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Radar and Office EMFs Suspected in Census Bureau Brain Tumor Cluster

Census Bureau employees in Suitland, MD, are suspicious that electromagnetic radiation could be responsible for a cluster of up to 20 brain tumors among the staff. Concerns are focused on a powerful air traffic control radar that operated nearby until 1982 and on the electrical equipment, computer terminals and wiring in the bureau's offices.

In an April 11 memo, however, the acting director of the bureau, Harry Scarr, assured employees that electromagnetic field (EMF) levels "are well within tolerance and thus the equipment and the work area do not pose a health risk to our employees." He did not mention the radar.

Scarr based his views on the findings of Federal Occupational Health (FOH) researchers, but their investigation leaves many unanswered questions. The size of the cluster is still disputed, and assessments of possible radiation sources are incomplete. A magnetic field survey conducted for FOH found magnetic fields of 4-8 mG throughout the Census Bureau offices and much higher fields near many types of electrical equipment.

Bureau managers said that they had no information about the radar or other possible sources of radiofrequency and microwave (RF/MW) radiation. When contacted by *Microwave News*, however, Federal Aviation Administration (FAA) spokesperson Paul Laude confirmed that a radar had been in operation at Suitland until 1982. The radar, which was located approximately one-half mile from the bureau offices, was the same type of radar as the one that is suspected as a possible cause of clusters of Hodgkin's disease and amyotrophic lateral sclerosis in South Patrick Shores, FL (see p.13).

(continued on p.12)

Digital Cellular Phones Can Disrupt Implanted Pacemakers

New studies conducted in Switzerland and in Italy show that cardiac pacemakers implanted in patients can be affected by electromagnetic interference (EMI) from digital cellular telephones. Australian researchers, meanwhile, have examined the effects of cellular phones on a variety of medical devices and have found no problems for pacemakers.

Papers on all three research efforts were presented at a June 17 workshop on the *Safety of Mobile Communications*, held in conjunction with the Bioelectromagnetics Society meeting in Copenhagen, Denmark. (For more on the workshop, see p.11.)

The U.S. Food and Drug Administration (FDA) now plans similar research. "We've seen the reports from Copenhagen," said Mitchell Shein of FDA's Center for Devices and Radiological Health (CDRH), "and we plan to do some testing of our own to confirm the findings." Shein told *Microwave*

(continued on p.10)

« Power Line Talk »

The analysis of the Canadian–French utility study data on **transients** and cancer has been accepted for publication by the *American Journal of Epidemiology* (*AJE*) and is expected to appear in November. Dr. **Ben Armstrong** of McGill University in Montreal, Canada, will preview the findings on September 23 in a presentation at the *10th International Symposium on Epidemiology in Occupational Health*, to be held in Como, Italy. Advance copies of the *AJE* paper are already circulating within the EMF community and are generating a great deal of interest. Armstrong declined to specify his results, but knowledgeable sources said that utility workers exposed to transient pulsed magnetic fields had six times the expected rate of lung cancer—a significant finding. Up to now, only Dr. Genevieve Matanoski of Johns Hopkins University in Baltimore has identified an EMF link to this type of cancer: In 1989, she reported a nonsignificant doubling of lung cancer among New York Telephone cable splicers (see *MWN*, N/D 89). The transient data were collected by Hydro-Québec and Electricité de France—Ontario Hydro collected data but did not release it—for the large-scale cancer study released earlier this year by Dr. **Gilles Thériault**, also of McGill, and co-workers (see *MWN*, M/A94). The sixfold excess risk is twice as large as the highest aggregate risk estimate presented in Thériault's paper. On a related front, EPRI has at last released an interim report on *Residential Transient Magnetic Field Research* (Report No. TR-103470) by Dr. **Jeffrey Guttman** and his colleagues at Enertech Consultants in Campbell, CA. The report includes a brief summary of an EPRI workshop on transient magnetic fields, held in Palo Alto, CA, in February 1992, and a paper by **Patrick Reilly** of Metatec Associates in Silver Spring, MD, and Dr. **William Kaune** of EM Factors in Richland, WA, on possible biologically significant parameters associated with transient EMF exposures. To order the report, contact the EPRI Distribution Center, (510) 934-4212.

