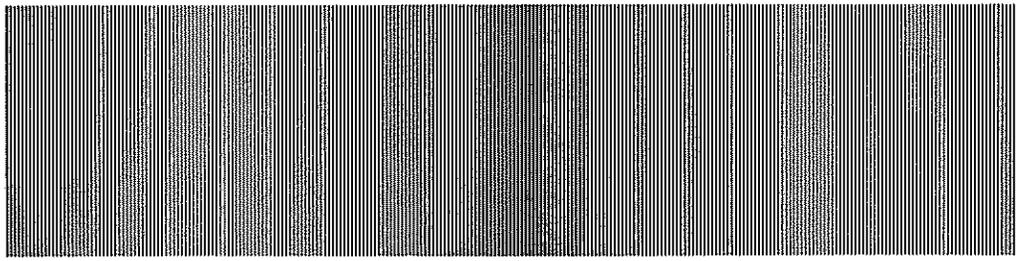


MICRO WAVE NEWS



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A Report on Non-Ionizing Radiation

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RCA Pays \$250,000 To Settle Yannon Microwave Injury Suit

The widow of a New York Telephone Co. radio technician has settled a 1976 product liability suit against the RCA Corp. for a record \$250,000. In the suit, Mrs. Antoinette Yannon charged that RCA was responsible for the wrongful death—due to long-term microwave exposure—of her husband, Samuel Yannon.

"It took me 13 long years. I could write a book about what they put me through," Mrs. Yannon, a resident of Staten Island, NY, told *Microwave News*. "I would have loved to have the story come out in court, but the lawyers advised against it because they said I would not live to collect."

Mrs. Yannon's case, filed in May 1976, was initially thrown out on procedural grounds, but, following two successful appeals, the case was scheduled to go to trial on the merits when a settlement was reached.

In the past, similar cases have been settled with the stipulation that details of the agreement be kept confidential. In this instance, however, no such conditions were enforced, according to Sheridan Albert, one of Mrs. Yannon's attorneys, who is with the New York City firm of Schneider, Kleinick & Weitz. "Nobody puts a gag on me," he said in a telephone interview. Mrs. Yannon was also represented by Jerome Ellis and David Paully of Staten Island.

RCA's insurance company paid Mrs. Yannon and her children \$154,688; the remaining \$95,361 will cover her legal fees. In addition, expert witness fees and related costs totaling \$18,041 will come from Mrs. Yannon's share of the award. RCA's attorneys refused to divulge the name of the insurance company, but, according to the "closing statement" filed with the court, RCA was covered by the Zurich Insurance Group.

(continued on p.13)

Canadian Utility Offers To Buy Homes Next to Power Line ROW

A Canadian utility has made an unprecedented offer to buy the homes along a power line right-of-way (ROW) on Vancouver Island. British Columbia (BC) Hydro is prepared, upon request, to pay a fair market price to landowners concerned about increased electromagnetic fields (EMFs) from a new 230 kV line. BC Hydro will then put the purchased properties back on the market.

The 90-mile 230 kV Dunsmuir-Gold River power line was built on an existing ROW which already had two 138 kV lines, according to a utility spokesman, who said that all but 20 miles of the line is in an unpopulated area. The new line, which will serve a pulp and paper mill, is scheduled to

(continued on p.14)

HIGHLIGHTS

Double-Blind Studies Show Efficacy of PEMF Treatment

After years of controversy as to whether the application of pulsed electromagnetic fields (PEMFs) is an effective therapy, new double-blind studies are showing that PEMFs can indeed help mend fresh and nonunion fractures, tighten prostheses, heal skin lesions, ease pain and treat osteoporosis. Eight double-blind studies, each with statistically significant results, were presented at *Electrobiology Today: An International Symposium in Honor of Luigi Galvani*, held in Bologna, Italy, in mid-April.

Professor W.J.W. Sharrard of the University of Sheffield, U.K., reported an improvement of tibial fractures with delayed unions when treated with PEMFs for 12 weeks. Sharrard found clinical and radiological evidence of union in 25% of the 20 patients who received PEMF treatment, compared to only 4% among the 25 controls ($p < 0.01$). The patients, who were enrolled between 1981 and 1985, were treated more than 16 weeks—but less than 32 weeks—after injury.

On his return from the Bologna meeting, Dr. Andrew Bassett, professor emeritus of orthopaedic surgery at Columbia University's medical school in New York City, told *Microwave News* that the new results "should wipe out the last vestige of skepticism in the few members of the academic community who have made a profession of denigrating the biological activity of PEMFs." Bassett is well-known for his pioneering studies on the medical uses of PEMFs.

"Double-blind studies are extraordinarily hard to do. Dr. Sharrard must be complimented for completing this study," Dr. Brian Pethica of Electro-Biology, Inc. (EBI), the leading manufacturer of PEMF devices, said in a telephone interview. Pethica, who is the vice president for research at EBI in Parsippany, NJ, was also at the Bologna meeting. "The field has advanced very rapidly over the last few years," he said.

Sharrard's report was particularly welcome news to the PEMF community because, in 1984, he and his coworkers reported interim results that cast doubt on the efficacy of PEMF therapy (see *MWN*, Ju84). Sharrard told *Microwave News* that the way cases were selected in the 1984 trial tended to skew the results "rather considerably." He also pointed out that their fractures did not unite for a year or more. Overall, he called the 1984 paper "inconclusive, rather than negative." Sharrard said that a paper describing his new results is undergoing final editing prior to publication.

Of the seven other double-blind studies reported at the Bologna meeting, one was by an American-Australian group on the use of PEMFs for the treatment of loose cemented hip prostheses.

The other six double-blind studies were by Italian researchers. A group led by Dr. G. Borsalino of the Department of Orthopaedics and Traumatology at Montecchio Hospital reported on 32 patients treated with femoral intertrochanteric osteotomies (a surgical procedure for arthritis of the hip).

Those treated with a 75 Hz signal showed a statistically significant improved rate of healing. A paper describing the team's findings appeared in *Clinical Orthopaedics and Related Research*, No.237, pp.256-263, December 1988. Send reprint requests to: Dr. Ruggero Cadossi, University of Modena, Clinica Medica II, Policlinico, Via del Pozzo 71, 41100 Modena, Italy.

The other Italian papers were reports on the use of PEMFs for the treatment of non-cemented knee prostheses, fresh femoral fractures, skin lesions, osteoporosis and pain.

For more information on these studies, contact: Dr. Angelo Gusella or Stefano Nardi, Divisione Ortopedica, Istituti Ortopedici Rizzoli, Via G.C. Pupilli 1, 40136 Bologna, Italy, (051) 63.66.225.

The abstracts of the papers presented at the Bologna symposium will be published in the *Journal of Bioelectricity*, edited by Dr. Andrew Marino of the Louisiana State University Medical Center in Shreveport, LA, at the end of the year.

Did EMI Cause a Bomb To Fall from an F-16?

Electromagnetic interference (EMI) may have triggered an electro-explosive device (EED) aboard a U.S. Air Force (USAF) F-16 jet, releasing a 500-pound bomb in western Georgia, the *Macon Telegraph and News* reported on May 11.

During a routine training mission on May 4, an F-16 pilot was unable to release a bomb over the target area. As the pilot circled back over Marion County, the bomb dropped, shaking windows up to 1,000 feet away. There were no casualties, however.

The USAF and the U.S. Army are now investigating a number of potential causes—including radio signals from transmitters and radars at nearby Fort Benning—of the unintentional release. A report should be available by August, a USAF spokeswoman told Stuart Leavenworth of the *Macon* newspaper. Members of Georgia's Congressional delegation are monitoring the investigation.

EMI-related problems have become a recurring news story in Georgia. For more than a year, the PAVE PAWS radar at Robins Air Force Base (AFB) has been at the center of a controversy over whether EEDs aboard aircraft flying through the radar's main beam are in danger of detonating (see *MWN*, J/A88, N/D88 and J/F89).

A spokesman at Moody AFB, GA, where the F-16 is stationed, told *Microwave News* that the jet was equipped with EEDs which are used to facilitate the release of bombs.

The Department of Defense has become sensitive to the threat posed by EMI and recently initiated a three-year, \$30 million study of the compatibility of the electronic weapons used by the different branches of the military (see *MWN*, M/A89).

European Bioelectromagnetics Society To Be Formed

Planning is underway to form a European Bioelectromagnetics Society (EBEMS). Dr. Jocelyne Leal, who is leading the effort to create the new group, believes it is needed to reinforce contacts among European scientists and to facilitate setting up collaborative research projects financed with European funds. EBEMS will address both biomedical applications and health effects of electromagnetic fields.

EBEMS has the blessing of many members of the Bioelectromagnetics Society (BEMS), which is based in the U.S. Dr. Tom Rozzell of the National Research Council in Washington, DC, who was one of the founders of BEMS in 1978, has argued that there are "compelling reasons" for the creation of EBEMS.

