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## Jamail Drops Childhood Cancer Suit—No Explanation Given Others Cite Changes in Texas Legal System

Famed Texas attorney Joe Jamail and his cocounsel John Tyler Jr. have withdrawn their lawsuit against Houston Lighting & Power Co. (HL&P) on behalf of 11 families with children who had contracted cancer. Originally filed last December, the suit prompted widespread concern within the utility industry because of Jamail's success in winning large awards—once as high as \$11 billion (see *MWN*, M/A95).

The plaintiffs' motion for "nonsuit" was granted on September 11 by the Harris County District Court. The case was dismissed without prejudice, meaning that the plaintiffs can refile their claims in the future.

Jamail, of Jamail & Kolius, and Tyler, of Tyler & Das, both in Houston, refused to return phone calls asking for comment. No one at either firm would discuss any of the reasons for dropping the lawsuit.

Neither would the plaintiffs themselves reveal the basis for the withdrawal. "I have no interest in talking about this at all," said Alma Villarreal of Missouri City, TX, whose daughter Valerie had been diagnosed with a soft-tissue cancer. Her neighbor and fellow plaintiff David Iniguez, whose son died from leukemia at the age of seven, referred all questions to their lawyers.

Some observers have suggested that the suit may have been dropped in response to recent changes in Texas laws and the makeup of the Texas Supreme Court. Indeed, the October issue of *Texas Monthly* calls Jamail's decision to abandon the case "a sure sign of just how much the high court—and

*(continued on p.7)*

## Swedish Occupational Study Finds Small Risk for Many Cancer Types

Dr. Birgitta Floderus and coworkers at Sweden's National Institute for Working Life (NIWL) in Solna have reported a small, but significant, increased risk of a host of different types of cancer among men and women exposed to electromagnetic fields (EMFs) on the job.

"The associations are weak, but if the results reflect causal relationships between EMFs and cancer, we have to talk about hundreds of cases—not tens of cases—per year due to EMFs in Sweden," Floderus told *Microwave News* in an interview at the Bioelectromagnetics Society (BEMS) annual meeting held June 18-22 in Boston.

When asked if she thought EMFs can influence the development of cancer, Floderus replied: "I think so. I was very hesitant in the beginning because of the low risk estimates, but I changed my mind because most of the hormonal-dependent sites were linked, including testicular, prostate and breast cancer."

*(continued on p.8)*

## « Power Line Talk »

The **National Academy of Sciences-National Research Council** (NAS-NRC) EMF health study is nearing completion, and a draft will be ready for internal review in October, according to Dr. **Larry Toburen**, the project director. The study, which was mandated by Congress in 1991, took more than a year to get under way, and was further delayed by budget problems (see *MWN*, S/O91, M/J93 and M/A95). Although any member of the academy can ask to review the report, Toburen said that he expects at most eight or nine reviewers. But, he cautioned, "It can still take a reasonably long time to complete the process." Nevertheless, he predicted that the final report will be out "early next year." Meanwhile, the NAS-NRC progress report on the EMF Research and Public Information Dissemination (RAPID) program, required under the Energy Policy Act of 1992, is almost done and should be ready for release in October (see *MWN*, M/A95). Toburen himself has left Washington to teach physics at East Carolina University in Greenville, NC. He is continuing to work with the NAS-NRC Board on Radiation Effects Research until these two reports are completed. Toburen noted that, for the present, the board is not planning to replace him. "I'm doing as much as I can to help keep the reports on track from a distance," he said.

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When it comes to EMFs, "recommendations such as prudent avoidance should be prudently avoided." Dr. **Richard Wilson**, a professor of physics at Harvard University in Cambridge, MA, took this position in a paper distributed at a course on *Electric and Magnetic Field Health Research: State of the Science*, held August 21-23 at the Harvard School of Public Health in Boston. "In order to take any responsible action on a risk, it is necessary to have some idea [of] how big it is," contended Wilson, who held that prudent avoidance makes sense only if the potential risk is "well-defined and large." He stated that this is not the case for a possible EMF-cancer connection. Making an argument favored more by physicists than by epidemiologists, Wilson noted that while the use of electricity has risen sharply since 1940, there has been no corresponding increase in the rate of cancer (see *MWN*, M/J92 and J/F93). Wilson was a featured speaker at the Harvard course, but originally prepared the paper for discussion at the *2nd Annual Michaelson Research Conference* in Kalispell, MT (see also p.8). In 1991, Wilson served on the committee that sharply criticized a draft Environmental Protection Agency (EPA) report citing EMFs as a possible human carcinogen (see *MWN*, J/F91 and M/J91). The Harvard course was sponsored by several northeastern utility companies, including Boston Edison Co. and Consolidated Edison Co. of New York City, as well as EEI, EPRI and the DOE.

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The next EMF personal injury case is scheduled to begin in Miami on October 23 when attorneys for **Leonard and Elsa Glazer** will try to convince a jury that **Florida Power & Light Co.** (FP&L) is responsible for their chronic myelogenous leukemia (CML). In court papers originally filed on January 20,

1994, in Dade County Circuit Court, the Glazers claimed that FP&L power lines, situated outside the couple's bedroom in Coral Gables, FL, led them to develop CML, an extremely rare form of cancer (see *MWN*, J/F94). Elsa died in 1988 at the age of 48. "We are looking forward to taking the case to trial because we feel we can present the evidence in a new way," said **Howard Talenfeld** of Colodny, Fass & Talenfeld in Ft. Lauderdale. Talenfeld and cocounsel **Larry Marraffino** of Marraffino & Roth in Boca Raton will call Dr. James Kornberg, an occupational and environmental physician in Boulder, CO; Dr. Howard Ozer, an oncologist at Emory University in Atlanta; Dr. David Ozonoff of Boston University School of Public Health; and Dr. Vichate Ungvichian, the director of the EMI Research Facility at Florida Atlantic University in Boca Raton. FP&L is being represented by a number of attorneys, including **Carlos Alvarez** of Tallahassee and **Mark Warnquist** of LeBoeuf, Lamb, Greene & MacRae in Denver. They will call: Dr. John Bennett, an oncologist at the University of Rochester Medical Center in New York; Dr. Peter Cassileth, an oncologist and hematologist at the University of Miami School of Medicine; Dr. Philip Cole, an epidemiologist at the University of Alabama, Birmingham; Dr. Steven Collins of the Fred Hutchinson Cancer Research Center in Seattle; Dr. Paul Leaverton of the University of South Florida College of Public Health in Tampa; and Dr. John Moulder, a radiation biologist at the Medical College of Wisconsin in Milwaukee. An attorney for FP&L declined to comment.

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Nebraska's **Julie Larm**, founder of Omaha Parents for the Prevention of Cancer, and **Phyllis Gorski**, founder of Parents Against Cancer Plus in Troy, MI, have been awarded scholarships by the Department of Energy (DOE) to cover the costs of attending its *Annual EMF Research Review*, November 12-17 in Palm Springs, CA. Larm's son Kevin was diagnosed with leukemia in 1992, and his brother Patrick questioned President Clinton on the EMF issue during an ABC special in March 1994 (see *MWN*, M/A94). The Larms met privately with Clinton a week later. A leader in local struggles over power lines, Larm was recently featured on *Frontline* in its report on EMFs and public health (see *MWN*, J/A95). Gorski's son David was diagnosed with non-Hodgkin's lymphoma ten years ago. Her organization has campaigned for state authorities to do more detailed geographic mapping of cases of childhood cancer and birth defects over a five- or ten-year period, and then to investigate possible correlations with siting of power lines and toxic-waste dumps. Gorski told *Microwave News* that the group is now focused mainly on public education, and that she hopes to share what she learns at the Palm Springs meeting by speaking "to the Rotary, professional women's groups, and so on."

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On Sunday afternoon November 12, before the opening of DOE's EMF meeting in Palm Springs, there will be a workshop on **Magnetic Sensory Perception**. Among the scheduled speakers are:

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Dr. **John Phillips** of Indiana State University, Bloomington, Dr. **Peter Semm** of German Telekom in Darmstadt and Dr. **Denis Willows** of the Friday Harbor Lab, associated with the University of Washington, Seattle. “We are going to discuss the limits of magnetic field perception in animals and their implications for the question of EMF bioeffects,” said **Paul Gailey** of the Oak Ridge National Lab in Oak Ridge, TN, who provides support for the DOE program. For more information, contact Gailey at (615) 574-0419.

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A Snow Hill, NC, woman is suing **Pitt & Greene Electric Membership Corp.**, claiming that the utility racially discriminated against her in the late 1980s by buying property and easements from her white neighbors—but not from her—to build a substation and associated power lines. **Emma Hill**, who is 62, claims that she and her family are suffering permanent dam-

ages “associated with being exposed to a potential health hazard, i.e., an EMF in the 2.36 mG range and below,” according to her March 31, 1995, complaint filed with the Wilmington Division of the U.S. District Court for the Eastern District of North Carolina. Pitt & Greene, headquartered in Farmville, NC, “contracted and purchased land and easements from each of plaintiff’s white neighbors but refused to contract for the purchase of an easement over plaintiff’s land solely because plaintiff is black,” the complaint states. Hill also is charging that three high-voltage transmission lines are illegally crossing her property. On August 11, U.S. District Court Judge Malcolm Howard denied Pitt & Greene’s motion for dismissal. Pitt & Greene spokesperson Mark Suggs said, “The matter is in the hands of the judge and the attorneys, so we’re not in a position to make any comment.” But, he added, “I don’t know of any discrimination whatsoever.” Also named in the suit is the U.S. Department of Agriculture and the Rural Utilities Service.

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## ***Ground Currents and Transients: Clues to Residential Cancer Risk***

What kinds of EMFs are people exposed to in residential environments? New studies on ground currents and transients shed some light on this question, and researchers feel they are making progress towards identifying the basis of the EMF-cancer connection.

Dr. Nancy Wertheimer, Dr. David Savitz and Ed Leeper have found that in homes where ground currents are present, people are up to four times more likely to contract leukemia.\*

High-frequency transients—sudden, brief EMFs that result from switching electrical loads on or off—have also been cited as a possible culprit in the EMF-cancer equation. A recent study by EnerTech Consultants† found that transients from outside the home occur more often in houses with a very-high-current-configuration (VHCC) wire code—the wire code linked to the highest cancer rates in past epidemiological research. EnerTech’s Dr. Jeffrey Guttman, who led the study, said he believes that “transients merit a closer look.”

Guttman’s team explains that, “The driving force [behind] most residential magnetic field exposure assessment research is the desire to understand...why wire codes are more strongly associated with disease risk than are measured magnetic fields.”

The EnerTech researchers describe three hypotheses that have been advanced to explain this apparent discrepancy: 1) that past EMF exposure is not well assessed by “a magnetic field measurement made long after the exposure of interest has occurred”; 2) that there is “some aspect of magnetic field exposure that is not captured by the simple field measurements...made in previous studies”; and 3) that “the wire code-disease association is either the result of a confounder or is an artifact of some sampling bias.”

The first hypothesis is supported by the 1992 study by Drs. Anders Ahlbom and Maria Feychting of the Karolinska Institute in Stockholm, Sweden. They noted that electric current loads had changed over the years, and so contemporary spot measurements might not be a good indication of past exposure. Using Swedish state power company records, they

reconstructed historic EMF exposures for children living close to high-voltage transmission lines. While present-day measures of EMF intensity did not correlate with the incidence of leukemia, exposures experienced prior to diagnosis showed a clear and significant link.