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One of the most contentious issues at the June Bioelectromagnetics Society (**BEMS**) conference in Copenhagen, Denmark, was the reproducibility of the **gene expression** experiments of Drs. **Reba Goodman** of Columbia University and **Ann Henderson** of Hunter College, both in New York City. Dr. **Jeffrey Saffer** of the Battelle Pacific Northwest Labs in Richland, WA, and **Adam Lacy-Hulbert** of the U.K.'s University of Cambridge, each reported their inability to replicate the Goodman–Henderson work showing increased expression of the *c-myc* oncogene in HL-60 cells exposed to a 60 Hz magnetic field. Late last year, Saffer came to New York City to work in Goodman and Henderson's labs in an effort, according to Saffer's subsequent report to the DOE, to "solidify the existence of magnetic field effects on gene expression." But Saffer could not find the effect. Neither could Lacy-Hulbert, and this is what they each reported in Copenhagen. Saffer has given up trying: "For me, the issue is resolved and I am going to address other questions." He added, however, "I do not rule out the possibility that there are gene transcription effects from

EMFs" in other cell lines or under different exposure conditions. For her part, Goodman is standing firm. "Since we came back from Copenhagen, we have repeated our experiments using the types of controls suggested by Saffer and Lacy-Hulbert and we continue to see an effect using HL-60 and MCF-7 cells. We covered all the bases." Goodman said that she will present these results at the DOE review in Albuquerque in November (see p.3). The issue of reproducibility of experimental results is not new to the EMF controversy and, in fact, a portion of the funds made available under the National EMF Research and Communications Program (**NERP**) has been set aside to allow researchers to repeat and validate key experimental findings. Four regional EMF exposure facilities are being established: at the FDA in Rockville, MD, at NIOSH in Cincinnati, at Oak Ridge National Lab in Oak Ridge, TN, and at Battelle in Richland. The FDA lab will focus on gene expression while the NIOSH lab will concentrate on calcium and signal transduction—the roles of the other two labs have yet to be decided. The FDA work will be directed by Dr. **Mays Swicord**, who is organizing a small, by-invitation-only workshop on the gene expression studies, to be held at the FDA on August 31. "The purpose of the meeting is to agree on a protocol to replicate the original Goodman–Henderson and Phillips work and to augment it with additional controls," Swicord said in an interview. Dr. **Jerry Phillips** of the VA Hospital in Loma Linda, CA, has also shown changes in gene expression, albeit at higher exposure levels than those used by Goodman and Henderson. Goodman, Henderson, Phillips and Saffer will all be at the workshop, together with others who have not, to date, been directly involved in these experiments. "I hope we have the opportunity to bring some resolution to these issues," said Dr. **Gregory Lotz**, who is in charge of the NIOSH exposure system.

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Dr. **Indira Nair** of Carnegie Mellon University in Pittsburgh livened up an otherwise lackluster workshop on *EMF Research & Standards Setting* when she labeled the International Radiation Protection Association's (**IRPA**) EMF standard "unethical." "IRPA is the truth, but not the whole truth," Nair said, citing the absence of consideration of health risks due to chronic exposures. In 1990, IRPA's non-ionizing radiation committee adopted 1,000 mG and 5,000 mG 50/60 Hz exposure limits for the public and workers, respectively, and it reaffirmed them last year (see *MWN*, M/J89, J/F90 and M/J93). The committee is now known as the International Commission on Non-Ionizing Radiation Protection (see *MWN*, J/A92). Nair also challenged the view that EMFs pose only a minor risk. "Do we have to wait for an odds ratio of 15 like smoking?" she asked. Nair pointed out that odds ratios may be on the order of two for EMFs, but that EMF exposures—unlike cigarette smoking—are involuntary. If magnetic fields are indeed promoters, she added, then they would be an important part of the risk equation because "there are chemical carcinogens everywhere." The workshop, which was organized by the DOE,

was held in Copenhagen on the eve of the BEMS meeting.