How the two societies will coordinate their activities is still unclear. Leal, who is based in Madrid, Spain, told *Microwave News* that she would like to establish a "strong and effective relationship" between EBEMS and BEMS. Specific details about this relationship—for instance, whether they will have joint meetings and share the same journal—are currently under discussion.

In addition to Leal, the members of the EBEMS planning committee are: Drs. Alessandro Chiabrera (Italy), Sylvia Fitton-Jackson (U.K.), Maurice Hinsenkamp (Belgium) and Bernard Veyret (France). BEMS has also set up a committee to act as a liaison between the two societies.

For more information, contact: Dr. Jocelyne Leal, Department of Research, Hospital Ramón y Cajal, Carretera de Colmenar, Km 9, Madrid 28034, Spain, (1) 336-8699.

Nuclear Plant Alert Set Off by RFI from Hand-Held Radios

On the night of April 22, the Nine Mile Point-2 nuclear power plant went on alert when radiofrequency interference (RFI) from workers' hand-held radios created noise in the low-voltage circuitry, causing the plant's turbine control valves to close, *Nucleonics Week*, an industry newsletter, reported in its April 27 issue. The safety system switched on and there was no damage to the 1,165 megawatt (MW) plant, which is operated and partly owned by the Niagara Mohawk Power Corp. The Nine Mile plant is located near Oswego, NY, on Lake Ontario.

"We're going to reidentify those areas of the plant that are especially sensitive to interference and post warning signs," Stephen Brady, a Niagara Mohawk spokesman, told *Microwave News* from his office in Syracuse, NY. He added that the company will redouble its emphasis on training personnel to take the necessary precautions so that similar situations do not occur again.

In a telephone interview, Jon Johnson of the Nuclear

Brodeur on Power Lines, Radar and VDTs in "The New Yorker"

Paul Brodeur, the author of *The Zapping of America*, is publishing a three-part series on the health, scientific and political issues related to power line, radar and video display terminal (VDT) electromagnetic fields in the June 12th, 19th and 26th issues of *The New Yorker*, a national magazine.

A book will follow in the fall: *Currents of Death: Power Lines, Computer Terminals and the Attempt To Cover Up Their Threat to Your Health* will be published by Simon and Schuster.

Brodeur has also written books on asbestos and articles on ozone-depleting chemicals—all of which first appeared in *The New Yorker*. *The Zapping of America* was serialized in the magazine in December 1976.

Regulatory Commission's (NRC) regional office in King of Prussia, PA, said that this type of RFI does occur, but that, "it has not been a serious safety problem." He said that, "Most plants, if not all, have done surveys on where radios can cause RFI and have published procedures for their use." There are no overall NRC rules governing the use of walkie-talkies in nuclear plants, according to Johnson.

In February 1982, the No.2 reactor at the Three Mile Island nuclear power plant in Middletown, PA, went on alert for eight-and-a-half hours before officials discovered that radio signals from a portable two-way radio were interfering with a combustible gas meter, leading operators to believe that hydrogen gas was accumulating inside the reactor (see *MWN*, Mr82). The plant was the site of a major accident in 1979.

FCC on Part 15 RF Rules and Measurement Procedures

The Federal Communications Commission (FCC) has made major changes in the way it regulates non-licensed devices that emit electromagnetic energy and has proposed new methods of measuring their radiated and conducted emissions.

On April 18, the commission released the final version of its Part 15 rules, which govern the use of such non-licensed radiofrequency (RF) appliances as remote control units, garage door openers and cordless telephones. The revised rules, first proposed in October 1987, are designed to establish uniform technical standards to replace the previous case-by-case approach (see *MWN*, N/D87).

The FCC argues that the new rules remove "unnecessary regulatory barriers" for new services, such as wireless computers and other high speed data transmission and consumer

HIGHLIGHTS

video systems. At the same time, they tighten up certain emissions limits, thus avoiding the risk of interference to licensed radio and TV broadcasting.

According to the FCC's John Reed, some of the key changes in the final rules are that: (1) a ban has been imposed against any new devices operating in the TV broadcast band—the FCC notes the importance of not hampering the development of high-definition TV; (2) a number of restricted frequency bands have been added—including those used for LORAN-C, wind shear detection and radio astronomy; and (3) for frequencies above 1 GHz, limits are based on average values, in contrast to the limits on emissions below 1 GHz, which are specified in terms of CISPR quasi-peaks, although a cap here is also specified (20 dB).

The revised rules are under attack from a variety of sources, Reed told *Microwave News*. Linear Corp. and Sensomatic Electronics Corp. have already petitioned the FCC for reconsideration, and Reed expects others will follow.

Indeed, the American Radio Relay League (ARRL) has announced that it too will ask the FCC to reconsider. In the June 1989 issue of *QST*, the ARRL's monthly magazine, the league calls some of the rules "ghastly." For instance, the ARRL believes that the FCC's new "consumer bands" allow a host of different types of equipment to emit too much radiation.

On the other hand, the National Association of Broadcasters (NAB) takes a more positive view. "Overall, we're reasonably satisfied with the rules' protections," NAB staff engineer Kelly Williams said in a telephone interview.

Measurement Methods

On May 17, the FCC's Office of Engineering and Technology (OET) announced three new proposals on how to measure radiated and conducted emissions from devices regulated under Part 15. The proposals cover the following types of devices (the document designations are given in italics):

U.K.'s NRPB Issues Guidance

In mid-May, the National Radiological Protection Board (NRPB), based in Didcot, U.K., issued recommendations on public and occupational exposures to all frequencies up to 300 GHz, including power line electromagnetic fields.

Microwave News will feature a complete report in the July/August issue.

- Intentional radiators, including wireless microphones, cordless telephones and household intercom systems (*OET TP-3*);
- Unintentional radiators, including radio and TV receivers and cable terminal devices—but excluding digital devices, CB receivers and carrier current systems (*OET TP-4*);
- Intentional radiators which operate periodically, including emergency alarms and door openers (*OET TP-6*).

At press time, the actual proposals had not yet been released.

These proposals follow the recent release of a new procedure (*OET TP-5*) for measuring emissions from digital devices (see *MWN*, M/A89). AT&T and the Computer and Business Equipment Manufacturers Association (CBEMA) have requested an extension of the deadline for filing comments and reply comments. They are now due June 7 and July 7, respectively.

For more information on the final Part 15 rules, contact: John Reed, FCC, 1919 M St., NW, Washington, DC 20554, (202) 653-7313. And for more information on the new measurement procedures, contact the FCC's Paul Marrangoni at (202) 653-8107; to order copies of the procedures, contact: Virginia Cannon, Downtown Copy Center, 1114 21st St., NW, Washington, DC 20036, (800) 541-1194 or (202) 452-1422.

ELF NEWS

« Power Line Talk »

Make room on your bookshelves for four new books on EMF bioeffects which will be available by the fall. In addition to Paul Brodeur's forthcoming book on power lines and VDTs (see p.3), Dr. Robert Becker will come out with the tentatively-titled *Healing the Body Electric*, to be published by Jeremy Tarcher, Inc., of Los Angeles, CA. Becker, the author of *The Body Electric*, covers both the promise and the peril of the human use of EMFs. Becker looks at the role of EMFs in ancient and modern techniques of healing, as well as at the implications of upsetting the natural environmental balance. Battelle's Drs. Larry Anderson, Richard Stevens and Bary Wilson have edited a collection of papers for a volume called *Extremely Low Frequency Electromagnetic Fields: The*

Question of Cancer—they also wrote many of the chapters. The collection, which will be published by Battelle, will feature reviews on such topics as the pineal gland, oncogenes, calcium homeostasis and ion cyclotron resonance. In their preface, the editors note that their book is intended to be "provocative and useful." On the other side of the Atlantic in the U.K., Dr. Cyril Smith of the University of Salford, and Simon Best, a medical journalist, have written *Electromagnetic Man: Health and Hazard in the Electrical Environment*, which will be published by Dent & Sons of London at the end of July. Smith and Best link EMFs to allergies, depression, pain and some forms of cancer, and provide coherent explanations of homeopathy and parapsychology. They also "show

what action can be taken against the dangerous effects of EMFs, as well as how we can make beneficial use of them.”

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The annual tug of war over DOE's ELF research budget is starting again. As in past years, the Administration has proposed \$2.2 million for EMF effects research for FY1990. Last year, due to public pressure, the research program ended up with an additional \$800,000 (see *MWN*, S/O88). Now the question is whether the DOE program will succeed in getting \$3 million again. Dr. Imre Gyuk, program manager of the DOE's Office of Energy, Storage and Distribution, told *Microwave News* that the proposed \$2.2 million budget would result in "considerable cutbacks" in the program's ongoing projects. Some members of Congress are seeking \$4 million—a level that is supported by the American Public Power Association (APPA). In an April statement to Congressional appropriations subcommittees, the APPA urged them to increase their support "to keep this important program on track." Research is needed, according to the APPA, because, "Almost every proposed new transmission line is currently being questioned—and some have been entirely blocked—by those concerned about possible health effects and potential decreases in property values because of perceived health effects." The final budget resolution is not expected until October.

