MICRO WAVE NEWS

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INSIDE...

National EMF Program Under Way: $15 Million in Research Awards

Two years after Congress ordered a national electromagnetic field (EMF) health research program, the National Institute of Environmental Health Sciences (NIEHS) has awarded 21 grants, committing a total of $15.5 million over the next four years for animal and cellular studies.

"This new program lays a sound scientific groundwork for mechanistic research—the basis for future studies," said Dan VanderMeer, NIEHS' program director for what has become known as the EMF Research and Public Information Dissemination (RAPID) Program. But the launch of the program has not been without delays and visible tensions between the NIEHS and the Department of Energy (DOE).

The projects cover four key areas—cell proliferation, gene expression, melatonin and signal transduction (see p.7 for a list of the grant awards). One study, by Dr. Charles Graham of the Midwest Research Institute, entails human EMF exposures to examine possible EMF-induced suppression of melatonin levels.

The NIEHS is not sponsoring any epidemiological studies with RAPID money. In August, NIEHS' Dr. Michael Galvin urged support of an epidemiological study of melatonin and breast cancer but was opposed by both the EMF interagency and advisory committees. VanderMeer said that the NIEHS will help fund the study, to be carried out by Dr. Stephanie London of the University of Southern California in Los Angeles, from its own budget.

Over one-third of the money is devoted to work on gene expression. "This could lead to the underlying mechanism of a cancer link," said

(continued on p.6)

EPA To Assess Health Impacts of Weak, Modulated RF/MW Radiation

The Environmental Protection Agency (EPA) has launched an effort to assess the possible health hazards of long-term exposures to low-level radiofrequency and microwave (RF/MW) radiation as part of its revived non-ionizing electromagnetic radiation (NIER) program. As a first step, the EPA has commissioned a two-year study by the National Council on Radiation Protection and Measurements (NCRP) on the potential role of weak, modulated radiation in human exposure limits. Existing guidelines are based on thermal effects.

In addition, the NCRP itself plans to revise its RF/MW exposure recommendations and may address low-level, modulated radiation (see p.12).

Separately, the EPA is back at work developing exposure limits based on known thermal effects—hazards from the heating of tissue due to acute radiation exposures. The agency tried for more than a decade to develop a formal RF/MW "guidance," which would have applied to all federal agen-

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EMF NEWS

« Power Line Talk »

EPA's long-awaited rewrite of its **EMF cancer assessment** has been drafted and sent out for review. The 240-page report, now titled *Relation Between Power Frequency Electric and Magnetic Field Exposure and Human Cancer,* clearly supports the view that EMFs play a role in cancer development: "The childhood cancer epidemiology studies consistently show repeated findings of a small excess relative risk of leukemia and brain cancer in children who live in homes near the electrical power distribution network." The EPA explains that "small" means an odds ratio of 1.5 to 3.5 with borderline statistical significance for individual studies (the link gets stronger when the studies are combined in a meta-analysis); and "near" means a home that would be classified as a "very high current configuration" residence under the Wertheimer–Leeper wire coding scheme or a home with an average historical magnetic field of 2-3 mG. The EPA analysts did not attempt to classify EMFs as a "probable" or "possible" carcinogen, as they did in the first draft (see *MWN,* M/J90 and N/D90). That 1990 draft was highly controversial and was sharply criticized by EPA's Science Advisory Board (SAB) (see *MWN,* J/A91 and J/F92). The new report concludes that the Scandinavian epidemiological studies put to rest the idea, long put forward by skeptics, that the EMF–childhood cancer link is due to bias in the selection of controls. "There is a real association that cannot be explained by improper epidemiologic methodology," EPA finds. Interestingly, the report also concludes that, "In many respects, there is a more complete set of data indicating a risk of breast cancer in male workers than for residential childhood cancer, although the dimensions of the potential hazard are still far from clear." Dr. **Robert McGaughy** of EPA's Office of Health and Environmental Assessment in Washington, who is in charge of writing the report, declined to comment on its findings, other than to say that they are "in flux." He said that once the ongoing review is completed, a revised draft will be sent to other federal agencies and, if there are no delays, will be released to the public in mid-February. After a comment period of at least 30 days, the report will be forwarded to the SAB for further review. McGaughy said that a new SAB panel will be assembled, pointing out that Dr. Genevieve Matanoski, the chair of the original review panel, has since become the chair of the entire SAB (see *MWN,* J/F 91 and N/D93). In addition to the EPA staff, there are four external reviewers for the August 1994 draft: Drs. Dean Astumian of the University of Chicago; John DiGiovanni of the M.D. Anderson Cancer Research Center in Smithville, TX; Kenneth McLeod of the State University of New York, Stony Brook; and Richard Stevens of Battelle Pacific Northwest Labs in Richland, WA.

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Does the **EPA** believe that EMFs increase the risk of childhood leukemia and does it favor a policy of prudent avoidance? It depends on whom you ask. A controversy is brewing in a Brooklyn, NY, neighborhood over the construction of an elementary school next to a Metropolitan Transportation Authority electrical substation. Betty Jean and Stanley Nelson are leading the fight to change the school site and have fired off letters to local and federal officials, including Vice President Al Gore. The letter to Gore ended up on the desk of Conrad Simon, director of the air and waste management division of **EPA Region II** in New York City, who replied, in part: "The EPA has reviewed the research in the potential health effects of [EMFs] and found the results of the studies to be inconsistent and sometimes even inherently contradictory. As such, we are unable to conclude that magnetic fields from power lines, substations and home and office appliances present a health risk." Some at EPA headquarters in Washington take a different view. When asked to comment on Simon's letter, Dennis O'Connor, a policy analyst at the **Office of Radiation & Indoor Air** (ORIA), told us that, "EPA continues to believe that there could be a risk posed by exposure to EMF," and that, "The Region II letter, while accurate, may have inadvertently underemphasized the scientific uncertainty that currently exists concerning this complex issue."

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Dr. **David Savitz**'s epidemiological study of EMF-exposed utility workers has been submitted to the *American Journal of Epidemiology,* after being rejected by the *New England Journal of Medicine*. Savitz and Dr. **Dana Loomis**, both of the University of North Carolina (UNC), Chapel Hill, examined the mortality rates from leukemia and brain cancer among 139,000 men from five large electric utilities. Savitz, who started work on the study in July 1987, declined to discuss his results prior to their publication. Meanwhile, a paper describing the exposure assessment used for the study has been accepted by the *Scandinavian Journal of Work, Environment and Health*. The lead author of this report is Dr. **Hans Kromhout** of Wageningen Agricultural University in The Netherlands, who was a visiting researcher at UNC.

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The **U.S. Navy** is set to begin building a housing development for enlisted personnel on a 41-acre site that has four **San Diego Gas & Electric** Co. (SDG&E) transmission lines running along one side. Plans call for buildings to be placed right up to the power line right-of-way (ROW), at the edge of which magnetic fields reach 23 mG, according to measurements taken by an SDG&E engineer. The survey, conducted for the Navy in December 1992, found field strengths of 5.7 mG 100 feet from the ROW and 3.5 mG 150 feet away. Of the 290 apartments planned, several dozen will be within 100 feet of the ROW; two children's play areas will be right next to it. The Navy is "putting these enlisted personnel and their families in harm's way," said Dr. Edwin Chelsea, vice president of the **Eucalyptus Hills Landowners Association**. In response to questions from Chelsea's group, the Naval Facilities Engineering Command, which is in charge of the project, consulted with researchers at the Navy's Bureau of Medicine and Surgery in Washington. The bureau responded in a Feb-

Will the DOE Bioeffects Research Program Continue?

The future of DOE's EMF biological effects research program is again in doubt. Congress' 1995 DOE appropriation, signed by the President on August 26, provides $6 million for the program in fiscal year 1995 but apparently leaves standing a Senate requirement that the DOE phase out its program by 1996 in favor of the RAPID program, which it administers jointly with the NIEHS (see p.1). The program's fate now hangs on further interpretation from Congress.

The budget saga began early this year when the President proposed $10 million for the RAPID program and $6 million for the DOE (see *MWN,* J/F94). On June 14, the House approved the President's request without comment.

The Senate looked less favorably on the DOE program, however (see *MWN,* M/A94). On June 30, the Senate cut the House recommendation, decreasing RAPID's funding to $6 million. It also gave the DOE $6 million but added the proviso that the program must be phased out in 1995. As a guarantee, the Senate prohibited use of DOE's 1995 money until a plan was in place to roll the DOE research into the RAPID program, asking for the plan to be completed by January 31, 1995. The Senate's language was unequivocal: "There is no point in having two overlapping and independent programs."

A conference committee compromise, approved in August, provided $8 million for the RAPID program—to be matched with $8 million from industry—in addition to the $6 million for DOE's ongoing work. But it did not resolve the differences between the House and the Senate on what should now happen to the DOE program.

The DOE has support for continuing its own program. "When we developed the strategic plan, our assumption was that the DOE program would continue," said Dr. Michael Marron, of the Office of Naval Research in Arlington, VA, and a member of the RAPID program's Interagency Committee. Rick Loughery of the Edison Electric Institute in Washington added, "We want the DOE program to go on."

"We are trying to get clarification of the congressional intent to know how to move forward," said DOE's Marvin Gunn. "We need both programs." The NIEHS, the DOE and other groups are hoping the matter will be clarified soon. "We don't want to independently interpret the law," said NIEHS' Dan VanderMeer, adding that the NIEHS was "absolutely not" trying to take over the DOE program. "We want to work with DOE to generate the health effects data to determine if there is a hazard from EMFs."

ruary 8, 1993, memo that there was "no compelling basis for modifying the site plan." Jeanne Light, a Navy public affairs officer in San Diego, said that EMFs on the site are "well below" ACGIH and IRPA guidelines. The landowners association is continuing to fight the project, however, and will soon file a suit alleging that the Navy has not complied with the National Environmental Policy Act (NEPA), Chelsea said. His group objects to the project for many reasons—including the impact on local schools and the density of the housing in the semirural surroundings. The suit will charge that these issues—and the EMF hazard—were not sufficiently addressed by the Navy in its original environmental review, and it will ask that a complete environmental impact statement (EIS) be prepared. Previously, the group voiced its concerns to the White House **Council on Environmental Quality** (CEQ), which monitors NEPA compliance. After discussions with navy planners, CEQ attorney Elisabeth Blaug responded that, "The Navy's decision not to prepare an EIS for the Eucalyptus Hills housing project is appropriate."

