to comment on specific absorption rates in neighboring tissue.

MELATONIN

The Eyes Have It... A new discovery has heightened concerns over the use of melatonin supplements. In the April 19, 1996 issue of *Science*, Drs. Gianluca Tosini and Michael Menaker of the University of Virginia, Charlottesville, reported that a mammalian retina synthesizes melatonin and has its own separate biological clock. The circadian production of melatonin is thought to control important processes in the eyes, including restoration of rods (for night vision) at the end of the night, and renewal of cones (for color vision) at the end of the day. Other scientists see these findings as an indication that taking melatonin pills could have unanticipated negative effects on eyesight (see *MWN*, M/A96). For years, mammals were thought to have only one biological clock, located in the brain, which regulated their circadian rhythms. Then, about 20 years ago, researchers found they could make the eye’s circadian rhythm run at its own, different pace. In 1991, Dr. Michael Terman of the Columbia-Presbyterian Medical Center in New York City showed that the daily rhythm of a rat’s retinas continued even after the biological clock was removed from its brain. This experiment also suggested that the eye produces its own melatonin, separately from the pineal gland. Many observers remained skeptical, however. Now, Tosini and Menaker have devised a technique for keeping hamster retinas alive and functioning in culture and have found that melatonin production continues to follow a circadian cycle. They argue that this supports the idea that “circadian rhythmicity of melatonin level is essential for normal photoreceptor function.” Tosini and Menaker’s findings led Dr. Al Lewy of Oregon Health Sciences University in Portland to comment, “If we knew with certainty that melatonin has an important function in the human eye, this hormone should be taken off the market immediately—no questions asked,” reported Janet Raloff in the April 20 *Science News*. Ophthalmologist Dr. Charlotte Remé of the University of Zurich in Switzerland told Raloff, “When we have a high melatonin level in the retina and are exposed to very bright light, we risk light-induced damage.”

MICROWAVE NEWS

A Report on Non-Ionizing Radiation

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PEOPLE

Dr. **Eleanor Adair** is leaving the John Pierce Laboratory in New Haven, CT, to become a senior scientist working on electromagnetic radiation effects at the U.S. Air Force's Armstrong Lab at Brooks AFB, TX. She expects to move to Texas in September....Dr. **Antonio Sastre** has moved to Kansas City, MO, where he is now a principal scientist at the Health Assessment and Research Center at the Midwest Research Institute. Sastre will be collaborating with Drs. **Mary Cook** and **Charles Graham** on their continuing investigation of the effects of human exposures to EMFs. Sastre is keeping open his consulting firm, A.S. Consulting & Research Inc., which will operate out of nearby Overland Park, KS....**Robert Manor**, formerly of LeBoeuf, Lamb, Greene & MacRae, has joined the law firm of Schmeltzer, Aptaker & Shepard in Washington. He will be working on radiation and toxic tort litigation, including EMF cases. Manor is also an alumnus of Crowell & Moring. Schmeltzer, Aptaker has defended clients in cases about ionizing radiation and Agent Orange and has worked on EMF litigation both in the U.S. and in other countries....Attorney **Gina Fietsam** is again working on cellular phone health litigation. In 1994, she left the Chicago firm of Holstein, Mack & Klein to do corporate law. On May 1, she returned to the fray at Barnow & Goldberg, also in Chicago, where she will be part of the team representing **Robert Kane** in his brain tumor case against Motorola, as well as working on other related lawsuits. Holstein, Mack & Klein and Barnow & Goldberg are cocounsels in the Kane litigation. ...Dr. **Patricia Buffler** of the University of California, Berkeley, has been elected to the National Council on Radiation Protection and Measurements, based in Bethesda, MD....Dr. **Alessandro Chiabrera** of the University of Genoa in Italy and Dr. **Peter Semm** of German Telekom in Darmstadt have been appointed associate editors of *Bioelectromagnetics*. They are representatives of the European Bioelectromagnetics Association.