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Dr. Nancy Wertheimer and Ed Leeper's analysis of the Battelle epidemiological study of adult leukemia will be published in a letter appearing in the August 1989 issue of the *American Journal of Epidemiology*; they show a link between residential EMF exposures and adult leukemia when magnetic field exposures from electric blankets and water beds are taken into account. Last year, Wertheimer and Leeper reported that the risk of leukemia was 50-90% higher than expected among people exposed to magnetic fields from electrically heated beds or power lines and that the risk increased to 110-260% above controls for those exposed to both (see *MWN*, M/J88). Battelle's Dr. Richard Stevens and his collaborators will publish their response in the same issue of the journal. They note that an association between adult leukemia and residential ELF field exposure cannot be ruled out because of their study's small sample size and the potential misclassification of exposures.

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"Why expose ourselves, and our customers, to any risk?" asks a Canadian company which is marketing what it calls a "field-free" water bed heater. In its ads, the Toronto-based Halcyon cites the 1986 Wertheimer-Leeper study on electric bed heaters and miscarriage risks, and claims that its product provides "an unquestionably safe alternative"—the company believes that there is "minimal, if any, danger" from exposure to EMFs. Despite repeated requests from *Microwave News*, the company has not provided any additional information.

IRPA Revises ELF Guidelines: Cancer Risk "Not Convincing"

The International Radiation Protection Association (IRPA) has approved new interim guidelines for human exposures to 50/60 Hz electromagnetic fields (EMFs). The guidelines, which were developed by IRPA's International Non-Ionizing Radiation Committee (INIRC), specify public exposure limits for electric and magnetic fields of 5 kV/m and 0.1 mT (1,000 mG), respectively.

The extremely low frequency (ELF) limits seek to protect workers and the public from "established or predicted immediate health effects"; they are not based on cancer risk. "Current evidence from the epidemiological studies suggesting an association between the cancer incidence and residential or workplace exposure to 50/60 Hz EMFs is not convincing," according to the IRPA/INIRC, but "these results raise a hypothesis that needs to be tested."

Dr. Richard Phillips of the Environmental Protection Agency's Health Research Laboratory in Research Triangle Park, NC, criticized the new IRPA limits as too lenient. "It's ridiculous—they are not representative of our state of knowledge." Phillips, who served on the 1984 World Health Organization's (WHO) and IRPA's Task Group on ELF Fields, said that, "The document reflects the views of the members of the committee and the committee does not really represent the

overall scientific community. It represents one extreme of the distribution of the various scientific opinions."

The new interim guidelines are based on biological effects due to internal currents induced by external electric and magnetic fields—they are designed to limit induced currents to approximately 10 mA/m².

In 1987, the IRPA/INIRC circulated a review draft of the 50/60 Hz guidelines specifying magnetic field exposure limits which, though based on the same 10 mA/m² limit, were more lenient—by a factor of ten for workers and by a factor of two for the general public (see Table on p.6 and *MWN*, M/A88). The electric field limits are essentially unchanged from those proposed two years ago.

In an interview with *Microwave News*, Dr. Michael Repacholi, the chairman of the IRPA committee, said that, in developing the new guidelines, the committee sought to set levels for the general public that are five times stricter than those for workers—as IRPA has recommended for exposures to radiofrequency and microwave radiation (see *MWN*, M/84 and J/F88). He added that, while this could be done for magnetic fields, it would not be possible for electric fields if contact currents and transient discharges were to be taken into account.

Magnetic Field Guidelines

The IRPA residential magnetic field limits are approximately 1,000 times more lax than the levels linked to cancer by the Wertheimer-Leeper, Tomeniuss and Savitz epidemiological studies. For instance, in an effort to protect against such a risk, an Oregon state legislator proposed a standard of 2 mG earlier this year (see *MWN*, M/A89).

The IRPA guidelines are also much looser than those adopted by the state of Florida earlier this year for power line rights-of-way (see *MWN*, M/A89). The Florida limits are not health-based standards, but are set at a "technologically achievable" level, according to a state official.

The May 1987 draft of the guidelines, which predated the publication of the Savitz study, pointed out that the residential epidemiological studies—specifically those by Wertheimer-Leeper—could not be considered in a health risk evaluation because of their many inherent deficiencies.

"The Savitz study tends to support the earlier studies, but we nevertheless concluded that chronic low-level EMF expo-

IRPA/INIRC Committee

The members of the IRPA/INIRC are as follows (see *MWN*, J/A88):

Drs. Jürgen Bernhardt (F.R.G.); Branko Bosnjakovic (The Netherlands); Przemyslaw Czerski (U.S.); Annette Duchêne, Scientific Secretary (France); Martino Grandolfo (Italy); Dietrich Harder* (F.R.G.); Henri Jammet (France); Bengt Knave (Sweden); John Marshall* (U.K.); Michael Repacholi, Chairman (Australia); David Sliney (U.S.); and Jan Stolwijk (U.S.).

*Retired

sure has not been established to increase the risk of contracting cancer," Repacholi told *Microwave News*. "Similarly, no definitive conclusion can be drawn from the occupational studies," he said. Repacholi is the chief scientist at the Royal Adelaide Hospital in Adelaide, South Australia.

IRPA/INIRC Interim ELF Human Exposure Guidelines

	Electric Field kV/m (rms)		Magnetic Field mT* (rms)	
	May 1989	May 1987†	May 1989	May 1987†
Occupational				
Whole Working Day	10	10	0.5	5
Short-Term	30 ^a	20-30 ^b	5 ^b	10 ^b
For Limbs	—	—	25	25
General Public				
Up to 24 Hours Per Day	5 ^c	5	0.1 ^c	0.2
Few Hours Per Day	10 ^d	10	1 ^d	—

Notes: (a) Short-term occupational exposure to rms electric field strengths between 10 and 30 kV/m is permitted provided the rms electric field strength (kV/m) times the duration of exposure (hours per workday) does not exceed 80 for the whole working day.
 (b) Maximum exposure duration is 2 hours per workday.
 (c) This restriction applies to open spaces in which members of the general public might reasonably be expected to spend a substantial part of the day, such as recreational areas, meeting grounds and the like.
 (d) These values can be exceeded for a few minutes per day provided precautions are taken to prevent indirect effects.

* To convert from mT to G, multiply by ten; to convert to mG, multiply by 10,000.
 † Exposure limits specified in an IRPA/INIRC draft dated May 12, 1987 (see *MWN*, M/A88).

Currents Induced by 50/60 Hz Magnetic Fields and Their Bioeffects

- 1-10 mA/m² (induced by magnetic fields above 0.5-5 mT)—minor biological effects have been reported;
- 10-100 mA/m² (above 5-50 mT)—there are well-established effects including visual and nervous system effects;
- 100-1000 mA/m² (above 50-500 mT)—stimulation of excitable tissue is observed and there are possible health hazards; and
- 1000 mA/m² and above (greater than 500 mT)—extra systoles and ventricular fibrillation can occur (acute health hazards).

Electric Field Guidelines

In a report prepared by the IRPA/INIRC for the WHO in 1984, the committee concluded that, "It is not possible from present knowledge to make a definitive statement about the safety or hazard associated with long-term exposure to sinusoidal electric fields in the range of 1-10 kV/m" (see *MWN*, D84). "We are still in the same situation today," Repacholi said.

Nevertheless, the new IRPA guidelines allow continuous public exposures of 5 kV/m for the public and 10 kV/m for workers. "For the general public, the 5 kV/m limit applies to open spaces, like sports grounds, where people might spend a substantial part of the day. When they go indoors, the electric fields would be lower by more than an order of magnitude. For occupational exposure, where the limits apply for the workday only, many lab studies on human volunteers have shown no adverse effects from short-term exposure to electric fields of up to 20 kV/m or magnetic fields of up to 5 mT," Repacholi explained.

The IRPA guidelines, which went through final editing at the INIRC annual meeting, in Sicily, Italy, in mid-May, will be published in *Health Physics* in late 1989 or early 1990. They will also appear in a special book on INIRC guidelines and publications to be released later this year.

The guidelines will not be available until publication. For more information, contact: Mme. A. Duchêne, 32 rue Gambetta, F-92260 Fontenay-aux-Roses, France.

WI PSC Initiative for "Independent" EMF Research

The Wisconsin Public Service Commission (WI PSC) is seeking an independent national research effort on the health effects of electromagnetic fields (EMFs). In a March 13 letter to the 49 other state utility commissions, the three Wisconsin commissioners urged the development of an "adequately funded" program to quickly resolve "what is clearly an important issue that needs to be resolved."

A key goal of the WIPSC plan is to make the research program credible by freeing it of direct utility influence. To that end, the WIPSC proposes two potential approaches: either to persuade the Electric Power Research Institute (EPRI) that all or part of its EMF research funding be managed independently, with advice from utilities and state PSCs, or to set up an interstate body, patterned after the New York State Power Lines Project (NYPLP). The commissioners suggest that the National Association of Regulatory Utility Commissioners (NARUC) or a group of "interested states" should develop the new program.