No one has yet applied Ahlbom and Feychting’s approach in the U.S., probably because comparable data are not available. But in any case, most residential exposures come from distribution lines, not transmission lines, and electrical current levels in distribution systems fluctuate with everything from air-conditioner use to grounding practices. Past U.S. epidemiological studies have focused on distribution lines, and it is hard to assess past exposures from this source of EMFs.

The recent EnerTech project, sponsored by the Electric Power Research Institute (EPRI), based in Palo Alto, CA, focused on the second hypothesis: the idea that the biologically significant part of EMFs may be a field characteristic not captured in spot measurements of 60 Hz fields—like transients.

The first two hypotheses are not mutually exclusive, and the paper by Wertheimer, Savitz and Leeper is consistent with both. “Measuring ground currents is not in opposition to other metrics,” Savitz said in an interview. “In some ways it just represents an attempt to do a better job of capturing the average magnetic field exposure.”

“We know there are other determinants of magnetic fields besides the existence of outside power lines, but some are hopelessly erratic,” added Savitz, a professor at the University of North Carolina School of Public Health in Chapel Hill. “Ground currents may be one of the few that we can capture in a way that would help us reconstruct past exposures.”

“The most important aspect of our paper was that in looking at ground currents, we identified a type of EMF measurement that is significantly associated with the incidence of both childhood and adult cancer,” Wertheimer told *Microwave News* from Boulder, CO. This does not mean that ground currents cause cancer while power line fields do not—ground

currents may pose different health risks than power line fields, or they may just be easier to describe accurately.

"If there's a risk here, it would be a lot easier to fix than would be the case with power line fields," Wertheimer said, explaining that changes in grounding practices could eliminate most of this type of magnetic field.

In any case, both Wertheimer's study and the Energetech report underscore the importance of looking at the complex interactions between different parts of the electrical system.

### **Ground Currents and Cancer**

The Wertheimer-Savitz-Leeper paper on ground currents is the first major collaboration between researchers whose landmark work first indicated a connection between power lines and cancer. Wertheimer and Leeper's 1979 study of childhood leukemia in the Denver area was followed by Savitz's paper in 1988, which reproduced and extended their findings (see *MWN*, N82, N/D86 and N/D87).

Writing in *Bioelectromagnetics*, they explain that grounding connections to conductive plumbing—common throughout the U.S.—can create strong, localized EMFs in the home. If household wiring is grounded to plumbing that includes a section that is nonconductive, little current is diverted and the flow of electricity in the "hot" and neutral wires remains balanced. In this case, the magnetic fields around the two wires will largely cancel each other out. But grounding to conductive plumbing often allows a significant amount of electricity to escape through water mains from one house to another. The result is that the flow of current is unbalanced, producing substantial magnetic fields in both plumbing and house wiring.

In order to look at the possible role of ground currents, the researchers examined data from Savitz's 1988 Denver study. Evaluating the homes of 347 cancer cases and 277 controls,

they found that conductive plumbing was associated with an elevated risk of cancer—as much as three times the risk for children living with nonconductive plumbing.

The three researchers also found a way to examine the issue of ground currents more directly. The 1988 Denver study not only measured the intensity, but also the angle, of magnetic fields in the subjects' homes. They explain that if a substantial magnetic field is relatively horizontal, this is "a good indicator that the...field comes from a ground current source active enough to dominate the measurement."

Examining the Denver data for these elevated non-vertical (ENV) fields, they found that such fields were even more strongly associated with cancer than conductive plumbing in general. They report that the presence of ENV fields is linked to "a high and significant cancer risk," elevated as much as fourfold.

They also examined a second set of data—from a Seattle study of adult leukemia by Dr. Richard Severson (see *MWN*, N/D86; the study was published in 1988). Here again, they found an association between ENV fields and cancer, in this case with an apparent doubling of the risk. But they note that the actual connection is probably stronger.

"One of the major problems in epidemiologic studies of magnetic field exposure," they write in *Bioelectromagnetics*, "is that, in modern society, there is no truly unexposed referent group." In the Seattle study, about half of the subjects used electrically heated beds—a practice that was rare among the children studied in Denver. When users of electrically heated beds were removed from the Seattle reference group, ENV fields were associated with a cancer risk that was quadrupled instead of doubled (see also *MWN*, M/J88).

"We have some confidence in these results because the elevated risks appear across a range of possible definitions of an 'elevated' or a 'non-vertical' field," Wertheimer told *Mi-*

### **Meter To Record Transients in Development**

Dr. William Kaune of EM Factors in Richland, WA, has contracted with EPRI to develop a meter that can measure and record magnetic field transients. Kaune is designing the device with John Niple of Energetech Consultants in Campbell, CA. "Our goal is to have a prototype by the end of the year," Kaune told *Microwave News*.

"Interest has intensified in magnetic field transients as a possible way of explaining the wire code-cancer association," Kaune explained. He noted that "recent laboratory studies with rats and humans indicate that living organisms may respond to rapid changes in magnetic field strength."

In a recent study of transients in residential settings, Energetech recorded the waveforms of hundreds or even thousands in a day (see p.5). But the size and expense of the instruments involved, as well as the sheer quantity of data, would be unwieldy for use in a large-scale field study.

The new meter will not measure each transient in as much detail as did the system that was custom-built for the Energetech study. Instead, it will have two counters, recording how many transients exceed either a "high" or a "low" thresh-

old. The "low" threshold will be set so that the majority of transients will register, while the "high" counter will be triggered only by the stronger ones.

Kaune's planned three-axis device will count all transients falling within the 2-100 kHz band, and will give an approximation of the field's overall strength.

"Ultimately the instrument is going to look a little different from the original specs," Kaune said. "The actual sensors will be in a separate housing from the rest of the electronics, which means it's going to be a bit bigger. At this point our first prototype will not be portable enough for personal exposure measurement."

A different kind of transient meter was developed two years ago by Ed Leeper of Monitor Industries in Boulder, CO. Leeper's meter is a small, portable device designed to locate the sources of transient fields. It measures the peak strength of a transient along a single axis, providing directional information, as well as the transient's rise time. While not designed to record information, it has an output that can be connected to a data storage device.

*crowave News*. She emphasized that the same trend exists in both the Denver and the Seattle data sets. "We need others to look for this in future residential studies," she said.

As for mechanisms through which ground currents might play a role in raising the risk of cancer, the paper by Wertheimer, Savitz and Leeper suggests several possibilities (using their emphasis):

- They create "a source within the house [that] provides opportunity for frequent...encounters with 'hot spots' of *unusually high intensity* fields."
- Field *angle* may be important, "especially if resonance with the earth's steady magnetic field is in some way involved in biological effects."
- Exposure to fields from ground currents "is likely to be *intermittent* and relatively weighted with *high harmonics*."
- Currents in household plumbing may have "an effect on the constituents of *drinking water*."

### **Transients, Wire Codes and Electrical Noise**

The Enertech study was conducted by Guttman in Campbell, CA, Dr. Luciano Zaffanella in Enertech's office in Lee, MA, and Gary Johnson of EPRI's High-Voltage Transmission Research Center in Lenox, MA. Noting that prior to their study there were little data on transients in residential environments, they report that, "VHCC residences...showed a significantly larger proportion of magnetic field transients generated outside the residence." The transients in the Enertech study were not rare events: They numbered from 84 to over 2,000 in a given 24-hour period.

Guttman and Zaffanella told *Microwave News* that their measurements were not designed to identify the source of these external transients. Large transients can be generated by the switching of electric loads in primary distribution lines. However, external transients can also be caused by appliances being turned on or off in a neighboring residence.

"I oscillate between being excited and being skeptical about transients," said Zaffanella, adding that more research is essential. He expressed interest in whether transients are generated by sewing machines, which have been linked to higher rates of Alzheimer's disease and childhood leukemia (see p.6 and *MWN*, J/A94 and J/A95).

Dr. Antonio Sastre, a consultant based in Suffern, NY, called the association between wire codes and external transients "the single most interesting and intriguing finding" in the study by Guttman, Zaffanella and Johnson. Sastre has been working on a related EPRI-sponsored effort.

Sastre's work deals with the question of whether the EMFs found in residential environments could possibly be large enough to be detected by biological systems. Dr. Robert Adair of Yale University in New Haven, CT, and other skeptics have argued that the EMF "signal" would be far smaller than the noise created by the normal activity of living cells (see *MWN*, J/A95). But Sastre and others have observed residential transients that would create signal-to-noise ratios far greater than unity. "The objection that environmental fields are too weak...to induce changes in cells does not apply to these transients," Sastre told *Microwave News*.

### **Senate Panel: No EMF Work at EPA**

The Senate Committee on Appropriations has cut \$350,000 from the Environmental Protection Agency's (EPA) EMF budget, because, "The committee believes EPA should not engage in EMF activities."

In a September 13 report (No.104-140), the committee also stated: "Section 2118 of the Energy Policy Act of 1992 established a federal program to investigate and report on human health effects from [EMFs]. Congress mandated that this program of research and public communication be managed jointly by the Department of Health and Human Services and the [DOE]. No programmatic role was assigned to EPA, yet EPA has pursued a number of un-integrated activities on EMFs that are of questionable value."

The House committee has already announced plans to cut EPA's low-priority radiation programs, which would include its work on EMFs (see *MWN*, J/A95).

Meanwhile, the EPA is reorganizing; effective October 1, the EMF program is moving to a new division, and Dennis O'Connor, the current EMF team leader, has been reassigned to work on the disposal and cleanup of radioactive waste. No replacement has yet been named.

Working with a mathematical model of isolated cells, Sastre, Guttman, EPRI's Dr. Robert Kavet and Dr. James Weaver of the Harvard-MIT Division of Health Sciences and Technology in Cambridge, MA, showed last year that large residential transients could induce changes in the cells' transmembrane voltage that would be larger than the thermal noise associated with the cells' normal activity. They reported signal-to-noise ratios that frequently exceeded ten to one.

At last June's meeting of the Bioelectromagnetics Society in Boston, Sastre, Johnson and Kavet presented more recent work, in which they examined residential transients generated by capacitor-bank switching in simplified primary distribution power lines at the EPRI research center. They described how they measured transients in a variety of test configurations, from a simple clean line to others involving complex interactions between power lines, grounding systems, residential wiring and appliances. Signal-to-noise ratios greater than unity occurred in every type of test scenario. Sastre told *Microwave News* that the power configurations closest to those found in daily life showed the highest signal-to-noise ratios, running as high as 70-80 to 1.

"You only need classical physics to build our mathematical models," said Sastre. He cautioned, however, that, "Conventional biology and conventional physics tell me a signal could be detected. But that does not mean that the cell is listening to that signal."

\* Nancy Wertheimer, David Savitz and Ed Leeper, "Childhood Cancer in Relation to Indicators of Magnetic Fields from Ground Current Sources," *Bioelectromagnetics* (16, pp.86-96, 1995).

† J.L. Guttman, L.E. Zaffanella and G.B. Johnson, *Survey Measurements and Experimental Studies of Residential Transient Magnetic Fields*, Report TR-104532, Palo Alto, CA: EPRI, December 1994.

