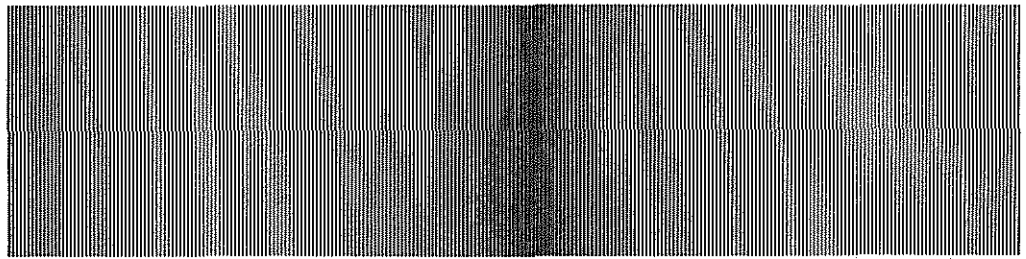


MICRO WAVE NEWS



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INSIDE...

EMF NEWS pp.2-7

Power Line Talk:
DOE's Program Development Questioned •
HEI Ready To Go • EPRI Rejoins DOE
Review • TLPJ's May Conference • Granger
Morgan Defends Prudent Avoidance •
More on JASONS

Bowman on Geomagnetic Resonances

Legal and Administrative Notebook:
Wisconsin Neurological Claim • Virginia
EMF Trespass Suit Dismissed • Missouri
PSC Approves Power Line • PG&E
Sued • Legal Advice

NERP Pushes Ahead

State Roundup:
Connecticut • Illinois • Indiana • New
York • Pennsylvania • Wisconsin

U.K. Epi Childhood Cancer Study Planned

California Group: Limited Consensus
Consulting Ban Cut from House Bill p.11
Finnish EMF-Miscarriage Link p.12

HIGHLIGHTS pp.7-11

Testicular Cancer and Michigan Police
Other Police Radar Notes

NRPB Report on ELF & RF and Cancer

Research Update:
New EMF & NIER Books and Papers

Computer Companies Form VDT
Health Research Foundation

FROM THE FIELD p.13

Cancer Among Police Radar Users
EMFs and Toys

UPDATES pp.14-15

Housing Plan and FAA Radar • WHO on
Ovens • NEXRAD • DOE Workshop Report •
Singapore NIER Standards • People in the
News • Cellular Statistics

CLASSIFIEDS pp.15-16

\$65 Million EMF Research Bill Heads to House Floor

The House of Representatives Science, Space and Technology Committee approved a \$65 million electromagnetic field (EMF) research and communication measure on March 31 and sent it to the floor of the House as part of the national energy bill. In the process, the committee shortened the research program from ten years to five, effectively doubling the annual research budget. (The bill's ban on outside consulting and expert testimony by researchers was substantially weakened; see box, p.11.)

The House is now likely to act on the EMF research proposal this year since it is attached to legislation that is a high priority for both the President and Congress. However, House leaders have not yet scheduled action on the energy bill. The original EMF bill, H.R.3953, was approved as a backup, with language identical to that in the energy bill.

The EMF legislation has broad support. At a March 10 hearing of the science committee's environment subcommittee, utility, state and labor union officials endorsed H.R.3953 (see *MWN*, N/D91 and J/F92). "We hope this bill becomes law this year," Bob Bergland of the National Rural Electric Cooperative Association (NRECA) told the subcommittee. The Electric Power Research Institute (EPRI) "supports the objectives of the proposed program," said EPRI's Dr. Stanley Sussman.

(continued on p.11)

Strong VDT Magnetic Fields Linked to Higher Rates of Miscarriages

Women who use video display terminals (VDTs) that emit strong magnetic fields may be at a greater risk of having miscarriages than those using low-field VDTs, according to the preliminary results of a new Finnish epidemiological study. This is the first time magnetic field exposures have been an integral part of an epidemiological study of VDT reproductive risks.

Speaking at the *First Congress of the European Bioelectromagnetics Association* (EBEA) in Brussels, Belgium, on January 25, Dr. Maila Hietanen of the Institute of Occupational Health in Helsinki, Finland, reported that VDT operators who were exposed to extremely low frequency (ELF) magnetic fields of greater than 9 mG had a miscarriage risk close to three-and-a-half times greater than those who used VDTs with ELF exposures of less than 4 mG. The increase was statistically significant.

Women exposed to 4-9 mG ELF magnetic fields had nearly twice as many miscarriages as those exposed to less than 4 mG and there appeared to be a dose-response relationship between magnetic fields and miscarriages, but neither finding was significant.

(continued on p.12)

« Power Line Talk »

The DOE is sticking to its ambitious schedule for developing a unified national EMF research program by this summer (see *MWN*, N/D91), but some federal officials seem wary of the department's way of doing business. Rep. James Scheuer (D-NY) objected to DOE's decision to exclude the press, the public and congressional aides from its February 28 meeting of representatives from more than a dozen federal agencies. He delivered a lecture on "open democracy" to DOE's Michael Davis at the March 10 congressional hearing on EMF research (see p.1). Davis, assistant secretary for conservation and renewable energy, countered that DOE officials closed the interagency meeting to create "an environment where we could have a no-holds-barred discussion." Marvin Gunn, the DOE official directing the planning process, told *Microwave News* that the department convened the meeting to ensure that DOE officials understand what work other agencies are doing on EMFs and to emphasize the need for a unified federal program. He said that he sensed a "clear willingness to cooperate" at the meeting. But one participant who asked for anonymity told *Microwave News* that he could not shake the feeling that the DOE has a "hidden agenda." "The DOE will hold additional interagency meetings as needed," Gunn said. The department plans a round of meetings this spring for working groups on science, engineering and communications. Public meetings are also on the agenda; dates and locations will be announced in mid-April, according to Gunn.

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In February, the Health Effects Institute's (HEI) board of directors concluded that the institute "has an obligation" to pursue EMF research if it can secure adequate funding from the government and the private sector (see *MWN*, N/D91). Based on what has been learned during its planning effort, HEI is preparing a report addressing the question, "Does EMF exposure cause human health effects?" It should be completed by the end of this summer. HEI, based in Cambridge, MA, is ready to implement the five-year research plan that is being developed by the NERP steering committee (see p.5). Alternatively, the HEI board suggests that with \$3 million in new funds HEI could collaborate with the National Toxicology Program on its animal studies; or it could develop ways to improve epidemiological studies with an initial grant of \$1 million.

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The DOE and EPRI have agreed to work together again as joint sponsors of the annual review of EMF research, held every November. At the 1989 meeting, EPRI announced that it would no longer ask its contractors to attend future reviews—instead they would present their findings at the summer meeting of the Bioelectromagnetics Society (see *MWN*, N/D89). A new steering committee has been set up to broaden participation at the meeting and to select the papers to be presented. The members are: Dr. Daniel Driscoll of the New York State Department of Public Service, Paul Gailey of Oak Ridge National Lab, DOE's

Dr. Imre Gyuk, EPA's Dr. Doreen Hill and EPRI's Dr. Charles Rafferty. "We are pleased to be working with the other research sponsors to put together a more broadly representative conference on ongoing research," EPRI's Dr. Stan Sussman said in an interview. Driscoll said that he would encourage those who will work on the NERP to attend the reviews. This year's meeting will be held November 8-12 at the Holiday Inn on the Bay in San Diego, CA.

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The Trial Lawyers for Public Justice (TLPJ) Foundation will hold its *Second Annual Multidisciplinary Seminar and Citizen Action Conference* on May 15-16 in Ann Arbor, MI. The May 15 seminar is for lawyers, and the May 16 conference is being held to develop "an effective response to the public health hazards of EMFs on the grass-roots and workplace level." The first TLPJ conference, held in November 1990, served to launch the ten-member Electromagnetic Radiation Case Evaluation Team (EMRCET), set up to investigate and evaluate EMF cases for attorneys (see *MWN*, M/A91). Speakers at this year's meeting will include EMRCET attorneys, as well as Drs. Abe Liboff, Bruce McLeod and Peter Wright. The registration fee is \$150 for May 15 and \$25 for May 16. However, lawyers who have represented utilities and manufacturers of EMF-emitting equipment must pay \$1,000 to attend the seminar and will be barred from the conference. The Robert Carl Strom Foundation and the Michigan State Trial Lawyers Association are cosponsors of the May meetings. For more information, contact: Michael Withey, Schroeter, Goldmark & Bender, 810 Third Ave., Suite 500, Seattle, WA 98104, (206) 622-8000.