The Wisconsin initiative comes at a time when many state legislatures, in response to public pressures, are considering or sponsoring their own research (see *MWN*, M/A89). The WI PSC notes that a joint approach would be more productive.

Wisconsin has already received encouragement from

HL&P v. Klein Case Is Over

The Texas Supreme Court has again refused a motion by the Klein Independent School District for a rehearing on the reversal of its \$25 million punitive damage award from Houston Lighting and Power (HL&P).

In 1985, Klein won the landmark judgment when a jury found that the utility had built a 345 kV power line across school property without obtaining proper permission (see *MWN*, N/D85). The damages were struck down by the Texas Court of Appeals in 1987 and the state Supreme Court first refused to review the case last summer (see *MWN*, N/D87 and J/A88).

Dixon Montague of Vinson & Elkins, a Houston law firm representing Klein, said the case is over. "There's nothing else we can do," he told *Microwave News*. HL&P had filed its own motion for a rehearing, but the request was conditional on the court's agreeing to hear Klein's motion, according to Harris Leven, an HL&P attorney.

some of the more active state utility commissions. In an April 25 response, New York PSC Commissioner Peter Bradford agreed that "one of [the] first steps should be to have NARUC urge EPRI to restructure part of its EMF research to assure independence." He also pointed out that the NY Department of Health had already proposed a number of "independently-managed health studies" as a follow-up to the NYPLP (see *MWN*, N/D88).

The California Public Utilities Commission (CA PUC) has sent a "statement of general support" for state-coordinated research, CA PUC's Clyde Murley told *Microwave News*. "We welcome any approach that would increase efficiency," he said. Murley added that the CA PUC shares the WI PSC's concerns about funding, credibility and timeliness of research results.

The CA PUC is currently working on its own literature review of health effects research, in cooperation with the state Department of Health Services. The report should be out in mid-September (see *MWN*, N/D88 and M/A89).

The WI PSC initiative was developed by Michael John Jaeger. For more information, contact Jaeger at: PSC of Wisconsin, PO Box 7854, Madison, WI 53707, (608) 267-2546.

Seattle City Light (SCL), a Washington state utility, would also like to see more EMF research that is "independent of industry interests." In an April 10 letter to U.S. Representative Norman Dicks (D-WA), SCL Superintendent Randall Hardy called for Congressional support for a national EMF effects program to be developed by an interagency coordinating group, and for a fiscal year 1990 Department of Energy EMF budget of \$4 million (see p.5).

Hardy pointed out that although EPRI plans to spend approximately \$6 million on EMF effects research this year, "These efforts will never...replace the contribution of an independently run federal research program."

Australians Take Cancer Risk Seriously

Government and industry researchers in Australia are taking the cancer threat associated with electromagnetic fields (EMFs) very seriously, as indicated by the two papers discussed below:

Call for a 15-30 mG Magnetic Field Limit

Until definitive results are in, magnetic fields from new power lines should not exceed the average levels surrounding existing 220 kV lines—15 to 30 mG, Dr. Ken Joyner of Telecom Australia Research Laboratories in Clayton, Victoria, recommends.

Joyner's survey of EMF bioeffects is one of the first reviews by a researcher—especially one working for industry—to call for specific magnetic field limits to protect against cancer risks.

Discussing the epidemiological literature, Joyner points out that, although some studies have been "soundly criticized," an EMF-cancer association "deserves serious consideration given the ubiquitous nature of exposure to the electricity distribution system and to AM/FM radio and TV broadcast signals." He further notes that the levels "implicated" in those studies indicating increased cancer risks are "readily found in our homes and environments."

Having reviewed *in vitro* experiments, including those by Drs. Takuya Akamine, Craig Byus and Jerry Phillips, Joyner observes that extremely low frequency (ELF) fields may be "growth enhancers" of malignant tissue cultures and may cause transitory suppression of cell-mediated immunity.

In his paper, Joyner also considers the role of the earth's geomagnetic field and proposes a model to explain the mechanism for the interaction of ELF EMFs at cell membranes.

Joyner calls for the support of further research: "Certainly the recommendations of the WHO/IRPA [World Health Organization/International Radiation Protection Association] committee concerning the 'urgent need' for studies to resolve the suspected link between ELF magnetic fields and cancer should be fully supported by those agencies responsible for the funds for research" (see *MWN*, M/A87).

"[ELF] Electromagnetic Radiation and Interactions at the Cell Membrane" appears in *Radiation Protection in Australia*, 6, pp.118-125, October 1988. Joyner can be reached at: Telecom Australia Research Laboratories, 770 Blackburn Road, Clayton, Victoria 3168, Australia.

A Critical Evaluation of the Literature

Dr. Vincent Delpizzo, a member of the Australian Radiation Laboratory's Non-Ionizing Radiation Group, will soon publish a critical review of the ELF cancer literature, in which he concludes:

There is enough evidence at present to justify further investigation of this subject. Although exposure to ELF [fields] is an inevitable part of the lifestyle in any technologically advanced society, the degree of this exposure could be reduced, sometimes simply and inexpensively, if health considerations warranted it. The vagueness of the *in vitro* results is not unprecedented in a complex and little understood area.

Delpizzo finds that the "epidemiological data show a reasonable degree of consistency." With respect to the residential studies, he observes that the "available data indicate that a strong association [between ELF fields and cancer] does not exist, but there is some reason to believe that this is partly due to misclassification of exposure." He also notes that 19 of 23 occupational studies have reported an increase in some form of cancer—in nine cases, leukemia.

Delpizzo provides an unusually frank analysis of the ongoing debate over the latest epidemiological and laboratory results. For instance, he dismisses many of the arguments put forward by Dr. Philip Cole of the University of Alabama in Birmingham as "trivial" and "naive." Delpizzo calls Cole's conclusion that the Wertheimer-Leeper study was biased "unproven and unconvincing."

"An Evaluation of the Existing Evidence on the Carcinogenic Potential of [ELF] Magnetic Fields" will appear in the June 1989 issue (Vol.12, No.2) of *Australasian Physical and Engineering Sciences in Medicine*. Delpizzo can be contacted at: Australian Radiation Laboratory, Lower Plenty Road, Yallambie, Victoria 3085, Australia.

Around the United States...

Florida... Three Boca Raton parents went to court on May 15 to shut down the Sandpiper Shores Elementary School, located within 230 feet of five power lines in Palm Beach County (see *MWN*, J/F89). A decision from the judge is expected in the first half of June. The experts who testified for the parents were: Drs. Harris Busch, Andrew Marino, Jerry Phillips and Stephen Smith. Testifying on behalf of the school board were: Drs. Edwin Carstensen, Philip Cole, Fred Dietrich, William Feero, Dwight Mercer and Morton Miller. A number of the experts appeared on videotape.

Florida... The Hillsborough County Attorney's office has temporarily withdrawn its petition challenging the state's new electric and magnetic field limits of 2-10 kV/m and 150-250 mG, respectively (see *MWN*, M/A89). The case is now being handled by outside attorneys, Chief Assistant County Attorney Elliott Dunn told *Microwave News*. Dunn expects the petition to be re-filed "any day now."

Maine... Bill No.1347, which would have imposed interim electric and magnetic field standards of 1 kV/m and 3 mG, re-

spectively, for new power lines and which would have required the Public Utilities Commission (PUC) to consider techniques for reducing power line magnetic fields and to review research on health risks associated with EMF exposure, has been withdrawn by its sponsor, Representative Conrad Heesch. The PUC is now willing to collect data on health effects and magnetic field mitigation and to serve as a resource center, Heesch told *Microwave News*—although the PUC's approach is not as "active" as he would have liked. With regard to future legislation, Heesch said that he will first "monitor what the PUC is doing and then go from there." At a May 10 public hearing prior to the bill's withdrawal, Arthur Adelberg, a Central Maine Power Co. (CMP) vice president and general counsel, testified that the utility supported the research efforts, but was opposed to the interim limits, calling them "unwarranted," "premature" and "severely disruptive to economic development of this state." CMP submitted a new draft of the bill without the standards and with a provision for a PUC-appointed panel of experts to assist the commission. Dr. William Bailey, Dr. Philip Cole and Michael Silva also appeared as expert witnesses for CMP. Silva presented a chart which chronicled the magnetic field levels he encountered on the way to the hearing room through the streets of Augusta, ME. The chart showed that the state legislature's usual hearing room measured magnetic field levels of about 25 mG; the local Burger King measured over 10 mG.

Oregon... Interim electric and magnetic field limits of 1 kV/m and 2 mG, respectively, will most likely be dropped from Bill No.2932 until the results of proposed health studies have come in, according to Marc Overbeck, an aide to Representative Nancy Peterson, the bill's sponsor (see *MWN*, M/A89). In a telephone interview, Overbeck explained that a number of projects proposed by the Department of Health Services are being considered, although Peterson favors a combined research and literature review package which would cost \$124,000; Overbeck conceded, however, that budget shortfalls make such an allocation highly unlikely. Overbeck added that the review would cover all forms of non-ionizing electromagnetic radiation, while the research would focus on

November DOE-EPRI Review Will Be Held in Portland, OR

This year, the annual review of research sponsored by the Department of Energy and the Electric Power Research Institute (DOE-EPRI) on the bioeffects of extremely low frequency electromagnetic fields will be held in Portland, OR, November 12-16.