## **Electric Blankets Can Lead to Birth Defects**

Use of electric blankets during pregnancy is associated with a greater risk of birth defects among babies born to women with low fertility, according to a study from Washington state.

Writing in the September issue of *Epidemiology* (6, pp.485-489, 1995), Dr. De-Kun Li of the Kaiser Permanente Medical Group's Division of Research in Oakland, CA, and Drs. Harvey Checkoway and Beth Mueller of the University of Washington School of Public Health in Seattle report on 118 mothers of children with congenital urinary tract anomalies and 369 controls. For women who had been trying to become pregnant for more than a year, electric blanket use was associated with a four times greater risk of this birth defect in their children.

There was a significant tenfold increase in risk when electric blankets were used by low-fertility women during the first trimester of pregnancy. "The first trimester is the most sensitive period for almost all birth defects," Li told *Microwave News*, "so this supports the hypothesis." The risk also grew with the length of time that electric blankets had been used.

Women of normal fertility showed no increased risk, leading the researchers to suggest that "a woman with a compromised reproductive system [may be] more vulnerable to environmental insult," and thus more likely to be affected by EMFs.

"Ours was the first study to look at EMFs in terms of identifying a more susceptible population," said Li. "We think that's the key as to why results of past studies look inconclusive. Since EMFs seem to have a weak effect, if any, probably only the most susceptible population will show it. Biologically it's very logical."

"We were particularly interested in this birth defect not because of an interest in EMFs, but because of some anecdotal reporting that it was linked to cocaine use," Li explained. Other possible risk factors, such as smoking, vitamin use and EMF exposure, were included in the study.

Besides electric blankets, the researchers also investigated exposure to electrically heated water beds and to video display terminals (VDTs). Neither was associated with any increased risk of urinary tract defects for children of women with either normal or below-average fertility. Li's team noted that electric blankets are much closer to the developing fetus, and cause higher EMF exposures than water beds or VDTs.

"It seems likely that EMFs would also have an effect on other birth defects," commented Li. "That's speculation, but I don't have any biological reason to think that an EMF effect would be specific to this one particular birth defect."

Li advised that pregnant women should avoid the use of electric blankets. "This is a first study, the numbers are small, and it needs to be confirmed," he cautioned. "But although the proof of the relationship is not final, I don't see any downside to not using electric blankets—even if in the future it turns out that this was just a fluke. You can just add two more blankets, or turn up the heat instead."

Li's group is the first to show that electric blankets may increase the chances of birth defects. A 1990 study by Dr. David Savitz of the University of North Carolina, Chapel Hill,

linked prenatal exposure to electric blankets with a significant rise in children's brain tumors (see *MWN*, M/J90). Studies by Dr. Nancy Wertheimer and Ed Leeper in Boulder, CO, have found an association between problem pregnancies and electric blanket use (see *MWN*, N/D88 and M/J86), while Dr. Michael Bracken of Yale University School of Medicine in New Haven, CT, reported that his EPRI-sponsored research found no effect on the rate of fetal growth (see *MWN*, M/J95).

## **EMF Exposures: Garment Workers Top Utility Employees**

Sewing machine operators have some of the highest EMF exposures ever found in the workplace, according to a paper that will be presented this November at the Department of Energy's (DOE) annual EMF research review in Palm Springs, CA. EMF levels varied widely with the type of machine, showing up to a tenfold difference among the various brands.

In a study of workers at three clothing factories in Finland, one type of sewing machine was consistently found to produce EMFs above 200 mG at the operators' knees, with some readings ranging over 600 mG. Spot measurements of 64 machines led to an estimate of a mean whole-body exposure of 20.5 mG, while personal dosimetry measurements of two machine operators indicated a mean whole-body exposure of 30.2 mG. Motorized hand-guided fabric cutters and heat press units also generated significant EMFs, with the fabric cutters exposing operators' hands to over 1.8 G.

"We believe that we found an occupation with higher average exposures than any studied so far, with the exception of aluminum potroom workers," Dr. Bary Wilson of Battelle Pacific Northwest Laboratories (PNL) in Richland, WA, told *Microwave News*.

"Finding this highly exposed group is especially important because we don't yet have much information on exposures for occupations with primarily women workers," said Lynne Gillette, manager of DOE's EMF RAPID program, who also worked on the study. "With such striking exposures, these women would be a very interesting group to study for female breast cancer, among other diseases."

A previous study of Finnish and U.S. garment workers by another member of the research team, Dr. Eugene Sobel of the University of Southern California School of Medicine in Los Angeles, found a strong association between EMF exposures and the likelihood of Alzheimer's disease (see *MWN*, J/A94). This past summer, Dr. Claire Infante-Rivard of McGill University in Montreal, Canada, pointed to Sobel's study and said EMFs could have been responsible for a rise in leukemia rates she had detected in an earlier investigation. In 1991, Infante-Rivard had reported an increase in leukemia among children born to women in Spain who had worked with sewing machines during pregnancy (see *MWN*, J/A95).

The sewing machine operators examined in Finland were found to have higher exposures than utility workers for almost all metrics, including time-weighted averages, transients, intermittency and time above a given threshold. The one exception was for metrics related to field stability over time.

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The variation in exposure by type of machine was “large and very predictable,” according to Wilson. The researchers attributed the wide range in field strengths to differences in the kind of motor used in each brand.

“We brought sewing machines into the lab here to develop measurement protocols,” Wilson added. “However, lab data proved to be a poor predictor of what we found in the work-

### **Jamail Drops Childhood Cancer Suit** (continued from p.1)

Texas law—has changed.”

HL&P’s attorney, Irvin Terrell of Baker & Botts in Houston, told *Microwave News*, “Having tried a case with and against Joe, I am delighted to see him go. Joe is a great trial lawyer, but his problem here is that he had a weak case.” Terrell added, however, that, “He did not tell me so.”

“There were no settlement discussions between HL&P and the plaintiffs which led to this dismissal,” according to a statement from HL&P. “We welcome the voluntary dismissal of this lawsuit by the plaintiffs. There is no consensus in the scientific community as to the health effects, if any, associated with EMFs and therefore no reason to put the plaintiffs and their families through the stress of litigation. Our hearts go out to these families who have been touched by childhood cancer and we commend them for taking this responsible action.” The company said it will continue supporting research on possible EMF health effects and will keep its customers informed about the issue.

Nine of the children involved in the suit developed leukemia; two others contracted other forms of cancer. Three have died. The suit charged that magnetic fields from power lines, which “were many times stronger than the level proven to cause childhood cancers,” invaded their homes “secretly and silently.” While there has been much EMF litigation in recent years, this was the first case in the U.S. to focus on childhood leukemia.

The action was also the first to name the Electric Power Research Institute (EPRI) as a defendant, according to EPRI spokesperson Barbara Klein. Jamail and Tyler had charged that EPRI and HL&P “conspired to falsely persuade plaintiffs, the public at large and the responsible governmental entities that magnetic fields present no cancer danger.”

EPRI is “extremely pleased” that the plaintiffs have withdrawn the suit, Klein said in an interview. “Had the case proceeded to trial,” she added, “we believe that our attorneys would have been successful in defending EPRI and obtaining a judgment in our favor.”

Texas is well known as being friendly to plaintiffs. The October 16 *Fortune* magazine reported in a cover story on “Fatal Litigation” that the state is “a plaintiffs’ mecca,” where “judgments are higher than they are practically anywhere else in the country” and where “the standards for evidence are far more favorable to the plaintiffs.”

But that may be changing. In an October 3 profile of Dallas-based John Cracken—who, like Jamail, is referred to as “one of the most feared personal injury attorneys in Texas”—the *Wall Street Journal* noted that, “The Texas legislature recently adopted a raft of tort-law changes that tightened venue

place. The take-home lesson here is that if you want to know what is in the workplace, you have to go there.”

DOE’s Gillette noted that the data acquisition and reporting scheme developed by another team member, Norman Hansen of Battelle PNL, “worked very well and will help the EMF RAPID program meet its goal of setting a new standard for exposure assessment and reporting.”

laws, capped punitive damages and limited the liability of defendants found to bear less than half the fault.” The *Journal* pointed out that, “Many plaintiffs’ attorneys will suffer.”

The new laws only apply to cases filed after September 1, 1995, so they do not directly affect Jamail’s EMF lawsuit. But they do reflect a change in attitudes towards tort litigation.

One key change came last June when the Texas Supreme Court voted in *E.I. du Pont de Nemours & Co. Inc. v. C.R. Robinson* to adopt the restrictive *Daubert* rule used by the federal courts to determine what kind of scientific evidence is admissible (see also pp.11-12). *Texas Monthly* observed that this decision “makes it almost impossible to win a groundbreaking health-related lawsuit in Texas if the scientific evidence is in dispute, as is the case with EMFs.”

In this case, decided by a vote of 5-4, Justice Bob Gammage was one of the dissenters. On August 24, Gammage announced that he would retire on September 1. “It was a total surprise to the public,” Gammage’s assistant, Linda Smith, said in an interview. Gammage’s replacement on the court will be appointed by Republican Gov. George W. Bush, elected last fall.

On September 1, plaintiffs in the suit against HL&P, *Bicki et al. v. Houston Industries Inc. et al.*, asked that their case be dismissed.

Chief Justice Thomas Phillips of the state Supreme Court is a former partner at Baker & Botts, HL&P’s attorneys. In the September 4 *Texas Lawyer*, Robert Elder Jr. wrote that Phillips had been accused of being “a corrupt lackey for his former firm” by Richard Laminack, a lawyer in the breast implant class action suit against Dow Chemical Co. “Houston plaintiffs’ lawyers have been grumbling about the alleged Baker & Botts connection all summer, but Laminack has been the only one bold—or careless—enough to put it in writing,” *Texas Lawyer* reported. Dow Chemical lawyer Richard Josephson told Elder that these charges were “just ridiculous,” pointing out that Phillips left Baker & Botts 15 years ago.

A Houston attorney who has been following the Jamail case noted that under Texas law the statute of limitations for the complaint brought against HL&P does not begin to run until the children reach the age of 18.

Jamail is listed in the *Guinness Book of World Records* for an \$11.12 billion verdict against Texaco on behalf of Pennzoil. His reputation is not based on this case alone, but on a whole series of multimillion-dollar settlements and jury awards. Observers credit Jamail with a special talent for converting complicated legal issues into clear-cut battles between right and wrong. With a personal fortune estimated at \$700 million, Jamail would have had the deep pockets required for the protracted expense of battling an electric utility in a landmark case.



Floderus analyzed cancer records for 1971 to 1984 for nearly 1.6 million male and more than 800,000 female workers 20-64 years of age. The rates of brain, breast, colon, kidney, liver, lung, prostate, skin and testicular cancers were all elevated by 5-35% among those believed to be exposed to EMFs at work. In addition, the incidence of all cancers combined was 5-10% higher than expected for both men and women. EMF exposures were estimated based on job titles.

One notable exception was leukemia. Although the incidence of chronic lymphocytic leukemia was up to twice the expected rate for women, there was no parallel increase among men.