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RADON HYPOTHESIS

Skepticism Abounds... Researchers in England and the U.S. have raised strong objections to Dr. Denis Henshaw's hypothesis that radon concentrated by electric fields from transmission lines and electrical appliances could explain the EMF-cancer link. In the January 1996 issue of the *International Journal of Radiation Biology*, Henshaw and his coworkers at the University of Bristol in the U.K. had reported observing up to 18 times higher-than-expected levels of radon daughters near power lines and outlined a number of possible ways electric fields could increase human exposure to these carcinogens (see *MWN*, M/A96). Other researchers are not convinced, however. It "seems most unlikely" that electric fields could increase radon doses to the lungs and other organs, four members of the U.K.'s National Radiological Protection Board in Chilton wrote in the May issue of the *Journal*. "The overall effect of the mechanisms considered by Henshaw et al. would be expected, if anything, to reduce slightly the activity of radon decay products deposited in the lung and hence reduce the dose to the lung and other tissues," they explained. A second letter in the *Journal*, from the U.K. Electricity Association, made a

similar argument. But Henshaw is standing firm. His response, which followed the two letters, tried to clear up what he called "a degree of confusion." He contended that, "Our measurements of increased airborne activity near a large source of [EMFs] lead directly to increased dose to all body organs via inhalation." He pointed out that his work could generate a number of "testable hypotheses" about the possible EMF-cancer link. Dr. Larry Toburen of East Carolina University in Greenville, NC, also questioned Henshaw's conclusions: "I am inclined to discount the electric fields-radon proposal," he wrote in the April 20 *Lancet*. Toburen, who is the project director of the NAS-NRC EMF health study (see p.5), argued that lung cancer, which is associated with radon exposure, "has not been detected in excess in people living near power lines." However, a letter published in the April 15, 1996 *American Journal of Epidemiology* cited five studies showing associations between lung cancer and EMF exposures. Dr. Thomas Erren of the University of California School of Public Health in Berkeley described three occupational studies—by a Swedish team (see *MWN*, D83), by Dr. Genevieve Matanoski of Johns Hopkins University (see *MWN*, N/D89) and by Drs. Ben Armstrong and Gilles Thériault of McGill University (see *MWN*, N/D94)—that found an association between lung cancer and EMFs, as well as two residential studies, one from the U.K. and one by Dr. Nancy Wertheimer and Ed Leeper. Given that lung cancer is multifactorial, "a (co)carcinogenic potential of electromagnetic fields cannot be refuted at this time," Erren wrote. And because lung cancer in the United States is epidemic, "a link of [EMFs] to this malignancy would have considerable public health relevance," he added.

WALL STREET

A Winning Bet on Nonthermal Effects... Move over Microsoft and Intel. OrthoLogic, based in Phoenix, has been one of the stock market's shining stars over the last year. In just one week in May, the stock skyrocketed \$16 a share to \$49. That's an increase of more than 45%. Not bad, but those who have held the stock for the last year have done much better. Last May, OrthoLogic was selling at \$4. (The stock gave up some of these gains the following week.) The company's flagship product is the OrthoLogic 1000 Bone Growth Stimulator, which, by the end of 1995, had gained 20% of the non-union fracture market. The stimulator is taking clients away from the industry leader, EBI of Parsippany, NJ, by using weaker magnetic fields (peak amplitude of 400 mG) and shorter treatment times (30 minutes a day). The OrthoLogic 1000 uses a static (DC) magnetic field of 200 mG and an AC frequency of 15.3 Hz or 76.6 Hz to increase the synthesis of the growth factor IGF-II. These field parameters are based on the cyclotron resonance hypothesis championed by Drs. Abe Liboff, Bruce McLeod and Stephen Smith (see *MWN*, N/D90 and J/F94). Drs. Robert Fitzsimmons and David Baylink of the VA Hospital in Loma Linda, CA, have shown that these combined AC and DC fields can increase DNA synthesis (see *MWN*, M/J93). Baylink is a member of OrthoLogic's scientific and medical advisory board. A brief description of the OrthoLogic stimulator is featured in the May 25, 1996 issue of *The Lancet* (p.1474).

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