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When authors of the **CIRRPC** report contended that rising electricity use in this century would have led to an epidemic of childhood cancer *if* EMFs posed a cancer risk—a hypothesis advanced by particle physicist Dr. **David Jackson**, among others—many epidemiologists were openly skeptical (see *MWN,* M/J92, J/A92, N/D92 and J/F93). Now, a team led by Dr. **Allen Kraut** of the University of Manitoba in Winnipeg has found an association between the rates of leukemia and brain cancer in children and residential electricity consumption across Canada. Writing in the May/June 1994 issue of the *Archives of Environmental Health (49,* pp.156-159), Kraut reported that the higher a province ranked in electricity consumption, the higher were its rates of childhood leukemia and brain cancer. The trend was statistically significant. Kraut also observed a significant relationship between the increases in all types of cancers and electricity use—although the incidence of leukemia did not go up during the study period. He told *Microwave News* that while "ecological" analyses like his are not as powerful as other types of epidemiological studies, his results are another piece of the EMF puzzle. "This is consistent with there being an [EMF] effect," he said, pointing out that a major drawback, common to all ecological studies, is that individual exposures are unknown.

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While most utilities in the U.S. and Canada have an EMF policy and provide customers with information, few are taking steps to mitigate EMFs from transmission and distribution lines, according to a survey conducted for **Toronto Hydro**. The survey was included in a report responding to a **Toronto City Council** request for information about what mitigation methods are available and what steps are being taken in other North American cities. Of 39 utilities surveyed, all said that they make EMF literature available to customers and 95% offer household measurements on request. But, only 33% said that they are currently reducing EMFs from their facilities or are planning to do so in the future. "Utilities are not spending appreciable amounts of money to make changes in their distribution systems for the purpose of mitigating fields, except in isolated instances," concludes *Technologies Available To Mitigate Magnetic Field Exposure due to Distribution Systems*

(April 1994). The report was prepared for Toronto Hydro by **EMF-RAD Consulting and Engineering** Ltd. in Brampton, Ontario (see *MWN,* N/D93). Most of the utilities—77%—do provide advice on how to limit exposures. However, of 21 utilities that supplied copies of their EMF position statements, less than 40% specifically recommend prudent avoidance.

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The town of **East Greenwich, Rhode Island**, and a group of local home owners have lost a round in their fight to force **Narragansett Electric** Co. to bury a proposed 115 kV power line that will run through the town. In a 3-0 vote on August 31, the Energy Facility Siting Board approved the utility's plan to build above ground. Providence-based Narragansett intends to run the new line on the western edge of the ROW, farthest from any houses. The utility also agreed to move an existing 115 kV line from the eastern edge of the ROW to the same site and to dismantle a 34.5 kV line on the same ROW. The utility says that when the work is completed, magnetic fields near the houses will be 98% lower than they are now. Charles Moran, a spokesperson for Narragansett, said the utility was trying to accommodate customers concerned about EMFs. Governor Bruce Sundlun had presented this plan in a letter last year as a "remedy" for East Greenwich residents who were unhappy about his veto of a bill to bury all power lines over 69 kV in the state (see *MWN,* J/A93 and J/F94). In 1990 the town had declared a moratorium on all new power lines over 60 kV, but the ban was later overturned (see *MWN,* N/D90). Adrienne Southgate, general counsel for the board, told *Microwave News* that the siting board's decision was guided by prudent avoidance. Magnetic field levels at the eastern edge of the ROW are projected to be 0.1 mG if the line is buried and 0.4 mG if it is located close to the western edge. The board felt there was "no meaningful distinction" between the two alternatives, Southgate said. **William Harsch**, former chair of the state's PUC, who represented the town before the board, accused its members of "bending every way they could to find in favor of the company." In an interview, Harsch explained that East Greenwich believed burying the line would preserve scenic areas and prevent the erosion of property values, in addition to minimizing health effects from EMFs. "But the board did not adequately assess these issues," he said, a point he expects the town to raise in its appeal, filed September 30. Harsch said that the health issue is still a concern because the board "was ineffective in assessing questions of future loading of the line," which may increase EMFs. Linda Seiler, president of Rhode Islanders for Safe Power (**RISP**), said the board had "denied all the advantages of undergrounding" and predicted more lines would ultimately be built along the ROW. A group of 17 home owners, represented by David Bazar of Rappoport, Audette & Bazar in East Providence, appealed the board's decision on September 30, based on loss of property value. Bazar said that the case will be modeled after California "stigma suits," in which property bordering toxic waste dumps, even if uncontaminated, is considered "stigmatized." Siding with Narragansett, the *Providence Journal–Bulletin* ran a September 5 editorial stating, "We suspect that aesthetic and property-value considerations are really more at play here."

Feychting–Ahlbom's New Analysis of Adult Leukemia; Breast Cancer and Incubator Studies Are Next

The September publication of Maria Feychting and Dr. Anders Ahlbom's paper on adult leukemia and residential EMF exposures completes the first phase of their landmark power line–cancer studies, which were made public two years ago. A new analysis based on cumulative exposures adds weight to earlier estimates that showed a weak EMF–adult leukemia link. The companion childhood study, published last year, showed a stronger association between EMF exposure and leukemia.

The epidemiologists, from the Karolinska Institute in Stockholm, are now using their innovative exposure assessment technique to examine breast cancer in both women and men. In an interview with *Microwave News,* Feychting said that they expect to finish this effort by the end of 1995.

Writing in the September 1994 issue of *Epidemiology (5,* pp.501-509), Feychting and Ahlbom cautioned that while the adult study provides "some evidence for an association" between magnetic field exposure and leukemia, the number of cases was small and the risk estimates were "unstable." They reported for the first time that adults with the highest *cumulative* exposures to power line EMFs faced twice the risk of developing acute or chronic myeloid leukemia (AML or CML) compared to less-exposed adults, but the results are of only borderline statistical significance. The new exposure index—the sum of the estimates of magnetic fields in the homes of leukemia victims during the 15 years prior to diagnosis—differs from the estimates used in their 1992 report. Those results, which are also in the *Epidemiology* paper, show that adults exposed to 2 mG or more in the year closest to diagnosis were 70% more likely to develop AML or CML than those exposed to less than 1 mG (see *MWN,* S/O92).

One anomalous and as-yet-unexplained finding is why residents of single-family houses, particularly children, seem to be at a greater risk for leukemia than similarly exposed residents of apartment houses. At the June meeting of the Bioelectromagnetics Society in Copenhagen, Denmark, Feychting noted that power lines are not the only important source of magnetic fields in multiple-unit dwellings. Reinforcing this point, Dr. Lars-Erik Paulsson of the Swedish Radiation Protection Institute (SSI), also in Stockholm, said that measurements he had taken at the front doors of apartment houses—where spot measurements are often done—do not reflect the magnetic field exposures inside the apartments.

Feychting and Ahlbom did not distinguish between single-family houses and apartments in their *Epidemiology* paper. Dr. Nancy Wertheimer of Boulder, CO, told *Microwave News* that she wishes they had. In the original 1992 report, Wertheimer said, Feychting and Ahlbom "got their strongest odds ra-

tios for adults in the sample where exposure was most reliably assessed, that is, in single-family homes." In a 1982 study, Wertheimer and Ed Leeper found a relationship between exposure to power lines EMFs—entailing median exposures of 2.5 mG—and some types of adult cancer (see *MWN,* J/F83). Feychting explained that they had to limit the number of tables in the paper—omitting this and other analyses.

For their breast cancer study, Feychting said they will include only women living in single-family houses. As in the adult residential study, the women will have lived within the power line corridor in the year closest to diagnosis. The researchers will draw on the same database and apply the same techniques used in their earlier studies. But, because female breast cancer is more common than leukemia, they expect to have approximately 800-900 women—nearly three times the number of cases they had in the adult study. Twelve cases of male breast cancer, regardless of the type of housing, will also be included.

Much is riding on the outcome of the breast cancer study. Jaak Noü, technical director of the National Electrical Safety Board in Stockholm, has commented that if a link between EMFs and breast cancer is documented, the government will be more likely to set exposure limits (see *MWN,* M/J94).

Feychting and Ahlbom are also planning to study the risks to premature infants from EMFs in incubators. This effort was prompted by high readings found by Dr. Gert Anger of SSI. He measured magnetic field levels of up to 48 mG. Higher levels were found by Dr. Charles Polk of the University of Rhode Island, Kingston (see *MWN,* M/A94).

Feychting said this case–control study will include about 700 children with leukemia born between 1973 and 1989. Information on whether the children had been in incubators—as well as health factors that might confound an EMF–leukemia link—will be drawn from medical records, she said.

Rulings Set the Stage for Three EMF–Leukemia Trials

Pilisuk Decision Upheld

With one dissenting opinion, Washington state's three-member Board of Industrial Insurance Appeals has agreed with Industrial Appeals Judge Linda Williams's decision to reject the long-running pension claim brought by the widow of utility worker Robert Pilisuk (see *MWN,* M/A91, M/J92, J/F94 and M/J94). Mimi Handlin Pilisuk contends that on-the-job EMF exposures were responsible for the death of her husband from acute lymphocytic leukemia. The board's September 6 decision stated that Williams's April 14, 1994, proposed order was "supported by a preponderance of the evidence, and is correct as a matter of law."

However, dissenting board member Frank Fennerty Jr. argued that Pilisuk's exposure "more likely than not" was responsible for his leukemia. "The claimant is not required to disprove all speculative causes of the leukemia, or to establish how the heavy exposure to EMFs results in leukemia. The fact is medical science still cannot explain the biological mechanism by which asbestos causes mesothelioma, but that fact cannot act as a bar to allowance of claims for occupational disease" (see excerpt, p.14).