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As public concern over EMFs has spread throughout the world, **Japan** has been largely immune to the controversy. That began to change in 1993 when a nationwide grassroots network was set up. In May 1994, the 200-member network sent the government a petition with 2,000 signatures, urging EMF epidemiological studies, according to *The Daily Yomiuri* (June 2). Last December, the Natural Resources and Energy Agency had dismissed the need for EMF standards because the 200 mG levels found in some Japanese residential neighborhoods were smaller than the IRPA standard, the paper reported. In mid-to-late August, **TV Asahi**, one of the country's major television networks, will further increase the visibility of the issue when it airs an hour-long program on EMFs on its prime time news show, *The Scoop*—the name of the show is in English. Satoshi Toshida, the show's director, became interested in the EMF health issue when the local utility proposed a new power line in the Tokyo area and was greeted with community opposition. Nearby residents asked for the line to be rerouted. In July, Toshida interviewed researchers across the U.S., including Drs. Ross Adey, Robert Becker, Jerry Phillips and David Savitz, as well as citizen activists in New York and California. Previously he had gone to Sweden to talk to Jaak Noü and Drs. Anders Ahlbom and Birgitta Floderus. Toshida will also highlight the near absence of EMF research in Japan. Japanese electric utilities have sponsored studies in the U.S., but much of this work is shrouded in secrecy (see *MWN*, N/D90).

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On June 22, attorneys for **Nancy and Larry Jordan** took their case to the Georgia Court of Appeals. In May, a jury rejected the Jordans' claim that EMFs from **Georgia Power Co.** and **Oglethorpe Power Co.** power lines were responsible for Nancy Jordan's non-Hodgkin's lymphoma (see *MWN*, M/J94). "I am convinced that had we had a level playing field, we would have won the case," said **Bruce DeBoskey** of Silver & DeBoskey in Denver, one of the Jordans' attorneys. "The legal and evidentiary rulings of the trial judge denied the Jordans a fair trial and a full opportunity to present their case," he added. Lawyers for the utilities referred calls to Georgia Power. Todd Terrell, a spokesperson for Georgia Power, declined to comment other than to say that, "We will have to wait and let the appeal run its course."

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Brain tumors and related cancers have struck as many as six people in the Welsh suburb of Mardy near Abergavenny, Gwent. Two have died. An 11 kV power line passes directly over the homes of two of the victims and within ten yards of the house of a third, according to the *Sunday Times* (U.K.), which broke the story on four of the cases on June 5. A 132 kV line also runs nearby. **Martyn Day**, an attorney with Leigh, Day & Co. in London, is seeking damages from the local utility, Swalec, on behalf of two brain tumor survivors, Stuart Williams, a 38-year-old farm machinery fitter, and 15-year-old

DOE Research Review Now Set for Albuquerque—Not El Paso

Cancel your reservations for El Paso. The annual review of EMF bioeffects research sponsored by the DOE and EPRI has been moved to Albuquerque, NM. The dates for the meeting, November 6-10, are not affected. Dr. Bill Wisecup, who is organizing the meeting, told *Microwave News* that contract difficulties with the El Paso hotel prompted the change.

For more information, contact: W/L Associates, 120 West Church St., Frederick, MD 21701, (301) 663-1915. For room reservations, contact the Doubletree Hotel: (505) 247-3344.

Noel Davies. A fifth and a sixth case were reported in the June 9 and 10 *South Wales Argus*, a local newspaper. One, a 14-year-old former resident of Mardy who also suffers from a brain tumor, has joined the suit, but the other, a Mardy resident with tumors on his spine, will not take part in the legal action. Day is the solicitor for the Studholmes, who allege that power line EMFs caused their son Simon's fatal leukemia, and for 50 children who are suing Michael Heseltine, the U.K.'s Secretary of State for Trade and Industry, to stop activation of six 275 kV power lines being built near the children's homes (see *MWN*, J/A93, S/O93 and M/A94).

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The U.S. **DOE** and **Australia's Department of Primary Industries and Energy (DPIE)** have agreed to cooperate on EMF health effects research. The agreement, signed May 12 in Canberra, Australia, calls for the two departments to develop a framework that will prevent the duplication of EMF work and "facilitate the timely exchange of scientific information." It also provides a structure for joint funding of future bioelectromagnetics research. In announcing the agreement, Bob Collins, a senator and head of the DPIE, noted that the Electricity Supply Association of Australia is currently sponsoring a \$1 million (Australian) animal study at the Royal Adelaide Hospital that is designed to examine whether EMFs act as tumor promoters. He also mentioned an exposure assessment program by a utility in Victoria and a childhood cancer epidemiological study being conducted by researchers at the Royal Hobart Hospital. (A separate childhood cancer study by the Australian Radiation Laboratory in Yallambie has been shelved; see *MWN*, M/J94.) Collins added that the pact between the two agencies will "enable researchers of both nations to have early access" to research results.