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Answering a spate of recent criticism, Dr. Granger Morgan defends the concept of prudent avoidance in the March 15 issue of *Public Utilities Fortnightly*. He responds directly to a vehement attack by the *Electromagnetic Energy Policy Alliance (EEPA)*, published last October in the *Health Physics Society Newsletter*. EEPA condemned prudent avoidance as "the abandonment of science" and a "great danger to society, as we know it." Morgan counters that his strategy "is an example of using incomplete science to make a reasoned judgment in the face of uncertainty." He makes it clear that he does not see EMFs as a grave health threat: "On the basis of the epidemiological results, I'd give pretty good odds (better than a 90% chance) that if fields pose a risk, they pose a modest risk (of the order of 1 in 10,000 per year) to all exposed people, rather than posing a very high risk to a few unfortunate people." Yet he argues that these odds still demand prudent avoidance. He adds that, "Whether or not there is a risk, there is a good chance it will be at least a decade before the mainstream scientific community will be able to reach a consensus." While acting on the possibility of a risk "runs contrary to the usual societal habit of declaring everything either safe or hazardous," he suggests, most people in their daily lives know

how to make common sense judgments about uncertain risks. He then asks whether "our legal and regulatory system [is] so set in concrete that we must ignore common sense? I think the answer is no...." Morgan and his colleagues at Carnegie Mellon University in Pittsburgh, PA, Drs. Indira Nair and Keith Florig, put forward the idea of prudent avoidance in a 1989 OTA report (see *MWN*, J/A89).

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In our last issue, we reported that a committee of top scientists

convened by the JASON Program Office (JPO) held a meeting to consider EMF health effects. This, however, was just an introductory session: EMFs will now be one of the topics at the JASONS' main summer session, to be held June 15-July 31 in La Jolla, CA, according to DOE officials. The DOE expects a final report by the end of the summer. EMFs were selected from among some 25 issues submitted by various DOE offices, assistant secretary Michael Davis explained at the March 10 congressional hearing (see p.1).

Bowman's Brave New Theory on Geomagnetic Resonances

Dr. Joseph Bowman may have an explanation for the sometimes puzzling results of epidemiological studies of childhood cancer and power frequency magnetic fields. He believes the key to the problem is the earth's static magnetic field.

"When a 60 Hz magnetic field is in resonance with the natural geomagnetic field, there is a trend of increased childhood leukemia risk with *measured* magnetic fields in the University of Southern California [USC] epidemiological study," Bowman told *Microwave News*. His analysis of the USC data resulted in odds ratios (ORs) as high as 6.0 and 9.0 for those exposed to field levels greater than 3.0 mG, although he emphasized that these findings are not statistically significant.

The USC study showed a leukemia risk with wire codes, but not with 24-hour or spot magnetic field measurements (see *MWN*, M/A91 and S/O91). Bowman, a member of the USC team, is now at the National Institute for Occupational Safety and Health in Cincinnati, OH.

Dr. John Peters, the lead investigator of the USC study, thinks that Bowman may be on to something important. "This may be where the answer lies," he said at a March 16 seminar at the Harvard School of Public Health in Boston, MA.

Dr. Abe Liboff of Oakland University in Rochester, MI agrees. "Bowman has struck boldly, like a swashbuckling scientist. He deserves a lot of credit for looking at the earth's magnetic field in the context of epidemiology," he said in a telephone interview.

Bowman said he was inspired by Dr. Carl Blackman's studies on calcium efflux, Liboff's experiments on cyclotron resonance and Russia's Dr. V.V. Lednev's theoretical models. Resonances occur for 60 Hz fields at static fields of 380 mG and 506 mG, according to Bowman's calculations; he assumes that there is a 91 mG bandwidth around each of the two resonances.

Working primarily with Peters and Dr. Duncan Thomas, also of USC, Bowman found that when the cases that fit in these two resonance bands were combined, there was a trend of increasing risk that began climbing at the second lowest power frequency exposure group of 0.7-1.4 mG (OR=2.40) and peaked for those exposed to more than 3.0 mG (OR=6.00). The trend of this dose-response curve approached statistical significance (P=0.056). For the cases in resonance at 380 mG, the risk of developing leukemia was nine times the expected rate. The original USC study found no trend with measured magnetic fields.

Bowman's analysis has been hampered by the small size of the data set and by the intensity of the geomagnetic field in Los Angeles, the site of the USC study. Static field measurements were only available for 128 of the 232 leukemia cases included in the USC study. Of these 128 cases, only 32 were in the 380 mG resonance and only 14 were in the 506 mG resonance—the remaining 82 cases fell between the two.

While applauding Bowman's work, Liboff has doubts about some aspects of the model, including the use of Liboff's own lymphocyte data for determining the width of the resonance bands. Liboff suspects the bandwidths are too large but acknowledges that Bowman's assumptions were driven in part by the need to include a sufficient number of cases to test his hypothesis. "As far as possible, Bowman used the tools available to him, but, at this point, there aren't enough experiments to answer some of the questions that have to go into the analysis," Liboff said.

"There are plenty of questions to be answered and the hypothesis has not yet been thoroughly tested," Bowman said. Nevertheless, he believes that his findings are strong enough to motivate the next generation of childhood cancer studies. He has talked to researchers at the National Cancer Institute who are working on a large-scale EMF-childhood leukemia study, which will include measurements of static magnetic fields (see p.6 and *MWN*, N/D89). Peters and Bowman think that Denver is a good test site for future studies because resonance conditions would be met more often than in Los Angeles. Liboff, however, prefers New Orleans, LA or Phoenix, AZ because their geomagnetic fields are closer to the predicted resonance conditions.

Bowman's model will no doubt encourage researchers to move away from the idea that average magnetic field measurements can predict cancer risks. One of the USC team likened their use of an EMDEX meter to measure fields to evaluating a symphony orchestra with a noise meter, Bowman pointed out.

Bowman said that he has received "fairly heated, but justified, criticism" from a number of scientists since he began discussing his theory. He first presented his findings at the November 1991 Department of Energy Contractors Review in Denver, CO. He maintains that his model has motivated people to think more in terms of mechanisms and to apply theoretical and experimental results to epidemiological studies. "This is the way to go in the future," he said.

Legal and Administrative Notebook

Neurological Claim Against Wisconsin Utility

The parents of a child with a neurological disorder have sued Wisconsin Electric Co., seeking unspecified punitive damages. Leo and Cathy LaBonte of New Berlin, WI, a suburb of Milwaukee, state in their February 26 claim, filed in Waukesha County Circuit Court, that the utility failed to warn them about potential health risks associated with electromagnetic fields (EMFs), particularly for people with neurological disorders. They allege that EMFs from Wisconsin Electric power lines induced seizures in their seven-year-old daughter, who suffers from lissencephaly, a congenital neurological brain disorder. The plaintiffs' attorney, Timothy Aiken, is with the firm of Aiken & Sceptur in Milwaukee.

EMFs inside the family's home ranged from 16 to 27 mG, according to Leo LaBonte's measurements. The utility found EMFs of 10-20 mG indoors and 50 mG outdoors, at the edge of the right-of-way (ROW), under summer peak load conditions. The house is about 70 feet from 230kV and 138 kV transmission lines, as well as from 26 kV and 8 kV distribution lines, all belonging to Wisconsin Electric.

"There is nothing unusual about the LaBontes' home," Wisconsin Electric's EMF issues coordinator, Jackie Olson, told *Microwave News*. "We feel our facility neither caused nor aggravated their daughter's condition." The Milwaukee-based utility noted in a letter to the LaBontes that EMFs at the edge of the ROW fall below the standards set by Florida and New York—the only two states that have established magnetic field standards for transmission lines.

EMF Trespass Suit Dismissed in Virginia

On February 10, a Hanover County, VA circuit court judge dismissed a lawsuit claiming EMFs as a trespass violation. The plaintiffs will not appeal the decision.

Nineteen local families had filed suit against Virginia Power, alleging that EMFs from the utility's proposed power lines would invade their properties. Judge Richard Taylor agreed with the utility that the State Corporation Commission (SCC), not his court, has authority over power lines. The SCC approved Virginia Power's proposal for the disputed 31.5-mile, 230 kV transmission line in 1990.

The plaintiffs' attorney, Todd Benson, of the Richmond firm of Press, Jones, Waechter & Stoneburner, told *Microwave News* that EMFs constitute a trespass and that the claim is allowed under Virginia anticipatory trespass law. Virginia Power attorney John Holleran, of the Richmond firm of Hunton & Williams, disagreed. "You've got to have a physical invasion to show trespass and since EMFs don't constitute a physical invasion...there's nothing the court can do," he said in a telephone interview.

In his written complaint, Benson called Virginia Power's plan to take a 60-foot easement on either side of the transmission line "grossly inadequate." Dayna Page, principal plaintiff in the

suit and leader of Virginia RAGE, Residents Against Giant Electric, told *Microwave News* that the group wanted to be compensated for at least 300 feet of land on each side of the proposed line. She said their goal was to raise costs for the power company and force it to bury the lines. Although the plaintiffs will not appeal—mostly because of high legal costs, according to Page—they are collecting signatures to send to the Army Corps of Engineers, requesting that it prepare another environmental impact report. Page said that a correct assessment would show that construction along the proposed ROW would damage wetlands.