Pilisuk's attorney, Michael Withey of the Seattle firm of Schroeter, Goldmark & Bender, filed an appeal of the board's decision on September 14. A trial date has been scheduled for April 12, 1995. Mark Warnquist of LeBoeuf, Lamb, Greene & MacRae in Denver is representing Seattle City Light with city attorneys. Betty Ngan, an assistant city attorney for Seattle, said that she expects the April trial will be the last step in the saga: "I don't see any legal issues that can be appealed."

Judge: EMFs Inseparable from Power Lines

Power lines and the EMFs they generate are inseparable, according to a New Jersey Superior Court ruling in John Altoonian's cancer lawsuit against Atlantic Electric Co. The Pleasantville, NJ, utility had asked the court to separate the two when considering Altoonian's charge that an electrical cable and its EMFs were trespassing—one of several counts in his lawsuit. Atlantic Electric then asked the court to dismiss the EMF trespass charge.

"The court is not convinced, however, that such a separation of the electrical lines and the EMF is warranted....[E]xpert reports suggest that the EMFs associated with electricity [are] inextricably linked to the electrical flow in a way that differs from airborne pollution or other types of activity by-products," Judge Joseph Visalli wrote in his decision.

Altoonian claims that EMFs caused his chronic myelogenous leukemia (CML), diagnosed in October 1990 (see *MWN,* N/D93 and M/A94). Altoonian's deck and backyard are above an underground 69 kV power line operated by Atlantic Electric.

The trial date, January 23, 1995, is expected to be postponed because discovery has not been completed, explained Altoonian's lawyer, William Wolf of Bathgate, Wegener, Dugan & Wolf in Lakewood. Gerald Corcoran, whose Pleasantville law firm, Megargee, Youngblood, Franklin & Corcoran, represents Atlantic Electric, did not respond to telephone calls.

Glazer v. FP&L *Trial Date Set*

The trial of another CML–EMF claim—*Leonard Glazer v. Florida Power & Light Co. (FP&L)*—is scheduled to begin in Dade County Circuit Court, FL, on June 5, 1995. Glazer believes that the leukemia that killed his wife, Elsa, and now threatens his own life, was caused by the utility's power lines outside his bedroom (see *MWN,* J/F94). He contends that FP&L, based in West Palm Beach, should have warned them of the potential EMF dangers.

Glazer's attorney, Lawrence Marraffino of Boca Raton, FL, said that he is just beginning to review 140 boxes of material provided by FP&L during discovery. A delay of the trial is unlikely. Circuit Court Judge Maria Korvick has ordered that there will be no continuance, said Marraffino: "That indicates that the judge recognizes the uniqueness of the case."

"We're in the early stages of discovery," confirmed FP&L's attorney, Alvin Davis of Steel, Hector & Davis in Miami, but he referred all other questions to the utility. Stacey Shaw, a spokesperson for FP&L, said that while "we are very sympathetic...FP&L does not believe that EMFs are responsible for their illnesses."

VanderMeer. Six different labs will receive $5.5 million for such research, which has become highly controversial amid reports of failures to replicate some of the landmark experiments of Drs. Reba Goodman of Columbia University and Ann Henderson of Hunter College, both in New York City (see *MWN,* J/A94). Dr. Jeffrey Saffer of Battelle Pacific Northwest Labs in Richland, WA, whose attempts at replication have failed—and who has become one of Goodman and Henderson's sharpest critics—received one of the largest NIEHS grants for additional gene expression studies.

Ever since the Energy Policy Act of 1992 became law in October 1992 (see *MWN,* N/D92), the $65 million health research and communications program, also known as the NERP, has been mired in delays, bureaucratic infighting and allegations of bias in evaluating the proposals.

The DOE and the NIEHS, which are charged with jointly running the RAPID program, have missed all the deadlines specified under the law (see box below).

Some of the delays were due to rivalries between the DOE and the NIEHS—especially over funding. All RAPID appropriations are given to the DOE, which then passes some of the money to the NIEHS. While the tensions have been kept below the surface for the most part, they emerged publicly on September 21, days before the grants were to be announced. In a widely circulated letter, VanderMeer said that he was "distressed and outraged" that the DOE was not going to make funds available before October 1, thereby forcing the NIEHS to pay for $850,000 in program expenses out of its own budget and further delaying distribution of research awards. VanderMeer suggested that, "Responsible officials in the DOE do not support the NIEHS participation in the EMF program."

On receiving VanderMeer's letter, senior DOE officials scurried to correct an NIEHS–DOE interagency agreement and to supply the money. The following day, the NIEHS received $6.25 million from the DOE and VanderMeer sent out a second letter saying that the snafu had been resolved. What one close observer called a "crisis in faith" had passed. Marvin Gunn, who is responsible for the RAPID program at the DOE, told *Microwave News,* "I hope we can now move forward. We want to get this done right."

One of the most contentious issues has been the peer review of the proposals competing for research grants, which is handled by the National Institutes of Health (NIH) for the NIEHS. Critics charge that few members of the review committee have published in the field of EMF health effects, and of those, the majority are engineers or physicists, rather than biologists, or have ties to the utility industry. (The members of the peer-review committee are listed on p.7.)

"It is not *peer* review," Dr. Ross Adey of the VA Hospital in Loma Linda, CA, told *Microwave News.* "The review is being done by individuals who are asked to give their opinions on subjects beyond their professional competence." Battelle's Dr. Richard Lovely echoed Adey's concerns. "I don't see the expertise on the committee to deal with cutting-edge EMF issues," he said.

NIH's Dr. Paul Strudler, who assembled the peer-review panel, defended his selections. "I am very comfortable with the quality of the panel," he said in an interview. "I compose a study section to review the science—I don't do body counts." In an April 22, 1994, letter, Dr. Asher Hyatt of NIH's Division of Research Grants (DRG) assured Shirley Linde, the chair of the National EMF Advisory Committee, that the DRG management and the NIEHS senior staff "are very comfortable" with Strudler's choices. Linde had voiced concern about the makeup of the panel. Dr. Anthony Demsey, Hyatt's superior, told *Microwave News* that he is "satisfied" with the process. "Unless someone can tell me why it is broken, we will continue to do it as we are doing it now."

Four of those receiving grants—Luben, McLeod, Reiter and Saffer—will serve on the NIH committee for peer review of EMF proposals submitted under the existing NIH program announcement, scheduled for November 3-4. Three recipients—Luben, Reiter and Williams—are members of the National Academy of Sciences' EMF panel (see *MWN,* M/J93).

GAO Criticizes RAPID Delays

The DOE and the NIEHS have missed key deadlines for the $65 million RAPID program, the General Accounting Office (GAO) charges in a new report, "thus reducing the amount of information that can be obtained and reported to the Congress by March 31, 1997." This is the date set for submission of the program's findings.

In formal responses appended to the GAO report, the DOE and the NIEHS each pointed out that the NIEHS issued the first requests for applications for research grants in the fall of 1993 and that faster action was impossible, given the timing of congressional funding.

"It was a no-win situation," NIEHS' Dan VanderMeer told *Microwave News,* since funding decisions for 1993 had already been made when the law was passed. "Congress didn't appropriate any money [for the new EMF program] for over a year," he explained.

VanderMeer also said that the original request for a GAO investigation, by Rep. George Miller (D-CA), chairman of the House Committee on Natural Resources, did not address the RAPID program. Indeed, Miller's March 1993 letter asked only about the extent to which the public is exposed to EMFs from federally owned power lines. The response to this question fills a small part of the final report, with the GAO concluding that less than 1% of the population lives near enough to federal power lines to be exposed to their fields.

After considering Miller's request, the GAO suggested a broader investigation, including an examination of federal research efforts. Miller's staff agreed. "It is not unusual for GAO to take a narrow request and propose widening it," a congressional aide explained.

Copies of *Electromagnetic Fields: Federal Efforts To Determine Health Effects Are Behind Schedule,* June 1994, are available from: GAO, PO Box 6015, Gaithersburg, MD 20884, (202) 512-6000, Fax: (301) 258-4066. Single copies are free.