The new Swedish results complement those of Dr. Genevieve Matanoski of the Johns Hopkins University public health school in Baltimore. In 1989, she reported that telephone cable splicers had higher rates of colon, lung and prostate cancers, as well as leukemia and lymphoma (see *MWN*, N/D89).

Both Floderus's and Matanoski's findings are consistent with a hypothesis put forward by Dr. Russel Reiter of the University of Texas Health Science Center in San Antonio that magnetic fields may promote cancer by suppressing the production of the hormone melatonin (see *MWN*, N/D93). This would result in higher rates of a variety of different cancers, according to Reiter.

"The wide variety of tumors represented [in Floderus's data] suggests the mechanism is a basic one—for example, involving free radicals and melatonin," Reiter told *Microwave News* at the BEMS meeting.

Floderus had already presented her results in Sweden before the BEMS meeting and the Swedes who came to Boston were well aware of them. Rolf Lindgren, the EMF manager at Vattenfall, the state power company, in Göteborg, commented that, "The most striking result is that she found elevated rates of cancers for the types of cancers that have been increasing in Sweden."

Dr. Yngve Hamnerius of the Chalmers University of Tech-

## **Swedish Government Agencies To Issue New EMF Policy**

On October 9, the five Swedish government agencies with responsibility for EMF health and safety will issue a new policy on exposures to magnetic fields. Although Swedish officials would not disclose the planned recommendations, knowledgeable sources told *Microwave News* that a policy of prudent avoidance will be endorsed.

Also on October 9, an NIWL working group, chaired by Dr. Bengt Knave, will issue *Magnetic Fields and Cancer—A Criteria Document*, which summarizes current thinking on the EMF problem in the Swedish work environment, according to Dr. Ulf Bergqvist, the secretary of the working group and a researcher at NIWL. He declined to say what the group has concluded.

nology, also in Göteborg, said that, "The message is that we should look at other types of tumors, not just leukemia and brain tumors."

Floderus's new study has been widely covered in the Swedish press. For instance, on August 24 the tabloid *Aftonbladet* featured Floderus on the front page along with the headline, "The Jobs That Can Give You Cancer." Inside, a headline announced in bold letters: "Alarming New Report: Magnetic Fields Can Cause Cancer."

Floderus estimated worker exposures with data she collected for her earlier major occupational study, released in 1992 (see *MWN*, S/O92). She noted that she had more confidence in her new results for men than for women because the exposure measurements were done for men—not for women.

The NIWL was formerly known as the National Institute of Occupational Health (NIOH).

## **HIGHLIGHTS**

### **« Cellular Phone Notes »**

For better health, "eat a low-fat diet, exercise and use a cellular phone." That was the advice given by Dr. **Robert Park**, director of information for the Washington-based American Physical Society (APS), in the August 18 edition of his news bulletin on the Internet. Park played a key role in the recent APS statement on EMFs, which argues that magnetic fields pose no health hazard (see *MWN*, M/J95). This time, Park announced preliminary results from 260,000 subjects in "a massive study" of cellular phone use—though he did not say who was doing the research. "The most striking finding is that age-specific mortality of cellular-phone users is significantly below that of the overall U.S. population," he said. "So skip the broccoli, and spend a little extra time with your cellular phone." When *Microwave News* asked Park which study he was referring to, he said he had heard it described by Dr. **Don McRee**, director of extramural research for **Wireless Technology Re-**

**search (WTR)**, in a presentation at the *2nd Annual Michaelson Research Conference* this August in Kalispell, MT. As for the data behind the "striking finding," Park provided only a syllogism: "McRee pointed out the obvious: Cellular phone users tend to be affluent, and the affluent always have lower mortality rates." Who was actually conducting this research? Park still did not say. McRee said in an interview that Park was talking about results that were displayed on a single slide, which had been provided by WTR's chair, Dr. **George Carlo**. But even McRee was not familiar with the study's details, and he referred further questions to WTR, the research arm of the Cellular Telecommunications Industry Association in Washington. WTR spokesperson **Mike Volpe** expressed displeasure with Park's commentary, calling it "pretty irresponsible." Volpe added: "It sounds like he's playing fast and furious with a serious public health issue." As it turns out, the cellular phone



study mentioned by Park is the one being sponsored by WTR at Epidemiology Resources Inc. in Newton Lower Falls, MA (see *MWN*, J/F94). Dr. **Nancy Dreyer**, the company's president and CEO, said that her team had submitted its first paper for peer review and publication, but added, "I'd prefer not to comment on the results. I think the role of a responsible scientist is to put her results through the peer-review process." Asked why Carlo would then be making their data available to the Michaelson conference, Dreyer offered no explanation. "I can only speak for the research that's being conducted by Epidemiology Resources," she said. When asked the same question, Volpe said only, "The WTR policy is not to comment on research before it's been peer-reviewed."

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How soon can epidemiology tell us anything about the safety of cellular phones? Since they have only recently become a part of daily life, useful answers may well be years away, according to Dr. **Stan Barnett** of Australia's **Commonwealth Scientific Industrial Research Organization**. He questions the priority that WTR has placed on this line of research in a recent report: "The type of studies described by Carlo as important may not be the most appropriate....His program has identified epidemiology studies as important, while the common opinion is that there is negligible chance of identifying a risk, certainly within the next ten years" (see pp.13-14).

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First it was cardiac pacemakers—now implantable cardiac defibrillators have also been found to be vulnerable to interference from some digital cellular phones. An implantable defibrillator monitors the user's heart 24 hours a day. When it senses an irregular heartbeat (fibrillation), it sends a jolt of electricity to stabilize heart function. But interference from digital cellular phones can cause defibrillators to fire their full 750-volt charge needlessly, according to **Howard Bassen** and **Paul Ruggera** of the FDA in Rockville, MD, and Dr. **Hans Moore** of George Washington University Medical Center in Washington. They will present their findings at the *68th Scientific Sessions of the American Heart Association*, to be held November 13-16 in Anaheim, CA. "The effect would not be fatal or damaging," Bassen told *Microwave News*. "It would be painful, and could knock you down. It is undesirable and could cause unnecessary risk to the user." He said that the problem may be more serious than that of interference to pacemakers (see *MWN*, J/A94 and M/J95). Bassen, Ruggera and Moore observed the effect in laboratory testing when the base of the antenna of certain phones was held within 5 cm of the defibrillator's pulse generator. The researchers feel that their work should be repeated with devices actually implanted in users, and Moore is developing a protocol that would ensure the safety of participants during testing.

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In July, WTR issued *Potential Public Health Risks from Wireless Technology, Risk Evaluation Research: Progress, Priorities and Request for Proposals*, which prompted a number

## **WTR Gives Gandhi \$185,000 for Cellular Phone Dosimetry**

Dr. Om Gandhi of the University of Utah, Salt Lake City, has been awarded a \$185,000 contract from WTR to determine the accuracy of the finite difference time domain (FDTD) method for predicting the distribution of energy from cellular phones inside the human head.

"Our computer models will help us develop tools that will in turn help industry design hand-held phones that have desirable radiation patterns while assuring compliance with health standards," Gandhi told *Microwave News*. This work will lead to the development of a certification program for the next generation of portable phones. Gandhi said the project should be completed by the end of the year.

WTR, the Washington-based research arm of the cellular phone industry, first announced its intention to sponsor work in Gandhi's lab in December 1993 (see *MWN*, J/F94). As the negotiations dragged on, Gandhi grew more and more frustrated (see *MWN*, J/F95 and M/J95), but he did not offer an explanation for the long delay.

A second WTR dosimetry contract, also announced in December 1993, was awarded this spring to Dr. C.K. Chou of the City of Hope National Medical Center in Duarte, CA (see *MWN*, M/J95). Neither Chou's nor Gandhi's proposal was reviewed by the advisory committee on cellular phones at the Harvard Center for Risk Analysis in Boston, according to the center's Dr. Susan Putnam.

of scientists to scratch their heads. Of particular concern is a "special requirement" that all *in vitro* research be carried out in a single exposure facility. "It's ridiculous," commented one researcher who asked not to be named. "This is an expensive and unproductive way to do research. In addition, the variety of studies that can be done at the facility will obviously now be limited." Another scientist, who also asked for anonymity, commented that, "Using one lab makes no sense because the whole purpose of replication is to repeat an experiment in different labs in order to eliminate possible artifacts." In an August 22 "Dear Colleague" letter, WTR's Dr. Ian Munro sought to explain the rationale behind the group's decision: "A single site will open the program to investigators who do not have access to appropriate dosimetry systems or [RF] engineering expertise. Additionally, a single exposure system will guarantee that all work will be conducted under the same conditions." Munro did leave the door open for WTR to sponsor those "who do have the expertise to develop an appropriate exposure system at their own site." Proposals were originally due by October 1, 1995, but the deadline has been extended to November 1.

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In addition to the reports on cellular phone safety recently issued in Australia and in Denmark (see pp.12-14), the **International Commission on Non-Ionizing Radiation Protection**

### **WTR Goes International; November Meeting in Rome, Italy**

WTR has formed the International Committee on Wireless Communication Health Research (ICWCHR) with a mission similar to that of WTR: "To identify and coordinate research and to communicate research findings on the potential health effects of wireless communication technology."

According to WTR spokesperson Mike Volpe, the new organization "has no formal structure" and has "no chairman." He explained that it "evolved from a desire of scientists to have a forum to exchange information about their various programs." Susan O'Donnell in WTR's Washington office is the contact person for the ICWCHR.

WTR and the ICWCHR are jointly planning a *State of the Science Colloquium* to be held November 13-15 in Rome, Italy. Space is limited to 200 participants; and the registration fee is \$250. A written proceedings will be published and a video summary is planned.

Among those scheduled to present invited papers in Rome are: Drs. David Brusick, Alessandro Chiabrera, C.K. Chou, Om Gandhi, David Hayes, Kenneth Joyner and Kenneth Rothman.

The members of the ICWCHR are: Dr. Jørgen Bach Andersen, Center for Personkommunikation, Aalborg University, Aalborg, Denmark; Drs. Paolo Bernardi and Guglielmo D'Inzeo, Dept. of Electronic Engineering, "La Sapienza" University of Rome, Italy; Dr. George Carlo, WTR, Washington, U.S.; Gerd Friedrich, Forschungsgemeinschaft Funk (FGF), Bonn, Germany; Dr. Zlatko Koren, Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia; Dr. Alastair McKinlay, Head, Non-Ionizing Radiation Dept., National Radiological Protection Board, Oxfordshire, U.K.; Dr. Michael Repacholi, Royal Adelaide Hospital, Adelaide, Australia; Dr. Masao Taki, Dept. of Electronics and Information Engineering, Tokyo Metropolitan University, Japan (invitation under consideration); Dr. Paolo Vecchia, National Institute of Health, Dept. of Physics, Rome, Italy; Dr. Gary Williams, Chief, Div. of Pathology and Toxicology, American Health Foundation, Valhalla, NY, U.S.

For more information, contact O'Donnell at (202) 833-2800, Fax: (202) 833-2801.

(ICNIRP) will soon issue its own statement, *Health Issues Related to the Use of Hand-Held Radiotelephones and Base Transmitters*. ICNIRP's Scientific Secretary, **Roger Matthes** of the German Institute for Radiation Hygiene in Neuherberg, said that the statement will be published in *Health Physics*, but he would not reveal any other details about its contents. The statement has been under discussion for years. A draft obtained by *Microwave News* in 1992 recommended the rejection of the 7 W exclusion clause, which would exempt essentially all cellular phones from safety guidelines (see *MWN*, M/J93).