Missouri PSC Approves Power Line Siting

The Missouri Public Service Commission (PSC) decided on December 13 that the Union Electric Co. of St. Louis does not need to mitigate EMFs from a proposed transmission line. In a written report (case no. EA-91-56), the commission said that it cannot order the utility to reduce EMFs when there is no scientific evidence that EMFs from power lines damage health. The commission added, however, that it cannot conclude that EMFs are harmless.

The PSC's findings undermine a local municipality's opposition to the siting of the power line. The city of Linn Creek, in Camden County, sought to block or alter the proposed route for the 161 kV line, 700 feet of which will fall within its bounds. The city intervened before the PSC, claiming that the line would threaten public health and lower property values.

But the PSC, in Jefferson City, approved the line, stating that it will provide reliable service in the face of a growing demand for electricity in the area. Linn Creek had requested that the utility adopt a policy of prudent avoidance and reroute the power line, but the commission responded that the proposed route is the most direct and least intrusive.

PG&E Sued Over Property Sale

A Santa Cruz, CA couple is pursuing a lawsuit against Pacific Gas and Electric (PG&E), claiming that the utility sold them property that it knew was unfit for development. The suit, filed in California Superior Court in 1990, had been on hold until the couple could formally establish that they were denied the intended use of their property, according to Dale Dawson, attorney for the plaintiffs, Jacqueline and Michael Keogh. On February 11, 1992, the Santa Cruz County Board of Supervisors denied the Keoghs' application for a residential subdivision.

The board agreed with the county planning department determination that the property is "not suitable" for the proposed development because "residents would be exposed to unsafe levels of EMFs." The 1.95 acre parcel, which the couple purchased in 1983, contains two 115 kV transmission lines and one 21 kV distribution line, all belonging to PG&E. EMF measurements at the site are as high as 18.7 mG in some locations, according to the board's report.

"The suit was filed because PG&E did not disclose that

there was a problem with high EMFs," Dawson, a partner with the Scotts Valley firm of Dawson, Passafiume & Bowden, told *Microwave News*. Dawson alleges that the utility participated in EMF studies before the sale, and should have, under California real estate law, disclosed any material fact that might affect the value of the property.

But Stephen Jones, with the San Francisco law firm of Sedgwick, Detert, Moran & Arnold, who is representing PG&E, said in a telephone interview that, "Back when the Keoghs purchased the property, no one anticipated there would be a problem in obtaining a building permit." Furthermore, the utility believes that there would be no substantial health risk for residents if the property were to be developed, Jones said.

Legal Advice

- When faced with legal defense fees and possible liability costs, utilities must determine whether these claims will be covered under their insurance policies, writes Keith Meyer in the February 15 issue of *Public Utilities Fortnightly*. Meyer, a partner with the Los Angeles firm of Paul, Hastings, Janofsky & Walker, represents policyholders in insurance litigation. His article urges utilities to fight for the coverage they are entitled to under their CGL (comprehensive general liability) policies before a poor precedent is established. "Too frequently carriers look for ways to deny coverage," he writes. "EMF claims may become the next wave of continuous, progressive disease cases where the total amount of liability could exceed the amount paid out in asbestos cases."

- In a February 19 *Toxics Law Reporter* article, corporate defense lawyer Richard Dandrea argues that claims alleging that EMFs cause cancer should be dismissed before trial. He contends that scientific data establishing an EMF-cancer link are inconclusive—and that any testimony is therefore based on inadequate information and should not be permitted in court. Dandrea notes that, for the same reason, hired consultants should not be permitted to testify that EMFs "probably" caused a plaintiff's cancer. Causation cannot be proved, he concludes, adding that the subject requires "further, more formalized analysis." The *Toxics Law Reporter* is published by the Bureau of National Affairs in Washington, DC.

- When considering what can be done now to minimize the risk of liability in future EMF cases, Paul Hanzlik, a litigator representing public utilities at the Chicago law firm of Hopkins & Sutter, recommends that utilities weigh the following measures: encouraging public utility commissions to establish reasonable EMF standards; mitigating EMFs in new transmission lines and locating the lines away from schools, hospitals and playgrounds; and encouraging companies with EMF-generating equipment to form groups to monitor research and meet with customers and community officials. "The utility with a program that includes a reasonable response to what is presently known will decrease its risk of future liability," Hanzlik writes in his paper, "Electric and Magnetic Field Litigation—Thinking Beyond Today's Challenges," which he presented at a March 9-10 conference sponsored by *Transmission & Distribution* in Arlington, VA.

NERP Pushes Ahead Despite Funding Uncertainties

The National EMF Research Program (NERP) is moving forward despite uncertainty about funding sources and the support of government agencies.

At its March 24-25 meeting in Arlington, VA, the NERP steering committee decided to issue a request for proposals (RFP) this summer for a research administrator and to begin research by January 1, 1993.

"We're in a very fluid situation," said NERP Chairman John Coughlin, referring to the possibility that pending congressional legislation may siphon funding from the NERP. Like the NERP, the legislation would set up a long-term research program funded by federal, state and private sponsors (see p.1 and *MWN*, N/D 91 and J/F92).

Anne Strauss of the New York Power Authority (NYPA), which has been the primary utility industry supporter of the public-private approach, said in an interview that industry does not want to contribute to more than one national program. NYPA is a member of an informal group of potential private sector sponsors that NERP officials call the "significant contributors group."

The DOE and the Environmental Protection Agency (EPA) also plan to fund EMF research, and it is not clear how their plans will mesh with the NERP's. The DOE has asked Congress for \$7.5 million for the fiscal year that begins on October 1, 1992. It is in the process of formulating an EMF research program for federal and state agencies and private companies.

EPA currently has \$1.94 million for EMF research. It has not decided whether to spend it on research by agency scientists, allocate it according to DOE's plan, contribute it to a federal-state program such as the NERP or give it to a private research organization such as the Health Effects Institute (HEI) of Cambridge, MA (see p.2). A decision is expected soon, according to agency sources.

Working in their favor, steering committee members say, is NERP's ability to begin research and produce results faster than the pending congressional program could. Energetics Inc. of Columbia, MD, which is providing staff support to the NERP, estimates that the bill would require at least 20 months of planning before research would begin.

At its March meeting, the steering committee introduced two new members and announced one member's resignation. The addition of David Kleffman, deputy director of EPA's Office of Health Research, makes EPA the first federal agency to join the NERP. The utility contributors had considered the lack of federal participation a major drawback, NERP sources say. Coughlin hopes to add at least one more federal representative. Wendell Holland, a public utility commissioner from Pennsylvania, has also joined the steering committee.

Dr. Mark Cooper of the Consumer Federation of America (CFA) has resigned. Sources involved with the NERP told *Microwave News* that Cooper withdrew after the American

Public Power Association (APPA) and the National Rural Electric Cooperative Association (NRECA), both of which are members of the CFA, questioned its involvement with the NERP. The CFA decided independently to have Cooper resign, the sources said. Cooper did not return calls for comment.

The steering committee plans to add a member from a national environmental or consumer organization. It also is considering adding a representative of the Electric Power Research Institute (EPRI), at the urging of steering committee member Dr. Charles Imbrecht, a California energy commissioner. But Coughlin said that he has already met with EPRI officials and he does not think they want to join the NERP.

In its effort to issue an RFP, the committee directed Energetics to propose, by May 1, an organizational structure, a job description for the research administrator, a conflict of interest policy and bylaws. Energetics was also asked to incorporate the NERP as a nonprofit organization.

The steering committee will next meet this summer, when it hopes to finish the RFP.

Major New U.K. Epi Study

On April 1, the U.K.'s Coordinating Committee for Cancer Research (CCCR) will start a large-scale epidemiological study in an effort to determine the causes of childhood cancer, with the possible role of electromagnetic fields (EMFs) among the hypotheses tested.

The five-year, £6 million (about \$10.4 million) effort will be run by a management committee chaired by Sir Richard Doll, an epidemiologist at the Imperial Cancer Research Fund in Oxford. "This very important study is the largest and most wide-ranging to be carried out anywhere in the world," said Professor Dame Margaret Warwick, the chairwoman of the CCCR.

The families of all children under 15 newly diagnosed with cancer in England and Wales will be approached for the case-control study. Over the course of the study, the CCCR expects to investigate 1,000 cases of acute lymphoblastic leukemia—the most common type of childhood cancer—and 3,000 cases

State EMF Actions

Connecticut...A task force created by the Connecticut legislature last July has decided that adopting a policy of prudent avoidance of EMFs would be premature. The group, cochaired by representatives of the Departments of Environmental Protection and Health Services, wrote in its interim report, issued in February, that the state should not rule out "an association between EMFs and health risks and...the subject needs more investigation." The task force is hiring a consultant to conduct a literature review. Its final report is due by October (see *MWN*, M/J91 and J/A91).