The meeting, which will feature paper presentations and poster sessions, is open to the public and there is no registration fee. The Westin Benson Hotel is offering special room rates of \$50.00 to attendees.

For more information, contact: W/L Associates, 120 W. Church St., Frederick, MD 21701, (301) 663-1915.

the lower end of the frequency spectrum—for example, a study involving electric blankets, heating sources and home appliances.

Texas... On May 25, the Austin City Council adopted a resolution instructing the City Manager: (1) "to develop a transmission plan which meets the long-term needs of the [Lower Colorado River Authority] to maintain reliable service while at the same time [minimizing] the potential health effects of [EMFs] from the proposed transmission lines"; and (2) to make sure that if any lines of greater than 138 kV are proposed, "it must be demonstrated that the [EMFs] generated by said lines are no greater than the fields generated by 138 kV lines with the same capacity." The day after the vote, the *Austin American Statesman* applauded the council's recognition of "physical and fiscal reality." Less than two years ago, the council voted to scrap a proposed 345 kV line.

Washington... State bill No.5275, which would require a literature review of ongoing EMF studies, no longer calls for a \$10,000 appropriation (see *MWN*, M/A89). If approved, the Washington State Institute for Public Policy, a state-run organization, will conduct the survey with funding from its own budget.

UPDATES

COMPATIBILITY & INTERFERENCE

Surge Protection... KeyTek Instrument Corp. has issued three resources on surge testing: The eight-page *Application Note 103* describes equipment and methods for surge testing all types of electronic equipment and the various relevant industrial, national and international specifications. *Application Note AN-121* provides detailed information on high-voltage oscilloscope probes and techniques for measuring surge voltages up to 6 kV. And the second edition of the 68-page *Surge Protection Test Handbook* includes instructions on how to test equipment and refers to applicable standards.

Single copies of these items are available free from: Mike Hopkins, KeyTek Instrument Corp., 260 Fordham Rd., Wilmington, MA 01887, (508) 658-0880.

EMP

Strom, the Courts and 60 Minutes... Procedural questions—rather than the substantive issues—are now dominating the case of *Robert Strom v. Boeing*. Strom, a former Boeing EMP technician who developed leukemia, charges that Boeing was aware that EMP exposures can cause cancer, but failed to warn any of its employees or to take precautions to protect them (see *MWN*, J/A88 and S/O88). Most recently, Boeing

UPDATES

filed a petition to move the case to federal court (it was originally filed in the King County, WA, Superior Court). Strom countered with a May 22 petition to send the case back to state court. Strom is also asking that attorneys' fees and costs be imposed against Boeing for its "frivolous petition." Strom's planned videotaped deposition, which is intended to stand as permanent evidence in the event that Strom is incapable of testifying at the trial, is now on hold until the jurisdiction dispute is decided....Meanwhile, in the April 1989 *IEEE Antennas and Propagation Society Newsletter*, Editor W. Ross Stone takes aim at the March 5 *60 Minutes* segment on the Strom class action suit (see *MWN*, N/D88). Stone, who worked at the Cascade, MT, EMP test site in the late 60s and early 70s, calls the CBS news program a "personal shock" and says that potential harmful effects of EMP exposure were actively debated while he was at the site. "To the best of my knowledge, without significant exception, it was then and is now generally accepted within the EMP community that exposure to such fields per se does not represent a health hazard," Stone notes. He points out that improperly shielded EMP pulsers can emit X-ray radiation. With regard to *60 Minutes*' coverage, Stone comments that, "It is unfortunate that there apparently was little electromagnetic or bioelectromagnetic expertise involved in the investigative—and obviously provocative—reporting." He calls for those with scientific information on EMP effects to write to him so that it can be "shared with our newsletter readers." Contact Stone at: Stone-ware, Ltd., 1446 Vista Claridad, La Jolla, CA 92037, (619) 459-8305. For a transcript of the segment, contact: *60 Minutes* Transcripts, 267 Broadway, New York, NY 10007, (212) 227-7323.

MEASUREMENT

Near-Field Standard...The IEEE EMC Society's Working Group P-1140 has expanded its mission and will now develop a standard for measuring electric and magnetic fields (EMFs) near all types of sources. Originally, the group had limited itself to a protocol for measuring EMFs around VDTs (see *MWN*, J/A87 and M/A88). The decision to write a general near-field standard was reached at a P-1140 meeting on April 7 at AT&T Bell Labs in Murray Hill, NJ. According to Ric Tell, the new chairman of the working group, a consensus emerged at the meeting on the need for a single document to give guidance on how to do near-field measurements, rather than for a source-specific standard. The working group plans to have a draft standard within a year. Don Heirman and Ron Petersen, both of Bell Labs, Walt Baker of IBM, David Mertz of UL and Dr. Motohisa Kanda of NIST (NBS) were also at the meeting. Tell, a consultant based in Las Vegas, NV, took over the chairmanship from Stephen Berger of Electro-Mechanics and Jim Greeson of IBM.

New VDT and ELF Meters...A portable VDT magnetic field meter that allows measurements to be taken according to Swedish protocols, is now available in the U.S. Combinova

AB, a Swedish company, is manufacturing the unit and Ergonomics, Inc., a Southampton, PA, firm specializing in product safety, is distributing it in the U.S. The Magnetic Field Meter 1000 (MFM 1000), which weighs 6.6 pounds, can measure VDT magnetic fields in the 1 kHz-400 kHz frequency range, as well as the time rate of change of the magnetic field. Each measurement takes less than two seconds. A calibration device (MFG 250) is also available. The MFM 1000 costs approximately \$8,000. When purchased with the meter, the MFG 250 costs \$900. (The prices vary with international exchange rates.) Combinova will soon introduce a new meter to measure power frequency magnetic fields. The MFM 10 will be portable and has been designed for both single measurements and for surveys. Pricing information for the MFM 10 was not available at press time. For more information, contact: Frances George, Ergonomics, Inc., PO Box 964, Southampton, PA 18966, (215) 357-5124. In Europe, contact: Combinova AB, Box 20050, S-161 20 Bromma, Sweden, (8) 733 93 10.

MEDICAL APPLICATIONS

Hyperthermia Device Implant...The Los Alamos National Laboratory and the Department of Energy are soliciting requests from companies interested in participating in the joint development and licensing of a surgically-implanted "diathermic" device. According to a notice in the April 17 *Commerce Business Daily*, the device, which was developed at the Los Alamos Lab, provides a mechanism for treating deep tumors without invasive techniques, and eventually may be used for bone healing. Once the device is in place, an external antenna is aligned with the implanted one to induce current in the tumor. Since it does not require a power source, the device can remain in place "indefinitely." For more information, contact: Janis Rhoades, Industrial Applications Office, Los Alamos National Lab, M/S M899, PO Box 1663, Los Alamos, NM 87545, (505) 667-3839.

Treating Cancer With Electricity...Dr. Björn Nordenström of the Karolinska Institute in Stockholm, Sweden, described his work on biologically closed electric circuits in a paper presented at the American Cancer Society's (ACS) 31st Annual Science Writers' Seminar in Irvine, CA, on April 2. Nordenström's "electrochemical treatment" involves inserting an electrode in a tumor and another in the surrounding tissue and inducing a low voltage current between them. Some experts are skeptical about Nordenström's unorthodox procedure. But Dr. Gerald Murphy, ACS's vice president for medicine, said that Nordenström's basic research is "impeccable," the April 11 *Washington Post* reports. For the most part, Nordenström's treatments have been limited to lung and breast cancer patients who have not responded to traditional treatments. Of over 100 patients treated, only two are still alive and cancer-free, according to the *Washington Post*, but Nordenström emphasizes that his patients' cancers were in advanced states of development. "I got only very, very poor cases, where no

other therapy was available," Nordenström was quoted in the April 1986 *Discover* magazine cover story (see *MWN*, M/A86). He points out in his paper that "other patients have shown regression of treated cancers but died...from non-treated tumors." He adds that patients who have undergone surgery or radiation therapy may not be good candidates for his method, because such procedures create scar tissue which can "insulate" the tumor. Nordenström was also featured on the October 21, 1988, edition of ABC-TV's *20/20*.