RAPID EMF Research Grants

Name/Institution	Type*	Award	Project
Dr. Dean Astumian University of Chicago	NIEHS	$434,000 (4 yr)	Interactions between low-frequency, AC electric fields and yeast membrane proteins.
Dr. Elizabeth Balcer-Kubiczek University of Maryland, Baltimore	RfA§2118	$702,203 (3 yr)	Effects of 60 Hz EMFs on the expression of genes associated with cancer in human cell lines, HL-60 and MCF-7.
Dr. David Binninger Florida Atlantic University, Boca Raton	RfA§2118	$379,838 (3 yr)	Molecular basis for the effects of 60 Hz EMFs on gene expression (transcription) in yeast.
Dr. Craig Byus University of California, Riverside	EPA	$441,408 (2 yr)	Animal cancer studies using a mouse skin model on copromotion by 60 Hz EMFs with the initiator DMBA and the promoter TPA.
Dr. Charles Graham Midwest Research Institute, Kansas City, MO	RfA§2118	$1,289,662 (4 yr)	Human studies on the effects of nighttime EMF exposures on melatonin, other hormones and the immune system.
Dr. Sek Wen Hui Roswell Park Cancer Institute, Buffalo, NY	RfA§2118	$667,940 (4 yr)	Role of 60 Hz EMFs on gene expression, cancer promotion and signal transduction.
Dr. Henry Lai University of Washington, Seattle	EPA	$732,411 (4 yr)	Effects of ELF magnetic fields on neurological function and behavior in rats with emphasis on cholinergic activity.
Dr. Robert Liburdy University of California, Berkeley	NIEHS	$833,279 (3 yr)	Role of various AC/DC field combinations in calcium signaling and cell proliferation and viability—a test of the Lednev hypothesis.
Dr. Richard Luben University of California, Riverside	NIEHS	$839,073 (4 yr)	Biochemical mechanisms of 60 Hz magnetic field effects in signal transduction and on membrane receptors in mammalian cells.
Dr. Rosemonde Mandeville University of Quebec, Laval, Canada	RfA§2118	$353,292 (3 yr)	Copromoting effects of 60 Hz, CW magnetic fields and subthreshold doses of ENU on brain tumors in rats; search for dose–response.
Dr. David McCormick IIT Research Institute, Chicago	RfA§2118	$1,233,548 (4 yr)	Influence of EMFs on the proliferation of human breast epithelial cells and on the expression of cancer-associated genes.
Dr. Kenneth McLeod State University of New York, Stony Brook	EPA	$350,967 (2 yr)	Role of frequency, intensity and duration of ELF electric field exposures and cell characteristics on the modulation of cell behavior.
Dr. Richard Miller Columbia University, New York City	RfA§2118	$778,129 (4 yr)	Effects of 60 Hz EMFs on the expression of oncogenes in cancer initiation and promotion in human and mouse cells.
Dr. Steven Miller SRI International, Menlo Park, CA	RfA§2118	$826,756 (4 yr)	Effects of 60 Hz EMFs on signal transduction *in vitro* and possible effects on reactive oxygen intermediates in tumor promotion.
Dr. Richard Nuccitelli University of California, Davis	RfA§2118	$921,336 (4 yr)	Changes in expression of proteins associated with differentiation of human skin cells resulting from 60 Hz EMF exposures.
Dr. Russel Reiter University of Texas, San Antonio	RfA§2118	$801,472 (4 yr)	Impact of sinusoidal magnetic fields on melatonin levels *in vivo*; search for critical exposure parameters and for role of pineal gland.
Dr. Clifford Rinehart University of North Carolina, Chapel Hill	RfA§2118	$666,381 (3 yr)	Effects of 60 Hz EMFs on expression of oncogenes, transcription factors and enzymes related to malignant transformation in cells.
Dr. Jeffrey Saffer Battelle Pacific NW Labs, Richland, WA	RfA§2118	$1,161,070 (3 yr)	Gene expression studies on the role of various ELF fields in copromoting neoplastic transformation of JB-6 cells.
Dr. Jerry Williams Johns Hopkins Oncology Center, Baltimore	RfA§2118	$1,444,601 (4 yr)	Cellular studies on the effects of EMFs on *myc* oncogenes, growth enzymes (ODC) and carcinogenic and cocarcinogenic processes.
Dr. Gayle Woloschak Argonne National Lab, Argonne, IL	RfA§2118	$467,086 (3 yr)	Identification of EMF-induced genes, the kinetics of their response and the mechanism of the modulation of gene expression.
Dr. Steven Yellon Loma Linda University, Loma Linda, CA	EPA	$156,745 (1 yr)	Effects of EMFs on melatonin production and on reproductive development in the Djungarian hamster.

*All research projects listed here are funded with monies from the RAPID program. Those marked "RfA§2118" were funded in response to the RAPID requests for applications (RfAs) issued in November 1993; those marked "EPA" were initiated with funds from EPA that were transferred to NIEHS (see *MWN,* J/F93); those marked "NIEHS" were in response to NIH's long-standing program announcements (see *MWN,* M/J91).

A special NIH panel, convened by Dr. Paul Strudler, met May 4-7 in Portland, OR, to evaluate proposals for research on cellular and *in vivo* effects of EMFs under the RAPID program. Requests for applications were first distributed in November 1993 at DOE's annual review (see *MWN,* N/D93). The members of the panel were: Drs. Joseph Roti Roti (chairman), Washington University School of Medicine, St. Louis, MO; Stuart Calderwood, Harvard Medical School, Boston, MA; Joseph Coggin, University of South Alabama College of Medicine, Mobile; Deborah Cory-Slechta, University of Rochester School of Medicine, Rochester, NY; Eugene Gerner, University of Arizona Health Sciences Center, Tucson; Nigel Greig, National Institute for Aging, National Institutes of Health, Bethesda, MD; Kenneth McLeod, State University of New York School of Medicine, Stony Brook; Martin Misakian, National Institute of Standards and Technology, Gaithersburg, MD; John Moulder, Medical College of Wisconsin, Milwaukee; Rodney Nairn, M.D. Anderson Cancer Center, University of Texas, Smithville; Leslie Redpath, University of California College of Medicine, Irvine; Robert Sack, Oregon Health Sciences University, Portland; Fred Stormshak, Oregon State University, Corvallis; Maria Stuchly, University of Victoria, Victoria, BC, Canada; Peter Valberg, Gradient Corp., Cambridge, MA; Lynn Wiley, Institute of Toxicology and Environmental Health, University of California, Davis.

« Cellular Phone Notes »

Dr. **Om Gandhi** has notified the **FCC** that he made a number of errors in his much-publicized study on the amount of energy deposited in the brain from the use of hand-held cellular phones (see *MWN,* J/F94). In an August 19, 1994, letter to Thomas Stanley, the FCC's chief engineer in Washington, Gandhi said that the SARs he released last year were too low by a factor of 1.08 to 2.47 for the ten phones tested. The peak SARs are now "on the order of 0.26 to 0.69 W/Kg," he wrote. Gandhi, who is the chairman of the department of electrical engineering at the University of Utah, Salt Lake City, explained that he had made separate errors in his numerical calculations and in his experimental measurements. In a paper submitted to *IEEE Microwave and Guided Wave Letters* last year, Gandhi had reported "excellent agreement" between the two techniques. After making the necessary corrections, Gandhi once again found that the two yielded peak SARs that were "in general agreement." In a telephone interview, Gandhi pointed out that "agreement" is a relative term: "We don't expect to do better than a factor of two or three." He added that his experimental techniques are less detailed and precise than his computer model. In contrast to the media blitz that followed the release of the results Gandhi has now retracted, the industry has been relatively silent about these revelations. Interestingly, however, Gandhi's letter to the FCC first surfaced when the Cellular Telecommunications Industry Association gave it to CNN correspondent Steve Young, who reported it on the August 29 edition of *Moneyline*. Gandhi told *Microwave News* that he had first discovered the errors last January. When asked why he had waited so long to acknowledge them, he said that he was under no obligation to do so and, in any case, "The phones were still within the ANSI guidelines." At last June's *Workshop on the Safety of Mobile Communications,* held in Copenhagen, Denmark, Gandhi presented data showing higher SARs—up to 2.27 W/Kg, which exceeds the 1.6 W/Kg standard specified by ANSI/IEEE—than those reported last year (see *MWN,* J/A94). The highest SAR, he said, was not obtained with a cellular phone, but with an experimental antenna. "The smaller the antenna, the higher the SARs," Gandhi explained in September, adding that, "Antenna design is an important aspect of mobile communications and it ought to be done carefully because there can be substantial coupling to the head. It is possible to exceed the guidelines." He concluded by saying that, "We need more research." A paper detailing Gandhi's corrected data has been accepted by *Radio Science*. Meanwhile, he is updating the paper submitted to *IEEE Microwave and Guided Wave Letters*.

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Members of 16 research groups from all over the world will meet in **Rome**, Italy, November 18-19 to discuss computer models of energy absorption from hand-held cellular phones. "We will compare the techniques and assess to what extent they are applicable to modeling the absorption caused by the use of cellular phones," said Dr. **Niels Kuster** of the Swiss Federal Institute of Technology in Zurich, who is helping to organize the workshop. It is being held under the auspices of Working Group 3 on **Numerical Computations** of **COST 244**, the European Community's project on the biomedical aspects of EMFs.

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The **General Accounting Office** (GAO) report on cellular phone safety, requested almost two years ago by Rep. **Ed Markey** (D-MA), should be out in November, according to a GAO source. It will go to the House Energy and Commerce Committee's telecommunications and finance subcommittee, chaired by Markey, which will have up to 30 days to review the report. The investigation has covered both government and private sector research on the health effects of low-level RF radiation, along with federal regulatory actions. The GAO, the investigative arm of Congress, had previously predicted that the report would be completed last spring (see *MWN,* S/O93).

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Should cellular phones be **tested for compliance** with health standards? As we reported in our last issue, the **FCC** recently adopted rules that essentially require all PCS phones to be tested if their power outputs are 100 mW or more. Since hand-held cellular phones in the U.S. have power outputs of up to 600 mW, it seems likely that the commission will require them to be tested too. The FCC is still weighing its options and could decide to adopt the 1992 ANSI/IEEE guidelines, which exempt phones from testing if power output is less than approximately 700 mW and if a 2.5 cm distance is "maintained" between the user and the "radiating structure." Cellular phones are held right against the head, however, and there is no separation between the phone and the user's hand. **Ericsson GE Mobile Communications** Inc., a major manufacturer of cellular phones based in Research Triangle Park, NC, asked the IEEE Standards Coordinating Committee 28 (SCC28), which approved the 1992 standard, for clarification on how to interpret the exclusion clause. In a June 22 letter, Drs. **Eleanor Adair** and **Om Gandhi**, cochairs of SCC28 subcommittee 4 on safety levels, replied that they "did not intend to exempt from the exclusion clause hand-held devices where the radiating structure may be within 2.5 cm of the head some of the time." Rather, they wrote, the subcommittee had wanted to ensure the testing of devices "worn on the body." This opinion, Adair and Gandhi wrote, was approved by the subcommittee's Interpretations Working Group, whose members are Motorola's Quirino Balzano, FDA's Howard Bassen, GE's John Bergeron, Raytheon's John Osepchuk, AT&T Bell Labs' Ron Petersen, the VA's Carl Sutton, and consultants Jules Cohen, Bill Guy and Richard Tell, as well as Adair and Gandhi. At least two of the group, Balzano and Bassen, did not agree with the majority view. As Balzano told *Microwave News,* "It is my opinion that hand-held cellular phones should be tested and should not be excluded because you maintain them close to the head." In separate interviews, Petersen and Gandhi said that while they continue to support the new interpretation, they

both feel that the matter is moot because the FCC will not go along. "AT&T is not counting on the low-power exclusion. It's inevitable that we will have to test the phones," Petersen said. Gandhi agreed: "When the dust settles, it is very likely that the FCC will require testing." Ericsson is still hopeful, however. In a September 12 letter to the FCC, its attorney, David Jatlow of Young & Jatlow in Washington, asked the commission to adopt a rule that provides a categorical exclusion for low-power hand-held cellular phones from SAR testing.