Illinois...A bill requiring a three-year moratorium on the construction of power lines carrying more than 60 kV was introduced into the House on February 13 by Rep. John Matijevich. HB 2775 would also require the Illinois Commerce Commission to conduct a study of the effects of EMFs on health and to submit a report to the legislature before January 1995. The measure states that power lines greater than 60 kV could be repaired and rebuilt as long as the modifications didn't increase capacity. The bill is pending in the House Rules Committee. Senate sponsors have not been named....Another bill with a similar three-year moratorium was introduced by Rep. Suzanne Deuchler on March 4. HB 2863 would require the Department of Energy and Natural Resources to conduct a study on the health effects of EMFs. The measure—which was assigned to the House Environment and Energy Committee on March 25—would require a report to the legislature by January 1994.

Indiana...An EMF bill introduced by Senator Robert Meeks passed the Senate on January 27 but died two days later after it was moved to the House Committee on Rules and Legislative Procedures. SB 223 would have required the Utility Regulatory Commission to study scientific literature about the health effects of EMFs and to establish EMF safety requirements with regard to transmission lines.

New York...An EMF bill introduced by Assemblyman Maurice Hinchey is awaiting a hearing in the Committee on Environmental

Conservation after being returned there by the Ways and Means Committee in January. AB 4657 would authorize the Department of Environmental Conservation (DEC) to regulate EMFs. The measure also recommends EMF exposure limits along ROW edges: for example, 150 mG for a transmission line of no more than 230 kV and 200 mG for a 500 kV line. The DEC would be required to review literature on the health effects of EMFs and to submit a report to the governor and the legislature by January 1993. New York already follows standards set by the Public Service Commission (see *MWN*, S/O90).

Pennsylvania...HB 2273, introduced by Rep. Patricia Carone, would authorize the Public Utility Commission (PUC) to develop an EMF avoidance program to reduce public exposure to EMFs from power lines. The program would be based on the concept of prudent avoidance. The measure, introduced last December 10, awaits a hearing in the conservation committee. It would authorize the PUC to adopt standards for maximum EMFs at ROWs. In addition, the PUC would collect a power line siting fee from any public utility authorized to build a transmission line.

Wisconsin...AB 698, which would require a survey of the location of transmission lines in relation to schools and other public facilities, was passed by the Assembly on March 11. Introduced by Rep. Maxine Hough last November, the bill originally called for a moratorium on the construction of new lines of at least 60 kV. This requirement was later deleted. "Even though the final bill is much reduced from the original language, it's a great victory," said Paulette Quick, legislative aide to Hough. "A survey is the most minor action you can take, yet it received tremendous opposition from utilities and individuals." The legislation still must be passed by the Senate and then signed by the governor. The Wisconsin Public Service Commission decided in January that state utilities must use the best available control technology to reduce EMFs from new and upgraded transmission lines; however, it rejected a citizens group proposal for a three-year moratorium on new lines of at least 60 kV (see *MWN*, J/F92).

of other types of cancer. A similar study among Scottish children began a year ago.

Along with EMFs, four other possible risk factors will be investigated. They are: ionizing radiation (exposure both in utero and after birth); carcinogenic chemicals and drugs; damage to the father's sperm by chemicals or ionizing radiation; and infectious agents.

A large-scale study of childhood cancer is already under way at the National Cancer Institute (NCI) in the U.S. (see *MWN*, J/F89). It should be completed by 1995, according to NCI's Dr. Martha Linet. The possible EMF-childhood cancer link is also being studied in Australia (see *MWN*, J/A91).

A previous U.K. study on power line EMFs and childhood cancer failed to show any association, but few of the participants were, in fact, exposed: more than 95% of the cases' and controls' homes had calculated magnetic fields of less than 0.1 mG (see *MWN*, J/F91).

Doll is also the chairman of an advisory group that reviewed the status of EMF research for the National Radiological Protection Board and that formulated priorities for future study (see p.9).

California Group Reaches Limited Agreement

California EMF Consensus Group members were unanimous in their basic belief that "society can no longer ignore the warnings that electromagnetic fields [EMFs] are a potential problem," according to a March 20 report. Although the group's 17 members—who represent diverse interests including utili-

ties, labor unions and citizens groups—recommended that the California Public Utilities Commission (PUC) adopt research, education and mitigation policies, they could not always agree on how these requests should be implemented. The consensus group was charged in October 1991 with developing recommendations on interim EMF policies for the PUC.

First among the consensus group's policy recommendations was that the PUC adopt an interim plan that permits utilities to take no-cost or low-cost steps to reduce EMFs. There was no consensus on how to define "low-cost" mitigation, however.

In the field of research, recommendations for state and national EMF research programs were restrained by members' inability to agree on funding levels for the programs.

Although the consensus group recommended an EMF education plan for electric utility personnel and customers, the members could not agree on how much more should be spent than the \$3 million California electric utilities now contribute annually to EMF education programs, and on who should pay to implement the plan.

The consensus group also recommended that the commission ask electric utilities to consider public concerns about EMFs when siting new facilities, and, at the same time, proposed that the public take action to protect itself—for example, by adopting a policy of prudent avoidance. The PUC must decide if it wants to hold formal hearings and adopt the recommendations.

For a copy of the report, *Issues and Recommendations for Interim Response and Policy Addressing Power Frequency Electric and Magnetic Fields*, contact: CA PUC, CACD-Environmental Section, 505 Van Ness Ave., San Francisco, CA 94102, (415) 703-2523. (For more on the consensus group, see *MWN*, N/D91.)

HIGHLIGHTS

Testicular Cancer Cluster Among Police Radar Users

Seven officers in two small Michigan police departments have been diagnosed with testicular cancer, and traffic radar is suspected as a possible cause. The two departments, in Grand Rapids and the nearby suburb of Wyoming, have 265 and 75 officers, respectively—and a total of about 200 patrol officers.

"This strikes me as very odd, very unusual," said Dr. Robert Davis, who is studying cancer rates among police officers in Washington State. "We shouldn't just dismiss it out of hand." He added that, "My gut feeling is that, given that we don't know what causes testicular cancer, radar is the common factor among these officers that is unusual."

Four officers in the Grand Rapids department developed testicular cancer over the last ten years—diagnosed in 1982, 1984, 1988 and 1991. Each of the first three had used hand-held radar units for over ten years prior to diagnosis, according to a series of interviews. The fourth had used radar for less than a year and only for a short time before his cancer was diagnosed.

In Wyoming, three officers developed testicular cancer. Two were diagnosed in 1979: one used hand-held radar for about five years, the other for more than ten years. The third officer was diagnosed last year; he had used hand-held radar for six months in a previous job in the early 1980s and had used dashboard-mounted radar more recently for two-and-a-half years in Wyoming.

Davis, of the division of general pediatrics at the University of Washington Medical Center in Seattle, explained that to quantify the possible link between the testicular cancer cases and radar use, he would count only six of these cases. He would include the most recent Wyoming case, but he called it "questionable," since the officer's exposure to hand-held radar was limited. He said the Grand Rapids officer diagnosed most recently apparently was not exposed to radar long enough prior to diagnosis to be considered.

There are at least two other cases not included in the cluster:

HIGHLIGHTS

a fourth Wyoming officer who used radar had a benign testicular tumor removed in the late 1970s; and an officer in the local sheriff's department was diagnosed with testicular cancer in 1989.

Davis designed his analysis to bias his calculations *against* finding any excess incidence of testicular cancer. He considered a group of 300 officers; going back to 1960, he allowed for a complete turnover in the work force every ten years; he also used the peak testicular cancer rate, which is for men 25-35 years old, though many officers would be older and at less risk. With these assumptions, he still found that only about two cases would be expected in this group. Thus, five or six cases in the actual population is up to triple the expected rate.

"The numbers are strong," said Davis, since they show an elevated risk even in an analysis designed to avoid such a result. He cautioned, however, that any disease cluster can be a statistical anomaly. "The way to follow this up is to do a large-scale study," looking at the cancer rates among at least 50,000 to 100,000 law enforcement officers, he explained.

The policemen themselves suspect hand-held radar to be the cause of their cancer and they point to the way they used their radar guns. David Berndt, the Grand Rapids officer who was diagnosed in 1988, told *Microwave News* that he often left the radar, which transmitted continuously, resting near his groin. In

what he described as common practice among fellow officers, Berndt would point the unit out the window to clock traffic, then rest it on the seat, on his lap or between his legs when it was not in use. "You would plug the unit in and then typically it would be on for the duration of the shift," Berndt said, adding that most units had an on/off switch, "but no one used it."

