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INSIDE...

Making the Economic Case for EMF Bioeffects Research

For the last six months, Dr. Keith Florig has been saying that dealing with perceived electromagnetic field (EMF) health risks—prudently or otherwise—is now costing the U.S. over $1 billion a year, and perhaps much more (see *MWN*, N/D91 and M/A92). The cost of *not* doing research, he says, is far greater than that of doing the work that might show, as some critics argue, that there are no low-level EMF risks.

Florig, a fellow at Resources for the Future in Washington, has just published the details of his analysis in the July 24 issue of *Science*, one of the country's most influential policy forums.

On the basis of a rough cost–benefit analysis, he estimates that if the cancer risks are as "large as suggested by some epidemiological evidence," the U.S. could "justify spending" on the order of $10 billion a year on EMF mitigation. "This may not be much more than the highly uncertain estimates of the costs of our current ad hoc efforts—and, if applied entirely to the electric power system, would increase electricity costs by only several percent," Florig told *Microwave News*.

Billions of dollars may be being wasted, Florig allows, but this can only become known "through additional bioeffects research." He rejects as politically unrealistic the call of those who would prefer to "quell 'irrational'

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Judge Extends Time for Filing RF/MW Radiation Exposure Claims

A New York trial judge has ruled that claims arising from exposure to radiofrequency and microwave (RF/MW) radiation are not subject to the usual statute of limitations. The June 30 decision from Judge Edward Lehner gives people more time to file lawsuits after they have been injured, a policy similar to the one followed in asbestos and DES cases.

"This decision will not be lightly disregarded," said the plaintiff's lawyer, John Sweeney of John E. Sweeney & Associates in Agoura Hills, CA.

The product liability suit was brought by Thomas Ford, who worked as a U.S. Navy radar technician between 1965 and 1967. Ford believes that his military exposure to RF/MW radiation caused his non-Hodgkin's lymphoma. He filed a claim in 1990, which he said was two years after he began to suspect the radar. Ford holds the manufacturers of the radar equipment responsible for negligently causing his injuries (see *MWN*, N/D90).

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« Power Line Talk »

A panel set up by the Committee on Interagency Radiation Research and Policy Coordination (**CIRRPC**) has completed its review of EMF health risks and is set to release its report. The panel argues strongly that there is no compelling evidence of adverse health effects from power line or VDT EMFs, *Microwave News* has learned, and it opposes any major expansion of EMF research funding. Commissioned in the fall of 1990 at the request of the Department of Labor in reaction to the series of articles in *The New Yorker*, the review was put in the hands of the Oak Ridge Associated Universities (**ORAU**) in mid-1991, after a false start (see *MWN*, N/D90, J/A91 and S/O91). The 450-page CIRRPC response has not yet been seen outside of ORAU, said Diane Flack, a technical adviser in ORAU's Washington office. It will be made available to the public and the federal agency representatives that make up CIRRPC at the same time, she told *Microwave News*, in an effort to assure the independence of the expert panel that conducted the review. Top administration officials were briefed on the findings on June 15—and were given explicit warnings that the briefing was confidential. The White House science adviser, Dr. **Allan Bromley**, did not attend. Among other key points reportedly made by the panel: epidemiological links to childhood leukemia are inconclusive; there is no strong evidence of carcinogenicity; there is no compelling evidence of developmental or teratogenic effects; and neurobehavioral effects are generally temporary and not severe.

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Dr. **Gerri Lee**'s epidemiological study of miscarriage risks among users of **electric blankets** has many people talking. Lee, who is with the California Department of Health in Berkeley, presented some preliminary results at a by-invitation-only workshop sponsored by **EPRI** and the **DOE** in early July—she reported an up-to-fivefold increased risk among women who use electric blankets. In an interview with *Microwave News*, Lee said that she would prefer not to discuss her results because "they are based on crude preliminary analyses of retrospective, incomplete data." Her study is much anticipated because it is the first prospective study of its kind, but Lee pointed out that she has only looked at the retrospective part of her data. "The final results could easily change," she cautioned. If Lee does conclude that electric blanket users suffered high rates of miscarriages, her study would be the fifth to indicate that EMFs can affect pregnancy. Lee's final results are not expected until next year.

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At the time the House of Representatives included a major EMF research initiative in the **national energy strategy bill** it passed earlier this year (see *MWN*, M/J92), many on Capitol Hill expected Congress to approve the energy legislation quickly. But it now seems that time is running out to reconcile differences between the House and Senate bills, as legislators are anxious to get on the campaign trail. The Senate version, which does not contain any EMF provisions, was approved on July 30, after a battle over coal miners' health benefits threatened to kill it. As we go to press, the legislation is in the hands of a House–Senate conference committee, only some of whose members have been named. The committee is expected to meet once in August and reconvene after Labor Day, according to a House aide. If the energy legislation fails, it will be a whole new ball game for congressional EMF research funding in 1993. Rep. **James Scheuer** (D-NY), chairman of the subcommittee that launched this year's EMF bill, will retire at the end of this session. Rep. **George Brown** (D-CA), the influential chairman of the House Science, Space and Technology Committee, who has shown a continuing interest in a national EMF program (see *MWN*, J/F92), is facing a tough reelection challenge from Republican Dick Rutan. Brown must run in a redrawn district—one that now favors a Republican, according to *Roll Call* (July 13), a Capitol Hill newspaper which lists Brown as one of the ten most vulnerable House Democrats.

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The prospects of the National EMF Research Program (**NERP**) Steering Committee that is being led by **John Coughlin** of the Wisconsin PSC have risen and fallen with the energy bill. If the EMF program contained in the energy legislation is enacted, Coughlin's committee will have little or no role, according to many observers. But if the energy bill fails, "We really will be the only game in town," Coughlin told *Microwave News*. Key utility groups agree. Rick Loughery of the Edison Electric Institute (**EEI**) said that EEI supports a legislated research program but added that if the EMF program dies in Congress, then "the NERP is probably where we're going to turn." Similarly, Anne Strauss of the New York Power Authority (**NYPA**) told us that, "We cannot afford to wait another two years" to start a major research effort. According to Loughery, "The next meeting for the NERP is going to be critical."...At the steering committee's July 14-15 meeting in Alexandria, VA, NIOSH's Dr. **Lawrence Fine** became a member. And a week later, Coughlin announced that DOE's **Marvin Gunn** would also join the committee, bringing to three—with EPA's **David Kleffman**—the number of federal government representatives. The committee also opened the door to more direct industry involvement by deciding to allow utility company officials to join as nonvoting members—a departure from a year-old practice meant to maintain distance between the NERP and industry. So long as the utility representatives are only observers, their involvement "doesn't compromise them or us," said Coughlin. The subject of credibility was on the agenda at the July meeting as the committee discussed a draft policy stating that the NERP "must identify and avoid situations that may result from real, perceived or potential conflicts of interest." The committee hopes

Commentary

Fear and Cowardice at EPA

Little has been resolved in the more than two years since the Environmental Protection Agency (EPA) stunned the country with its report, which labeled EMFs "probable" or "possible" carcinogens. While some reviews have cast doubt on the strength of EPA's conclusions, recent studies—notably, Peters on childhood cancer and McLean and Stuchly on EMF–chemical cancer copromotion in animals—have made the link all the more convincing.

Incredibly, EPA has failed to sponsor a single study of any kind to explore the EMF–cancer connection since it issued the report. The agency is pretending that the report does not exist and that it never sounded the alarm. Staffers at EPA's Office of Research and Development, which is headed by Dr. Erich Bretthauer, have even refused to spend the meager $1.9 million allocated by Congress for EMF research in 1992. With only a few weeks left in the fiscal year, this money will probably have to be returned to the treasury.

Last year, rather than fund any original work, Bretthauer gave most of his EMF money to the Health Effects Institute (HEI) in Cambridge, MA so that the institute could teach itself about EMFs in preparation for running a National EMF Research Program (NERP). That money was wasted. First, no one could understand why EPA was not using its own in-house experts. Then, Bretthauer and his aides, Dr. Ken Sexton and Dr. William Farland, got egg on their faces after word got around that HEI had a credibility problem over its work on asbestos. After all, the whole point of a NERP was that it be free from real or perceived biases. Otherwise, it would have been easier to let the electric utility industry handle the EMF question.

EPA's performance is no different than crying "Fire!" in a crowded theater. Having raised the alarm over EMFs, the agency has an obligation to try to allay public concerns or to adopt policies to control health risks. All sides agree that more research is needed—Dr. Keith Florig has now shown that EMF research also makes good economic sense (see p.1)—so why does EPA refuse to spend its few available dollars at a time when EMF scientists are begging for money to keep their labs open?