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Electromagnetic interference (EMI) to critical **medical devices** from wireless technology continues to attract attention—this time from Congress. As we went to press, the House Government Operations Committee's subcommittee on information, justice, transportation and agriculture, chaired by Rep. **Gary Condit** (D-CA), had called a hearing for October 5. Those scheduled to testify included representatives from the FCC, Southwestern Bell Mobile Systems and Medtronic Inc. Recent reports of EMI to such devices as wheelchairs, pacemakers and critical hospital equipment prompted the hearings (see *MWN,* J/A93, N/D93 and J/A94). "We want to raise the issue and put some pressure on," said a congressional aide, "but we don't want to create an environment of hysteria."

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EMI from a **mobile phone** may have caused the crash of a Royal Air Force (RAF) **Chinook helicopter** in Scotland in early June, killing 25 top military intelligence officers and the four-person crew, according to the U.K. newspaper *Sunday Express*. "Aviation experts examining the wreckage have ruled out mechanical fault or pilot error," the paper reported in its July 31 edition. "Now they think a call to a mobile phone on the helicopter may have fatally distorted vital radio navigating signals." Though the deaths of the military officials represented a devastating blow to the intelligence services that are involved in the fight against the Irish Republican Army, the RAF announced immediately following the incident that there was no evidence of a terrorist attack. The *Express* outlined the following scenario: The helicopter, coming from Northern Ireland, was approaching the coast of Scotland in bad weather with the automatic pilot engaged and was relying on a Tacan UHF radio navigation system; a call came in to a phone carried by one of the officers; since the phone and the Tacan receiver use similar frequencies, the navigation system was disrupted when the officer answered the call; off course, the helicopter crashed into a hillside on the rugged coast. The paper quoted an RAF spokesperson as saying that "the RAF is very keen on the use of mobile phones" and that the officers would have been carrying them. But the spokesperson also said that the RAF prohibits the use of mobile phones in flight. The use of cellular phones and all types of mobile radios is prohibited on commercial airline flights in the U.K. and elsewhere. Jack Satterfield, a spokesperson for **Boeing** Co.'s helicopter division in Philadelphia, manufacturer of the Chinook, told *Microwave News,* "We do not know why it crashed." He added that the mobile phone scenario amounts to nothing more than "speculation." "It's interesting speculation, I'll admit," he said, but he emphasized that the only thing known for certain is that "it was raining and the visibility was very poor." The RAF, which is leading the crash investigation, has not said yet whether the pilot was even using instrument navigation, Satterfield pointed out. A final report on the crash will take many months. The helicopter carried the RAF designation HC-MkII Chinook. It had been completely rebuilt and upgraded at a Boeing factory and was delivered to the RAF just a few months before the accident. Two U.S. Army combat helicopters, the Apache and the Black Hawk, have reportedly suffered severe EMI—resulting in fatal accidents—when exposed to radiation from radars, communications equipment and other sources (see *MWN,* N/D 87, S/O88, N/D88 and S/O91).

Cellular Phone Industry Research Group Sees Need for "Basic Information in All Areas"; Proposals Under Review

The Scientific Advisory Group (SAG) on Cellular Telephone Research, charged by the Cellular Telecommunications Industry Association (CTIA) to develop a $15-25 million program on the potential health effects of radiation from cellular phones, has published its research agenda.

Actual requests for proposals (RFPs) have not yet been issued, however, except those for genotoxicity studies, which were released in December 1993. Dr. George Carlo, chairman of the SAG, said he expects that projects in genotoxicity and other areas will be under way—"with checks signed"—by the end of the year. To date, the SAG has spent $2 million.

In a review of the existing data, included as part of the research agenda, the SAG concludes that "basic information in all areas" is still needed: "Existing scientific literature encompassing toxicology, epidemiology and other data integral to health risk assessment, while providing useful information, is inadequate for drawing either the conclusion that wireless communication instruments present a public health threat or that they do not."

This marks a departure from the industry's stance as it launched the research program in January 1993, when media reports about a cellular phone–brain tumor lawsuit put the health issue in the spotlight. (A fifth suit has now been filed; see p.10.) CTIA President Thomas Wheeler said at the time that the program would "revalidate the findings of existing studies, which have found that the radiowaves from cellular phones are safe" (see *MWN,* J/F93 and J/A93). Asked about the SAG statement, CTIA's Ron Nessen said that the evolving views should help demonstrate that "the scientific program is working as it is supposed to."

Overall, the newly completed research plan "is in keeping with what we suggested 18 months ago," said Dr. Mays

Swicord, chief of the radiation biology branch of the Food and Drug Administration's (FDA) Center for Devices and Radiological Health in Rockville, MD. The FDA—initially asked by CTIA to run the industry's health research program but later dropped—has consistently maintained that the available data are inadequate for assessing whether cellular phones pose a hazard. "There is not enough evidence to know for sure, either way," the FDA concluded in a February 1993 statement.

Several guiding principles are articulated in the research plan. For example, appropriate exposure methodology will be given top priority, and animal studies will be given more weight than cellular research. In addition, the research plan calls for five "concept papers" on topics such as how to extrapolate animal and cellular studies to humans and how to assess exposures for epidemiological studies.

The actual types of research the SAG will fund fall into four general areas: dosimetry; genotoxicity; lifetime animal exposures; and epidemiology. Depending on the outcome of this work, "there may be a need to conduct *in vitro* or *in vivo* mechanistic and methodology studies," the plan states. The description of the research fills just eight pages, however, and does not identify past studies that should be followed up or replicated. "The plan does not address replication of existing studies head on," Swicord said. This is understandable, he added, since none of the relevant research involves exposures at cellular phone frequencies, but this omission is, nonetheless, "somewhat of a disappointment to us."

Carlo explained that his next set of RFPs—due in November—will cover several of the concept papers and will include a request for investigator-initiated proposals in response to the full research agenda. More detailed, project-specific RFPs will be issued next spring, Carlo said. These may describe past work that merits attention but will go further, requiring, for example, the incorporation of exposure methods that are currently being developed as part of the SAG program.

No proposals have yet gone through the formal review process and received funding. The SAG—consisting of Carlo, Dr. Bill Guy, emeritus of the University of Washington, Seattle, and Dr. Ian Munro of CanTox in Mississauga, Ontario, Canada—has spent $2 million developing the research agenda, conferring with more than 100 scientists and holding three symposia, Carlo said. The SAG has made laboratory site visits and completed a thorough review of the literature, he added. About 40 researchers have been paid as consultants, Carlo estimated, allowing preliminary work to be done that will form the underpinnings of the program.

CTIA, based in Washington, has committed $15-25 million to the effort. But Nessen told *Microwave News* in September that, "It's probably going to take more than $25 million. The industry has said it will spend whatever it takes."

Noting that CTIA was pleased with the work done so far, Nessen said Carlo has performed "a balancing act" between going too fast and too slow. "We'd like the program to move faster, but then we would run the risk of having people say that we're trying to rush out some quick results," Nessen said.

Some delays have been caused by the SAG's requirement that all its researchers follow good laboratory practices (GLPs) or good epidemiology practices, Carlo said. These are standards accepted by the federal government. "Most of the people who have submitted proposals have not been up to GLPs," he said.

The SAG announced last December that it had commissioned dosimetry studies from Dr. C.K. Chou of City of Hope National Medical Center in Duarte, CA, and from Dr. Om Gandhi of the University of Utah, Salt Lake City, along with an epidemiological study from Dr. Kenneth Rothman of Epidemiology Resources in Newton Lower Falls, MA (see *MWN,* J/F94).

The GLP requirement, among other things, has delayed funding of formal research proposals from Gandhi and Chou, Carlo said. Gandhi told *Microwave News,* however, that, "I

New Cellular Phone Brain Tumor Suit Filed

A new lawsuit filed in federal court in Tampa, FL, alleges that radiation from a hand-held cellular phone caused or aggravated the brain tumor that killed William Hartwig. Attorneys involved in this litigation say additional suits are likely soon.

The suit by Hartwig's widow against Nokia Corp. of Finland, and others, charges that the defendants should have warned that the device exposed users to "dangerous, hazardous and excessive microwave radiation." Filed September 6 in U.S. District Court in Tampa, the complaint also states that the phone should have been equipped with a shielding device and that it did not meet existing microwave radiation exposure standards. The defendants named in the suit include Nokia's U.S. subsidiary, Nokia Mobile Phones Inc. of Largo, FL, and a U.K. company, Technophone, which is owned by Nokia. The phone Hartwig used carried the Technophone name.

This is the fifth brain tumor suit filed against a cellular phone manufacturer—and the second filed by John Lloyd Jr., an attorney in St. Petersburg, FL. Lloyd also represents David Reynard, who charges that radiation from an NEC hand-held cellular phone caused his wife's death from a brain tumor. Publicity about the Reynard suit rocked the cellular phone industry in early 1993 (see *MWN,* M/J92 and J/F93). The other cases, filed after Reynard's, are a claim brought by a Motorola engineer, Robert Kane, who alleges that his cancer resulted from the testing of a prototype cellular phone antenna, and two claims that were begun as part of a class action and then refiled as separate personal injury cases (see *MWN,* J/A93, J/F94 and J/A94).

"William Hartwig used his phone right up until the day he died," Lloyd said, arguing that exposure to radiation from the phone hastened his death, even if it did not cause the initial formation of the tumor. Hartwig died in September 1992, at the age of 48, three months after he was diagnosed with an astrocytoma. For several years prior to that, he had been suffering from symptoms that could have been related to a brain tumor, Lloyd told *Microwave News,* but he had been diagnosed otherwise.

A Nokia spokesperson declined to comment on the case.

do not know whether to be optimistic about receiving funding from the SAG." He added that he has "no problem with GLPs." Chou was traveling and could not be reached for comment. Carlo said that the SAG has asked Chou to develop a head-only RF exposure system for animal studies. Gandhi has been asked to "work out the bugs" in his human dosimetry model, Carlo said (see p.8).