Berndt has sued the manufacturers of the radar guns he used: CMI Inc. and MPD Inc., both of Owensboro, KY, Decatur Electronics Inc. of Decatur, IL and Kustom Signals Inc. of Overland Park, KS. "It seems to me that there is both a statistical and a logical connection between the cancers and the radar units," explained Berndt's attorney, Barbara Crozier of Bremer, Wade, Nelson, Mabbitt and Lohr in Grand Rapids. Crozier told *Microwave News* that she "anticipate[s] there will be more claims filed." (See box below.) Berndt's case was filed in Michigan Circuit Court on November 8, 1991.

Davis is developing a questionnaire, which he hopes to use to interview officers with testicular cancer in the Grand Rapids area and elsewhere (see p.13). In Washington State, he is conducting a cohort study of state patrol officers, looking for elevated cancer rates related to radar use, in collaboration with Dr. Samuel Milham Jr., an epidemiologist for the state Department of Health in Olympia (see *MWN* M/A91).

Other Police Radar Developments

- A hearing date of August 11 has been set for police officer Eric Bendure's lawsuit against Kustom Signals Inc. and MPH Industries Inc. of Lenexa, KS. Bendure alleges that the companies' hand-held radar units caused his lymphoma, which originated in his groin (see *MWN*, M/A91). Meanwhile, the suit filed by Hyman Rosen against Kustom Signals in March 1991—the first police radar case—has now been dismissed. Attorney John Sweeney of Agoura Hills, CA said he voluntarily withdrew Rosen's suit because of difficulties in establishing the extent of the officer's radar use. Rosen was diagnosed with melanoma on the back of his neck in 1986 and died November 7, 1991. Sweeney explained, "We were unable to get his testimony about his radar usage as his condition was deteriorating and he had difficulty communicating toward the end of his life." Sweeney told *Microwave News* that the logs kept by Rosen's employer, the U.S. Park Police, were incomplete. "Rosen told me he used radar continuously since 1979 or 1980, and I believe that," Sweeney is also representing Bendure and is cocounsel with Barbara Crozier on the lawsuit filed by David Berndt in Michigan (see story above). Kustom Signals declined to comment.

- A police officer is subject to the greatest radar exposure when a hand-held unit is placed on the front seat next to the officer, according to a report on a series of measurements commissioned last fall by the Connecticut State Police. Emissions from a Decatur MVR724 fixed-position radar and from a Kustom Signals HR-8 hand-held unit were measured at Retlif Testing Labs in Ronkonkoma, NY. Exposures were measured at head height in the driver's position of a patrol car while the radars were operated in a variety of positions an officer might use. With the hand-held unit on the seat, facing the driver, the exposure was 164 μ W/cm². Facing

away from the driver, it was 265 nW/cm², and pointed over the driver's shoulder toward the rear of the vehicle, it was 90 nW/cm². With the fixed unit, the lowest exposure was achieved when the radar was mounted on the dashboard and angled away from the driver; the highest exposure, 16 nW/cm², was measured when the antenna was mounted on the inside of the rear, driver's-side window. Even stronger exposures came from a police radio system that Retlif tested: the highest measurement from the radio was 19 mW/cm². While pointing out that the radar emissions were all below current national standards, the report states that "the levels observed were still quite interesting and of concern considering what may be viewed as long-term exposure to police officers." Prepared by Retlif and F.L. Helene Inc., a Wallingford, CT consulting firm, the report recommends "certain prudent steps" to minimize exposure: fixed-position units should be used rather than hand-held radars, and certain locations within a patrol car should be avoided. A limited number of copies of the report are available from: Connecticut State Police Union, 2138 Silas Deane Highway, Rocky Hill, CT 06067, (203) 721-0121.

- The controversy that flared in Connecticut last year over the possible police radar-cancer link led not only to testing of radar units, but also to legislation to restrict their use. HB 5070 would ban the use of hand-held radar units in the state—a step that many local police departments and the Connecticut State Police instituted at least temporarily last October (see *MWN*, N/D91). It is scheduled to be considered by the full House on April 9, according to the secretary of the Labor and Public Employees Committee, which approved the measure 14 to 1. Another bill, requiring the labor commissioner to study possible cancer risks associated with the use of hand-held radar, died in committee.

U.K. Panel Discounts ELF & RF Cancer Risks, Seeks Research

An advisory group set up by the U.K.'s National Radiological Protection Board (NRPB) has concluded that there is "no firm evidence" of a cancer risk from exposure to extremely low frequency (ELF) electromagnetic fields (EMFs).

In a report released on March 31, the NRPB panel said that, "The experimental evidence [on ELF EMFs] provides no reason to suggest that a carcinogenic effect of any sort is at all likely except possibly for a small risk attributable to melatonin." With respect to epidemiological studies of brain cancer, the panel concluded that for children the "weak evidence" of an association with EMFs may be due to "artefacts of the method of enquiry" and that for workers it is "impossible to decide" whether the risk is due to EMFs or to chemicals.

For radiofrequencies (RF) above 100 kHz, the panel found that animal studies provide "some evidence for effects on tumor incidence," but noted that they could be due to heating.

At a press conference held in London, Dr. Roger Clarke, the director of the NRPB, said that, "The epidemiological data in particular do not appear to provide the basis for restricting human exposure to non-ionizing electromagnetic radiation."

The panel cited the need for more research. It recommended epidemiological studies of workers exposed to EMFs on the job and of children exposed at home and said these studies should be undertaken "as soon as practical" (see p.6). In a reference to male breast cancer risk, the panel said that the "evidence is suggestive enough to require further investigation."

Experimental studies—both animal and cellular—were also suggested because they "can play a significant role in resolving current uncertainties on the possible association between [EMFs] and carcinogenesis."

The advisory group, which was chaired by Sir Richard Doll, was set up to review the U.S. Environmental Protection Agency's (EPA) report on EMFs and cancer (see *MWN*, J/F91). In contrast to the EPA report, which placed a higher risk on ELF EMFs than on RF radiation, the U.K. panel found that RF is of greater concern. "There is room for more doubt" that there is no cancer risk above 100 kHz, said Doll, who is at the Imperial Cancer Research Fund in Oxford.

"Electromagnetic Fields and the Risk of Cancer: Report of an Advisory Group on Non-Ionizing Radiation," *Documents of the NRPB*, Vol.3, No.1, 1992 is available for £10.00 from: HMSO Publications Center, PO Box 276, London SW8 5DT, U.K. It will soon be available for \$25.00 from: Unipub, 4611-F Assembly Drive, Lanham, MD 20706, (800) 274-4888.

Research Update: New EMF & NIER Books and Papers

Glenn Bell et al., "Human Sensitivity to Weak Magnetic Fields," *The Lancet*, 338, pp.1521-1522, December 14, 1991, and "Electrical States in the Rabbit Brain Can Be Altered by Light and Electromagnetic Fields," *Brain Research*, 570, pp.307-315, 1992.

This research group from Louisiana State Medical Center in Shreveport, including Dr. Andrew Marino, found that half of a group of 14 volunteers responded to 250 mG or 500 mG magnetic fields. The second paper explores the effects of EMFs on the EEGs of rabbits.

D. Sh. Beniashvili, V.G. Bilanishvili and M.Z. Menabde, "Low Frequency Electromagnetic Radiation Enhances the Induction of Rat Mammary Tumors by Nitrosomethyl Urea [NMU]," *Cancer Letters*, 61, pp.75-79, 1991.

These researchers, based in Tbilisi in the Republic of Georgia, found that both static and 50 Hz magnetic fields acted synergistically with NMU, a chemical carcinogen known to increase the incidence of breast tumors and reduce the mean latency period for their development. As the magnetic field exposures grew longer, more tumors developed, and they grew more quickly.

Zoreh Davanipour et al., "Electromagnetic Field Exposure and Amyotrophic Lateral Sclerosis [ALS]," *Neuroepidemiology*, 10, p.308, 1991.

Six years ago, USC scientists reported that electricians had elevated rates of ALS, a degenerative and usually fatal neurological disease (see *MWN*, S/O86). Now, researchers at the Loma Linda University

School of Medicine in Loma Linda, CA describe the case of a 61-year-old man with ALS whose desk chair was above a power transformer on the floor below his office. When the man's feet were near the transformer, the exposure reached as high as 75 mG. While the researchers caution that the link may be a coincidence, they note that, "His first symptom was foot dragging and loss of control of the toes."

Richard P. Gallagher et al., "Brain Cancer and Exposure to Electromagnetic Fields" (letter), *Journal of Occupational Medicine*, 33, pp.944-945, September 1991.

The authors, from the British Columbia Cancer Agency in Vancouver, Canada, found a nonsignificant elevated risk of brain tumor mortality among workers exposed to EMFs. But they also found higher rates of brain tumor deaths among those in other occupations. On analysis, the only common factor they could identify was that those afflicted were, for the most part, of high socioeconomic status: government officials, engineers aboard ships, civil and mechanical engineers. Bus drivers were an exception.