The answer lies at the highest levels of the Bush Administration. Dr. Allan Bromley, the President's science adviser, and the U.S. Air Force want to stifle the EMF issue—and, in many ways, they are succeeding. The about-to-be-released CIRRPC report promises to show their hand by taking an absurdly dismissive view of the possibility of EMF health risks (see item at left).

After having been called onto the White House carpet a few times, Bretthauer and his crew got the message and they now turn a deaf ear whenever the subject is raised. Things are so bad that Bretthauer won't even let the Office of Radiation Programs, in another part of EPA, issue a booklet to answer the public's questions about EMFs. As one EPA staffer told us, "Our managers are absolutely terrified about this issue."

There are rumors that EPA Administrator William Reilly made a deal with Bromley: Bromley would support EPA on greenhouse gases if Reilly ignored EMFs. If true, Bush's performance at the Rio environmental summit would indicate that Reilly sold out EMFs for nothing.

It may be too late, but EPA could salvage the $1.9 million by giving the money to the NERP Steering Committee, chaired by Wisconsin PSC Commissioner John Coughlin. This small amount of money would be a windfall for the committee, which is fighting for its life after more than a year of trying to get a research program off the ground.

If Bretthauer refuses to do EMF research, at least he could give the money to a group that *is* committed to doing it. The public deserves answers and it's time someone had the courage to give them some.

to insulate itself from potential conflicts by giving decision-making authority to a newly created board of directors and limiting the steering committee to an advisory role. Some current committee members will serve on the board. The committee is planning its fall meeting to coincide with either the EPRI science and communication seminar in San Francisco, October 13-16 or the annual DOE Contractors' Review in San Diego, November 9-12.

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On June 22, the **Connecticut** legislature overrode a veto by Governor Lowell Weicker, assuring that the state's EMF Interagency Task Force will continue to report to the General Assembly. "Even if the task force had lost its legislative mandate, we still would have followed the issue," Dr. **Peter Galbraith** of the Department of Health Services (DHS), cochair of the task force, told *Microwave News*. "But this way the DHS won't appear to have closed the book on EMFs." The new law—Public Act 92-169—essentially continues work begun under an earlier measure that Weicker signed in June of 1991 (see *MWN*, M/J91, J/A91 and M/A92). On July 28-30, the DHS and the task force sponsored a meeting, *Electromagnetic Fields: How Do We Deal with the Issues?* at which Drs. **Michael Bracken, David Carpenter** and **Jan Stolwijk** spoke. All three are members of the ad hoc committee that wrote the **Connecticut Academy of Science and Engineering**'s recent report, which found that it would be "inappropriate" for public authorities to recommend a policy of prudent avoidance (see *MWN*, M/J92). According to Don Michak's account of the meeting in the *Journal Inquirer* (July 29), Carpenter "threatened to quit the panel" because the report downplayed the EMF–cancer link. This fall, the task force plans to issue a study of prudent avoidance, and in January, Connecticut Health Commissioner Susan Addiss will advise the legislature on recent research on EMFs and health effects.

The Economics of Mitigation

Magnetic fields from power lines can be reduced substantially—depending on how much one wants to spend, according to a report commissioned by the Rhode Island EMF task force. The $81,500 study, financed by Rhode Island utilities, looks at the costs associated with different magnetic field-reducing techniques.

Burying power lines—the most effective option—costs nearly four times as much as traditional overhead designs, according to the report prepared by Commonwealth Associates of Jackson, MI. While a 345 kV H-frame configuration costs $390 per mile to build, putting the same line underground would cost $1,450 per mile. The cost and effectiveness of the other alternatives fall between those of the traditional and the underground designs.

"The task force will probably propose that the state Energy Facility Siting Board assume jurisdiction over the siting and construction of high voltage power lines, including those of 345 kV or below," Scott Wolf, chairman of the Governor's EMF Task Force, told *Microwave News*. He noted that the board now only regulates lines over 345 kV, of which there are "really none" in the state. The task force will issue its recommendations to the governor by the first week in August, he said.

The study, released to the public on June 24, features more than 90 pages of charts and diagrams. It focuses on mitigation techniques that "take advantage of the natural canceling effect of the three-phase circuit." Analysis is limited to 115 and 345 kV transmission lines—those planned for Rhode Island. Similar mitigation reports have been commissioned in Florida, New York and Washington State (see *MWN*, J/F92).

Florida's report will be completed by October, according to Ken Klein, of Energetics Inc., who is based in Washington and who manages the project (see *MWN*, M/A89 and M/J90). The study, which he said will cost less than $300,000, is looking at alternative designs for 230 kV and 500 kV lines.

In New York, two mitigation studies are under way and should also be completed by October, according to John Wilson of Con Edison, who is a member of the Empire State Electric Energy Research Corp.'s EMF Task Force (see *MWN*, M/J90).

Excerpts from the Rhode Island report, *Cost Effectiveness Analysis: Mitigation of Electromagnetic Fields*, follow:

- For 345 kV overhead transmission, magnetic fields at the edge of [the] right-of-way can be reduced by 45% (relative to existing H-frame structures) by designing support structures to result in a compact delta configuration of the phase conductors...the incremental increase in construction cost for this design is 21% and in life-cycle cost, 14%.
- Edge of right-of-way magnetic fields can be reduced by 75% over existing 345 kV H-frame designs by using a six-wire configuration. ...The incremental increase in construction cost for this design is 41%, and in life-cycle cost it is 27%.
- Underground 345 kV transmission provides the greatest reduction in magnetic fields. [The field] is estimated to be 1.7 mG [directly above a buried pipe] and 0.12 mG 25 feet from the pipe for 600 amp loading. The estimated construction cost...is 372% more than for existing overhead design and 266% more on the basis of life-cycle cost.
- For 115 kV overhead transmission, there is more opportunity for the designer to compact the phase spacing than at 345 kV. By decreasing the phase spacing and arranging the phases in a delta arrangement, the edge of right-of-way magnetic fields can be reduced by 57%....The construction cost and life-cycle cost of the compact design are nearly the same as for existing 115 kV H-Frame designs.

A limited number of copies of the Rhode Island report, for which there might be a charge, are available from: Scott Wolf, Chairman of the Governor's EMF Task Force, Statehouse, Room 111, Providence, RI 02903, (401) 277-2850. For more on six-wire configurations, see *MWN*, J/F92.

DOE Research Plan Draws Weak Public Response

The Department of Energy (DOE) has tried to solicit comments on its EMF research agenda but has been frustrated by a lack of involvement by grass-roots citizens groups.

Only a handful of power line critics spoke at two meetings—in Denver on June 29 and in Philadelphia on July 9—that were held to learn the public's opinion of DOE's national EMF program. Most who testified were from the utility industry, government or various research organizations—all of which have participated throughout the planning process that the DOE began last November (see *MWN*, N/D91, J/F92, M/A92 and M/J92).

DOE officials have said that the final research plan, which is due in September, must reflect a consensus of all interested parties. The agency has not scheduled any more public meetings but is accepting written comments through August 7.

The DOE's EMF staff was disappointed by the weak public turnout, Robert Brewer, director of the department's utility systems division, told *Microwave News*. He said that the DOE had expected the upswing in media coverage of EMFs and the growing number of citizens groups across the country to generate much greater involvement.

The DOE had picked Denver and Philadelphia for the hearings because both are focal points in the debate over power line EMFs. Two of the major epidemiological studies of EMF exposure and childhood cancer were carried out in Denver (see *MWN*, N/D86). And a well-organized citizens group is opposing a 230 kV transmission line built by Philadelphia Electric Co. (PECO) in suburban Philadelphia (see *MWN*, M/J91).

At the Denver meeting, only three people spoke—none on behalf of citizens groups. And, of the three, one came forward only after being encouraged to do so by DOE staff during the course of the meeting, according to Brewer. In Philadelphia, 12 people spoke; four were EMF activists, including Louise Young, the author of *Power over People*, first published in 1973 and recently reissued by Oxford University Press.

The group fighting the PECO line, Parents Against an Unsafe Environment (PAUSE), did not show up in Philadelphia. Although the DOE announced the meetings in the *Federal Register* on June 2, PAUSE's Dorothy English told *Microwave News* that she did not hear about it until late June. "We should have had more time," English said.

Other citizens groups made similar complaints. For instance,

Harry Kochenderfer of the York County (PA) Citizens' Action Group testified that he could not comment on DOE's *Draft Strategic Overview* because he had only seen it for the first time that day. His group and several others are opposing a proposed 500 kV line between Pittsburgh and Harrisburg (see p.6).

Michael Reed of DOE's Morgantown, WV Energy Technology Center criticized his own department for not informing its field offices about the ongoing EMF planning process. In Philadelphia, he said that he had learned about the development of DOE's research agenda just a few days before the meeting. "EMF is very important to us," Reed said.