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WTR has published a report, *Laying the Foundation*, on the completion of "Phase One" of its research program. "Today, 25 months into what was projected as a 60-month program, we have achieved significant understanding of the key scientific issues," writes WTR's chair, Dr. **George Carlo**, in the introduction. "We have moved forward with Phase Two: Extramural Research, where specific hypotheses will be tested in independent universities and laboratories around the world." Future phases are outlined in a pyramid-style chart titled "Getting to the Answers":

- 1998: Informed Judgments
- 1997: Long-Term Study Findings
- 1996: Short-Term Study Findings
- 1995: Extramural Research
- 1994: Laying the Foundation

The report describes WTR's four program areas and how much was spent on each during 1994: risk evaluation research (\$2,036,000); risk management research (\$160,000); surveillance of ongoing research in order to spot any potential public

health concerns (\$269,000); and outreach to "interested parties in the scientific community, government, industry, and the public" (\$370,000). Within risk evaluation research, \$489,000 was spent on dosimetry, \$814,000 on toxicology, \$637,000 on epidemiology and \$96,000 on electromagnetic interference.

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The Congressional **Office of Technology Assessment (OTA)** released its report on *Wireless Technologies and the National Information Infrastructure* on August 7, with a section on health issues that reflects significant changes from an earlier draft. When the April 4 version of the report was leaked (see *MWN*, M/J95), it was criticized for unsupported statements such as, "Cellular telephones...put out little power and skin proves to be a fairly effective shield for much of the radiation a typical cellular phone puts out." This does not appear in the final document, nor does the assurance that "there appears to be little cause for concern" that cellular phones might cause cancer. Also missing is the draft's assertion that brain cancer rates have not gone up in the last ten years, which contradicted National Cancer Institute statistics. The final report says simply that the debate over possible health effects is "intensely polarized," and that "both sides have evidence...they believe supports their case." Like the draft, it states that questions raised by the General Accounting Office about possible bias in WTR's industry-funded research (see *MWN*, N/D94) "appear to have been addressed." Gone, however, is the assertion that WTR "and its research process appear to meet the criteria for unbiased and open scientific research." Copies of the OTA report can be obtained for \$19.00 each from: New Orders, Superintendent of Documents, PO Box 371954, Pittsburgh, PA 15250; or by calling (202) 512-1800.

## Two Courts Differ on Evidence in Cell Phone–Cancer Cases

Two judges are interpreting the admissibility of scientific evidence alleging a cellular phone–cancer link differently. A federal court judge in Florida dismissed a case in May for lack of evidence, but, in August, a Georgia state court judge decided there was enough evidence to send the case to a jury. Both decisions are being appealed.

In Georgia, Richard Ward is suing Motorola Inc., which is headquartered in Schaumburg, IL. Ward, who is in his mid-40s, is claiming that he developed an astrocytoma on the right side of his head from holding a cellular telephone in his right hand (see *MWN*, N/D94). He bought his cellular phone in June 1989 and was diagnosed in February 1991.

The Florida lawsuit, the first cellular phone–brain tumor case in the U.S., was brought by David Reynard on behalf of

his wife Susan, who died in 1992 (see *MWN*, M/J92, J/F93 and M/J95). Susan Reynard had used a hand-held cellular phone for two years prior to her diagnosis, according to her husband. Reynard is suing Melville, NY-based NEC America Inc. and GTE Mobilnet of Tampa.

“The rules for accepting scientific theory and evidence from an expert are much stricter in federal court,” noted attorney Bruce Goodhart of Holstein, Mack & Klein in Chicago. Goodhart’s firm is representing several clients with brain tumors, including Robert Kane and Debbra Wright, who are suing cellular telephone manufacturers (see *MWN*, J/F94 and M/A95).

In denying Motorola’s request to dismiss the Ward case, Fulton County, GA, Judge Jerry Baxter found that, “There are genuine issues of material fact remaining.” But he signed a Certificate of Immediate Review, the first step in a process that allows his decision denying the defendants’ motion for summary judgment to be appealed. The appeal was filed September 18.

## President Clinton To Facilitate Siting of Cellular Phone Antennas on Federal Property

*The memorandum reprinted below on Facilitating Access to Federal Property for the Siting of Mobile Services Antennas was sent by President Bill Clinton to the heads of all federal agencies on August 10, 1995. The memo follows a March 22 letter from Thomas Wheeler, president and CEO of the Cellular Telephone Industry Association (CTIA) in Washington, who asked the President to issue an executive order directing federal agencies to facilitate the use of property they control (see *MWN*, M/J95). The CTIA is clearly pleased with the outcome. “It’s a win-win situation,” CTIA spokesperson Mike Houghton told Microwave News. “It’s good news for the government because carriers have to pay, so there is new revenue. It’s also a win situation for carriers because it gets us access to locations that often are the largest buildings in town.”*

Recent advancements in mobile telecommunications technology present an opportunity for the rapid construction of the nation’s wireless communications infrastructure. As a matter of policy, the federal government shall encourage the efficient and timely implementation of such new technologies and the concomitant infrastructure buildout as a means of stimulating economic growth and creating new jobs. The recent auctioning and impending licensing of radio frequencies for mobile personal communications services presents the federal government with the opportunity to foster new technologies and to encourage the development of communications infrastructure by making federal property available for the siting of mobile services antennas.

Therefore, to the extent permitted by law, I hereby direct the administrator of General Services, within 90 days, in consultation with the Secretaries of Agriculture, Interior, Defense, and the heads of such other agencies as the administrator may determine, to develop procedures necessary to facilitate appropriate access to federal property for the siting of mobile services antennas.

The procedures should be developed in accordance with the following:

1. (a) Upon request, and to the extent permitted by law and where practicable, executive departments and agencies shall make available federal government buildings and lands for the siting of mobile service antennas. This should be done in accordance with federal, state, and local laws and regulations, and consistent with national security concerns (including minimizing mutual electromagnetic interactions), public health and safety concerns, environmental and aesthetic concerns, preservation of historic buildings and monuments, protection of natural and cultural resources, protection of national park and wilderness values, protection of National Wild-

life Refuge systems, and subject to any federal requirements promulgated by the agency managing the facility and the Federal Communications Commission, the Federal Aviation Administration, National Telecommunications and Information Administration and other relevant departments and agencies.

(b) Antennas on federal buildings or land may not contain any advertising.

(c) Federal property does not include lands held by the United States in trust for individual or Native American tribal governments.

(d) Agencies shall retain discretion to reject inappropriate siting requests, and assure adequate protection of public property and timely removal of equipment and structures at the end of service.

2. All procedures and mechanisms adopted regarding access to federal property shall be clear and simple so as to facilitate the efficient and rapid buildout of the national wireless communications infrastructure.

3. Unless otherwise prohibited by or inconsistent with federal law, agencies shall charge fees based on market value for siting antennas on federal property, and may use competitive procedures if not all applicants can be accommodated.

This memorandum does not give the siting of mobile services antennas priority over other authorized uses of federal buildings or land.

All independent regulatory commissions and agencies are requested to comply with the provisions of this memorandum.

This memorandum is not intended to create any right, benefit or trust responsibility, substantive or procedural, enforceable at law or equity by a party against the United States, its agencies or instrumentalities, its officers, or any other person.

This memorandum shall be published in the *Federal Register*.

### **EC Report Calls for More Cellular Phone Safety Research**

“The general public should have the best possible assurance that there are no health risks involved in using wireless, portable phones....Scientific data of a high quality are essential in order to provide a basis for determining the potential health risk. These data are lacking at the moment.” That is the conclusion of a report on cellular phone safety sponsored by the European Community (EC) (see *MWN*, N/D94).

Prepared by Professor Jørgen Bach Andersen and colleagues at the Center for Personkommunikation at Aalborg University in Aalborg, Denmark, and the Danish Cancer Society at the request of the EC’s telecommunications directorate, the report states that its goal was “to collect in one small document the most relevant information concerning the exposure from European systems,” providing “an overview enabling decision-makers to better understand the issues.”

“Near the turn of the century a major part of all telephones will be wireless,” the document states, “and it is in this respect that environmental issues come to the forefront.”

In a short summary of existing research, the report cites many experiments that demonstrate both EMF and RF/MW bioeffects. However, it explains, “Most often power levels,

modulation spectra, carrier frequencies, etc. are different from the ones of interest” relative to cellular phones. In calling for more research, it suggests that “especially the modulated systems should be studied further.”

In discussing GSM phones, which are widely used in Europe, in contrast to the U.S., the report states that if the antenna is held too close to the head, ANSI/IEEE guidelines on power density can be exceeded. It notes that this standard is based only on possible thermal effects.

Although it states, “There is no evidence of any health risks related to the use of a mobile hand-held phone,” the report finds that “the data are inadequate for drawing any conclusion that cellular phones...present a public health risk or not.” It concludes that, “The subject matter still needs a great deal of robust research.”

For more information about *On the Possible Health Effects Related to GSM and DECT Transmissions: A Tutorial Study*, contact: Dr. J. Bach Andersen, Center for Personkommunikation, Aalborg University, Fredrik Bajers Vej 7, DK-9220 Aalborg, Denmark, (45) 9815 8522, Fax: (45) 9815 1583.

Ward’s attorneys see Baxter’s decision as a clear-cut victory and his subsequent signing of the appeal procedure form as routine. “Contrary to the [cellular phone] industry’s position, a growing bank of evidence from multiple scientific disciplines exists that electromagnetic emissions from portable cellular telephones can have biological and carcinogenic effects on humans,” said William Gray of Dennis, Corry, Porter & Gray in Atlanta. “The court...simply confirmed that there was sufficient evidence of causation to create a jury issue.”

Motorola has a different view. “Our position is that the allegation at the heart of this case is absolutely baseless and the other side has failed to produce any scientific evidence, credible or otherwise, to back up its claim,” said Norm Sandler, a spokesperson for Motorola.

One of Ward’s expert witnesses is Dr. David Perlmutter, a Naples, FL, neurologist, who reviewed Ward’s medical records and concluded that his use of a cellular phone “did in fact cause, exacerbate and/or promote the growth of [the plaintiff’s brain] tumor.” Ward is also using testimony from Dr. Andrew Marino of the Louisiana State University Medical Center in Shreveport, who similarly concluded that Ward’s use of a cellular phone “caused or exacerbated the plaintiff’s malignant brain tumor.” Sandler referred to Perlmutter’s and Marino’s testimony as “personal opinions.”

Interestingly, Perlmutter had previously provided testimony in Reynard’s case, which was dismissed on May 17 by U.S. District Court Judge Ralph Nimmons Jr. on the grounds that Perlmutter’s testimony on medical causation was inadmissible. Nimmons cited the U.S. Supreme Court’s 1993 decision in *Daubert v. Merrell Dow Pharmaceuticals Inc.*, which lets the trial court determine the admissibility of expert testimony.

Nimmons wrote that Perlmutter had given no indication that he examined Susan Reynard or reviewed her medical records and that “the conclusions of the affidavit are not supported by any objective source, such as a treatise or a published article in a reputable scientific journal.”