Reba Goodman and Ann Shirley-Henderson, "Transcription and Translation in Cells Exposed to Extremely Low Frequency Electromagnetic Fields," *Bioelectrochemistry and Bioenergetics*, 25, pp.335-355, 1991.

A review of EMF effects on RNA transcription (see *MWN*, J/A83 and J/A88).

Leland H. Hemming, *Architectural Electromagnetic Shielding Handbook, A Design and Specification Guide*, New York,

HIGHLIGHTS

NY: IEEE Press, 1992, 240 pp., \$59.95.

Written for architects and engineers, this volume includes detailed information on the need for RF shielding, some basic shielding theory and complete descriptions of the major types of commercial shielding.

René R. Kuijten et al., "Parental Occupation and Childhood Astrocytoma: Results of a Case-Control Study," *Cancer Research*, 52, pp.782-786, February 15, 1992.

In this case-control study of 163 pairs of children, researchers from The Netherlands and the U.S. observed a significant risk of brain tumors among the children of electrical and electronic repairmen. However, they write that this finding "has to be interpreted very cautiously, since it was based on only nine discordant pairs and since we were unable to replicate the previously observed elevated risk in the combined group of electrical assembling, installing and repairing. Furthermore, odds ratios for [EMF] exposure were only slightly elevated."

Martin C. Moore-Ede, Scott S. Campbell and Russel J. Reiter, eds., *Electromagnetic Fields and Circadian Rhythmicity*, Boston, MA: Birkhäuser, 1992, 210 pp., \$49.50.

The ten review papers in this collection were first presented at a conference sponsored by EPRI in 1989 (see *MWN*, S/O88). Among the authors are: Drs. Martin Kavaliers, James Olcese, Klaus-Peter Ossenkopp, Russel Reiter, Walter Rogers, Kurt Salzinger, Peter Semm and Rütger Wever, as well as groups from Battelle Pacific Northwest Labs and from the Max Planck Institute. In addition, there are three short commentaries by Drs. Sue Brinkley, Bruce Goldman and Alfred Lewy.

J. Michael Muhm, "Mortality Investigation of Workers in an Electromagnetic Pulse [EMP] Test Program," *Journal of Occupational Medicine*, 34, pp.287-292, March 1992.

Muhm, an epidemiologist at Boeing, found a suggestion of "an association between death due to leukemia and employment in the EMP test program" but notes that "firm conclusions could not be drawn because of limitations of the study." He advocates "further investigation in an independent cohort." In 1990, Boeing paid \$500,000 to settle a suit by Robert Strom claiming that he had developed leukemia following EMP exposure (see *MWN*, S/O90).

Charles Poole and Dimitrios Trichopoulos, "Extremely Low Frequency Electric and Magnetic Fields and Cancer," *Cancer Causes and Control*, 2, pp.267-276, 1991.

The authors conclude that, "The hypothetical carcinogenicity of ELF EMF[s] represents an intriguing scientific problem and a potentially important public health issue but, at this stage, nothing more. It clearly is not possible to exonerate ELF EMF[s]. In order to do so, very large and valid studies showing very little or no association between ELF EMF[s] and cancer would be needed....On the other hand, the empirical evidence linking ELF EMF[s] to cancer is weak and inconsistent. Causal interpretations are not supported by available biologic data."

Gregory B. Rauch et al., "A Comparison of International Residential Grounding Practices and Associated Magnetic Fields," *IEEE Transactions on Power Delivery*, 7, pp.934-939, April 1992.

Grounding systems used in Australia, Germany, Japan, the U.K. and

Computer Companies Form VDT Health Research Foundation

In response to customer concerns about electromagnetic fields (EMFs) from video display terminals (VDTs), IBM Corp., Apple Computer Inc. and Compaq Computer Corp. have committed \$2.25 million over three years to create the VDT Health Research Foundation.

Dr. Glenn Haughie, IBM's director of health, announced the initiative at the March 10 congressional hearing on federal EMF research funding (see p.1). He said that the foundation is soliciting additional financial support from other computer manufacturers.

The foundation will sponsor a VDT Health Research Center, to be located at a university, with the goal of creating an independent and credible research program, Haughie said. He explained that the center will have an independent board to help it "maintain an 'arms-length' relationship from the foundation and its member companies." The host school has not yet been selected.

Haughie stressed that the computer industry does not believe that EMFs from VDTs pose a health risk, but he added that there is an urgent need for additional research. He said that creation of the foundation does not preclude the three companies' support for other EMF research programs.

The foundation was launched by the chief scientists of the three computer giants: David Nagel, an Apple senior vice president, is chairman of the foundation; John Armstrong, IBM's vice president for science and technology, is vice-chairman; and Christopher Gintz, director of corporate development at Compaq, is on the foundation's board. Other companies that contribute \$250,000 annually will be represented on the board, IBM spokesman Michael Dutton told *Microwave News*.

In addition to studying the health effects of extremely low frequency and very low frequency EMFs, the foundation will investigate the role of ergonomic factors in repetition strain injuries among computer users.

the U.S. are described. Different systems can result in a range of magnetic fields: "These differences illustrate the need for tailoring a residential magnetic field measurement protocol to take into account the consideration of grounding schemes as magnetic field sources." The researchers also note that, "Possible future strategies to manage household magnetic fields might take into account alternatives to present-day grounding system practices."

Leonard A. Sagan, "EMF Danger: Fact or Fiction? A Hypothetical Link Between Magnetic Field Exposure and Cancer Continues to Tantalize Researchers," *Safety & Health*, pp.46-48, January 1992; and Gordon Hester, "Electric and Magnetic Fields: Managing an Uncertain Risk," *Environment*, 34, pp.7-11, 25-32, January/February 1992.

Sagan, who recently stepped down as EPRI's program manager for

EMF studies, concedes at the outset that he cannot answer the question in the title of his paper. At the close of this short review, he advocates more research because "observations of effects of EMF exposure in cells indicate that something is going on, even if physicists can't explain it." At this time, Sagan believes that it is still "too early to make judgments about...what should be done should there be a risk." In his more detailed overview, Hester, an EPRI project manager, also calls for more research, and goes further, suggesting that, "In constructing new transmission and distribution facilities, many utilities may wish to consider low-cost modifications to reduce fields." But he cautions that, "The modification of existing lines cannot be justified on the grounds of necessity." *Safety & Health* is published by the National

Safety Council in Chicago, IL.

Richard G. Stevens et al., "Electric Power, Pineal Function and the Risk of Breast Cancer," *The FASEB Journal*, 6, pp.853-860, February 1992.

This is a detailed and updated exposition of Stevens's landmark 1987 paper, which first put forward the hypothesis that EMFs and/or light-at-night could be responsible for the increasing number of breast cancer deaths among women in industrial countries (see *MWN*, J/F 87). The authors, from Battelle Pacific Northwest Labs and from the Fred Hutchinson Cancer Research Center, cite 106 references.

EMF Research Bill (continued from p.1)

Other industry witnesses backing the bill represented the American Public Power Association (APPA), the Edison Electric Institute (EEI), the Electromagnetic Energy Policy Alliance (EPPA), the New York Power Authority (NYPA) and Southern California Edison Co.

H.R.3953 was also endorsed by IBM Corp., Apple Computer Inc. and Compaq Computer Corp., testifying jointly as the newly formed Video Display Terminal Health Research Foundation (see box, p.10), and by James DuShaw of the International Brotherhood of Electrical Workers (IBEW).

Only one witness was generally critical of the bill. Dr. Granger Morgan of Carnegie Mellon University in Pittsburgh, PA objected to its joint public-private funding approach. "We need a strong independent federal research program," he said. "It should not be tied to what the private sector chooses to do." Morgan said that, "The basic problem is that *there has been too little research*" (emphasis in written testimony), and he called for a \$20 million annual research budget.

Dr. Keith Florig of Resources for the Future (RFF), a Washington, DC think tank, termed the bill's \$6 million annual research budget "grossly incommensurate with the economic costs of the EMF problem," but said he nonetheless supported the measure. He estimated that the current costs associated with the EMF issue "likely exceed \$1 billion annually."

Department of Energy (DOE) assistant secretaries Michael Davis and Paul Ziemer also recommended a funding increase, noting that the proposed research budget was less than the \$7.5 million request the department made for fiscal year 1993 (FY93) (see *MWN*, J/F92).

In its amended form, the EMF legislation would now call for \$12 million for research and \$1 million for communications annually from FY93 through FY97. Nonfederal sources would provide up to half this research budget.

DOE's Office of Environment, Safety and Health would coordinate the effort, a designation the DOE opposes. Davis and Ziemer testified that the Secretary of Energy should be allowed to decide whether this role should remain with the Office of Conservation and Renewable Energy, which is now developing the department's EMF research strategy. Rep. George Brown (D-CA), chairman of the science committee and chief sponsor of H.R.3953, considers the shift of offices within the DOE a key

aspect of his legislation (see *MWN*, J/F92).