Legal Notebook

$2.5 Million Power Line Relocation Delayed

On July 8, the Illinois Commerce Commission (ICC) agreed to reconsider an earlier decision which would have forced Commonwealth Edison Co. to relocate a 138 kV power line. Pending the outcome of its review, the commission granted the utility a stay—delaying the move, which the company estimates would cost $2.5 million.

On May 28, the ICC ordered Chicago-based Commonwealth Edison to move the power line within three years. It found that the utility violated the state Public Utilities Act when it failed to seek permission for an upgrade from 34 kV. The upgrade was completed in 1987.

The ICC discovered the violation after Nick Lazazzera of Westchester, a suburb of Chicago, complained in 1990 that the transmission line was too close to his house and that it threatened his health and the value of his property. The commission didn't rule on either of these claims, but did order the utility to try to get rid of Lazazzera's television interference, about which he had also complained.

A spokesman for Commonwealth Edison, John Hogan, who called ICC's decision to rehear the case "very good news," said that the power line in question is an emergency standby line that is only "minimally energized." He said that Commonwealth Edison never had to ask permission to upgrade a power line in the past, and that ICC's May order was "arbitrary and unnecessarily costly."

The commission said that it granted the rehearing to determine whether Commonwealth Edison needed to apply for a permit, according to ICC spokesman David Farrell. A hearing date has not been set.

Judge Excludes Testimony In EMF Case

An Alabama judge has excluded EMF testimony from a lawsuit, arguing that there is not enough scientific evidence that EMFs are a health threat.

Alabama Power Co. had asked the judge to take this position in its case against Western Pocahontas Properties Ltd. Partnership. In 1988, the Birmingham-based utility condemned a strip of land that runs through property owned by Western Pocahontas in Shelby County, outside of Birmingham, to build a 30-mile, 230 kV power line. The two sides disagreed over how much money the utility should pay for the condemnation, which Western Pocahontas claimed would devalue adjacent land. "Power lines devalue property," said Alan Baker of Balch & Bingham in Birmingham, which is representing Alabama Power, "but not as much as they say."

In his May 1 decision, Circuit Court Judge Al Crowson ruled that the testimony of Dr. Andrew Marino of the Louisiana State University Medical Center in Shreveport should not be admitted because of the speculative nature of EMF bioeffects—or, in legal terms, because it did not meet the Frye rule.

The Frye rule grew out of the 1923 case, *Frye v. U.S.*, in which the court considered the "admissibility of evidence derived from a crude precursor of the polygraph," according to *Weinstein's Evidence*, a leading legal treatise. The court stated that the subject of testimony must be "sufficiently established to have gained general acceptance in the particular field [to] which it belongs." The Federal Rules of Evidence—which were adopted in 1973 and govern proceedings in U.S. courts—have since overridden *Frye*, but some judges continue to use the rule in their decisions. In two previous cases in Alabama, for example, judges refused to allow scientific testimony on EMFs for this reason.

At the same time, the U.S. Third Circuit Court has rejected the Frye rule, calling it "vague and conservative, and easily manipulated by the courts, usually to reject novel scientific evidence."

"I disagree with the judge's decision," said Jeff Grantham of the Birmingham firm of Maynard, Cooper, Frierson & Gale,

DOE Issues Overview of EMF Research Plan

The DOE has released its *Draft Strategic Overview: National EMF Research and Communication Program*, a summary of the agency's work on a coordinated EMF plan. The 21-page document describes the need for national research and lists the goals of the program (see *MWN*, N/D91). The DOE designed the overview to brief the general public and to provide a basis for comments and criticisms from advocacy groups.

The overview lists three priorities:

- Development of a research plan that takes into account all sides of the EMF issue;
- Involvement by other federal and state agencies and trade associations, as well as representatives from other countries; and
- Establishment of safeguards to ensure that research is of the highest scientific quality and credibility and to avoid "real or perceived" conflicts of interest.

Comments will be considered by the DOE officials preparing the final national plan, which is due in September. The overview was published in the June 2 *Federal Register* (pp.23,206-23,213); to order a copy of the *Draft Strategic Overview*, contact: Advanced Industrial Concepts Division, CE-232, 5E-066, DOE, 1000 Independence Ave., SW, Washington, DC 20585, (202) 586-5377.

State EMF Actions

Colorado...A group of scientists has found no link between EMFs and human health effects. Yet the researchers are quick to point out that, "It is equally clear that the book is not closed. Several questions remain unanswered...." The Universities Consortium on EMFs—five scientists from three Colorado universities—screened more than 11,000 articles to find those which were most methodologically sound. Although several of the human studies showed a correlation between EMF exposure and disease, "careful analysis...revealed possible bias in selection of controls." *Investigations in Power Line Frequency EMF and Its Risks to Health: A Review of the Scientific Literature*, released in June, was prepared with a $160,000 grant from the Public Service Co. of Colorado. "The report was our first project," said Edward Dauer, professor of law at the University of Denver and chairman of the Governance Committee that oversees the consortium, which was formed in January 1991. "We plan to be research managers—in the business of helping utilities or public agencies administer research projects." To order a copy of the report, contact: Michelle Reynolds, UCHSC, 4200 East 9th Ave., B165, Denver, CO 80262, (303) 270-7545. Elsewhere in Colorado, the Supreme Court—which had reversed a ruling denying Public Service's request to upgrade transmission lines—has granted Douglas County's request for a new hearing, sending the case back to the district court (see *MWN*, N/D89, M/A91 and M/J92). A date has not been set.

Florida...On June 23, Hillsborough County mounted its latest attack on the Department of Environmental Regulation (DER), when it proposed a 3 mG limit at the edge of rights-of-way for power lines of at least 230 kV. "We wanted to offer a first step in reducing exposure to EMFs," Michael Skelton of de la Parte & Gilbert, the Tampa law firm representing the county, told *Microwave News*. Skelton also said the county chose to take action after the DER failed to reconsider state standards (see *MWN*, J/F92). "We shouldn't change the standard until we get more science," said DER's Buck Oven. "I don't know if 3 mG is good enough." The issue will be discussed at the Environmental Regulatory Commission's October meeting.

Illinois...Utilities should take "prudent measures" to reduce EMFs, write two state agencies in a March report to the legislature. The Department of Public Health (DPH) and the state Environmental Protection Agency stress that setting state standards would be premature—given that EMFs are not a proven health threat—yet note that uncertain scientific evidence "indicates cause for concern." The report recommends that utilities reduce EMFs by providing larger rights-of-way, avoiding population centers and using mitigation techniques in future transmission lines. For a free copy of the 70-page report, *Possible Health Effects of Extremely Low Frequency Electric and Magnetic Field Exposure: A Review*, contact: Louise Boyd, DPH, Division of Environmental Health, 525 West Jefferson, Springfield, IL 62761, (217) 782-5830.

Pennsylvania...A battle is shaping up as citizens are opposing plans for a 268-mile, 500 kV transmission line between Pittsburgh and Harrisburg. PUC Commissioner Wendell Holland has called the dispute "one of the biggest cases I've ever seen," noting that the two sides have submitted at least 9,000 statements and other documents. Three subsidiaries of General Public Utilities—Pennsylvania Electric Co. in Johnstown, Metropolitan Edison Co. in Reading and Jersey Central Power & Light Co. in Morristown, NJ—are working on the project with the Duquesne Light Co. of Pittsburgh. The PUC is considering the utilities' proposal but has not set a date to begin public hearings. Harry Kochenderfer of the York County Citizens' Action Group in Franklintown is leading the opposition, along with two other citizens groups. Meanwhile, HB 2273, drafted by Rep. Patricia Carone in response to the proposed power line, continues to await a hearing in the Conservation Committee (see *MWN*, M/A92).

Washington...An EMF task force in Spokane is proposing that utilities be required to publish annually a six-year plan identifying potential routes for future power lines and substations. The group said the requirement would be a good way to keep the public informed. In its June report, the task force also recommends that the city not adopt safety standards because "not enough is known about the health risks associated with EMF...." For a copy of the *Electric/Magnetic Field Task Force Report*, contact: Irving Reed, Manager, Engineering Services, City of Spokane, 808 West Spokane Falls Blvd., Spokane, WA 99201, (509) 625-6270.

which is representing Western Pocahontas. Grantham added that he would have liked Marino to testify, but that "he's just one part of our case." Western Pocahontas, based in Huntington, WV, is focusing on the effects of power lines on property values, not on health. A trial date has been set for September in the Shelby County Circuit Court.

Georgia Utility Agrees To Release EMF Documents

On July 10, the Oglethorpe Power Co. withdrew its request for confidentiality in an EMF personal injury case, assuring public access to relevant documents.

Nancy Jordan and her family filed a lawsuit against Georgia Power Co. and Oglethorpe in 1991, claiming that power line EMFs caused her non-Hodgkin's lymphoma (see *MWN*, S/O91 and M/J92). The case is pending in state court.