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The **Long Island Lighting Company (LILCO)** has agreed to reconfigure a 69 kV power line adjacent to the **Hewlett-Woodmere Middle School** on Long Island, NY—which will reduce average EMFs to 0.5 mG—at one-third the cost of LILCO's original estimate. District Superintendent of Schools Dr. Bert Nelson negotiated the \$51,405 price with the assis-

Alzheimer's Disease Linked to EMFs

A joint U.S.–Finnish team has linked occupational EMF exposures to Alzheimer's disease, and the association appears to be quite strong. In a paper presented at the *4th International Conference on Alzheimer's Disease and Related Disorders* in Minneapolis on July 31, Dr. Eugene Sobel of the University of Southern California (USC) School of Medicine in Los Angeles reported a series of significant relative risks that are, he said, higher than those reported for leukemia and other types of cancer.

"We're really excited about this," Sobel told the *Los Angeles Times* (July 31). "It's a very dramatic effect."

In Minneapolis, Sobel reported a "consistent" pattern of increased incidence of Alzheimer's among workers with "medium" and "high" EMF exposures in three different data sets—two Finnish and one American. The odds ratios for the three study populations were 2.9, 3.1 and 3.0 (p values of 0.17, 0.006 and 0.10, respectively). For women, the ratios were 7.3, 3.3 and 4.2 (p=0.08, 0.03 and 0.24). When the three data sets were combined, the overall risks were 3.0 (p<0.0003) for all subjects and 3.8 (p<0.0008) for women.

In an interview with *Microwave News*, Sobel said that he had found similar risks for a fourth study population—Los Angeles workers. He added that, "The true risks could

be higher," citing possible misclassification of exposures based on job titles. He has approached EPRI for funds to pursue these results.

Sobel, who is a coauthor on the USC childhood and occupational EMF studies (see p.7 and *MWN*, M/A91), and his American and Finnish colleagues found that dressmakers and sewers were "overrepresented" among cases. Subsequent surveys showed that magnetic fields at the operator's head were 2.7-5.2 mG for home sewing machines and 2-11 mG for industrial units, according to Dr. Joseph Bowman of NIOSH, who worked on the study. The levels were much higher—on the order of 200 mG—at knee level, he said.

In 1986, researchers at the Johns Hopkins University Applied Physics Lab in Laurel, MD, reported finding indications of Alzheimer's in a monkey chronically exposed to microwave radiation (see *MWN*, S/O86). That work was never followed up, however, due to lack of funding.

Alzheimer's, a degenerative disease of the brain, afflicts up to four million Americans, mostly those over 65, and is the fourth leading cause of death among adults. Symptoms include impaired memory, thinking and behavior. Sobel's abstract will appear in the journal *Neurobiology of Aging*. A full paper has been submitted for publication, Bowman said.

tance of a representative from the state Department of Public Service. In a vote on May 4, residents had approved funds for the work on the line, which was the source of magnetic fields as high as 11 mG in some classrooms (see *MWN*, N/D92, M/A93, M/J93, J/A93 and M/A94). The district's EMF problems do not end with the power line, however. In the course of a survey commissioned by the district, Dr. **Luciano Zaffanella** of Energetech Consultants in Lee, MA, uncovered high readings in classrooms in all six district schools—of 381 classrooms, 59 had readings over 2 mG and 14 had readings greater than 5 mG. Zaffanella found that currents on water pipes and faulty grounding were among the major sources of magnetic fields in the schools. He told us that he and the district electrician were working to correct the problems. The ballasts of older fluorescent light fixtures also give off strong EMFs, he noted. Magnetic fields two inches off the floor in classrooms located above rooms with fluorescent light fixtures can be over 70 mG, Zaffanella said. But they fall off very quickly with distance, he explained, and may be as low as 1.5 mG one meter above the floor. Nelson said new ballasts would eventually be installed in grade school classrooms, above which children often sit on the floor. Michelle Goldberg, who leads a parents' group that has pressured the district to address the EMF problems, said, "I am happy that we have come this far. But I am not as optimistic as I would like to be—I am concerned about the fluorescent lights." Nelson said he believed his district was the first in the country to identify all the sources of EMFs in its schools and to come up with a plan to reduce them.