Another issue raised at the hearing centered on the ways in which the bill tries to ensure the credibility of the research program. James Cunningham of NYPA opposed H.R.3953's inclusion of utility and electric industry representatives on the advisory committee the bill would create. APPA's Alan Richardson also cautioned that industry involvement "could subject the overall effort to credibility charges." Rep. James Scheuer

House Panel Relaxes Ban on Consulting and Expert Testimony

The EMF legislation approved by the House science committee virtually eliminates a proposed ban on consulting and expert testimony by researchers funded under the measure. The only remaining restriction prohibits researchers from testifying about work they are doing under the federal EMF program.

Nearly all the witnesses at the March 10 hearing had urged the sponsors of H.R.3953 to relax its provision barring researchers from EMF consulting, but comments about expert testimony were divided.

Dr. Keith Florig of RFF supported the ban on testimony, noting that only a small number of researchers testify in adversarial cases. He objected to the restrictions on consulting, however: "Since the majority of EMF researchers engage in consulting of one type or another, [the ban] would severely limit the pool of available talent." James Dushaw of the IBEW also favored the ban on expert testimony.

EPRI's Dr. Stanley Sussman opposed the restrictions altogether. He testified that the bill might exclude "qualified researchers who are receiving or had received funding from other sources. This would be an unfortunate outcome...." EEI's Girard Anderson argued that "as long as all prior or current associations in this field are fully disclosed, any reputable researcher should be free to be involved with and pursue proposals for the program."

(D-NY), chairman of the environment subcommittee, disagreed. When the subcommittee marked up the bill on March 26,

it was amended to retain utility representatives on the advisory committee and weaken the committee's authority.

Finnish VDT-Miscarriage Study (continued from p.1)

Hietanen also reported a significant increase in the number of miscarriages among women exposed to strong, very low frequency (VLF) magnetic fields.

Interestingly, the Finnish study did not reveal a miscarriage risk when women were classified according to the number of hours they worked at a VDT—the method used in most past pregnancy studies. "It's only when exposures are classified according to actual magnetic field exposures that you see an effect," Hietanen said in an interview with *Microwave News*.

Hietanen, a physicist, was responsible for measuring the VDT electromagnetic fields (EMFs); she collaborated with a research team led by Dr. Marja-Liisa Lindbohm, an epidemiologist at the Helsinki institute.

"VDT workers should not be worried, because new models do not have high magnetic fields—only the older models have high fields," Hietanen said. She added that, "If your VDT meets the MPRII emissions guidelines, you need not be worried." The MPRII guidelines were developed by the Swedish Board for Technical Accreditation, known as SWEDAC (see *MWN*, M/J91).

"This is an important study because it is the first to look at measured magnetic field exposures for VDT operators and it is therefore possible to see who is exposed to higher than average fields," Dr. Jukka Juutilainen of Finland's University of Kuopio told *Microwave News* in Brussels. (For more on recent VDT pregnancy studies, see *MWN*, M/A91 and S/O91).

The VDT study population was composed of clerical workers at three different companies in offices all over Finland: 191 women who suffered miscarriages were compared with 394 who had live births from 1975 to 1985. Most of the women used VDTs. The women completed questionnaires about the number of hours of VDT work they performed and the type of VDT they used. The intensity of the ELF magnetic field and the time-rate-of-change of the VLF magnetic field (dB/dt) were measured for each of 23 different types of VDTs used by the women. There was very little variation in EMF emissions among the same models, according to Hietanen.

The clerks were assigned to one of three groups based on whether they worked at VDTs with "low" (less than 4 mG), "moderate" (4-9 mG) or "high" (more than 9 mG) ELF magnetic fields. (Four of the 23 models were in the "high" group.) A similar assignment was made on the basis of the women's VLF exposures.

As in the 1988 Kaiser Permanente study (see *MWN*, M/J88), there was an indication that women were at greater risk during the first 12 weeks of pregnancy, but this finding was tentative given the small number of women exposed to high ELF EMFs. The Finnish study population was too small to allow any inferences about the risk of birth defects.

Hietanen and Lindbohm concluded that, "There is an obvious need for future studies on the effects of low frequency magnetic fields on the outcomes of pregnancy using precise

assessment of exposures in the actual working environment."

The researchers stress that their results should be interpreted very cautiously because theirs is the first study on reproductive risks associated with VDT magnetic fields. They have submitted their results for publication. Lindbohm will present the final results of this epidemiological study at the *Work With Display Units '92* international conference, to be held in Berlin, Germany, the first week of September.

Power Frequency EMFs Increase Miscarriage Risk

A soon-to-be-published study indicates that women exposed to power frequency magnetic fields in their homes have significantly higher rates of early pregnancy loss. A team from the University of Kuopio in Finland, led by Dr. Jukka Juutilainen, found that women who lived in homes with magnetic fields of at least 6.3 mG—as measured at the front door—had five times the rate of miscarriages as those whose exposures were less than 1.1 mG.

There were no power lines near the homes of the women in the study, Juutilainen told *Microwave News*, leading him to suspect that the observed elevated magnetic fields were due to the electrical distribution systems in and around the houses (many of the subjects lived in multistory buildings).

Similar results were obtained when exposures were specified by the average of the measured values at the front door, in the living room, in the kitchen and in the parents' bedroom. Smaller increases in miscarriages were found when the maximum measured magnetic field was used as the exposure index. Early pregnancy loss was detected by assaying the women's levels of serum human chorionic gonadotropin (HCG). The study population was composed of 89 cases and 102 controls.

The results are "far from conclusive," according to the Kuopio researchers. They urge further studies, especially because their findings are consistent with observations in laboratory experiments.

The Juutilainen study and the Finnish study of VDT workers support previous work by Dr. Nancy Wertheimer and Ed Leeper showing increased rates of fetal loss among women exposed to magnetic fields from electric blankets (see *MWN*, M/J86) and those exposed to ceiling cable heating systems (see *MWN*, N/D88). The Juutilainen study has been accepted for publication in *Bioelectromagnetics* and is scheduled to appear later this year.

FROM THE FIELD

Police Radar and Cancer

To the Editor:

I am compiling a database of police officers who used traffic radar and later developed cancer. From a short, confidential questionnaire, which I ask each officer to complete, I record the type of cancer and type of radar. I also talk directly to many of the officers.

To date, there are 89 officers in my database, with diagnoses as follows:

Testicular cancer	22
Skin cancer	17
Lymphoma	13
Brain cancer	10
Eye cancer	9
Leukemia	7
Thyroid cancer	3
Prostate cancer	2
Bladder cancer	1
Bone cancer	1
Nasal-pharynx cancer	1
Spinal cord cancer	1
Stomach cancer	1
Unknown	1

Some patterns emerge when the type and location of the cancers and the type of traffic radars are cross-referenced:

- Among officers with testicular cancer, 20 out of 22 reported using hand-held radars. The other two cases are officers who used dashboard-mounted antennas. When the hand-held units are not being used to clock the speed of oncoming traffic, a common practice is to rest the radar in one's lap. Since some units have no on/off switch—and few officers know to turn them off even when it is possible—the radars continue to transmit while resting there.
- Among officers with eye cancer, all but one used window- or dashboard-mounted antennas. The lone user of hand-held radar said he would hold the antenna in front of his face and aim it out the back window of his vehicle to clock the speed of cars coming from behind as he sat on the shoulder of the interstate.
- Among officers with brain tumors, all but one reported using window- or dashboard-mounted radars. Their radars' antennas would sometimes be aimed directly at their heads. Some used older radar units with the antennas mounted on the inside of the window directly behind the driver's seat. The antennas pointed forward, directly at the officers' heads, and had no on/off switch. This means these officers were exposed to the radar signal for most of every shift.
- The officer with bladder cancer said he used hand-held radar while he was a motorcycle officer. He told me that he would rest the radar unit on the gas tank of the motorcycle, between his legs. He would always place the antenna so it was aimed toward him—continuously transmitting right at his bladder.
- One officer reported lymphoma in his right hip. He commonly rested a hand-held radar unit on the seat next to his right hip.
- Another officer related his thyroid cancer to the use of hand-held radar: when he was not aiming it out the window to clock the speed of approaching cars, he would rest the antenna against his chest, aiming upwards toward his throat.

From an examination of my database, it appears that all types of radar are potentially dangerous—and that hand-held units pose the greatest risk to police officers.

I am an 11-year veteran of the Ohio State Highway Patrol and have been investigating the connection between traffic radar and cancer for over three years. Officers have never been warned not to

rest the antennas in their laps or not to aim the antennas at their heads or other parts of their bodies. Officers have not been given enough information to make an informed decision about their use of traffic radar.

Sincerely,

Gary Poynter
6693 Cincinnati-Dayton Rd.
Middletown, OH 45044

EMFs and Toys

To the Editor:

In the course of performing a routine EMF survey with an EMDEX C gaussmeter, we found extraordinarily high ELF magnetic fields associated with a toy air hockey game set. (Other popular versions include air football and air soccer.)