“We feel that the judge erred in, among other things, his application of the superior court’s ruling in the *Daubert* case,” said Reynard’s attorney, John Lloyd of St. Petersburg, FL. Lloyd filed a notice of appeal on August 17.

### **NCRP To Revise Report on Bioeffects of RF/MW Radiation**

The National Council on Radiation Protection and Measurements (NCRP) has formed a committee to update the agency’s “*Report No. 86: Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields*.” The eight-member group is expected to meet for the first time in November. The revision should take at least three years, according to the committee’s chairman, Dr. James Lin of the University of Illinois, Chicago. The committee’s vice chairman is Dr. C.K. Chou of the City of Hope National Medical Center in Duarte, CA.

The original radiofrequency and microwave (RF/MW) radiation report, issued in 1986, took nine years to complete and was based on research published through 1982 (see *MWN*, M/J 86). The revision will update the literature database and reevaluate the report’s conclusions in light of new laboratory findings and human health studies. “Certainly, research has been ongoing over the past decade, so this report will take that into account,” said Dr. Tom Koval, an NCRP senior staff scientist

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assigned to work with the committee. The NCRP is based in Bethesda, MD.

The report will include sections on: molecular, cellular and tissue interactions; effects on blood, endocrine, immune, nervous and reproductive systems; behavioral and ocular effects; epidemiology; and medical applications. It will address both thermal and nonthermal responses, continuous and pulsed fields, as well as exposure criteria.

An NCRP committee on RF/MW radiation has recently been criticized for its lack of biological expertise (see *MWN*, M/J 95). Asked why neither the chairman nor the vice chairman of this new committee is a biologist, Dr. Thomas Tenforde of Bat-

telle Pacific Northwest Laboratories in Richland, WA, a vice president of the NCRP, said, "The best understanding in the field is more on the physical science-engineering end than on the biology end."

The other committee members are: Drs. Eleanor Adair of the John Pierce Laboratory Inc., New Haven, CT; Patricia Buf-fler of the University of California, Berkeley; George Harrison of the University of Maryland Medical School, Baltimore; Gregory Lotz of the National Institute for Occupational Safety and Health, Cincinnati; Richard Luben of the University of California, Riverside; and Jan Stolwijk of Yale University School of Medicine, New Haven, CT.

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## **Australian Report on Cellular Phone Risks: More Questions Than Answers**

Australia's Commonwealth Scientific Industrial Research Organization (CSIRO) has concluded that the safety of cellular telephones (CTs) cannot be resolved "in the near future." But very little RF/MW radiation research is being done in Australia to resolve the uncertainties, according to Dr. Stan Barnett, a principal research scientist at CSIRO's Division of Radio-physics, who prepared the report.

"My goal is to establish a national committee to approach this problem by coordinating relevant and focused research," Barnett told *Microwave News*. "We need to know whether bio-effects are repeatable, before we spend too much effort trying to determine a mechanism." He added that, "Important issues are clearly those which suggest effects on the central nervous and sensory systems, such as the Lai-Singh report of single-strand DNA breaks, changes in the permeability of the blood-brain barrier and lesions in the cornea." Barnett said that this problem is a global one and that he is exploring the feasibility of forming international liaisons. He estimated that with a budget of \$3 million over a three-year period, some "valuable answers" would probably emerge.

The report, *Status of Research on Biological Effects and Safety of Electromagnetic Radiation [EMR]: Telecommunications Frequencies*, was commissioned by the Spectrum Management Agency (SMA) of the federal Department of Communications. Although completed in June 1994, the report was not released until March 30, 1995. Copies are available at no charge from: Roger Smith, SMA, Purple Bldg., Chan St., Belconnen, ACT 2617, Australia, (61+6) 256-5555, Fax: (61+6) 256-5200.

Reprinted below are excerpts from the report's executive summary.

...Digital technology has allowed unexpectedly rapid growth in the CT industry worldwide....Research on biological effects and development of safety standards always lags many years behind technological development, due to the limited availability of funding. However, public acceptance can be easily damaged if the safety issues are not satisfactorily resolved. A small proportion of the massive manufacturing benefits would fund substantial research programs.

To answer the question of safety of CT is a tall order....The main topic of concern seems to be whether or not a real risk exists for the development of cancer. This is doubtlessly due to the continuing uncertainty about power line frequencies....Many laboratory studies

show abnormal cell growth and gene expression when exposed to ELF or RF modulated with an ELF component....

In the present climate of scientific uncertainty it is difficult to see how the situation can be suitably resolved in the near future. There is no scientific basis to support initiation of cancer by RF radiation and most human cancers take many years to develop. The latency factor is an important issue. Meaningful animal studies require exposure throughout the normal lifetime and therefore require many years to properly plan, exercise and evaluate. There is no evidence that low levels of EMR at frequencies up to 300 GHz can directly alter the DNA genetic material of cells and initiate cancer. However, there is some evidence that EMR alters enzyme synthesis in ways similar to known chemical cancer promoters.

The thermal mechanism is most commonly accepted, and there is a tendency to assume that physiological effects cannot occur in conditions where the expected temperature increase is less than 1°C ....The attitude of physical scientists is, generally, to disregard reports of effects for which a known physical mechanism cannot be readily attributed. However, the mechanisms are inadequate to explain all of the observed biological responses. Radiation biologists have reported a number of changes in various biological systems following exposure to EMR that produces insignificant or undetectable temperature increase. These effects range from alteration of ion concentration in cells [to] increased rate of DNA synthesis to enhancement of the rate of tumor growth in experimental animals....Mechanisms for many of these biological effects have not been identified or proposed and this lack of scientific explanation has, not surprisingly, led to a reluctance to accept the effects as "real." The difficulty is compounded by the fact that as there is limited research activity, particularly at RF, much of the work has not been replicated in independent laboratories. There is often no attempt to establish a dose-response for reported effects. This is difficult to explain or justify.

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## HIGHLIGHTS

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Whilst researching the scientific database in the preparation of this report, it has become evident that subtle changes in cell structure and biochemistry have been frequently reported at exposure levels where gross thermal change could not be attributed as a cause. The effects involve a number of phenomena from cell membrane permeability to altered gene expression....

A number of effects have been reported from reliable research groups of *in vivo* effects resulting from exposure to pulsed MW radiation. Reported low-level *in vivo* effects that have received little notice involve the impairment of short-term memory function in rats exposed to 2.45 GHz at 1 mW/cm<sup>2</sup> or a whole-body SAR of 0.6 W/Kg for 45 minutes. The effect was produced with both CW and pulsed waveforms and is thought to be due to MWs activating endogenous opioids in the brain, thereby causing a decrease in cholinergic activity in the hippocampus. The effect is similar to that caused by stressors.

Degenerative changes have been reported in ocular tissues in primates exposed to pulsed (1.25-2.45 GHz) MWs where an SAR of 2.6 W/Kg has produced lesions in the cornea and iris. Application of the glaucoma drug timolol maleate reduced the threshold for MW-induced damage to 0.26 W/Kg (below the ANSI safety standard)....

SAR measurements in human tissue phantoms in the brain and cheek have been shown to exceed the ANSI uncontrolled safe exposure levels. Furthermore, modeling studies have shown that for CTs operating at the level of [the] occupational standard the SAR in the fetus has been shown to exceed the uncontrolled level.

Problems in studies of human populations published to date include imprecise estimates of exposure. As a result, such epidemiological studies may underestimate any real risk. The likelihood of epidemiological studies providing useful information is questionable, particularly if the biological end point cannot be predicted. Its value in the short term (<10 years) must be negligible unless there was an enormous increase in the rate of cancer growth. Interestingly, the incidence of brain tumors in the EC countries has increased sub-

stantially in recent years....

[RF] safety cannot be assessed in the absence of reported serious effects when so little research has been aimed at the problem. It is somewhat surprising, and rather disappointing, to find that although the literature contains many hundreds of publications, there are very few areas of consensus....At low levels the absence of clear thresholds and [the] presence of intensity and frequency windows have created questions rather than provided answers....

In many respects, the effects of exposure to RF from CTs should be relatively easy to determine because the radiation is emitted from the antenna close to the skull. Although the field becomes complicated due to interference by the head, numerical methods to estimate local SARs are improving....*In situ* SAR values on the order of 3 W/Kg averaged over 10 gm of tissue have been estimated in brain tissue close to a CT operating at 900 MHz and maximum output. Under the same conditions the maximum SAR value averaged over 10 gm of tissue was 4.6 W/Kg at 1.8 GHz.

It is difficult to envisage an epidemiological survey that would effectively discriminate amongst the other environmental variables. ...As a number of cellular responses have been associated with low-level [power] frequency, this may also be a potential confounding variable. The development of cancer is a slow process taking many years before it is positively diagnosed in humans....It is most unlikely that retrospective studies will provide any useful information for recently developed technology, such as CTs. Prospective studies will have [a] negligible chance of showing any effect, if present, in less than 10-20 years.

There is no doubt that the interpretation of bioeffects data has been clouded by a preoccupation with thermally mediated processes. In fact, development of the ANSI/IEEE standard is based only on well-established thermal effects, and ignores the more subtle nonthermal processes that are more difficult to interpret and apply to human health. The inappropriate exemption from standards by the 7 W exclusion clause is due to be removed from the ICNIRP standard.

## FROM THE FIELD

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### Clippings from All Over

In late 1889, a series of horrible electrical accidents gripped the city with fear....As a result of the electric wire panic, New Yorkers in the 1890s had a profoundly ambivalent view of electrical technology. They had great hopes and, at the same time, great fears of the new technology. They hoped that electrification would help bring about the moral and physical regeneration of the city, but also feared that it brought with it unexpected, random dangers. It was not simply the fear of death from overhead wires that terrified New Yorkers, but also the mysterious nature and randomness of this [kind of] death. The electric wire panic fixed in the public's consciousness the idea of electricity as a mysterious force that could suddenly and unexpectedly strike down members of the public....This tension between technological enthusiasm and pessimism manifested itself as a deep anxiety about electricity, and the new urban world it was creating.

—Joseph Sullivan, “Fearing Electricity: Overhead Wire Panic in New York City,” *IEEE Technology and Society*, pp.8-16, Fall 1995

EMF exposure may therefore ultimately be implicated in neuronal degeneration. This, in turn, may have important implications with respect to the etiology of Alzheimer's disease....As a working hypothesis, we suggest that EMF exposure may result in the initiation of an inflammatory process that may in part be responsible for creating a cascade of pathologic processes resulting in selective neu-

ronal cell death. An inflammatory process may result, for example, from various parts of the body receiving high levels of EMF exposure, thus activating microglial or other cells that migrate to the brain and initiate attacks on selected neurons. Alternatively, an inflammatory process may result from direct brain tissue exposure to EMF, which disrupts calcium ion homeostasis, causing neuronal damage or death. Once initiated, the pathologic process need not require additional EMF exposure for its continuation.