On May 8, Trial Lawyers for Public Justice (TLPJ), a public-interest legal group, filed a motion to block the protective order requested by Oglethorpe, which sought to keep certain documents from the public file. But the utility later agreed to release the information and TLPJ withdrew its motion. Oglethorpe is based in Tucker, GA.

"This is an important victory not only for the injured parties, but also for the public's right to know about the dangers of EMF," said TLPJ Foundation President Anthony Cunningham of Cunningham, Wagner, Vaughan & McLaughlin in Tampa, FL.

In withdrawing the request, attorneys for Oglethorpe wrote that most of the information the utility had wanted to keep confidential "did not relate to EMFs." James Orr of the Atlanta firm of Paul, Hastings, Janofsky & Walker, who is representing the utility, declined to comment further.

Georgia Power "took no position" on Oglethorpe's action, according to Robert Pennington of the Atlanta firm of Troutman & Sanders, which is representing Georgia Power in the case.

Scenes from the World Congress

The *1st World Congress for Electricity and Magnetism in Biology and Medicine*, held at Disneyworld in Orlando, FL, June 14-19, attracted some 733 participants from 30 countries. Here are some snapshots from the meeting.

Army v. Air Force on HPM Research

One of the most surprising—and tense—moments of the congress took place in a back room at a sparsely attended session on high-power microwaves (HPM). Dr. Edward Elson of the Walter Reed Army Institute of Research (WRAIR) in Washington was describing experiments showing that animals became confused and disoriented after exposure to various types of short, high-peak, pulsed HPMs with average power levels below those specified as safe by the IEEE standard (C95.1-1991).

The Department of Defense (DOD) supports the standard, so it was surprising to hear Elson, an Army colonel, cast doubt about its adequacy, but then he went even further. The safety question may be resolved by politics, not by science, he said, taking aim at Pentagon plans to consolidate all military nonionizing radiation research under Air Force control at Brooks Air Force Base in San Antonio, TX.

Elson's concern over what would happen to his research program if it were moved to Brooks is shared by some at the Naval Aerospace Medical Research Lab in Pensacola, FL.

Senior DOD officials favor the consolidation as a way of cutting costs, but those who actually do the research doubt the Air Force's scientific credibility. They believe that the Air Force puts a higher priority on promoting electronic gadgetry than on protecting health and safety.

Elson's message was clear: if the Army and Navy go to Brooks, the HPM work will stop. Spotting James Merritt, a longtime member of the Brooks team, in the audience, Elson challenged him to respond. A somewhat reluctant Merritt came to the microphone to say the work would indeed continue.

Understanding the effects of HPMs is important because the DOD plans to use microwaves—both defensively and offensively. For instance, in the battlefields of tomorrow, impulse radars, which emit ultrawide-band HPMs, will detect so-called stealth aircraft such as the B-2 bomber, and HPMs will zap the enemy's electronics. Elson's experiments suggest that pilots flying through HPM environments may become confused and unable to make the quick decisions that keep them aloft and alive.

Leakage Through the Blood–Brain Barrier

The history of efforts to investigate the effects of microwave radiation on the integrity of the blood–brain barrier (BBB) is a clear example of how politics can sidetrack an important line of research (see *MWN*, S/O86). In 1977, two Army scientists reported that pulsed 1.3 GHz radiation could cause BBB leakage at 30 $\mu W/cm^2$, but this finding has never been properly pursued.

Although scientists in the U.S. have essentially been barred from this kind of BBB study, those in other countries have dared to go forward. In Orlando, two Swedish researchers said they could increase the permeability of the BBB with extremely low levels of 915 MHz radiation.

Drs. Leif Salford and Bertil Persson of Lund University in Lund announced highly significant increases in leakage through the BBBs of rats at specific absorption rates (SARs) as low as 0.01-0.1 W/Kg. (Most standards assume that there are no health effects below 4 W/Kg.) They were surprised not to find a dose–response curve: they observed about the same leakage from 0.01 to 3 W/Kg (it increased above 3 W/Kg).

Some of those who heard their presentation suspected that the rats had experienced a thermal reaction. Not so, Persson told *Microwave News*, explaining that they had checked this possibility by measuring rectal temperatures immediately after exposure; they had used a fan to dissipate excess heat, he said.

Salford, a neurosurgeon, explained that he had become interested in microwaves as a way of treating brain tumors because the conventional therapies are woefully unsuccessful. If leakage through the BBB could be controlled, he reasons, perhaps drugs could one day be delivered directly to the tumors.

"The system we are using is very sensitive and we invite others to learn our techniques," Salford said in an interview. In the meantime, he and Persson said, their work will continue.

Protection from Melatonin Blocked by EMFs

Interest in the possible influence of EMFs on the pineal gland and the hormone melatonin continues to grow. Indeed, shortly after the congress, a number of those who were in Orlando flew to Palo Alto, CA for a two-day workshop on *EMFs and Melatonin*, jointly sponsored by the Electric Power Research Institute (EPRI) and the Department of Energy (see p.2).

At the congress, Margrit Wiesendanger, who works with Dr. Robert Liburdy at the Lawrence Berkeley Lab in Berkeley, CA, announced that extremely low frequency (ELF) magnetic fields can block melatonin's ability to control the growth of human breast cancer cells.

Wiesendanger first confirmed reports by Dr. David Blask, who has shown that melatonin can inhibit the growth of cancer cells *in vitro*. Using estrogen-positive MCF-7 human breast cancer cells, she then repeated the experiment in the presence of a 60 Hz field and found that melatonin's protective action was countered by the magnetic field.

The mechanism of interaction is unclear, Wiesendanger said. She offered two alternative explanations: the magnetic field may influence events at the membrane surface, possibly the way melatonin is bound to cancer cells; or the field may directly enhance the growth of the breast tumor cells.

"Our *in vitro* results suggest that direct cellular level interactions between ELF fields and melatonin and breast cancer cells are possible," Liburdy told *Microwave News*.

Future Directions for EMF Epi Studies

Some observers have a hard time making sense of the many EMF epidemiological studies that have appeared over the last few years. In her plenary address, Dr. Genevieve Matanoski of the Johns Hopkins University School of Hygiene and Public Health in Baltimore offered a guide for the perplexed by identifying some of the common threads of the research findings and outlining suggestions for future work.

Matanoski pointed out that for both childhood and adult studies the timing of the EMF exposure is emerging as a crucial variable. Exposures at an early age or repeated exposures over extended periods of time appear to enhance cancer risks, she said. As an example, she cited the male breast cancer study by Dr. Paul Demers and coworkers (see *MWN*, J/A90 and S/O91), which indicated a substantial increase in cancer among those workers who were first exposed before the age of 30 or first exposed 30 years prior to diagnosis. Indeed, Matanoski noted that her own study of telephone linemen indicated that the greatest risk of leukemia was among workers exposed at an early age (see *MWN*, J/A91).

Second, Matanoski stressed the importance of investigating the effects of combined exposures. "Instead of only thinking about confounders, we need to look at the combined risk of EMFs with both chemicals and ionizing radiation," she told *Microwave News* in an interview following her talk.

Depression and Power Lines

More than a decade has passed since Dr. Stephen Perry, an English general practitioner, published the first of a series of papers linking power line EMFs to depression and suicide. His work has been largely ignored—some people have been openly scornful—but one presentation at the congress breathed new life into Perry's ideas.

Drs. Charles Poole, an epidemiological consultant based in Cambridge, MA, and Robert Kavet of EPRI reported an association between depressive symptoms and proximity to the right-of-way (ROW) of a power line. The link was moderately strong and reasonably precise, and it did not appear to be biased by attitudes about power lines or environmental issues in general.

Overall, Poole and Kavet found that depression was twice as common among people who lived along a ROW or who could see a power line from their property—a statistically significant increase. They also found a weaker link between non-migraine headaches and proximity to power lines.

"Exposure assessment is the weakest part of the study, but it would be relatively easy to go back and get these data or to try to replicate the study," Poole told *Microwave News*. He pointed out that their study cost only one fourth that of a cancer epidemiological study, but he declined to reveal where their study was done or who paid for it.

But Perry's work is not yet in the mainstream. A second paper presented in Orlando contradicted Poole and Kavet's findings. Dr. Shari McMahan of the University of California, Irvine, failed to find more symptoms of depression among women living next to a high voltage power line than among women living a block away. Her paper was adapted from her recently completed doctoral thesis.

McMahan measured the magnetic fields at the front door of the women's homes: average fields were 4.86 mG among those adjacent to the line and 0.68 mG among the controls. McMahan controlled for potential biases by not telling the 152 participants that she was investigating EMFs—she also no doubt profited by the fact that most people are not aware that magnetic fields drop off with distance from a power line.