Rothman's work accounts for as much as $400,000 of the SAG's expenditures to date, according to Carlo. Rothman told *Microwave News* that he has collected billing data from cellular service providers covering several million users. He is now conducting "validation studies" to assess the usefulness of these data as a measure of actual exposure to cellular phone radiation. Rothman said he also expects to conduct a full-scale study and has been told that the SAG will fund it. Carlo noted that the protocol for such work must still go through the SAG's review process.

Seventeen proposals have been received in response to last year's RFPs for genotoxicity studies, and these applications are among those now being reviewed. The proposals must still be evaluated by the SAG to see how they fit with the newly published research agenda, Carlo said, and then they will be reviewed by the cellular telephone panel that has been established at the Harvard Center for Risk Analysis in Boston (see *MWN,* J/A94). The panel also reviewed the research plan. "The SAG was responsive to the comments made by our reviewers," said Dr. Susan Putnam, a research associate at the center.

The SAG's *Potential Public Health Risks from Wireless Technology: Research Agenda for the Development of Data for Science-Based Decisionmaking* runs 125 pages, with an additional 100 pages of references and close to 200 pages of charts, tables and appendices, including detailed descriptions of the three symposia. It is available from SAG, 1711 N St., NW, Suite 200, Washington, DC 20036, (202) 833-2800.

Two Collections of Papers on Biological Interactions

Hot off the presses are two new works about EMFs and biological interactions. The first, a two-volume set, is *Biological Effects of Electric and Magnetic Fields,* edited by Dr. David Carpenter, dean of the School of Public Health at the State University of New York, Albany, and Dr. Sinerik Ayrapetyan, a visiting scientist who worked with Carpenter and has now returned to the Armenian Academy of Sciences in Yerevan. The second is *On the Nature of Electromagnetic Field Interactions with Biological Systems,* edited by Dr. Allan Frey, chairman of Randomline, a research and consulting firm. The books deal primarily with the effects of power frequency EMFs, but also include reviews on RF/MW radiation.

The first volume of the Carpenter–Ayrapetyan collection synthesizes the work of prominent researchers, examining the sources and mechanisms of the interactions of EMFs and biological systems, and the second volume examines the beneficial and harmful effects of those interactions. "I am pleased that we have several chapters from scientists from the former Soviet Union," said Carpenter. "That work is relatively unknown in the U.S."

Frey's book presents readers with timely information in a rapidly changing area of science: It was written, edited and published in eight months, said Frey, who is based in Potomac, MD.

Published by Academic Press in San Diego, the Carpenter–Ayrapetyan set costs $198.00; each volume is more than 350 pages. To order, call (800) 321-5068, or fax (800) 336-7377. The 184-page Frey book is published by CRC Press in Boca Raton, FL. It costs $89.95 ($108.00 outside the U.S.). To order, call (800) 272-7737, or fax (800) 374-3401.

EPA on Low-Level RF/MW Radiation *(continued from p.1)*

cies, but abandoned this effort in 1988 (see *MWN,* S/O88). This time, EPA, with a new interagency working group, intends to write guidelines, which will not have the force of law.

The NCRP study may challenge the reliance in existing guidelines on specific absorption rates (SARs) as the fundamental dosimetric method of measuring RF/MW exposures. "[S]ome studies indicate that exposure to pulse-modulated radiation produces effects that are different from exposure to CW [continuous wave] radiation of the same carrier frequency and SAR," the NCRP states in its proposal to the EPA. Describing the study's objectives, the NCRP concludes that, "A likely result of this assessment will be a recommendation that addresses the inclusion of the modulation of RF radiation as a factor in establishing RF radiation maximum permissible exposure limits."

"Modulation may very well render the concept of SARs null and void," said Dennis O'Connor of EPA's Office of Radiation and Indoor Air (ORIA). He explained that the NCRP project could provide the EPA with a basis for assessing nonthermal effects and could help stimulate research. "We keep reassessing and reassessing a smattering of existing research," O'Connor noted, "when what we really need is more research."

Dr. Thomas Tenforde of Battelle Pacific Northwest Labs in Richland, WA, who is overseeing the NCRP project, agreed: "Research on this issue is sparse." Tenforde is forming a new committee under NCRP Scientific Committee 89, the NIER umbrella group that he chairs (see *MWN,* M/J92). The EPA is providing $150,000 over two years for the NCRP project, which will result in an NCRP "statement" or "commentary" on the health effects of pulsed or modulated radiation. The membership and chair of the new committee will be announced this fall, Tenforde said.

The new panel will review the literature on modulation and nonthermal effects, Tenforde told *Microwave News,* but it will also consider theoretical dosimetry models and related biological interactions. "We may have to make some extrapolations," he said. In this way, Tenforde added, the project may be similar to the National Academy of Sciences' (NAS) report on possible health risks from the U.S. Air Force's GWEN communications system, which Tenforde directed. Faced with a lack of research directly applicable to the operational frequencies of

the GWEN system, Tenforde's panel used a novel—and controversial—risk assessment method (see *MWN,* M/J93).

O'Connor and Tenforde both said the new focus on modulation was prompted by the advent of digital cellular phones and other wireless devices that generate RF signals that are pulsed at extremely low frequencies (ELF). "It's only prudent that we start thinking about the potential health effects of this new technology before we have spent billions putting it in place," O'Connor told *Microwave News.* Tenforde noted that the new cellular phone technology makes concerns over ELF modulation a "much more timely and important issue."

In 1986, the EPA formally proposed three possible RF/MW limits—SARs of 0.04, 0.08 and 0.4 W/Kg, which translate into power densities of 100, 200 and 1,000 $\mu W/cm^2$ for 30-300 MHz—and a fourth, "no regulatory action" option (see *MWN,* J/F86, M/J86 and J/A86). The limits were based on the conclusion that adverse health effects "begin to occur" at SARs of 1-4 W/Kg and reflected a safety factor of 10-100. The existence of nonthermal health effects from RF/MW exposures at SARs of less than 1 W/Kg was "not clear," the agency stated at the time. Two years earlier, the EPA was close to proposing a 100 $\mu W/cm^2$ guideline but backed off in the face of political opposition (see *MWN,* Jun84, J/A84 and S/O85).

After all but abandoning NIER work in 1993, ORIA announced last winter that it would return to the issue and design a new program (see *MWN,* J/A93 and M/A94). The agency also announced at the time that it would resume work on RF/MW exposure guidelines.

The Institute of Electrical and Electronics Engineers (IEEE) committee that drafted the latest version of the 1992 ANSI/IEEE C95.1 standard specifically excluded consideration of nonthermal effects, noting that "no reliable scientific data exist" to indicate that exposure to nonthermal levels of modulated RF/MW radiation may be "meaningfully related to human health" (see *MWN,* N/D91 and N/D92).

Whether the EPA will return to the proposed 100 $\mu W/cm^2$ limit is unclear. The 1986 options will be "a starting point" for the interagency working group, explained Gene Durman, deputy director of ORIA. "We will not ignore our past involvement in this."

Durman said the agency "is not in a position" to go beyond the approach, based on known thermal hazards, used by the NCRP and the IEEE. "But we will be quite explicit about the fact that the standard does not address possible low-level effects." The EPA recognizes that "new research in the next few years could cause us to reevaluate what should be in the guidelines," he added.

The members of the interagency panel that will oversee this work are Dr. Robert Cleveland Jr. of the Federal Communications Commission, Robert Curtis of the Occupational Safety and Health Administration (OSHA), Norbert Hankin of the EPA, Dr. Gregory Lotz of the National Institute for Occupational Safety and Health, Janet Healer of the National Telecommunications and Information Administration and Dr. Mays Swicord of the Food and Drug Administration (FDA).

Everything is in place to move quickly, O'Connor said. "We are simply going to complete the task that was laid at our feet some time ago" by EPA's Scientific Advisory Board (see *MWN,* J/A91). A draft of the guidelines could be ready for public review in about a year, Durman said.

As early as 1978, an interagency committee with representatives from the EPA, the FDA and OSHA was assembled to examine RF/MW bioeffects research and possible control measures; this group was disbanded in 1981 (see *MWN,* N81).

NCRP To Revise 1986 RF/MW Limits

The NCRP plans to revise its 1986 RF/MW exposure recommendations, Dr. Thomas Tenforde, chair of NCRP Scientific Committee 89, told *Microwave News.* He added that he has support from at least one sponsor but declined to name the organization.

The original NCRP limits, which are similar to the 1992 ANSI/IEEE standard, were based on known thermal hazards. The NCRP also advised that, "If the carrier frequency is modulated at a depth of 50% or greater at frequencies between 3 and 100 Hz, the exposure criteria for the general population shall also apply to occupational exposures" (see *MWN,* J/F86 and M/A86). A more direct examination of low-level exposures is likely in the revision, Tenforde said. "We might be in a position down the road to make stronger statements about modulation, but we don't know yet."

FROM THE FIELD

Latvia's Russian Radar May Yield Clues to RF Health Risks

On June 17-21 a conference on The Effect of Radiofrequency Electromagnetic Radiation on Organisms *was held in Skrunda, Latvia, under the sponsorship of the Soros Foundation (see* MWN, *M/A94). Skrunda is the site of a large phased array radar, built by the Soviet military in 1969 as part of its ballistic missile early warning system. The radar operates at 154-162 MHz. Each antenna in the array has peak and average powers of 2.5 MW and 50 kW, respectively. The radar has long drawn complaints from the over 14,000 people who live nearby—many of whom believe the radar has damaged their health. The Skrunda Support Foundation, which describes itself as an "independent, nonpolitical, open, nonprofit organization," was founded March 3, 1994, at the University of Latvia, Riga, to investigate the effects of over 30 years of radar exposures. (The address of the foundation is 11 Raina St., Skrunda, LV-3326, Latvia.) Dr. John Goldsmith of the Ben Gurion University of the Negev in Beer Sheva, Israel, formerly an epidemiologist with the California Department of Health Services, attended the meeting and filed the following report on his return.*

The rolling countryside around Skrunda is green. Pine and birch woodlots and farms checker the land. Skrunda has about 6,000 people and with its railroad and the Venta river nearby, it is the trading center for this peaceful agrarian region.