—Dr. Eugene Sobel et al., “Occupations with Exposure to Electromagnetic Fields: A Possible Risk Factor for Alzheimer's Disease,” *American Journal of Epidemiology*, 142, p.522, September 1, 1995

As a nation, we suffer from a syndrome of paranoia and neglect. We are paranoid in the sense that we devote large amounts of resources to alleged dangers that are probably small or even nonexistent. At the same time, we neglect many large, well-proven dangers. We're caught up in a “risk of the month” mentality. One month, it's Alar in apples; the next, it's brain cancer from cellular telephones....Few citizens realize that many government regulations of “toxic substances” address risks that are no greater than what people routinely incur from drinking a cup of coffee each day or eating a peanut butter sandwich for lunch.

—Dr. John Graham, quoted in “Risks & Public Policy” by William Crain, *The Lamp* (published by Exxon Corp.), pp.9-10, Summer 1995

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## Reports from Pushchino and Copenhagen

Dr. Abe Liboff, a professor of physics at Oakland University in Rochester, MI, sent *Microwave News* the following reports on two recent meetings:

### EMF Workshop in Pushchino, Russia

A workshop on *Interaction of Electromagnetic Fields with Biological Systems* was held May 15-18, 1995, at the Russian Academy of Sciences Institute of Cell Biophysics (ICB) in Pushchino. It was sponsored by the European Bioelectromagnetics Association and the Russian Academy of Sciences' Problem Commission on Bioeffects of Electromagnetic Exposure. Participants included individuals from Kiev, Moscow, Pushchino, Rostov-on-Don and St. Petersburg, as well as the U.K. and the United States.

The two well-known ion cyclotron resonance models developed at Pushchino were presented by Mikhail Zhadin of the ICB in Pushchino and by Valery Lednev of the Institute of Theoretical and Experimental Biophysics (ITEB—also in Pushchino). Zhadin's model involves Larmor precession, while Lednev's focuses on parametric resonance. A number of ELF magnetic field cyclotron resonance experiments were reported on, including: changes in the rate of planaria regeneration (Lednev with H. Tiras of the ICB), reduction of the mass of implanted tumors in mice (V. Novikov, A. Kachan, N. Novikova, all of the ICB), and stimulation of heartbeat fluctuations in daphnia (N. Chemeris and V. Safronova, both of the ICB).

In each of these cases, the combination of AC and DC magnetic fields that was employed corresponded to the calcium ion charge-to-mass tuning condition. Zhadin and O. Deryugina (ICB) were one of two groups reporting replication of the work on rat behavior originally performed by Richard Lovely and coworkers at the Battelle Pacific Northwest Labs in Richland, WA, in which magnetic field combinations tuned to  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  resulted in slower and faster learning, respectively, when compared to controls. E. Lyskov of the Institute of the Human Brain in St. Petersburg found that not only do rats learn more slowly when exposed to calcium ion resonance combinations, but they also exhibit a range of behavioral changes including a marked reduction in aggressiveness.

A.R. Liboff of Oakland University reported on the effects of pure AC linearly polarized magnetic signals in the range 3-16 Hz on hippocampal theta rhythms in rats, demonstrating that coupling to the hippocampal oscillator occurs for magnetic intensities as low as 400 mG. Frank Barnes of the University of Colorado, Boulder, discussed his theoretical model that predicts changes in chemical reaction rates in the vicinity of cell membranes exposed to ELF magnetic fields. Roger Coghill, a consultant based in Wales, U.K., suggested that one cause of childhood leukemia in England may be the higher levels of electric fields around the beds.

The meeting was attended by the two "elder statesmen" of bioelectromagnetism in Russia: Yuri Kholodov and Yuri Grigorjev, both at the Institute of Neurophysiology and Higher Nervous Activity in Moscow. Kholodov reported on adaptive reactions to magnetic fields, and Grigorjev reviewed the many physiological effects he has observed and the possible mechanisms connected to weak ELF magnetic exposures.

An extensive set of measurements at 915 MHz has been conducted by the ICB's O. Kolomytkin on changes in concentration for the two most common types of synaptic receptors found in the brain, GABA and glutamate. Significant changes, relative to controls, were observed for intensities ranging between 10 and 1000  $\mu\text{W}/\text{cm}^2$  for exposures as short as one minute. He has determined that the hippocampus is the most sensitive to such exposures and the cerebellum the least sensitive. Zhadin's group, working at 900 MHz, has observed

that changes in conductivity in hippocampal slices are maximized at a modulation frequency of 16 Hz. The latter group has also made clinical use of a millimeter-wave device (55 GHz) (designed by O. Betsky, in Moscow) to treat hospitalized alcoholics. The members report that short, repetitive application of this type of device to the limbs results in profound changes in the EEG. Still another group (V. Geletyuk, V. Kazachenko, N. Chemeris and E. Fesenko, all of the ICB) exposed single activated potassium channels to 42.25 GHz radiation, and found changes in the affinity for  $\text{Ca}^{2+}$ , measured using patch clamp techniques. A resonance phenomenon was observed by A. Gapeev, N. Chemeris, and E. Fesenko of the ICB, and R. Khramov of the ITEB, with changes in motility in paramecia following exposures to 42.25 GHz modulated at 0.0956 Hz.

E. Kvakina and L. Garkavi, both of the Rostov Oncological Institute, argued that living things are somehow stressed by magnetic field exposure to the point where adaptational reactions are observed.

A number of new theoretical approaches were presented, two of which specifically attacked the unusual electrical properties associated with ion channels. First, G. Ovtchinnikova of Moscow suggested that the phenomenon of super-ionic conductivity may be connected to channel function, such that enhanced charge transport might result from electromagnetic absorption. Second, V. Bystrov of Pushchino presented what he called a "nontraditional" model of channel conduction, in which channel proteins display ferroelectric properties similar to liquid crystals.

### EM Sensitivity Conference in Copenhagen, Denmark

The 2nd Copenhagen Conference on Electromagnetic Hypersensitivity was held May 22-23, 1995, at the University of Copenhagen in Denmark. Program Cochairmen Jyrki Katajainen of the University of Copenhagen and Bengt Knave of Sweden's National Institute of Occupational Health (NIOH) in Solna organized the meeting into scientific papers, case histories and invited lectures.

The five invited lectures included an overview by Knave, who suggested that there are three aspects to EMF effects on humans. Apart from the potential for cancer and for adverse pregnancies, there are a host of neurobehavioral symptoms, including headaches, depression and hypersensitivity (which presents mainly as skin problems and neurasthenia, and, to a lesser extent, difficulties in vision). William Rea, an MD who runs an electromagnetic and chemical sensitivity clinic in Dallas, TX, and who also holds a chair at the University of Surrey, U.K., reviewed the case histories of five highly electrosensitive patients, one of whom died. These individuals were sensitive to telephones, VDTs, TVs, radios, fluorescent lights, electric power lines and electric tools. He also described techniques for discriminating electromagnetic from chemical sensitivity, and potential methods for de-adaptation. Monica Sandström of the NIOH in Umeå, Sweden, outlined experiments to determine possible differences between electrosensitives and controls in their neurophysiological responses to light stimulation at various flicker frequencies. Jean Monro of Breakspear Hospital in Hemel Hempstead, 20 miles outside of London, spoke on the possible connection between homeopathic mechanisms and ELF sensitivity. Still another possible connection, namely to heavy metals, was made by Mats Hanson of the Swedish Association of Dental Mercury Patients in Veberöd.

A number of individuals were present who had been clinically judged as suffering from electromagnetic sensitivity. Two such patients, both from the U.S., Marija Hughes of Washington, DC, and



## FROM THE FIELD

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Ruth Swisher-Schultz from the Elkhorn, WI, area (with her husband James Schultz speaking for her), described their personal medical histories, and especially the great difficulties they encountered with employers and medical insurers. The symptoms mentioned by these two individuals, as well as others at the conference, included "brain fog," skin rashes, involuntary muscle twitching, "sand" in the eyes, hair loss, nausea, headaches, pain and numbness, nosebleeds, and "drop attacks," i.e., a sudden loss of consciousness, often leading to auto accidents and broken limbs.

Dr. Roy Fox, a physician at Dalhousie University in Halifax, Canada, who has treated hundreds of patients who became temporarily dysfunctional due to incidents of chemical sensitivity, described an individual in this cohort who also became highly sensitive to computers. Further evidence for such effects was provided by Clas Tegenfeldt of the Department of Electrical Engineering at Sweden's Linköping University, who urged the revision of computer standards to accommodate electrosensitive individuals. G. Oftedal of SINTIF UNIMED in Trondheim, Norway, reported on a double-blind study involving 20 individuals working with VDTs. Martin Andersson of the Department of Technical Research of Librel AB in Skellefteå, Sweden, described two case histories, one connected to VDT use and the other to telephones, and the approaches taken to isolate the causes of these problems. A. Wennberg of Solna's NIOH reported on the failure to isolate a causative electric or magnetic field parameter in studying 13 electrosensitive workers.

A number of investigators have designed surveys to attempt to sort out this question. Sweden's Bengt Arnetz, of the Department of Clinical Neurosciences at the Karolinska Institute in Stockholm, discussed "technostress" in the electrical industries and his examina-

tion of stress-reduction training, especially as it involves the stress-sensitive hormone prolactin. Cecilia Wadman, also of Solna's NIOH, used questionnaires to examine a cohort of 111 people self-identified as electrosensitive. She found the most common complaints to be dry skin and headaches. Jörg Fachner, Jörg Reissenweber and Eduard David, all of the University of Witten, Germany, described the results of a survey which they claimed indicates that the phenomenon of electrosensitivity is more sociological than medical.

Two Swedish investigators, Per Sjöberg of Ellemtel Telecommunications in Älvsjö and Yngve Hamnerius of the Chalmers Institute in Göteborg, reported on a double-blind study involving seven VDT operators who suffer from electromagnetic sensitivity. They were unable to "reject the zero hypothesis that the subjects cannot distinguish between exposure and sham exposure."

A. Peel of U.K.'s Salford University reported on cell culture prostaglandin response to a variety of magnetic field frequencies at 1 mT exposures. Alf Riggs, a resident of Waltham Abbey in the U.K., spoke on "The Biological Effects of Earth Radiation." G. Markarov of Hospital 83 in Moscow found an increased sensitivity to ELF frequencies in the 20-80 Hz range for hospital patients who had been otherwise treated with ionizing radiation. E. Komarova of the Russian Research Center of Rehabilitation and Physical Therapy in Moscow discussed the use of low-frequency transcerebral currents, far less than the excitation threshold, to affect various physiological parameters in the rat brain.

A. Vidybida of the prestigious Bogolyubov Institute for Theoretical Physics in Kiev, Ukraine, spoke of the possibility that hypersensitivity to weak electromagnetic signals exists in cooperatively acting biomolecules, notwithstanding the thermal noise field.

## UPDATES

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### COMAR

**HDTV and RF/MW Radiation Exposures...**The Institute of Electrical and Electronics Engineers' (IEEE) Committee on Man and Radiation (COMAR) has issued a statement on *Public Exposure to Radiofrequency Fields from High Definition Television (HDTV) Broadcasting*. COMAR's broadcasting subcommittee, chaired by Richard Tell, a consultant based in Las Vegas, NV, reports that the HDTV digital signals alone result in lower public exposures to RF radiation than do the current analog TV signals. But because the FCC has mandated that TV stations will have to broadcast both the new HDTV and the current signals for 15 years, the addition of HDTV "will slightly increase ambient environmental RF fields from the TV service," although this change does not entail any increased public health risk. The COMAR statement appears in the September/October 1995 issue of *IEEE Engineering in Medicine and Biology Magazine*. The May/June issue of the magazine presented COMAR's report on *Human Exposure to Microwaves and Other RF Electromagnetic Fields*. This report concluded that, "There is no cause for concern regarding the environmental levels of RF [electromagnetic energy] fields to which the general population [is] routinely exposed. Based on present knowledge, human exposure at or below the permissible levels recommended by the IEEE and other organizations is not harmful to human health."