Epidemiology Roundup

Male Breast Cancer Among Workers Under 65

Dr. Dana Loomis has observed a doubling of breast cancer deaths among male electrical workers under the age of 65. This result is not statistically significant, but Loomis told *Microwave News* that, "It would certainly suggest that breast cancer among men *might* be caused by electrical exposures." Loomis, of the University of North Carolina (UNC), Chapel Hill, also noted a "substantial deficit" of breast cancer deaths among older electrical workers, however.

In a letter to *The Lancet* (339, pp.1482-1483, June 13, 1992), Loomis wrote, "The results are consistent with earlier reports of excess breast cancer among younger men, particularly those who have worked in electrical trades and telephone-related occupations."

He cautioned that his study had only a small number of cases and that it lacked information on EMF exposures and potential confounders.

In a survey of men from 24 states who died of breast cancer between 1985 and 1988, Loomis found four cases—the expected number—among electrical workers. However, three of the cases—one electric power worker, one electrical and electronics engineer-technician and one telephone worker—were younger than 65 years old at death. This finding is more than twice the expected rate.

This is the fourth study to link EMFs to male breast cancer. In 1989, Dr. Genevieve Matanoski and colleagues at the Johns Hopkins University School of Hygiene and Public Health in Baltimore reported an increased incidence of male breast cancer among young telephone company employees (see *MWN*, N/D 89 and M/A91). In 1990, Dr. Paul Demers and coworkers at the Fred Hutchinson Cancer Research Center in Seattle reported a sixfold increased risk among certain young electrical workers (see *MWN*, J/A90 and S/O91). Later that year, Drs. Tore Tynes

and Aage Andersen of the Cancer Registry of Norway in Oslo identified a significant doubling of risk among electrical transport workers (see *MWN*, J/F91).

Loomis and UNC's Dr. David Savitz reported an elevated rate of brain tumor deaths among electrical workers in 1989 (see *MWN*, N/D89).

Australian Study Finds CRT–Brain Tumor Risk

A new Australian study has found that women who worked at cathode ray tube (CRT) computer monitors developed brain tumors at close to five times the expected rate. This is the first study to investigate a link between video display terminal (VDT) use and cancer.

"We found a significantly increased risk for glioma [a type of primary brain tumor] associated with use of [CRTs] by females, although the number exposed was small," concluded a team led by Dr. Philip Ryan, a lecturer in public health at the University of Adelaide's Department of Community Medicine.

The team observed a nonsignificant *decreased* risk among men exposed to radiation in general. "I cannot explain the different estimates of risk between males and females," Ryan told *Microwave News*.

The researchers could not identify any other environmental hazard to explain their results. They cautioned, however, that their work shared the weaknesses of other brain tumor studies: a small number of cases, the potential for recall bias and an inadequate means of assessing cumulative exposures. In addition, their study was not based on any *a priori* hypotheses. "These factors may explain some of the present findings," they noted in their paper, which appeared in the *International Journal of Cancer (51*, pp.20-27, 1992).

More than a dozen studies have linked EMFs to brain tumors (see *MWN*, M/A90)—although none has specifically addressed VDTs.

While the researchers observed an increased risk for women exposed to sources of ionizing and non-ionizing radiation, the risk became more pronounced when limited to CRT use. There was a fourfold increase in risk for radiation exposure in general—and an almost fivefold increase for CRT work alone. Both findings are statistically significant. The risk was somewhat lower when the researchers excluded women who could not be interviewed in person.

There were six women with gliomas who worked at CRTs—three computer programmers, one computer operator, one office clerk and one road-transport supervisor.

The team investigated 170 cases of brain tumors diagnosed in adults aged 25-74 from 1987 to 1990 and 417 controls. Both

Epidemiology in Print

• In a series of letters in the May 1 *AJE (135*, pp.1069-1075) on the wire code–cancer link, two researchers took aim at the Savitz and the University of Southern California (USC) childhood cancer studies (see *MWN*, N/D86, and M/A91 and S/O91, respectively). Dr. Kenneth Mundt of the University of Massachusetts School of Public Health in Amherst argued that wire codes may be one of a number of interrelated surrogates for lower socioeconomic status, rather than an indicator of EMF exposure. He added that the controls may have been biased toward a higher socioeconomic level, thus skewing the results. Dr. David Savitz replied that, unlike those who dismiss the evidence on EMFs and cancer on "intuitive grounds," Mundt offered some valid criticism, which should be considered in the design of future studies. The USC team, led by Drs. Stephanie London and John Peters, responded that, "While Dr. Mundt raises interesting issues, we cannot conclude that his alternative explanation of our data is compelling." Raising some technical points, Dr. Michael Bracken of the Yale University School of Medicine in New Haven, CT expressed concern that the USC team's presentation of its data misled readers—particularly the media—about health effects. In response, the USC researchers pointed out that their paper was written "for the scientific literature, not the public media," and that very few of the reporters who contacted them had even read the abstract.

• A typographical error led to a misinterpretation in Dr. John Vena's study of electric blankets and female breast cancer (see *MWN*, S/O91). In a letter in the April 1 *AJE (135*, pp.834-835), Dr. Richard Stevens of the Battelle Pacific Northwest Labs in Richland, WA argued that if the pineal gland is the site of interaction, then electric blanket EMFs would not be significant since, according to calculations by Drs. Keith Florig and James Hoburg, they would be less than 1.0 mG at head level. Vena and Dr. Saxon Graham, both of SUNY, Buffalo, replied that their original paper relied on an abstract by Florig and Hoburg which contained a typographical error: it read 1.0-4.0 μT at head level instead of 1.0-4.0 mG. Vena and Graham conceded that although some evidence suggests that electric blanket use does not disrupt pineal function, they could not rule out other possible, more direct interactions.

• Two review papers on male breast cancer have recently appeared: a team led by Dr. David Thomas of the Fred Hutchinson Cancer Research Center in Seattle published "Breast Cancer in Men: Risk Factors with Hormonal Implications" in the *AJE (135*, pp.734-748, April 1, 1992); and the Italian–Swiss team of Drs. Carlo La Vecchia, Fabio Levi and Franca Lucchini published "Descriptive Epidemiology of Male Breast Cancer in Europe" in the *International Journal of Cancer (51*, pp.62-66, 1992)....In addition to breast and brain cancer, prostate cancer is also on the rise, according to the Centers for Disease Control in the June 12 *Morbidity and Mortality Weekly Report* (pp.401-404).

• Challenging prevailing opinions, two British scientists are each proposing that childhood leukemia is the result of viral infections. According to the June 19 *Science (256*, p.1633), Dr. Melvyn Greaves of the Leukaemia Research Fund Centre at London's Institute for Cancer Research suggests that exposures to common viruses may have compromised the immune systems of childhood leukemia sufferers. Dr. Leo Kinlen of Oxford University's Cancer Epidemiology Research Group lays the blame on as-yet-unidentified cancer-causing viruses.

cases and controls were from metropolitan Adelaide.

The study is one of ten on adult brain tumors being carried out in seven countries around the world. This international effort is being organized by the International Agency for Research on Cancer (IARC) in Lyon, France. The Adelaide study is the only one that has analyzed data on CRT exposure, Ryan said. He does not expect the complete results of all ten studies to be published before mid-1994, at the earliest.

No Birth Defects for Electric Blanket Users

Pregnant women who used electrically heated beds (EHBs) in their first trimester were at no increased risk of giving birth to infants with certain congenital defects, according to a new study.

"These results suggest that 60-cycle fields do not cause neural tube and oral defects," concluded a team led by Dr. Larry Dlugosz of the Department of Social and Preventive Medicine at the State University of New York (SUNY), Buffalo. The team included Dr. John Vena, also of SUNY, and Dr. Michael Bracken of the Yale University School of Medicine in New Haven, CT (see also p.9).

The researchers said that they selected neural tube and oral cleft defects because they are established before the second trimester, are obvious at birth and are influenced by environmental factors. There have been no reports of an excessive rate of neural tube or oral cleft defects in EMF–laboratory animal experiments, they noted in the May 1 *American Journal of Epidemiology (AJE, 135*, pp.1000-1011).

The researchers studied 1,070 women (535 cases and 535 controls) living in upstate New York who gave birth in 1983-1986. The women were asked about their use of EHBs for the period of one month before to three months after their estimated date of conception. EHB exposures were estimated to be approximately 3-5 mG.

Although the researchers called for additional study of EMFs and adverse pregnancy outcomes, they lamented that the advent of new "low field" EHBs (see *MWN*, M/J90) and the widespread publicity about potential EMF health effects "will make it difficult, if not impossible, to conduct an unbiased observational study of this type in the future."

Melanoma Linked to Fluorescent Lights

A new Canadian study has determined that men exposed at work to fluorescent lighting had a significantly elevated risk of developing melanoma, a type of skin cancer.