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"Parents worried about whether electromagnetic fields cause cancer now have a more all-American concern: Hot dogs...." So begins a short piece in the May 27 *Science* on three studies that link hot dog consumption with an increased risk of childhood cancer. The principal authors of two of these papers, Dr. **David Savitz** and Dr. **John Peters**, are well known for their studies linking power line EMFs to childhood leukemia (see *MWN*, N/D86, M/A91 and S/O91). The researchers used the data collected for their EMF work to look at the risks posed by processed meats. Hot dogs and other cured meats contain nitrosamines—known animal carcinogens. Savitz and Sara Sarasua, both of the University of North Carolina School of Public Health, Chapel Hill, found that children who ate hot dogs at least once a week doubled their chances of developing brain tumors. And Peters and his coworkers at the USC School of Medicine in Los Angeles found that children who ate more than 12 hot dogs a month were nine-and-a-half times more likely to get leukemia than children who ate none. Does the association between hot dogs and leukemia explain away the link between EMFs and leukemia? Not according to NIOSH's Dr. **Joseph Bowman**, one of Peters's coauthors. Bowman noted that, "The wiring codes and the nitrosamines from the processed meat are independent risk factors for childhood leukemia. Nitrosamine consumption is not a confounder that explains the association between wiring codes and leukemia." A third team, led by Dr. Greta Bunin of Children's Hospital of Philadelphia, observed a link between childhood brain tumors and mothers' hot dog consumption during pregnancy. All three papers appeared in the March 1994 issue of *Cancer Causes and Control*.

Breast Cancer Risk for Female Radio Operators in Norway

Women working in electromagnetic environments as radio and telegraph operators had nearly twice the risk of developing breast cancer as other Norwegian women, according to Dr. Tore Tynes of the Cancer Registry of Norway in Oslo. He urged caution in interpreting the findings since he had not measured individual radiation exposures.

In a presentation at the *16th Annual Meeting of the Bioelectromagnetics Society* in Copenhagen, Denmark, on June 15, Tynes said that women who had their licenses for up to nine years were 80% more likely to have had breast cancer than other, presumably unexposed women, but the result was just short of statistical significance. The risk was the same for those who had licenses for 10 to 20 years—this was a significant finding. For women certified over 20 years, the risk rose to 2.2 times the expected rate, which was also significant.

Tynes and his colleagues studied 2,132 Norwegian women, born between 1934 and 1969, and certified as radio operators. Nearly all of these women worked on ships. Tynes noted that the number of years since certification did not necessarily indicate that the women had been operators the whole time. He said that he did not know how to interpret “the lack of latency” for the breast cancer risk.

Tynes observed that there were a number of confounders that could distort the risk estimates, including high-fat diets aboard ship and shift work.

Workers in the radio rooms on ships may be exposed to 25

Hz and 50 Hz EMFs as well as signals in the 400-600 kHz and 1-30 MHz radiofrequency (RF) radiation bands, according to Tynes, who said that it was not clear which type of exposure was the most biologically significant.

Dr. Arnt Vistnes, a physicist at the University of Oslo, and Merete Hannevik of the Norwegian Radiation Protection Authority in Osteras, who are collaborating with Tynes, measured the EMF and RF levels, respectively, on several ships. The EMF levels were similar to those found in Norwegian homes, Tynes told *Microwave News*. RF levels were comparable to those found by Jorgen Skotte aboard Danish ships (*American Industrial Hygiene Association Journal*, 45, pp.791-795, 1984). At 22.1 MHz, the power density reached 0.7 mW/cm², while at 425 kHz, it was as high as approximately 3 mW/cm². Equipment on Danish and Norwegian ships is essentially the same, Tynes said.

The study is the second to show a link between female breast cancer and presumed exposure to electromagnetic radiation. Dr. Dana Loomis of the University of North Carolina, Chapel Hill, found that female electrical workers had a 40% higher mortality from breast cancer than other working women (see below and *MWN*, N/D93). Tynes was one of the first to suggest an association between breast cancer in men and workplace EMF exposures. To date, five studies have shown such a link (see *MWN*, N/D89, J/A90, J/F91, M/A91 and J/A92).