### MEETINGS

**EPA on RFR...**The EPA has published two volumes of the proceedings of its *Radiofrequency Radiation Conference*, held in Washington, April 26-27, 1993 (see *MWN*, M/J93). The first volume, a review of seven panel discussions at the meeting, presents information on a variety of topics, including bio-effects, dosimetry, epidemiology and standards. Recommendations made by the panels after surveys of the existing data include a call for more research to replicate disputed findings. Dr. Charles Susskind, a professor of engineering at the University of California, Berkeley, and an elder statesman of the RF community, stated in his closing remarks that the most notable result of the conference "was the overwhelming consensus that it was imperative for EPA to proceed promptly to provide guidelines on public and occupational human exposure to RF radiation by issuing the requisite federal guidance or, preferably, by endorsing the existing 1992 guide developed and promulgated by the Institute of Electrical and Electronics Engineers [IEEE] and approved by the American National Standards Institute [ANSI]." Still, Susskind continued, all guidelines should state their limitations, and one limitation of the ANSI/IEEE guide is the specific absorption rate, which, he said, "is based on thermal effects, whereas effects that may be due to mechanisms other than heating have been reported, although they have not been unequivocally shown to have adverse health

consequences." Among the papers in the second volume are discussions of epidemiology by Dr. Genevieve Matanoski, cellular effects by Dr. Stephen Cleary and shocks and burns by Dr. Om Gandhi. To order *Summary and Results of the April 26-27, 1993, Radiofrequency Radiation Conference, Volume 1: Analysis of Panel Discussions* (PB95-240537, \$19.50) and *Volume 2: Papers* (PB95-253753, \$27.00), contact: National Technical Information Service, 5285 Port Royal Rd., Springfield, VA 22161, (800) 553-6847, (703) 487-4650, Fax: (703) 321-8547.

**MELATONIN**

**Sleep Better...**The quality of sleep improved for 12 elderly subjects after they were given controlled-release doses of melatonin, according to a study published in the August 26 *Lancet* (346, pp.541-544, 1995). Total sleep time, however, was not affected. Conducted by Dr. D. Garfinkel of the Wolfson Medical Center in Bat-Yam, Israel, and others, the study suggests that insomnia among the elderly may be treated effectively with melatonin replacement therapy. A similar study by Dr. Iris Haimov of the Technion-Israel Institute of Technology in Haifa, Israel, and others (*Sleep*, 18, pp.598-603, 1995) found that both the initiation and maintenance of sleep improved with melatonin. Dr. Nava Zisapel of Tel Aviv University in Israel is a coauthor of both studies.

**MICROWAVE OVEN TESTERS**

**Let the Buyer Beware...**As microwave ovens proliferated throughout the 1970s and early 1980s, so too did concerns about radiation leakage. Meters and other devices soon became available for consumers to measure their ovens' emissions. But as early as 1978, the FDA reported that several such units were unreliable. Now, another device, the SMW-2A, is being marketed by A.W. Sperry Instruments Inc. in Hauppauge, NY, at the eye-catching price of \$7.95, a far cry from the hundreds of dollars charged for the standard models. Donald Witters, a physicist who was one of the authors of the 1978 FDA report and who is still with the agency, expressed some doubt about the new meter, saying, "We've never found these inexpensive instruments to be very accurate." When asked to distinguish his company's product from those that the government deemed unreliable, Kevin Basso, Sperry's engineering manager, could not provide any test results or other data. Like the FDA, major meter manufacturers are also skeptical of the low-cost testers. "Usually what happens is that the devices don't work at all, or are so inaccurate that they end up costing the consumer more money," said Edward Aslan of Loral Microwave-Narda, also in Hauppauge. He explained that many cheaper meters tend to give high readings, prompting owners to seek unnecessary, but expensive, service. Aslan added that the array of diodes needed to make a dependable detector would cost hundreds of dollars alone. Dave Baron, vice president of marketing at Holaday Industries Inc. in Eden Prairie, MN, agreed with Aslan, saying that most of the home models are inaccurate. Holaday's lowest-priced microwave meter, the HI-1801, sells for \$329. So what should concerned oven owners do? Nothing, said Baron, unless there is reason to believe that their ovens have been damaged.

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A Report on Non-Ionizing Radiation

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**PERSONAL RADAR**

**Small, Cheap Devices for Every Need...**New low-power radars that are inexpensive and that can fit in the palm of the hand may soon be a common part of daily life, according to an article by Ruth Flanagan in the August 12 *New Scientist*. Called micropower impulse radar (MIR), the new technology relies on short RF pulses to detect objects within a six-meter range. MIR devices, developed at the Lawrence Livermore National Laboratory in Livermore, CA, cost only about \$10 to build. The first products incorporating MIRs are expected to reach the market in two years and may well proliferate in a seemingly endless list of applications—including burglar alarms, parking meters that reset themselves when cars drive away, sensors that trigger air bags before a collision and devices that detect fluid levels in pipes or tanks behind walls. MIRs could also be trained on a sleeping baby to monitor breathing patterns and thus safeguard against sudden infant death syndrome. Health issues would not seem to be a concern, since, as Flanagan reports, “The power of the pulses is so low that the device produces only one-millionth as much electromagnetic radiation as a cellular phone.” She adds, however, that “more challenging applications will bring new sets of problems. Air bag deployment, for instance, might require a radar with greater range and power, which could in turn increase the cost and size of the system.”

**POLICE RADAR**

**NIOSH Recommendation Redux...**As late as last May, drafts of NIOSH’s police radar report included unequivocal support for a broad study of police officers’ occupational health risks. But when the final report came out in June, that language was dropped, replaced by a lukewarm endorsement of such a study (see *MWN*, J/A95). The five earlier drafts were obtained through a Freedom of Information Act request filed by Gary Poynter, research officer of the National Fraternal Order of Police in Cincinnati, who has been instrumental in focusing public attention on the possible link between radar guns and cancer. A detailed budget for the proposed research was included in the first through third drafts, and even the fifth draft took a strong position: “We recommend such a study.” But the final report stated only that the study “is feasible and needs to be conducted,” with the addendum that “this study is not within the scope of available fiscal year [FY] 1995 funds and no additional funds are requested by the Administration in [FY] 1996.” Dr. Gregory Lotz of NIOSH in Cincinnati, one of the report’s authors, told *Microwave News* that NIOSH was concerned that the stronger language would entail “the risk that Congress will tell us, ‘You said it was a good idea, now go and do it’—without providing any additional resources.” To some extent, Lotz said, that had happened already with his report, which Sen. Joseph Lieberman (D-CT) asked NIOSH to develop without a specific appropriation to pay for the study. The House Appropriations Committee recently passed a 25% cut in NIOSH’s budget, the first step in the House budget resolution’s call for a four-year phaseout of the agency. “For me, it’s aggravating knowing that the federal government says they can’t find \$2.6 million to study the health of police officers, yet the military spends \$900 for a hammer,” commented Poynter. “Chances are that epi study will never happen.”

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A Report on Non-Ionizing Radiation

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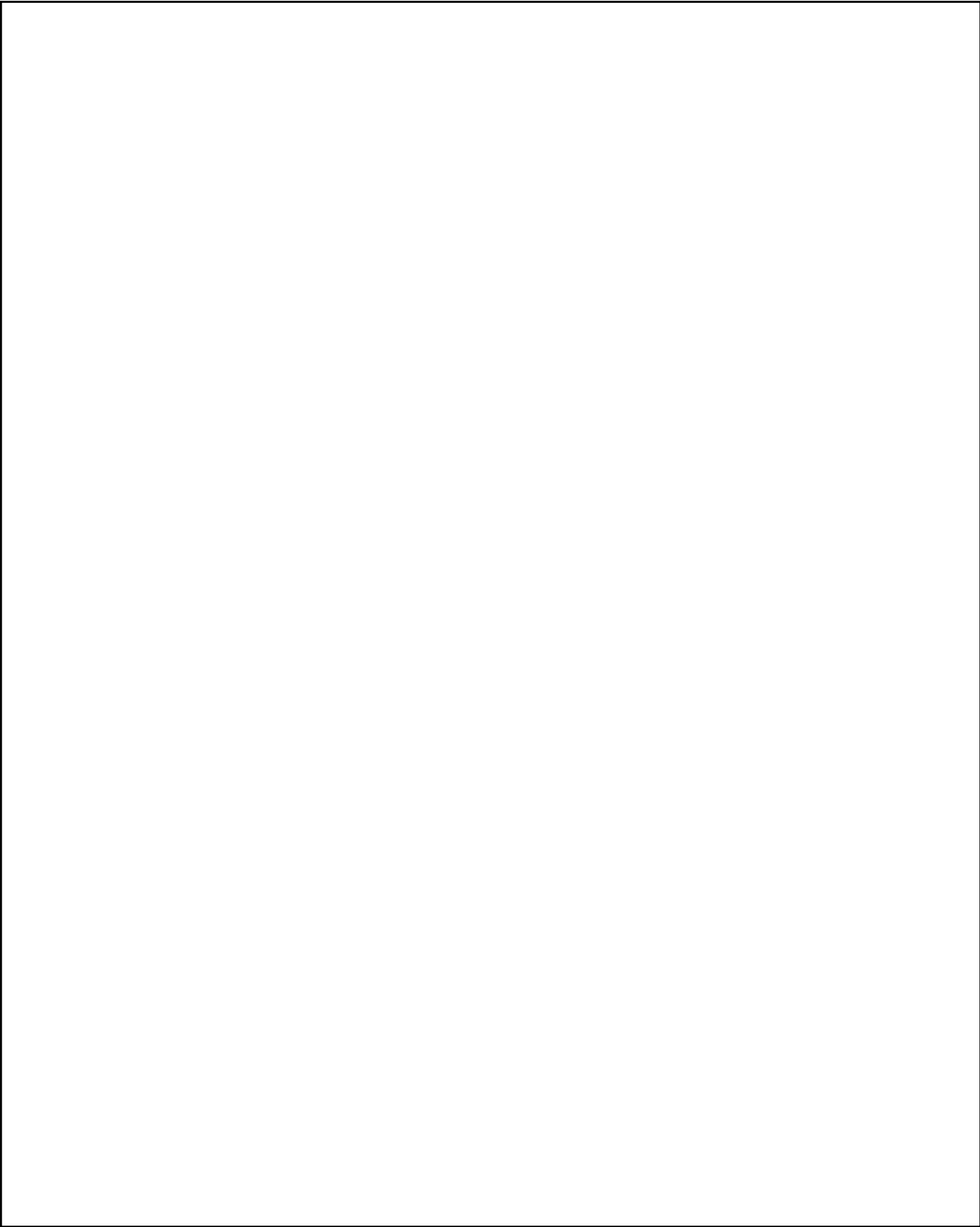
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