Dr. Stephen Walter and coworkers at McMaster University in Hamilton, Ontario also found that men exposed to fluorescent lighting at home had an increased cancer risk. There was no consistent risk increase among women, however.

"While the combined evidence is not sufficient for immediate alarm, we feel that fluorescent light should continue to be investigated," they concluded in the April 1 *AJE (135*, pp.749-762). "Because fluorescent light devices may generate a substantial portion of human exposure to ultraviolet B, they must be considered as a potential risk factor for melanoma."

For men who had cumulative occupational exposures of more than 20 years, the odds ratio (OR) was 1.77; for exposures of more than 30 years, the OR was 1.92. The dose–response relationship is statistically significant. The team investigated 583 cases (277 men and 306 women) diagnosed between 1984 and 1986 and 608 controls (283 men and 325 women). All were residents of southern Ontario.

In 1982, an Australian team reported a doubling of skin cancer risk among women and men exposed to fluorescent lighting at work (see *MWN*, S82).

Motion To Dismiss Police Radar Case Denied; Trial in November

The first trial in a police radar product liability case is scheduled to begin November 10. The path was cleared when, on July 23, U.S. District Judge Stanley Weigel denied a motion by the radar manufacturers to dismiss the lawsuit brought by Police Officer Eric Bendure, who has non-Hodgkin's lymphoma.

In their motion for summary judgment, Kustom Signals Inc. of Overland Park, KS and MPH Industries Inc. of Owensboro, KY had challenged the alleged link between police radar and cancer. They argued that there is no basis in the scientific literature to support claims of a health risk.

"The defendants contended that our case was based on 'junk science'," explained Bruce DeBoskey of the Denver firm of Silver & DeBoskey. But the judge's decision "showed that the claims of cancer causation are based on legitimate, accepted scientific methodologies," he said. DeBoskey is Bendure's co-counsel with John Sweeney of John E. Sweeney & Associates in Agoura Hills, CA.

Dexter Louie of the San Francisco firm of O'Connor, Cohn, Dillon & Barr, which represents Kustom, told *Microwave News* that, "The plaintiff's experts are not basing their opinions on generally accepted scientific principles"; he said that the motion for summary judgment was based on this argument, but he would not comment further. John Warner of Corte Madera, CA, who represents MPH Industries, said he would not discuss the case until after the trial.

Judge Weigel had originally scheduled the defendants' motion to be decided July 9, but he delayed the decision so he could review additional information that he requested from the plaintiff's attorneys. His questions focused on, among other things, the applicability of studies concerning exposure to non-ionizing electromagnetic radiation (NIER) at frequencies other than those used by the radar guns.

In response, DeBoskey and Sweeney wrote that, "There is simply no scientific evidence which supports [the] defendants'

Other Police Radar Developments

60 Minutes Airs Investigative Report

60 Minutes ran its segment on possible health risks associated with hand-held traffic radar as its lead story on June 21.

Correspondent Morley Safer began the piece by interviewing officers from across the U.S., who described how they used the radar. George Nelson of Grand Rapids, MI, for example, explained that he rested the unit in his lap while it was transmitting and he believed the radiation caused his testicular cancer. Toward the end of the piece, Safer included a shot of Nelson and the five other officers in Grand Rapids who have developed testicular cancer (see *MWN*, M/A92).

For two different views on research and regulation concerning health effects from microwave radiation, Safer relied primarily on interviews with Dr. Eleanor Adair of the John Pierce Foundation Laboratory in New Haven, CT and Dr. Louis Slesin of *Microwave News*. The last word, however, was given to Ohio State Trooper Gary Poynter: having described the database in which he records cases of cancer among traffic radar users (see *MWN*, M/A92), Poynter lamented the deaths of many of his fellow officers.

The producers had planned to air the piece in the fall, during the show's regular season, but moved the airdate up because the issue was gaining attention and they feared that others would beat them to the punch. Indeed, in an apparent effort to scoop the top-rated CBS program, *NBC Nightly News* ran a short piece on June 19 by reporter Robert Bazell.

IEEE Reaffirms COMAR's Stance

Even before the *60 Minutes* piece aired, the Institute of Electrical and Electronics Engineers (IEEE) issued a response to the concerns raised by "the allegations of Poynter [which] have been expanded in a series of media events...." The institute reaffirmed its views in an "Entity Position Statement," written by its Committee on Man and Radiation (COMAR), which argues that police radar guns are safe because the power levels are low.

The five-page statement relies primarily on the IEEE's own 1991 microwave exposure guidelines, written by SCC-28, and on the previous ANSI C95.1 limits. It notes that, "The vast majority of police radars operate between 10 and 25 mW, although a small number of 100 mW devices are still in service. By comparison, the power output of a child's walkie-talkie is 35 mW, and cellular hand-held radio-telephones operate at power levels of hundreds of milliwatts."

The IEEE concludes unambiguously that, "There is no scientific basis for worry that exposure to police radar may cause or promote cancer."

FDA: Advice for Police Officers

Also responding to "recent stories in the news media" about possible cancer risks from police radar use, the Food and Drug Administration (FDA) has published a two-page *Update on Possible Hazards of Traffic Radar Devices*.

Written as questions and answers for police officers, the information sheet states repeatedly that there are no proven health risks. But it is less categorical than the IEEE statement and avoids any conclusion that the devices are safe. Referring to a "preliminary comparison" of the number of cancer cases reported by police officers with cancer rates in the general population, the FDA states that this comparison "does not appear to show a greater cancer rate among the police, but it is too soon to conclude that there is no risk." This assessment is partially based on a review of Gary Poynter's database of police officers who developed cancer after using radar.

The update describes a number of precautions that go beyond simply keeping the radar units at least six inches from any part of the body—the advice given in an FDA letter to IEEE's COMAR in June 1991 (see *MWN*, J/A91). The FDA now suggests the following "simple steps" to reduce exposure:

- Pointing the hand-held radars away from the body when they are on;
- Pointing fixed antennas away from the occupants of a patrol car;
- Turning hand-held units off when they are not in use; and
- Not pointing the radars toward metal surfaces in a patrol car.

The FDA sent out copies to police officials across the U.S., urging them to "make this update available to the officers under your jurisdiction." The update also explains that the FDA will "continue to evaluate the research" on microwave radiation and asks police officers to report all cases of cancer among radar users to its toll-free number, (800) 638-6725.

Experts for the Bendure Case

Both sides in the Bendure case (see p.10) have designated their experts—including many who will be familiar to those who have followed previous EMF lawsuits and controversies. The following individuals, among others, have provided testimony or have been listed in court filings as experts who may be called during the trial.

For Kustom Signals and MPH Industries: Dr. Budd Appleton, an ophthalmologist formerly with the U.S. Army Medical Corps; Dr. Roswell Boutwell, McArdle Laboratory for Cancer Research, University of Wisconsin, Madison; Dr. Linda Erdreich, Bailey Research Associates Inc., New York City; Dr. Michael Fischman, Division of Occupational and Environmental Medicine, University of California, San Francisco; Dr. Bill Guy, Bioelectromagnetics Research Lab, University of Washington, Seattle; Dr. Don Justesen, VA Hospital, Kansas City, MO; Dr. Jack Mandel, an epidemiologist in Minneapolis; and Dr. Kristian Storm III, Comprehensive Cancer Center, University of Wisconsin, Madison.

For Bendure: Prof. Leo Birenbaum, Polytechnic University, New York City; Dr. Andrew Marino, Louisiana State University Medical Center, Shreveport; Dr. Samuel Milham Jr., recently retired from the Washington State Health Department; and Dr. Milton Zaret, an ophthalmologist in Scarsdale, NY.

Boutwell, Erdreich and Marino have previously testified in lawsuits concerning power line EMFs; Guy and Justesen have been called as experts in hearings on the siting of cellular and microwave towers. Appleton and Zaret have long held opposing views about the effects of microwaves on the eye. Storm was, for a time, the chairman of the SCC-28 subcommittee that wrote the C95.1-1991 standard.

Alternative Speed Enforcement Methods

Alternatives to traffic enforcement radar guns are discussed in "Improving on Police Radar," a six-page article in the July 1992 *IEEE Spectrum*. The author, Dr. David Fisher of the Michigan State University Radar Testing Laboratory in East Lansing, discusses radar, lasers, video cameras and Vascar (a device that calculates speed based on an officer's visual observations). The focus is on which technology is most effective for catching and prosecuting speeders. Fisher, who has done extensive testing of radar gun emissions (see *MWN*, N/D91), makes no mention of possible health risks from radar.

'divide and conquer' strategy to isolate the narrowest frequency band involved in police radar and ignore the great quantity of scientific evidence at other points along the [NIER] spectrum."