Although no one has looked at breast cancer among radio operators before, Dr. Samuel Milham, formerly of the Washington State Department of Health, found an increase in certain types of leukemias and lymphomas among amateur radio operators (see *MWN*, N/D87 and J/F89).

Trichopoulos Begs To Differ with Loomis on Breast Cancer

In its June 15 issue, the *Journal of the National Cancer Institute (JNCI)* published an editorial that casts a shadow over Dr. Dana Loomis's paper showing a higher-than-expected death rate from breast cancer among female electrical workers. In the editorial, which ran in the same issue as the paper, Dr. Dimitrios Trichopoulos, long identified as a skeptic of the EMF-cancer connection, disputes Loomis's claim that his findings are “broadly consistent” with the EMF-breast cancer hypothesis.

Trichopoulos, an epidemiologist at the Harvard School of Public Health in Boston and a member of the panel that wrote the Committee on Interagency Radiation Research and Policy Coordination report on EMFs (see *MWN*, N/D92), criticizes the mortality data Loomis used as having “inherent limitations.”

In an interview with *Microwave News*, Trichopoulos was more direct, saying the “database was of questionable validity, to say the least.” He noted that the data show that the breast cancer risk is higher among white women than among black women when, in fact, it is the other way around: “If a database is not able to demonstrate something as obvious as that, how can we trust it?”

Trichopoulos emphasized that his lack of enthusiasm for the study did not extend to Loomis and his colleagues, Dr. David Savitz and Cande Ananth. He repeated what he states in the editorial—that the analysis was “exemplary” and that “we should all be grateful” to them for undertaking such a project.

Loomis, of the University of North Carolina School of Public Health, Chapel Hill, told *Microwave News* that although he thought

JNCI could have put his paper in a more positive light, he did not think the editorial damaged the credibility of the study. Loomis took issue with Trichopoulos's implication that he believes that EMFs cause cancer in general. “That is not my belief nor one that is reflected in the paper,” Loomis said. But, he added, “In the end, I do not disagree with Dr. Trichopoulos's conclusions: The study is a preliminary one and more research is needed.”

Dr. Richard Stevens of the Battelle Pacific Northwest Labs in Richland, WA, questioned the studies cited by Trichopoulos as failing to support the breast cancer-EMF link. As an example, Stevens pointed out that, “Dr. John Vena's electric blanket study shows a 1.4 times higher risk, identical to that of Loomis's, yet Trichopoulos writes that the study ‘indicated no increase of breast cancer risk’” (see *MWN*, S/O91). Stevens is working on a large-scale epidemiological study of breast cancer and exposures to light-at-night and/or EMFs (see *MWN*, N/D91 and M/J92).

Publication of Loomis's paper received wide coverage. It was reported on June 15 in the *Wall Street Journal*, *New York Newsday*, *USA Today*, and on CBS News' *This Morning* program. In the June 17 issue of *Science*, Gary Taubes called the “unusual pair of articles” the “latest battle in the EMF wars.” Loomis first presented his results last November at DOE's annual research review (see *MWN*, N/D93). See: “Breast Cancer Mortality Among Female Electrical Workers in the United States,” *JNCI*, 86, pp.921-925, and Trichopoulos's editorial, “Are Electric or Magnetic Fields Affecting Mortality from Breast Cancer in Women?” on pp.885-886.

Aluminum Company To Contest Workers' Comp Cancer Award

Kaiser Aluminum & Chemical Corp. is contesting a precedent-setting Washington state ruling that awarded workers' compensation to a former employee who claimed EMF exposure was responsible for his cancer.

The June 29 decision by the state's Department of Labor and Industries is the first by a government body in the U.S. to link EMFs and cancer. Kaiser has asked the state to reconsider its ruling and will submit medical and scientific information to bolster its position.

James Brewer, who won the compensation, was diagnosed with non-Hodgkin's lymphoma on November 1, 1991. From 1969 to 1986, he was a production worker in the "potroom" of Kaiser's Tacoma smelting plant, where aluminum ions are reduced into the metal in large steel pots.

In his job, Brewer was routinely exposed to high levels of electromagnetic radiation, intense heat and toxic chemicals, including benzene and polycyclic aromatic hydrocarbons (see *MWN*, J/A90). In addition to high static magnetic fields, preliminary measurements by the National Institute for Occupational Safety and Health indicate that the time-varying fields can reach up to 75 mG in certain parts of the potroom.