MEETINGS

NCRP 1986 Symposium...The proceedings of the April 1986 annual meeting of the National Council on Radiation Protection and Measurements (NCRP), *Non-Ionizing Electromagnetic Radiations and Ultrasound*, have been published. The 384-page volume includes the text of Dr. Herman Schwan's Taylor Lecture, as well as papers by Drs. Ross Adey, Ed Alpen, Tom Budinger, H.B. Graves, Bill Guy, Don Justesen, Bill Kaune, Mary Ellen O'Connor and Tom Tenforde. Also included are updates—as of 1986—of the various NCRP committees working on non-ionizing radiation issues (see *MWN*, J/F86). The chairman of the NCRP program committee was George Wilkening of AT&T Bell Labs. A copy of NCRP Proceedings No.8 is available for \$28.00 from NCRP Publications, 7910 Woodmont Ave., Bethesda, MD 20814, (301) 657-2652. Note that those who have standing orders for NCRP publications will not receive this volume unless it is specifically ordered.

Medical Applications...The University of Tulsa and the FDA's Center for Devices and Radiological Health sponsored a conference on *Emerging Electromagnetic Medical Technology* at the university, May 25-28. Invited U.S. and European scientists reviewed well-known applications such as hyperthermia, diapulse and magnetic resonance imaging, as well as those applications still under development, such as using microwaves for warming and using PEMFs for nerve excitation. Issues of risk assessment and FDA approval were also addressed. For more information, contact: Professor Mary Ellen O'Connor, University of Tulsa, 600 South College Ave., Tulsa, OK 74104, (918) 592-6000.

Swedish NIER Proceedings...Papers presented at the *1st Symposium on the Biological Effects, Hazards and Protection from Non-Ionizing Radiation in Outdoor Applications*, held in Stockholm in August 1987, appear in the May 1989 issue of *Health Physics*. Most of them address laser radiation; there are four on RF/MW radiation (see Occupational Health at right). This special issue of the journal was edited by David Sliney of the U.S. Army Environmental Hygiene Agency.

MILITARY SYSTEMS

PAVE PAWS and the Shuttle...Georgia's *Macon Telegraph and News* reports that when the NASA space shuttle

Atlantis made a surprise visit to Robins AFB on May 15, the USAF turned off its PAVE PAWS radar. The Atlantis was attached to a modified Boeing 747 and was accompanied by NASA aircraft. The Macon newspaper quoted a USAF spokesman as saying that Robins officials were unsure as to whether the planes were carrying electro-explosive devices (EEDs): "So that's why we took the safety precautions." The Georgia PAVE PAWS was built near one of the Robins AFB runways, prompting fears that EEDs aboard aircraft flying through the radar's main beam might be detonated (see *MWN*, J/A88, N/D88 and J/F89).

HPMs are "Critical"...In a March 15 report to Congress on critical technologies, the DOD lists 22 areas that are vital to "ensuring the long-term superiority of U.S. weapon systems." Among these are high-power microwaves (HPMs), sensitive radars, phased arrays, pulsed power and hypervelocity projectiles. The report predicts that the DOD-DOE HPM program, with a \$50 million R&D budget for FY1990, will, over the next decade, increase the energy per pulse from 100 to 10,000 joules. It also cites the problem of electronic disruptions caused by HPMs: "Fratricide from friendly HPM systems is...a serious concern." According to the *Critical Technologies Plan*, the U.S. lags behind the U.S.S.R. in the development of certain types of HPM oscillators; "several allied nations" also have their own military HPM programs. The annual report was submitted to the Congressional Committees on Armed Services, as ordered by the National Defense Authorization Act for Fiscal Year 1989.

OCCUPATIONAL HEALTH

CNS Effects Among Radar Workers...In 1985, there was a flurry of news reports from Dr. Hans-Arne Hansson's laboratory at the University of Göteborg in Sweden: He announced that he had found that radar workers develop abnormal protein patterns in their cerebrospinal fluids (see *MWN*, My85). After a long silence, Hansson and six associates have now described these central nervous system (CNS) findings in a brief paper appearing in the May issue of *Health Physics*. An examination of 17 radar mechanics and 12 unexposed controls—all in their early 50s—indicated no differences in "pathological neurological findings" or in "psychometric tests" and "psychiatric rating scales," but did find that the "frequency of the occurrence of an increased protein band with an isoelectric point of 4.5 in the cerebrospinal fluid was higher among the men exposed to microwaves than among the referents." The team adds that, "The nature and clinical significance of this or these proteins are still unclear." The workers were exposed to radars which emit 1-10 GHz. The researchers found that the time rate of change of the magnetic field associated with some of the older transmitters was "surprisingly high"—up to 350 T/s. The lead author of the paper is Dr. Ralph Nilsson.

Radiation Accident...On February 3, 1986, nine Telecom

Australia workers were accidentally exposed to 4.1 GHz radiation. Two of the men, who were within two meters of the waveguide, were exposed to approximately 4.6 mW/cm² for up to 90 minutes—a level which exceeds the Australian exposure standard. The other seven men were exposed to less than 0.15 mW/cm². According to an account of the accident in the *Journal of Microwave Power and Electromagnetic Energy* (Vol.23, No.2, 1988), the whole-body average specific absorption rate (SAR) for the two men most exposed was estimated to be 0.13 W/Kg and the SARs for the eyes and the skin were calculated to be 3.8-4.8 W/Kg and 3.8 W/Kg, respectively. Drs. B. Hocking and K. Joyner of Telecom Australia and Dr. R. Fleming, a general practitioner, state that the two men reported a loosening of their scalp hair. Ophthalmological examinations found some changes, though they were not consistent. One of the two men reported continuing behavioral problems, including irritability and insomnia. A psychological assessment performed the following May found normal mental function, however. The blood pressures of all nine men were normal, as were their pituitary functions. The authors conclude that the exposure “has not resulted in harmful effects.” (For reports on other accidents, see *MWN*, N83, D84, J/A86 and J/F88.) In a companion paper appearing in the same issue of the journal, the two Telecom staffers propose a protocol for assessing health effects following an RF radiation accident.

PEOPLE

In April, **Richard Tell**, a consultant based in Las Vegas, NV, was among those elected to a six-year term as a member of the National Council on Radiation Protection and Measurements (NCRP). Outgoing members include Drs. **Tom Budinger** of the Lawrence Berkeley Lab and **Joe Elder** of EPA. Most of the council's 73 members specialize in ionizing radiation; those members with expertise in non-ionizing radiation whose terms are continuing include: Drs. **Bill Guy** of the University of Washington in Seattle, **Leonard Sagan** of EPRI, **Tom Tenforde** of Battelle and **George Wilkening** of AT&T Bell Labs....**Dave Janes**, a division director in EPA's Office of Radiation Programs who oversees the agency's non-ionizing radiation efforts, has announced that he will retire later this summer—just before EPA phases out its NIER program on September 30, the end of the fiscal year....**Eb Tingley**, a vice president of engineering at the Electronic Industries Association's Consumer Electronics Group, has retired. Tingley was long active in EMI issues and shared an Emmy award for the development of stereo television....**Frank Borghetti** has been appointed vice president of marketing and sales for Electro-Metrics, of Amsterdam, NY, which makes EMC and TEMPEST products....On April 1, **Liliane Volcy** of the FCC's Office of Engineering and Technology died unexpectedly. Volcy worked on the commission's EMI rules and was active in CISPR deliberations.

STANDARDS

ANSI on EMI Measurements...ANSI C63 has published four new EMC standards: (1) *Electromagnetic Compatibility—Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 10 kHz to 1 GHz—Methods of Measurement*, ANSI C63.4-1988 (\$46.00); (2) *Electromagnetic Compatibility—Radiated Emission Measurements in Electromagnetic Interference (EMI) Control*, ANSI C63.5-1988 (\$48.50); (3) *Electromagnetic Compatibility—Open Area Test Site Measurements—Guide for the Computation of Errors*, ANSI C63.6-1988 (\$7.50); and (4) *Guide for Construction of Open Area Test Sites for Performing Radiated Emission Measurements*, ANSI C63.7-1988 (\$50.00). Copies of all four standards are available, prepaid, from: Sales Department, ANSI, 1430 Broadway, New York, NY 10018.

CISPR and IEC Draft Rules...CISPR has released five six-month draft rules amending CISPR Publication 14, *Limits and Methods of Measurement of Radio Interference—Characteristics of Household Electrical Appliances, Portable Tools and Similar Electrical Apparatus*, CISPR/F(Central Office)56-60 (\$51.00). CISPR has also issued a draft of the second edition of CISPR Publication 13, *Radio Interference—Sound and Television Broadcast Receivers and Associated Equipment—Limits and Methods of Measurement of Interference Characteristics*, CISPR/E(Central Office)45 (\$22.00)....And the IEC has released a draft amendment (No.2, September 1988) to *Disturbances in Supply Systems Caused by Household Appliances and Similar Electrical Equipment, Part 2: Harmonics*, IEC 555-2: 1982 (\$6.00). In addition, the IEC has issued a five-part six-month draft rule, *Loading and Strength of Overhead Transmission Lines*, 11(Central Office)28 I-V (\$100.00). Copies of all proposals are available, prepaid, from ANSI's International Sales Department at the address above.