The game is powered by a motor in the center of the playing board, which is about 2 feet by 4 feet. EMFs from the motor were measured at nearly 2,000 mG about 2-3 inches from the motor. EMF readings 6 inches from the sides of the game ranged from 15 to 50 mG.

Because children lean over the game to play it, they may be exposed to several hundred milligauss during actual play. Children play these games for hours each day.

This exposure is much higher than the average residential exposure for children (about 1 mG in California). By comparison, the highest readings I've taken for pad-mounted ground transformers are in the range of 900-1,000 mG. These are off-limits for all children and are marked with warnings. Compared with occupational exposures for adults, the air hockey game ranks higher than all but a few in the "electrical occupation" categories.

Parents may wish to scrutinize toys and games more closely before purchasing them. Until science can confirm or eliminate concerns about the link between magnetic fields and adverse health effects, it would be prudent to know the exposures from elective purchases such as toys.

Sincerely,

Cindy Sage
Sage Associates, Environmental Consultants
1283 Coast Village Circle, Suite 5
Montecito, CA 93108

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UPDATES

CELLULAR COMMUNICATIONS

Statistical Abstract...The Cellular Telecommunications Industry Association (CTIA), a Washington, DC-based trade group, reports that 2.3 million customers signed up for cellular service in 1991—some 6,400 new subscribers each and every day—bringing the total number of cellular users in the U.S. to 7.6 million. Other CTIA facts: the industry's 1991 revenues were \$5.7 billion; at the end of the year, there were 1,252 cellular systems in operation at 7,847 cell sites; and the industry's total capital investment was \$8.7 billion as of December 1991.

INTERNATIONAL

Singapore Standards...The Republic of Singapore's Radiation Protection Act of 1991, which covers microwave ovens, MRI equipment, UV sunlamps, lasers and ultrasound units, took effect on February 1, 1992. The legislation appears in the November 1, 1991 *Government Gazette*; copies are available from: Aubrey Covey, Standards Code and Information Program, NIST, TRF Bldg., Room A163, Gaithersburg, MD 20899, (301) 975-4036.

OVENS

WHO Assures Safety...Foods prepared in microwave ovens are not a health risk as long as the manufacturers' instructions are followed to ensure that any pathogens are killed, according to a position statement issued by the World Health Organization (WHO) in Geneva, Switzerland. "The WHO has no information to support the contention that cooking with microwaves induces any toxic substances or harmful effects," WHO stated in a February 7 press release. WHO did not say what prompted the assurances, but, over the years, there have been recurring concerns over health risks due to incomplete cooking (see *MWN*, Jun81, Ap82, S/O88, M/A89 and M/J90). In 1989, researchers at the University of Vienna in Austria wrote to *The Lancet* (December 9) that cooking milk in a microwave oven could cause molecular changes in some amino acids, leading to the formation of neurotoxic compounds. *Microwave News* requested more details from the Vienna team, but has received no response. Experts in the U.S. and the U.K. have sharply discounted these claims. Some 70% of U.S. households have microwave ovens, as compared with 20% in France and 15% in Germany, according to WHO estimates.

PEOPLE

Dr. Ben Greenebaum of the University of Wisconsin-Parkside in Kenosha will take over from Dr. Don Justesen as the editor of *Bioelectromagnetics* this summer after the completion of Volume 13. "We're working on speeding up the publication process," Greenebaum said in a telephone interview....In June, Dr. Gregory Lotz will join NIOSH's research labs in Cincin-

nati, OH to work on EMF issues after 15 years at the Naval Aerospace Medical Research Lab in Pensacola, FL....Two former members of the EPRI staff have returned to the institute. John Dunlap has left Florida Power to become project manager of EMF research within the Electrical Systems Division. And Dr. Robert Kavet is becoming the manager of exposure assessment research in the EMF Health Studies Program. Kavet is taking over from Dr. Stan Sussman, who has moved up to become the manager of EMF issues being addressed by four EPRI divisions....Dr. Zory Glaser has retired from FDA's Center for Devices and Radiological Health. He plans to continue to teach and to consult on NIER issues....John E. Gerling has stepped down as the head of Gerling Laboratories, which he founded in 1979. The company has been sold to Applied Science and Technology Inc., a major producer of microwave power generators. John F. Gerling, his son, will continue to manage the firm, which is based in Modesto, CA....Dr. Frank Shellock has left Los Angeles's Cedars Sinai Medical Center to join the UCLA Medical Center; he will continue to be affiliated with Tower Imaging....Dr. Jeffrey Guttman has joined Enertech Consultants as a senior research engineer after nine years at Lockheed's Palo Alto research lab. Guttman will work on magnetic field transients....There have been rumors that Dr. Tom Budinger has resigned as the chair of IEEE's Committee SCC28, which develops standards for both RF/MW radiation and ELF EMFs. Although Budinger would not speak directly to *Microwave News*, he said, through his secretary, that he has not resigned.

RADAR

Affordable Homes...A housing group for two Cape Cod, MA towns plans to use unoccupied homes on the North Truro Air Force Station as low-income residences, but the presence of a nearby radar facility has some officials worried. The tract of homes is about a quarter-mile from an FPS/91A long-range air traffic control radar. According to the FAA, this is the same type of radar—based on the same transmitter—as the FPS/66A in South Patrick Shores, FL, which is seen as a possible cause of a cluster of Hodgkin's disease cases among nearby residents (see *MWN*, J/F92). Raymond Crowell, chairman of the Wellfleet-Truro Creative Housing Partnership, raised the group's concerns with the FAA and was assured that the site is safe, according to a January 28 article in the *Cape Cod Times*. Officials at the FAA's New England regional offices in Burlington, MA told *Microwave News* that human exposure would only exceed FAA safety guidelines (4.3 mW/cm²) within 630 feet of the radome. "The houses are both beyond this area and below the level of the antenna," said Patrick O'Connors, an FAA engineer. The officials said they were not familiar with the Hodgkin's disease cluster. The agency has announced plans to replace the existing radar with a less powerful unit in 1993.

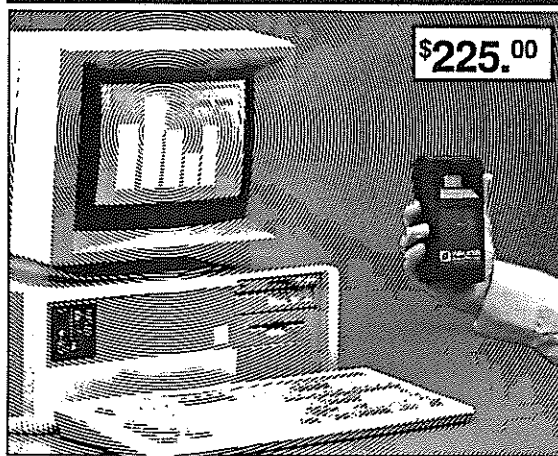
NY NEXRAD Report...A January 1992 report by the New York State Assembly Environmental Conservation Committee

states that the committee will "work to ensure that radars are sited only in areas where any environmental and health impacts can be minimized." The report is based on a year of research on the health effects of ELF and RF radiation and on a public hearing held in Sayville, NY in 1990. The National Weather Service (NWS) sought to site one of its Next Generation Weather Radars (NEXRAD) in Sayville, but protests by local residents—who feared that the 2.7-3.0 GHz radar could threaten public health—forced the agency to abandon the proposed site in 1990. The agency is now considering an alternative site at the nearby Brookhaven National Lab, which will most likely be approved, according to Lewis Boezi, department assistant for modernization at the NWS in Silver Spring, MD. The NWS is also facing opposition in Batavia, one of four other NEXRAD sites being considered in New York State. For more on NEXRAD, see "A Modern Weather Service," *Technology Review*, January 1992, and "Weather Radar Forecast: Mostly Cloudy," *Microwaves and RF*, March 1991. To order a free copy of *Non-Ionizing Radiation: A Report on the Proposed Next Generation Doppler Effect Radar System*, contact: Assemblyman Paul Harenberg, Room 724, LOB, Albany, NY 12248, (518) 455-5937.

RESOURCES

Workshop Report...The DOE has released the final report of its November 20-21, 1991 meeting (see *MWN*, N/D91). *The Development of a Coordinated Research and Communication Program on the Potential Health Effects of Electric and Magnetic Fields: Workshop Report* (February 1992) is available from: Marvin Gunn, Director of the Advanced Industrial Concepts Division, CE-232, 5E-066, DOE, 1000 Independence Ave., SW, Washington, DC 20585, (202) 586-5377.

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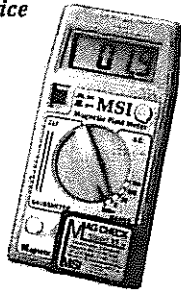
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