There is another Skrunda a few kilometers away that is surrounded by a barbed wire fence and guarded by soldiers. It was built by the Russians during the years they occupied Latvia to house a radiofrequency (RF) space probe and detector array. The radar installation is a massive complex that includes an 18-story building (with an additional four stories underground), which houses arrays of RF antennas configured to scan the northwestern sky. According to the terms of a recent treaty, Russia retains the right to occupy and operate the Skrunda complex until 1998, at which time the Latvians can decide its future.

At the conference, Latvian scientists reported adverse effects on tree growth and the health of both humans and cows living near the radar. Here are some highlights from the presentations of Latvian and visiting researchers:

• Dr. Valdis Balodis of the University of Latvia, Riga, who convened the conference, found a significant negative correlation between RF power density and tree ring growth. In 70 experimental and control plots in forests around the Skrunda radar, Balodis also investigated the possible role of geological, chemical and geographical factors, but none of these could explain the impaired tree growth.
• On the other hand, Dr. Paul Schmutz of the Federal Institute of Forest, Snow and Landscape Research in Birmensdorf, Switzerland, and his colleagues found no evidence of microwave-induced damage to spruce and beech trees exposed for long periods to power densities of 0.7 $\mu W/cm^2$ to 30 mW/cm^2, at a frequency of 2450 MHz. At the highest power levels, the temperature of sucrose solutions, suspended in the plots, increased by 4°C. Whether pulsed exposures with high peak powers—like those from the Skrunda radar—but with the same mean intensity would do any damage is not yet known, according to Schmutz.
• Zanda Balode, of the University of Latvia, Riga, and a coauthor of the Balodis paper, separately found evidence of chromosomal damage associated with the radar. Among 68 cows which had grazed for at least two years in fields in front of the radar array, Balode found significantly more red blood cell micronuclei than in unexposed cows. (Micronuclei are a sign of chromosomal damage.) Exposed cows had 0.6 micronuclei per 1,000 cells, compared to 0.1 per 1,000 in the blood of 105 cows from control fields.
• Dr. Vesma Robule and colleagues in Riga found significant increases in counts of white blood cells—including eosinophils, monocytes and thrombocytes—among 230 Skrunda residents compared to 297 controls. There were no differences in the incidence of cancer, however. Robule also reported increased headaches and sleep disturbances, among other symptoms. Significant health differences were found between exposed and unexposed children, including decreased lung function in exposed children.
• In an abstract prepared for the meeting, V. Ardanovich of the A.L. Minc Radio-Technical Problems Institute in Moscow pointed out that the 0.8 ms pulses of Skrunda-type radar make it difficult to evaluate or predict effects, most of which are estimated on the basis of time-averaged power densities. (No Russians attended the conference, although a number like Ardanovich sent abstracts.)
• Dr. Stanislaw Szmigielski of the Center for Radiobiology and Radiation Safety at the Military Institute of Hygiene and Epidemiology in Warsaw, Poland, reported that Polish military personnel exposed to radar had elevated rates of several cancers and blood disorders. Compared to controls, the increased risks for exposed personnel were 8.3 times for non-Hodgkin's lymphoma and lymphosarcoma, 7.8 times for acute lymphoblastic leukemia, 9.6 times for chronic myelocytic leukemia and 5.5 times for acute myeloblastic leukemia.
• Goldsmith reported on the genetic abnormalities previously disclosed among U.S. foreign service personnel exposed to microwave radiation at the U.S. embassy in Moscow. Of 35 employees whose white blood cell chromosomes were tested for abnormalities in 1966-1969, 6 were normal, 5 were questionable, 2 had growth failures, and the remaining 22 showed some degree of mutagenic activity. Dr. Cecil Jacobson of the George Washington University School of Medicine found in 11 cases a "clinical necessity" to follow personnel "for possible genetic consequences." Similarly, in his 1978 epidemiological study, the late Dr. Abraham Lilienfeld of the Johns Hopkins School of Hygiene and Public Health in Baltimore urged that the Moscow embassy population be restudied after a suitable interval. In light of the unresolved questions concerning the Moscow studies, Goldsmith argued that the blood samples from the human and bovine populations exposed at Skrunda are very important to our understanding of the possible health effects of RF radiation.

Bromley on EPA EMF Report

The following is excerpted from The President's Scientists: Reminiscences of a White House Science Advisor *by Dr. D. Allan Bromley. The book, which was published September 1, 1994, is available for $30.00 from: Yale University Press, PO Box 209040, New Haven, CT 06520. Note that the briefing on the EPA report was in 1990, not 1991 (see* MWN, *M/J90 and N/D90). For more on the CIRRPC report, see* MWN, *N/D92.*

Health risks of radiation of all kinds continue to be of immense public concern, often disproportionate to available scientific evidence. A longstanding FCCSET [Federal Coordinating Council for Science, Engineering and Technology] subcommittee, the Committee on Interagency Radiation Research and Policy Coordination (CIRRPC), has been meeting regularly to deal with these issues and to work toward standardizing rational regulatory policies across agencies.

In recent years there has been growing public concern about possible hazardous effects of the low-intensity, low-frequency electromagnetic radiation emitted by power lines, appliances, electric blankets, and, in particular, television receivers, computers, and video terminals. The magazine *Macworld* bound a preaddressed postcard to me at OSTP [Office of Science and Technology Policy] in one of its issues and invited its readers to sign and mail the card to indicate their concern about this newly recognized supposed health hazard.

I became involved in this matter because in 1991 I had received a requested briefing on a report about to be issued by the EPA [Environmental Protection Agency] and had been shocked by what I heard. The study was a detailed survey of all the published research on the subject of electromagnetic radiation in this intensity and frequency range. Much of the research was of poor quality and with questionable control studies, but the EPA review was a valid report of what had actually been published. What concerned me was the fact that the executive summary of the report painted a substantially more coherent picture than did the report itself, and—much worse—the vugraphs used in the briefing suggested that the correlation between exposure to low-frequency, low-intensity electromagnetic radiation and childhood leukemia was too great to be attributed to chance. In no way did the reviewed research support such a conclusion, and I insisted, as the senior scientist in the Bush Administration, that these vugraphs be changed. I specifically did *not* request any changes in the report or its executive summary.

The staff of the EPA involved in this work promptly leaked to the media and to Congressional staffers, without [EPA Administrator William] Reilly's knowledge, that I was censoring their efforts to protect children, and a minor fire storm developed. There were claims that I had attempted to stack Reilly's review committee within EPA because I had responded to his request for names of people who had expert credentials in the area by listing a number of individuals. One of the

people I recommended was Robert Adair, a Yale colleague who also happened to be the Chairman of the Physics Section of the National Academy of Sciences and had devoted considerable time and effort to studying the electromagnetic field (EMF) question.

I found myself called by two Congressional committees to defend myself against the assertions of censorship and—even more seriously—callous disregard for the health of children!

Public sentiment was fanned by articles in *The New Yorker* by Paul Brodeur. He is a very persuasive writer, but the weight of scientific opinion does not always agree with his conclusions.

Clearly something had to be done to put this issue back on a proper scientific basis, so I turned to Al Young, the Chairman of CIRRPC, with the request that he put together a blue-ribbon panel—without any input from me or from OSTP, to avoid any possibility of perceived improper influence—to undertake a detailed examination of the possible health-related aspects of EMF.

In 1992 the CIRRPC study was released as an FCCSET-commissioned publication. The report, prepared by an independent, nationally recognized group of experts assembled by the Oak Ridge Associated Universities (ORAU) organization, concludes that available evidence fails to document health risks of EMF in nonoccupational settings. A research agenda was proposed to explore the field further, but the committee concluded that an expansion of research efforts on this topic does not command high priority....

...It is safe, however, to conclude that the EMF risk issue will continue to be contentious and of immense potential economic importance; the current best estimate is that prior to 1993 it has cost the American public more than $23 billion to respond to public worries about EMF—particularly in connection with the placement of high-voltage power lines.

Clippings from All Over

If fields of two milligauss really are a serious threat in Denver, Los Angeles and Sweden, then commuters on East Coast electric trains—where the fields at power line frequencies can be hundreds of times larger—ought to be dying like flies. So much for the electromagnetic hoax. To grasp how much damage it's caused, consider what useful developments in cancer research, in education, or in any other field, could have been accomplished with the $23 billion already squandered on this scare. That ought [to] be more shocking to people than any electromagnetic field.

—"Power Lines Are Homely, Not Hazardous," Dr. William Bennett Jr., Yale University, *Wall Street Journal,* p.A8, August 10, 1994

At one extreme, we reject the assertion that there is nothing to be concerned about. Enough evidence exists to lead us to conclude that dismissing concerns about EMF is unwarranted. At the other extreme, we are discouraged by both the quality and quantity of the evidence available to us and thus cannot claim to know the nature nor the magnitude of the risk with any certainty. Thus, relying solely on the data currently available is also unwarranted.

—Edward Washburn et al., "Residential Proximity to Electricity Transmission and Distribution Equipment and Risk of Childhood Leukemia, Childhood Lymphoma and Childhood Nervous System Tumors: Systematic Review, Evaluation, and Meta-Analysis," *Cancer Causes and Control, 5,* pp.299-309, September 1994

They [CTIA] claim that they are being careful in getting a full review from everybody involved before moving ahead. I think they need to speed things up, though. They're moving too slowly.

—Dr. Om Gandhi, University of Utah, Salt Lake City, quoted in "Lone Study Refuting Cancer–Cellular Phone Link Raises Questions," Bloomberg Business News, August 31, 1994

It is clear that, at present, regulation is simply not a workable possibility of dealing with all of the problems of [EMFs]. However, given the weight of the evidence of human health hazards, the consistency of these observations, and the seriousness of the disease implicated, it is also unacceptable to take no action. We do, of course, need more research, both in areas in which human health is evaluated in relation to [EMF] exposure and in animal and cell systems in which one can determine mechanisms of action responsible for the human health effects. Much more engineering research is critically needed to allow us to distribute and utilize electricity without undue hazard to health. Both governments and individuals have difficulty dealing with uncertainty, and this is particularly so when health is involved. The concept of prudent avoidance by [Dr. Granger] Morgan is, in my judgment, an appropriate and wise approach to dealing with uncertainty.