TECHNOLOGY

FAA Inaugurates the MLS...The new microwave landing system (MLS), which has been plagued by delays, reached an important milestone in April when the FAA inaugurated the first U.S. commercial MLS at the Lebanon, NH, airport. An MLS has been in operation at the FAA Technical Center in Atlantic City, NJ, since March 1988. Hazeltine, the prime contractor for the MLS (see *MWN*, J/F84), is more than three years behind schedule, due to software development problems. According to the FAA, a key advantage of the MLS over the instrument landing system (ILS) now in use is that the MLS's curved landing approach gives pilots more than one incoming route from which to choose. The ILS, on the other hand, requires planes to line up for straight-in approaches. Another ILS limitation is its narrow frequency band, just above the 108-112 MHz FM band, which, in turn, makes it vulnerable to EMI from powerful FM radio antennas—

though some experts contend that there is enough spectrum space to meet the needs for new ILSs. The FAA's National Airspace Plan calls for 960 MLS installations at U.S. airports by the year 2000. The American Transport Association (ATA), however, remains skeptical: "It's not clear that the MLS is ready to replace the ILS; much of what was anticipated for the MLS hasn't been proven yet," ATA's Walt Coleman told *Microwave News*. Until then, ATA members are reluctant to pay the estimated \$100,000-\$250,000 to outfit a plane with an MLS receiver. The FAA and the ATA are currently engaged in a nine-part evaluation of the need for and capabilities of the MLS (see *MWN*, N/D88). Among the other airports slated to receive the MLS in the near future are Logan International Airport in Boston, MA, and one in Manchester, NH, according to the April 7 *New York Times*.

Prospecting for Oil and Gas...The February 1989 issue of the *Proceedings of the IEEE* has a special section on "Electromagnetic Prospecting for Oil and Gas." It features four invited papers and an introduction by Dr. Richard Sigal of Amoco Production Co. in Tulsa, OK.

VDTs

Low Magnetic Field VDTs in the U.S....Tandberg Data, Inc., a Norwegian company, is the first to market in the U.S. a line of cathode ray tube (CRT) displays designed to control VLF magnetic fields. A number of companies, including IBM, have been selling VLF-shielded terminals in Scandinavian countries, but these have not been available in the U.S. In addition, the Boston-based Safe Computing Company has introduced a flat liquid crystal display (LCD) shielded to eliminate exposure to ELF magnetic fields. LCDs do not emit VLF fields, but some ELF electromagnetic fields can be emitted by the fluorescent back-lighting. The power transformer for the computer itself is placed on the floor, away from the

operator, and the power cable is also shielded. The VLF magnetic fields emitted by the Tandberg displays are well below the guidelines adopted by Swedish government agencies. The time rate of change of the Tandberg's VLF magnetic fields (dB/dt) is approximately 3 mT/s—it varies slightly among the different models—and the magnetic field strength is less than 10 nT (both measured at 50 cm from the terminals). Their electrostatic fields (equivalent surface potential) are less than ± 500 V. Tandberg notes that the picture tube was redesigned to meet the Swedish limits of 25 mT/s and 50 nT (see *MWN*, S/O88), and then the VLF fields were further reduced with "active compensation coils"—that is, by partially canceling out the remaining magnetic fields. The company has applied for a patent on its "radiation reduction kit," Tandberg's Michael Tierney told *Microwave News*. When the coils are installed, they do not affect picture quality, he said. The prices of the Tandberg terminals were not available at press time, but Tierney said that they are competitive with other units that do not reduce VLF fields. The "Safe Monitor" was tested for radiation emissions by two independent laboratories. Chomerics, Inc. and Dayton T. Brown, Inc. found no measurable levels of radiation exposure at user distances, according to George Lechter, the founder and president of Safe Computing. "We shielded everything from 60 Hz up to 100 GHz," he said. Lechter added that, according to his measurements, some LCDs had "surprisingly high" electromagnetic fields. Safe Computing cites studies that link VDT work to reproductive risks as a cause for concern and targets the unit at women of child-bearing age. The Safe Monitor costs \$995. For more information on Tandberg terminals, contact: Michael Tierney, Tandberg International, Inc., 1 Labriola Court, PO Box 99, Armonk, NY 10504, (914) 273-6516 or Tandberg Data A/S, PO Box 9 Korsvoll, N-0808 Oslo, Norway, 47 2 18 9090. For more on the Safe Monitor, contact: George Lechter or Allen Nitschelm, Safe Computing Co., 368 Hillside Avenue, Needham, MA 02194, (800) 222-3003 or (617) 444-7778.

RCA Pays \$250,000 Settlement (continued from p.1)

The expert witnesses who testified for Mrs. Yannon on the health effects issue included Dr. Martin Geller, chief of neurology at Elmhurst General Hospital in Queens, NY, and Dr. Alfredo Santillo, a general practitioner based in Staten Island.

In 1980, Mrs. Yannon won a workers' compensation suit against New York Telephone Co. for \$29,000 plus \$48 a week for life. The decision was later upheld on numerous appeals. In 1982, the Appellate Division of the New York Supreme Court unanimously ruled that there was "substantial evidence to establish the necessary causal relationship" between exposure to microwave radiation and occupational disease resulting in death (see *MWN*, A81, Ju82, J/A82 and N82).

Samuel Yannon worked on microwave relay equipment for 15 years at the phone company's Television Transmission

Facility, located on the 87th floor of the Empire State Building. In 1968, Yannon, who was then 57 years old, began to suffer a drastic deterioration of his eyesight, hearing and coordination. He was transferred to another site in 1969 and was later forced to retire for medical reasons in 1971 after 42 years with the company.

Yannon died in 1974 at the age of 62. In his final months, he lost almost all sight, memory, speech and motor coordination. Santillo, who was Yannon's physician from 1970 to 1973, diagnosed him as having suffered from "chronic brain syndrome with psychotic overtones due to biological brain changes resulting from prolonged exposure to short wave radiation."

In 1976, Mrs. Yannon filed her \$3.5 million suit against RCA, the manufacturer of the relay equipment, in the New

York State Supreme Court, Richmond County, for breach of warranty, negligence and wrongful death. The product liability case was dismissed in 1982 on a pre-trial motion by RCA, which claimed that the three-year statute of limitations had passed when the suit was filed (see *MWN*, J/A82).

The decision was reversed on appeal in 1984, after Mrs. Yannon maintained that her husband was already suffering from "chronic brain syndrome" in 1968 (see *MWN*, Ju84). In cases of mental incapacity, the statute of limitations is suspended, Albert explained. RCA appealed again and was turned down once more (see *MWN*, J/A85).

After she had won the statute of limitations issue, RCA asked Mrs. Yannon to settle. Her attorneys urged her to accept, because a trial would still have been a few years away.

Karen Hymowitz of Bower & Gardner in New York City, which represented RCA in the suit, told *Microwave News* that she could not comment on the case. After Mrs. Yannon filed suit, RCA was taken over by General Electric Co.

Workers' Compensation Award

At the first appeal by New York Telephone of the 1980 workers' compensation award, Dr. Milton Zaret, a Scarsdale, NY, ophthalmologist and an expert on the effects of non-ionizing radiation, testified that Mr. Yannon had suffered an extreme case of microwave or radiowave sickness, which ultimately resulted in his death.

Dr. Sol Michaelson of the University of Rochester, NY, testifying on behalf of the phone company, said that there was no reason to believe that a cause and effect relationship existed between Yannon's condition and microwave radiation exposure. Captain Paul Tyler, a Navy doctor, also testified against Yannon.

Also appearing as an expert witness for New York Telephone was Dr. Robert Herndon of the University of Rochester, NY, who stated that Yannon suffered from pre-senile dementia, probably Alzheimer's disease, among other ailments, and that there were no data indicating a link between microwave exposure and his condition. But at a 1986 hearing convened by the Environmental Protection Agency, Dr. Sam Koslov of the Johns Hopkins University Applied Physics Lab in Laurel, MD, presented experimental results showing that a monkey exposed to microwave radiation developed neurofibrillary tangles, one of the classic signs of Alzheimer's disease. He hypothesized that the tangles may be related to microwave-induced leakage through the blood-brain barrier (see *MWN*, S/O86).

The workers' compensation panel upheld the original ruling in February 1981 and found that, "There was a direct causal relationship between [Yannon's] exposure to microwave radiation during his employment and his subsequent disability, all of which ultimately resulted in his death." It further ruled that Yannon "sustained an occupational microwave radiation disease...and that his death was causally related to his occupation." The decision was once again upheld on appeal in 1982.

BC Hydro's Purchase Offer (continued from p.1)

be energized on July 31.

In a letter dated May 9, Chris Boatman, BC Hydro vice president for corporate affairs and executive assistant to the chairman, informed property owners along the existing ROW that the utility was willing to purchase their land, even though "there is no reason to believe that exposures to [EMFs] pose a risk to human health." The deadline for accepting the offer was May 31.

"It's a real victory for us," Darlene Kavka of Courtenay, BC, who has been fighting for property compensation or an alternate route for the line, told *Microwave News*. "I take my hat off to BC Hydro for taking this issue seriously," she said. The ROW crosses Kavka's property.