DeBoskey told *Microwave News* that the court had accepted their view that research on radiation at other frequencies is relevant to police radar cases, adding that this decision is in turn important for lawsuits that allege adverse health effects from other types of NIER. "The same types of attacks are going to be made in radiofrequency [RF] radiation cases, power line cases, and so on," DeBoskey said.

Indeed, many participants in the Bendure case have played a role in other legal battles over NIER (see box p.11). Sweeney, a veteran of several military radar cases (see *MWN*, D82), is currently working on two RF/microwave radiation injury claims (see p.1). DeBoskey represented Beryl Main, who alleged that her lymphoma was caused by exposure to RF radiation from an FM radio transmitter operated by Jefferson-Pilot Broadcasting Inc. The case was settled out of court in March 1990 (see *MWN*, M/A87, M/J87, S/O89 and M/J90). DeBoskey is also cocounsel for Nancy Jordan, who has sued Georgia Power Co. and Oglethorpe Power Co., claiming that EMFs from the companies' power lines caused her non-Hodgkin's lymphoma (see p.6 and *MWN*, S/O91).

Bendure worked for the San Anselmo (CA) Police Department from 1985 to 1988 and for the Petaluma (CA) Police Department from 1988 to 1990. During that time, he used several models of Kustom hand-held traffic radar extensively. He was diagnosed in early 1989 with non-Hodgkin's lymphoma. According to his attorneys, the cancer originated in his right groin area near where he rested the radar when it was transmitting but not being used to clock traffic.

Senate Hearing on Police Radar

Sen. Joseph Lieberman (D-CT) is planning to hold a hearing on the health effects of traffic radar on August 10 in Washington.

Those scheduled to testify include: Dr. Ross Adey, Veterans Administration Hospital, Loma Linda, CA; Dr. William Farland, Office of Health and Environmental Assessment, Environmental Protection Agency, Washington; Sam Franzo, International Brotherhood of Police Officers, Rocky Hill, CT; Dr. Brian Hardin, National Institute for Occupational Safety and Health, Washington; Henry Kues, Applied Physics Lab, Johns Hopkins University, Laurel, MD; John Kusek, Kustom Signals Inc., Overland Park, KS; Officer Thomas Malcolm, Windsor Locks (CT) Police Department; State Trooper Gary Poynter, Middleton, OH; and John Rankine, IEEE Standards Board, Washington.

Lieberman is chairman of the consumer and environmental affairs subcommittee of the Committee on Governmental Affairs. Sen. John Glenn (D-OH), the chairman of the committee, is expected to attend the hearing.

When he announced the hearing in May, Lieberman noted that there had been a dearth of research on radar. At the same time, Connecticut's other senator, Christopher Dodd (D), asked Dr. Kenneth Olden, head of the National Institute of Environmental Health Sciences, to urge an epidemiological study of police radar users (see *MWN*, M/J92).

International Commission on NIR Protection Launched

On May 20, the International Radiation Protection Association (IRPA) approved the charter for the International Commission on Non-Ionizing Radiation Protection (ICNIRP), which will continue the work of IRPA's International Non-Ionizing Radiation Committee (INIRC). Dr. Michael Repacholi, chairman of the committee, will lead the commission.

"Non-ionizing radiation protection has come of age," Repacholi told *Microwave News*. Currently a visiting scientist at the Australian Radiation Laboratory in Yallambie, Repacholi said that ICNIRP will now have only a "loose association" with IRPA.

Dr. Mays Swicord, the chief of the radiation biology branch at the Food and Drug Administration's Center for Devices and Radiological Health and an ICNIRP member, predicted that the change "should elevate the status of the committee and provide for greater international coordination."

The commission has an ambitious work plan. Over the next four years, according to Repacholi, ICNIRP will issue separate guidelines for human exposures to static magnetic fields; lasers; ultraviolet (UV) radiation; infrared radiation (IR) and visible light; 0-100 kHz EMFs; and pulsed radiofrequency (RF) radiation. The commission will also publish shorter statements on police radar, mobile telephones (see *MWN*, M/J92) and medical ultrasound.

In association with the United Nations Environment Program (UNEP) and the World Health Organization (WHO), ICNIRP plans to update the volumes of *Environmental Health Criteria* on extremely low frequency (ELF) EMFs, UV radiation and visible light. Working with the International Labor Organization (ILO), ICNIRP plans to issue practical protection guides. These will cover UV and IR radiation for indoor workers, UV radiation for outdoor workers and RF radiation for operators of heat sealers. In addition, ICNIRP, the ILO and WHO hope to jointly publish manuals on the medical handling of accidental overexposures to NIR and on protecting health care workers from NIR.

Most of the members of INIRC have joined the commission. One exception is Sweden's Dr. Bengt Knave, who has stepped down and been replaced by his protégé, Dr. Ulf Bergqvist.

Annette Duchêne, who has served as INIRC's scientific secretary since it was founded in 1977, has announced that she will retire when a replacement is found—until then, she will continue to work with the commission.

In the past, INIRC has issued papers and reports on ELF EMFs (see *MWN*, D84, M/A88, M/J89 and J/F90); static and ELF magnetic fields (see *MWN*, My85 and M/A87); RF/MW radiation (see *MWN*, Mr84 and J/F88); VDTs (see *MWN*, M/A88); and MRI (see *MWN*, J/F92).

The commission members are: Drs. Michael Repacholi (chairman), Australia; Martino Grandolfo (vice chairman), Italy; Ulf Bergqvist, Sweden; Jürgen Bernhardt, Germany; Jean-Pierre Cesarini, France; Louis Court, France; Alastair McKinlay, U.K.; David Sliney, U.S.; Jan Stolwijk, U.S.; Mays Swicord, U.S.; Laszlo Szabo, Hungary; Tom Tenforde, U.S.; Henri Jammet (chairman emeritus), France.

EMF Bioeffects Research *(continued from p.1)*

public concerns"—at least until there is a "broad scientific consensus" that EMFs pose a negligible health threat.

"More bioeffects research is only part of the answer," Florig was quick to point out in a telephone interview. "The public has grown to distrust traditional risk management and is demanding to become more involved in the decision-making process. We must develop new ways to include the public in the resolution of EMF disputes, including the siting of power lines."

Florig outlines six types of economic impacts that are due to concerns about EMF health risks:

1. *Delays, cancellations and moratoriums on new transmission projects*—Industry statistics indicate that utilities are planning about 12,600 circuit-miles of new transmission lines through the year 2000.
2. *Loss of property value*—Florig estimates that a loss of even 1% in the value of homes and land close to transmission lines amounts to a market loss of about $1 billion.
3. *Litigation costs and awards in suits claiming EMF-induced health damage from power lines and appliances*—For instance, a Texas jury awarded a school $25 million (later reversed) in a dispute with Houston Light & Power Co. (see *MWN*, N/D85, N/D87 and M/J89).
4. *Low EMF designs implemented by utilities, such as burial or new line configurations*—Florig writes that these changes are adding up to $1 billion to the $13 billion a year that U.S. utilities are investing in transmission and distribution construction.
5. *Changes undertaken by the public and businesses to reduce EMF "hot spots"*—According to one estimate, reducing magnetic fields in offices can cost up to $400 per square meter.
6. *The production costs of low EMF household and office appliances*—Florig predicts that the $2 billion-a-year market for video display terminals and the $100 million-a-year market for electric blankets will soon be limited to low magnetic field models.

Even in the face of competing claims for federal research dollars for other environmental risks, Florig finds that, "The need for a stronger federal program of EMF research is particularly acute."

See Keith Florig, "Containing the Costs of the EMF Problem," *Science, 257*, pp.468-469, 488-490, July 24, 1992.

RF/MW Radiation Litigation *(continued from p.1)*

The defendants—AT&T, GTE Products Corp., Lockheed Electronics, GE and Raytheon—pushed to have Ford's suit dismissed, arguing that microwave radiation should not be classified as a toxic "substance." The court disagreed.

"The defendants' attempt to limit the statute...[flies] in the face of the legislative intent to expand the rights of persons injured by the latent effects of exposure to any substance," Lehner wrote in his decision.

If a chemical or physical agent is deemed a substance, a plaintiff has three years from the time an injury is *diagnosed* to determine the cause and file a claim, explained Kenneth Henrie of Henrie & O'Boyle in Wantagh, NY, Sweeney's local co-counsel. If the radiation had not been ruled a substance, Ford's case would have been subject to a statute of limitations giving him only three years from the time the exposure *occurred* in the 1960s to begin his suit.

A spokeswoman for AT&T said that the company is studying the June 30 decision and has not yet decided whether to appeal.