—Dr. David Carpenter, "The Public Health Implications of Magnetic Field Effects on Biological Systems," in *Biological Effects of Electric and Magnetic Fields,* Vol.2, David Carpenter and Sinerik Ayrapetyan, eds., San Diego: Academic Press, p.328, 1994 (see p.11)

By adopting the Proposed Decision and Order, the majority has stated that medical science has only advanced to a stage where electromagnetic field (EMF) exposure is a *possible* rather than a probable cause of leukemia. But under what circumstances? When the evidence, relative to Mr. Pilisuk's exposure, is examined in light of the burden placed on the claimant, it is eminently clear that Mr. Pilisuk's exposure placed him at a significantly higher risk of contracting leukemia, and that if not for that exposure, it is not likely that he would have developed the leukemia....The claimant is not required to disprove all speculative causes of the leukemia, or to establish how the heavy exposure to EMFs results in leukemia. The fact is medical science still cannot explain the biological mechanism by which asbestos causes mesothelioma, but that fact cannot act as a bar to allowance of claims for occupational disease. The evidence in this record clearly establishes that a statistical association exists between exposure to magnetic fields and the development of cancers. Mr. Pilisuk's exposure placed him in a group with a significantly greater risk of contracting leukemia, a risk he would not have borne, but for the distinctive conditions of his employment. More likely than not, this exposure caused his leukemia.

—Frank Fennerty Jr., dissenting opinion, Board of Industrial Insurance Appeals, Washington State, *In re: Robert Pilisuk* (see p.5), pp.2-4, September 6, 1994

Amid growing awareness of the potential hazards associated with [EMFs], leading U.K. insurers are saying their general liability policies do not cover injuries or damage arising from EMF exposure. The concern also is prompting at least one insurer to withdraw from the market for utility company excess liability coverage. The decision by Iron Trades Insurance Co. Ltd. to pull out of that market indicates that U.K. insurers are increasingly worried about the potential liability exposure associated with the [EMFs] around power lines.

—"Insurers Emit Liability Concerns," *Business Insurance,* p.17, September 12, 1994

BREAST CANCER

New Papers from Germany... Two recent reports from Dr. Wolfgang Löscher of the School of Veterinary Medicine in Hannover and colleagues shed more light on the possible link between breast cancer and EMFs. In one paper—whose preliminary results were originally presented in June 1992 at the *1st World Congress for Electricity and Magnetism in Biology and Medicine*—Löscher reports that rats treated with the chemical carcinogen DMBA and then exposed for 90 days to 50 Hz magnetic fields of 3-10 mG had significantly lower nocturnal melatonin levels. Although there were trends toward accelerated development, and higher incidence, of mammary tumors in the exposed rats, these results were not significant. The researchers play down the importance of the findings. They conclude that the exposure conditions did "not induce significant tumor promoting or copromoting effects" and that "modest changes in melatonin secretion in response to [EMF] exposure are not associated with gross effects on DMBA mammary carcinogenesis." In earlier work using 1 G fields and DMBA, Löscher found a significant increase in tumors (see *MWN,* J/A93). On the other hand, in the second paper, which reviews work on a number of cancer types in addition to breast cancer, Löscher and his coworker Dr. Meike Mevissen write that, "There is accumulating evidence that exposure of laboratory animals to power frequency [EMFs] induces a carcinogenic response." The German researchers examine models of spontaneous tumor development as well as cocarcinogenesis. This paper features two useful tables: one on *in vivo* studies of the carcinogenic effects of EMFs and a second on studies of the cocarcinogenic effects of EMFs on chemically initiated tumors. See: Löscher et al., "Effects of Weak Alternating Magnetic Fields on Nocturnal Melatonin Production and Mammary Carcinogenesis in Rats," *Oncology, 51,* pp.288-295, 1994, and Löscher and Mevissen, "Animal Studies on the Role of 50/60 Hertz Magnetic Fields in Carcinogenesis," *Life Sciences, 54,* pp.1531-1543, 1994.

INTERNATIONAL

Brain Hemorrhage Report..."Everyone in the town can name off five people who have had brain hemorrhages." That's how Dr. Mary Allen describes the cluster of brain hemorrhages that she has been investigating in the town of Crossmaglen, where she works as a general practitioner. Located in Northern Ireland on the border with the Republic of Ireland, the town is dwarfed by a British Army/Royal Ulster Constabulary base, and Allen blames non-ionizing radiation from military radars and communications equipment for the health problems (see *MWN,* S/O92). Now a study by Roger Coghill, a radiation researcher and activist based in Gwent, Wales, adds detail to her allegations. Released in August, the report lists 24 people who have suffered brain hemorrhages, pointing out that "a noticeable proportion are younger persons." Rough calculations by Coghill suggest that the 19 cases he could confirm in Crossmaglen, which has a population of 1,800, are at least ten times the expected number based on incidence data for Northern Ireland as a whole. His report points out that

low levels of RF/MW radiation have been shown to cause leakage through the blood–brain barrier (see *MWN,* J/A92) and concludes that "the possibility that MW radiation is responsible for these cases cannot be ruled out." To date, no one has documented the radiation exposures of area residents, and the military has not disclosed the exact types of equipment in use. Allen points out, however, that there are four observation posts in the immediate vicinity, in addition to the main compound in the center of town. "You're always near one of the posts," Allen said in an interview with *Microwave News* in August. The border with the Republic of Ireland in this area is "a microwave border." Many of the people who have had brain hemorrhages lived or worked close to the military facilities, she said. These include a woman who worked in the town's fish and chips shop and two managers of the same bank—businesses that are on the town square in the shadow of the military base. Health fears related to the military presence date back to the mid-1980s, when the base was established. Though Allen, who is the founder of a local group called Campaign Against Radiation Emissions, has been trying to publicize the local health problems for five years, Coghill's report has resulted in the most attention yet for her cause—with accounts in many Irish and U.K. newspapers and on the local television news.

OCCUPATIONAL HEALTH

AIHA's NIER Guides... The American Industrial Hygiene Association (AIHA) has completed the second edition of *Radiofrequency and Microwave Radiation,* a 33-page booklet that covers sources, bioeffects, standards and measurements. The guide, which includes a long list of references and a short glossary, was written by Timothy Hitchcock of IBM Corp. in Research Triangle Park, NC, under the auspices of the AIHA Non-Ionizing Radiation Committee. Dr. Zory Glaser, formerly with the FDA and now a consultant based in Laurel, MD, was elected the chair of the committee in May. Glaser told *Microwave News* that the AIHA will publish a booklet on ELF EMFs in mid-1995, written by Hitchcock, Dr. Shari McMahan of the University of California, Irvine, and Gordon Miller of the Lawrence Livermore National Lab in Livermore, CA. The AIHA issued its first NIER guide, *General Concepts,* in 1977, which was followed by the earlier edition of the RF/MW booklet in 1988 and *Ultraviolet Radiation* in 1991. Copies of the new RF/MW guide are $12 each for AIHA members and $20 for others. Contact: AIHA, 2700 Prosperity Ave., Suite 250, Fairfax, VA 22031, (703) 849-8888.

PEOPLE

Dr. **Thomas Budinger** of the University of California, Berkeley, has stepped down as the chair of IEEE's SCC28, which wrote the 1992 ANSI/IEEE C95.1 RF/MW exposure standard. No replacement has yet been named....Dr. **Leonard Sagan** has retired from EPRI but will continue to consult for the institute....Dr. **Dennis Hadlock** has left SAIC to form Innovative Technical Analysis Corp., a consulting firm based in Rockville, MD....**Kyle King** has joined the East Coast office of

Enertech Consultants in Lee, MA. He was formerly at the EPRI High Voltage Transmission Research Center.

RF LITIGATION

Family's Second Cancer Claim... In a replay of an earlier lawsuit, Scott Main alleges that RF radiation from an FM transmitter near the square dance camp his family ran for many years caused his malignant melanoma, which was diagnosed in 1992. In the previous case, Scott's parents, Beryl and Maelma Main, claimed that Beryl's non-Hodgkin's lymphoma was caused by the same broadcast tower, operated by KYGO-FM, a Denver station owned by Jefferson-Pilot Communications Co. The parents' claim was settled in 1990 for an undisclosed sum (see *MWN,* M/J90). Beryl Main was diagnosed in 1986; he died in 1991. In a 1986 survey, engineers from the FCC and the EPA documented RF radiation levels at the Lighted Lantern Square Dance Camp: On a patio/deck area at the camp, fields reached 300 $\mu W/cm^2$; indoors, fields were as strong as 100 $\mu W/cm^2$ (see *MWN,* M/A87). In a publicly accessible area at the base of the KYGO tower, which was just 100 ft from the camp, fields exceeded 10 mW/cm^2. Even before the parents began their lawsuit, their attorney, Bruce DeBoskey of Silver & DeBoskey in Denver, negotiated an agreement with KYGO to operate at reduced power and to fence off all areas near the tower where fields exceeded 10 $\mu W/cm^2$ (see *MWN,* M/J87). The company later moved its transmitter. "The cases are very similar, though not identical," said DeBoskey, who now represents Scott. In his complaint, Scott, who is 38 years old, states that he played or worked at the camp between 1966 and 1990. Jefferson-Pilot, the defendant, has moved to dismiss a portion of Main's complaint, including a charge of extreme and outrageous conduct. Even if Main proves his allegations of negligence and failure to warn, "there is nothing on the face of the plaintiff's complaint that will support a claim of extreme and outrageous conduct," the company argues in its brief. The defendant also maintains that the charges come too late to satisfy Colorado's statute of limitations and that they are preempted by federal law. Michael Montgomery of the Denver firm of Montgomery, Green, Jarvis, Kolodny & Markusson, who is representing Jefferson-Pilot, declined to discuss the case other than to say that it "is without merit." Scott Main's complaint was filed May 27 in state court and has been transferred to U.S. District Court in Denver.

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