BC Hydro sent letters to landowners with easements and/or whose property lies within 165 feet (50 m) of the edge of the ROW, Peter McMullan, BC Hydro's manager of corporate affairs, said in a telephone interview. The utility received 153 responses—90% of those eligible indicated an interest in the purchase offer, he said. And Kavka said, "I know of only six people who are staying. I would not risk living near the lines."

The utility still believes that, after some careful thought, the homeowners will change their minds, McMullan said. BC Hydro is asking all who accepted the offer if they are certain that they want to sell. "There is now a significant level of hysteria. It's been magnified all out of proportion," he said.

This is the first time BC Hydro, which is based in Vancouver, has encountered the issue of potential health effects from power line EMFs, McMullan explained. "We accept that the current situation will have an impact on future planning," he said, but he stressed that, "This has nothing to do with existing lines."

When asked how other utilities might view the purchase offer, McMullan replied that BC Hydro's first priority is its customers.

BC Hydro measured the EMFs along the ROW and determined which properties would have greater fields when the 230 kV line is energized, McMullan said. For example, Kavka said that the utility projected that the magnetic field level in her home will be between 2.5 and 6 mG when the new line is energized.

Dr. William Bailey of Environmental Research Information (ERI), Inc. in New York City, has been hired to advise the utility on power line health effects. Kavka said that the landowners have asked BC Hydro to bring in an expert of their own choosing—they favor Dr. Andrew Marino of Louisiana State University Medical Center in Shreveport, LA. McMullan said the matter is undecided.

In addition, BC Hydro is providing concerned landowners with literature prepared by ERI which states that the existing power line data "should reassure the public that transmission lines do not jeopardize the health of those who reside in their vicinity."

The FDA's Biased View of Electric Blankets

"FDA has found no conclusive evidence that electric blankets are a health hazard, despite claims to the contrary by a recent network television program. The program, 'Killer Electric Blankets,' which aired last February on the Fox Television Network, alleged that the use of electric blankets may be linked with a number of ill effects, including cancer.

"Electric blankets—like many other home appliances, including toasters, vacuum cleaners, and computers—produce low-intensity electric and magnetic fields. For the past decade, FDA and other scientists have been investigating whether magnetic fields affect human health. A study conducted in Colorado in 1979 suggested a relationship between exposure to electromagnetic fields and childhood cancer, but a similar study conducted in Rhode Island did not show such a relationship. And a 1988 study in Los Angeles County found no association between the use of electric blankets and adult leukemia. Animal studies have also proved inconclusive.

"Based on current information, FDA sees no reason for people to stop using electric blankets. FDA will continue its research in this area and will monitor the research of other organizations."

The item above—reprinted in its entirety from the May issue of *FDA Consumer*, the Food and Drug Administration's monthly magazine—was written to reassure the public that there is nothing to fear from electric blankets. The FDA was responding to Fox Television, which may have resorted to tabloid journalism and scared the public. Still, that is no excuse for the FDA to play the same game in reverse. After all, few experts doubt that there are some unsettling questions regarding the advisability of using electric blankets, especially for pregnant women. So why is the FDA trying to cover them up by providing an equally unbalanced picture of the health risks?

When we sought an explanation, an FDA press officer replied that the agency was not granting any interviews on this subject. We persisted and finally a senior official at the FDA's Center for Devices and Radiological Health agreed to talk to us—but only on the condition that he remain anonymous. We'll call him Dr. X.

"We are not comfortable that the epidemiological data is clear that there is an identifiable risk," Dr. X told us. "There is too much inconsistency in the data." He then conceded that the FDA is not doing any research to investigate specific risks associated with electric blankets because it is not a "high priority."

There *are* ambiguities in the data, we agreed, but why did the FDA fail to cite two key papers pointing to a health risk: the 1988 Savitz study, which supports the 1979 Wertheimer-Leeper study pointing to a cancer risk at milligauss exposure levels, and the 1986 Wertheimer-Leeper paper linking the use

of electrically heated beds with an increased risk of miscarriage? Could it be that the FDA is too busy to keep up with the literature?

No, Dr. X replied, the agency is aware of these studies, but sees no reason to provide the public with a balanced picture. The *FDA Consumer* item "is not complete in the presentation of data," he said, "Nor was it meant to be.... We were countering the Fox broadcast, which was clearly a biased view."

There are now more than two dozen published studies showing a link between electromagnetic fields and cancer. How many more does the FDA need before it is willing to raise a cautionary flag—especially for luxury appliances such as electric blankets? Many experts have long advised against buying a house next to a power line; electric blankets present unnecessary risks that are much more easily avoided.

After talking to Dr. X, we made a round of phone calls to see whether members of the bioelectromagnetics community are using electric blankets. We could not find any users—however, few people were willing to be quoted by name. One FDA staffer—not Dr. X—told us that he recommends that the public "proceed with some degree of caution."

The FDA should take a look at a new booklet prepared by researchers at Carnegie Mellon University in Pittsburgh, PA (see *MWN*, M/A89). Without alarming anyone, they offer some sensible advice: "How could prudent people manage their risks from 60 Hz electric and magnetic fields if they wanted to?...They could put away their electric blanket (or electrically heated water bed) and go back to using regular blankets."*

Fox Television may not have provided a balanced view of the electric blanket problem, but that is no reason for the FDA to fight tabloid journalism with whitewash.

The Commentary column is a regular feature in Microwave News. We invite our readers to write to us with their opinions.

*The New York State Department of Health issued its own advisory on electric blankets after the Fox Television news broadcast (see *MWN*, M/A89).

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CONFERENCES

New Listings

July 10-13: **The Neuropharmacology of Serotonin**, Vista International Hotel, New York, NY. Contact: Conference Director, New York Academy of Sciences, 2 East 63rd St., New York, NY 10021, (212) 838-0230.

September 27-29: **EPRI Annual Utility Seminar on EMF Laboratory Research**, Lake Lawn Lodge, Delavan, WI. Contact: Robert S. Banks Associates, PO Box 14574, Minneapolis, MN 55414, (612) 623-4646.

October 2-8: **2nd International School on Electromagnetic Fields and Biomembranes**, Pleven, Bulgaria. Contact: Professor Marko Markov, Dept. of Biophysics and Radiobiology, Sofia University, 8 Dragan Tzankov Blvd., 1000 Sofia, Bulgaria.

October 4-6: **Medical Conference: Health and Medicine at Work in the Electricity Industry**, Barcelona, Spain. Contact: International Union of Producers and Distributors of Electrical Energy Secrétariat, 39, avenue de Friedland, FR-75008 Paris, France, (33) 1 40 42 37 08.

November 12-16: **DOE-EPRI Review of 50/60 Hz Biological Research**, Westin Benson Hotel, Portland, OR. Contact: W/L Associates, 120 W. Church St., Frederick, MD 21701, (301) 663-1915 (see p.9).

December 11-13: **9th Miami International Congress on Energy and Environment (9MICEE)**, Miami Beach, FL. Contact: Lucille Walter, Clean Energy Research Institute, University of Miami, Coral Gables, FL 33124, (305) 284-4666.

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February 6-8: **6th Annual IEEE Semiconductor Thermal and Temperature Measurement Symposium**, Sunburst Resort Hotel, Phoenix, AZ.

Contact: IEEE SEMI-THERM Symposium, c/o C/S Communications, PO Box 23899, Tempe, AZ 85285, (602) 967-7444.

February 13-15: **14th Symposium on Explosives and Pyrotechnics**, Holiday Inn Crowne Plaza, Burlingame, CA. Contact: E&P Affairs, Franklin Research Center, 2600 Monroe Blvd., Norristown, PA 19403, (215) 666-3026.

February 13-15: **Instrumentation/Measurement Technology Conference (IMTC), Emerging Measurement Technologies**, Red Lion Inn, San Jose, CA. Contact: Robert Myers, IMTC Conference Coordinator, 1700 Westwood Blvd, #101, Los Angeles, CA 90024, (213) 475-4571.

May 20-24: **1990 International Geoscience and Remote Sensing Symposium (IGARSS '90)**, College Park, MD. Contact: Dr. James A. Smith, Code 623, NASA/Goddard Space Flight Center, Greenbelt, MD 20771, (301) 286-7282.

June 11-14: **Conference on Precision Electromagnetic Measurements**, Ottawa, Ontario, Canada. Contact: H. Lacoste, Conference Services, National Research Council of Canada, Ottawa, Ontario K1A 0R6, Canada, (613) 993-9009.

August 28-September 5: **23rd General Assembly of the International Union of Radio Science (URSI)**, Praha, Czechoslovakia. Contact: Prof. V. Zima, Institute of Radioengineering and Electronics, Czechoslovak Academy of Sciences, 182 51 Praha 8, Czechoslovakia.

October 4-6: **International Conference on Harmonics in Power Systems**, Budapest, Hungary. Contact: Dr. Andras M. Dan, Budapest Technical University, Dept. of Power Systems, 1111 Budapest, Egrý Jozsef u.18., Hungary, 361-666-438.

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