"This case could open up a real Pandora's box," Henrie said. "It's the beginning of the new wave of litigation for the 21st century." Sweeney told *Microwave News* that he thinks the ruling is "likely to resolve the same claim made by the defendants in the Dowgiallo case." Sweeney also represents Michael Dowgiallo, an electrician who filed a product liability lawsuit alleging that RF/MW radiation from an FM antenna and from a microwave transmitter caused his stomach cancer (see *MWN*, N/D90).

For more on RF/MW litigation, see *MWN*, M/J86, S/O86, M/A88, M/J89 and S/O89.

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FROM THE FIELD

EMFs and Cancer Rates

To the Editor:

In a paper published in the April 1992 *Proceedings of the National Academy of Sciences*, physicist J.D. Jackson asserts that there can be no cancer risk from exposure to power frequency electromagnetic fields (EMFs) because use of electrical power has increased markedly in the last 50 years while cancer risk apparently has not. Problems in his epidemiologic argument have already been noted (see *MWN*, M/J92). Perhaps less evident is his unfamiliarity with how power distribution practices affect the EMF exposure associated with power use.

Dr. Jackson unquestioningly assumes that power frequency EMF exposure increased proportionately with increasing power use over the last 50 years. The fact, however, is that numerous engineering changes have occurred over the years that markedly *decreased* the level of magnetic field exposure likely to accompany a given power use (and it is the magnetic field exposure that has been most clearly implicated by studies suggesting cancer risk). These changes include:

1. Use of higher voltage in primary distribution lines, allowing more power to be transmitted for the same amount of current (it is the current that produces a magnetic field);
2. Use of Romex instead of knob-and-tube wiring inside the home (greater cancellation of fields from current flow within the house);
3. Use of triplex rather than spaced secondary wires (greater field cancellation);
4. Increased use of 240-volt appliances, which generally use a lot of power, but have less potential for producing ground currents than do 120-volt appliances (ground currents within the house are a major source of magnetic field exposure);
5. Increased use of two secondary wires of opposite polarity, instead of only one "hot" wire, to serve homes (greater cancellation of in-house fields from ground currents);
6. Increased use of nonconductive elements (nonmetallic pipe, nonconductive joints, service insulators, etc.) in the plumbing system to which electric power is grounded. *This practice is especially important because it generally prevents injection of neutral currents into the plumbing system, which is arguably the most important underlying cause of magnetic field exposure within a house—both from ground currents flowing through the house and from the resulting net currents on distribution lines running past the house.*

These considerations (especially the last) seem largely to explain why, in the Savitz data, homes in newer suburban areas (where many people live today) clearly show *lower* magnetic field measurements than homes in older suburban areas. Thus, in spite of increased power use, it is likely that magnetic field exposures associated with power distribution have decreased, if anything, over the years for which reliable cancer data are available—at least in the Denver area, and probably nationwide.

Nancy Wertheimer, PhD
Ed Leeper, MA
Boulder, CO

UPDATES

CELLULAR COMMUNICATIONS

Court Blocks Cellular Transmission Tower... Opponents of a proposed 300-foot tower near Butler Township, PA are expressing confidence that they can stop the project. A Pennsylvania Common Pleas Court judge ruled in their favor on May 26, denying a request by Bell Atlantic Mobile Systems Inc. to reverse a decision by the Butler Township Board of Commissioners, which rejected the company's application for a development permit last January. The judge, George Kiester, believes an appeal is likely, according to an account in the May 28 *Butler Eagle*....A tower proposed by Cellular One is meeting with disapproval among residents of Old Chatham, NY. Three letters to the editor published in a local newspaper, *The Independent*, on May 28 expressed skepticism about the company's assurances that the tower would pose no health threat. The facility is aimed at improving cellular phone coverage for motorists on several major highways in the area, leading to the complaint in one letter that, "It seems to us that the main beneficiaries will be cars and trucks on I-90...."

MEASUREMENTS

RF/MW Standard Approved...ANSI has approved a new standard, ANSI/IEEE C95.3-1992, *Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields—RF and Microwave*. It is available for $54.00 from: IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08855, (800) 678-4333.

Swiss RF/MW Report... An advisory group to the Swiss Federal Office for Environment, Forests and Landscape has published *Non-Ionizing Electromagnetic Radiation Measurements—Part 1: Frequency Band 100 kHz to 300 GHz*, Environmental Protection Document No. 164. For a copy of the report, contact: P. Roch, OFEFP, Hallwylstrasse 4, 3003 Bern, Switzerland, (41+31) 616964; include a self-addressed mailing label with your request. The report is only available in French or German. In 1990, this advisory group endorsed IRPA's standards for human exposure to RF/MW radiation (see *MWN*, J/A90).

ELF and RF Body Current Meters... Holaday Industries Inc. has introduced two new products: a 3-axis ELF magnetic field meter and an induced body current meter. The ELF meter, HI-3627, measures 30 Hz to 2 kHz magnetic fields from 0.2 mG to 20 G. It is similar to the HI-3624, but can give a true rms reading, according to Holaday's Dave Baron. It costs $1,495. Holaday's HI-3701 meter can measure body currents induced by 3 kHz to 100 MHz radiation. The device, which looks like a bathroom scale, can be used to judge compliance with the 1992 IEEE/ANSI RF/MW exposure standard. Although the unit was based

on the research of Dr. Om Gandhi of the University of Utah (see *MWN*, J/A85), Holaday designed it independently, Baron said. The HI-3701 costs $3,495.

RADAR

NEXRAD Environmental Report... The WSR-88D radar—better known as NEXRAD—will have "no significant adverse environmental impacts," according to a draft environmental assessment issued by the National Oceanic and Atmospheric Administration (NOAA) in April. The report also asserts that transmission lines built to power the radar will not threaten public health. The study, prepared by SRI International in Menlo Park, CA—which has also prepared environmental assessments for the U.S. Air Force—concedes that RF radiation can cause biological changes by heating molecules in the body, but states that WSR-88D emissions "add heat at rates well below the human body's ability to dissipate heat." Studies that have shown that RF radiation can affect the blood–brain barrier, brain waves and the heart without exceeding this heating threshold were later found to have been "obtained erroneously," according to SRI. The WSR-88D radar will use microwaves in the 2.7-3.0 GHz frequency band, with a maximum peak radiated power of 475 kW and an average radiated power of 1 kW or less. Exposures will not exceed the guidelines adopted by the IEEE's SCC-28 in 1991 (see *MWN*, N/D91). Worldwide, 173 sites have been selected for the WSR-88D radars. Ten have been built, of which two are operating in a "testing mode," according to Andrew Anderson, a NOAA engineer. The agency is revising the draft assessment and a final report is expected by the fall, Anderson told *Microwave News*. To order a free copy of the draft *Supplemental Environmental Assessment of the Effects of Electromagnetic Radiation from the WSR-88D Radar*, contact: Andrew Anderson (15204), NOAA, NEXRAD JSPO, 1310 East West Highway, Silver Spring, MD 20910, (301) 713-0144. For more on NEXRAD, see *MWN*, M/A92.

STANDARDS

Puerto Rico Adopts RF/MW Rules... Responding to a "proliferation" of new radio, television, microwave and cellular telephone towers, Puerto Rico's planning board has developed new RF/MW exposure limits and criteria for siting telecommunications facilities. Signed by Governor Rafael Hernández-Colón on June 4, the new rules follow the outline of the National Council on Radiation Protection and Measurements (NCRP) standard for the general public—for example, 200 $\mu W/cm^2$ at 30-300 MHz and 1 mW/cm^2 at 1.5 GHz. A more stringent 10 $\mu W/cm^2$ limit had been included in a previous draft of the rules, but this had been sharply criticized by some in the cellular phone industry. "We impressed on [the planning board] that we preferred the ANSI or NCRP guidelines," said William King, president of CCPR Services Inc., an independent company that operates in Puerto Rico under the Cellular One name. King told *Microwave News* that 18 applications for new cellular transmission facilities filed by his company since 1990 had been held up pending enactment of the new rules.

ETC...

The View from Hollywood... If anyone doubts that EMFs have yet to permeate American culture, take a trip to the local cineplex and see *Honey, I Blew Up the Kid*, one of this summer's biggest hits. After the "kid" is accidentally hit with a high-tech laser beam—which puts him on a fast-track growth curve—his condition is aggravated by EMFs from a microwave oven, a TV and, of course, a high voltage power line.

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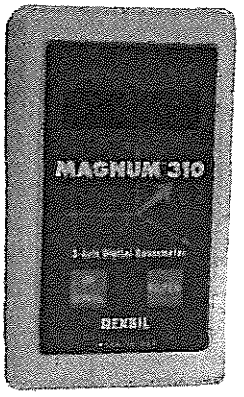

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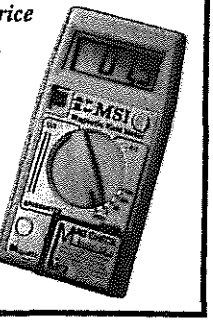

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