In a July 1 letter to Lance Palmer, who is Brewer's attorney, state Disability Adjudicator Joyce Edwards wrote: "There is medical opinion in [Brewer's] claim file that on a more probable than not basis, Mr. Brewer developed non-Hodgkin's lymphoma as a result of his exposure to electromagnetic fields while working for Kaiser Aluminum." Palmer is with the Seattle firm of Levinson, Friedman, Vhugen, Duggan & Bland.

Steven Valandra, a spokesperson for the state, said its decision in Brewer's case was based solely on the information it had been provided and did not represent any shift in policy. "It's just a matter of process. A worker is entitled to sure and speedy relief. [Brewer's] claim had been sitting around...and no decision had been made. Kaiser had been given a chance to respond...but didn't send anything in," said Valandra.

Susan Ashe, a Kaiser spokesperson, said that it was "simply a misunderstanding about timing for getting information in." She added that Kaiser is confident that the state will ultimately reject the claim. Kaiser, which is self-insured, uses a claims processor, Alexsis Risk Management Services, headquartered in Livonia, MI.

Dr. Samuel Milham, who had supported Brewer's claim, was the first person to link occupational exposure to EMFs with cancer (see *MWN*, J/A82). In a study published in 1990, Dr. Robert Davis and Milham, both then of the Washington State Department of Health, found abnormal immune systems in aluminum workers at the Kaiser plant who were routinely exposed to very high magnetic fields and toxic chemicals (see *MWN*, J/A90). The study was prompted by Milham's observation of a cluster of five cases of B-cell lymphoma among aluminum plant workers between 1978 and 1985. The observed change in the immune system—elevated levels of T8 suppressor lymphocytes—is a known risk factor for B-cell lymphoma, Davis and Milham pointed out at the time.

In another study of mortality rates at the Tacoma plant, by Dr. Howard Rockette and coworkers at the University of Pittsburgh, workers were found to be five times more likely to die of leukemia and lymphoma than controls (see *MWN*, J/F93).

Palmer said seven others who worked side by side with Brewer had filed for workers' compensation: The state denied six of the claims and the seventh was settled out of court.

After the state responds to Kaiser's request for a review of Brewer's award, either Brewer or Kaiser could appeal that decision, which could prolong the case for years. If the state allows the claim to stand, the burden of proof in an appeal would fall on Kaiser to prove that EMF exposure does not promote cancer.

"It will be interesting to see how the scientific evidence will be evaluated in a situation where the burden of persuasion is placed on the employer, instead of on the worker," said Dr. Richard Piccioni, a Seattle lawyer and EMF consultant, who represents plaintiffs.

Less than three months before the Brewer decision, the state denied a pension for the widow of electrical worker Robert Pilisuk, who had claimed that on-the-job exposure to EMFs was responsible for his acute lymphocytic leukemia (see *MWN*, M/J94). Judge Linda Williams of the state Board of Industrial Insurance Appeals acknowledged in her April 14 decision that there was a "possibility" of an EMF-leukemia link, but that it was not "probable."

Suit Alleges Cancer Cluster Due to Building's Transformers

Three workers from a small real estate office in Orange County, CA, are claiming that strong EMFs from a transformer vault in the basement of their building are responsible for their cancers. They are suing Grub & Ellis, their employer, Koll Co., the building owner, and Southern California Edison (SCE), a utility.

The plaintiffs, Michael Johsz, James Nichols and Mary Ann Stewart, have brain cancer, lymphoma and breast cancer, respectively. All three were diagnosed in 1993. They assert that others in their office, on the ground floor of a multistory building in Newport Beach, also have developed health problems.

"This is definitely a cancer cluster," said Annee Della Donna, an attorney with the firm of Wylie Aitken in Santa Ana, who is representing the plaintiffs. Since the early 1980s, when Grub & Ellis moved into the building, about 30 people have worked in the area of the office with the highest EMFs, she explained, and as many as half of them have fallen ill. According to the amended complaint, filed on May 18 in Orange County Superior Court, the plaintiffs' current or former coworkers have developed colon cancer, meningioma, cancer of the intestines and melanoma. More workers with cancer might join the case, Della Donna added.

John Tinker, SCE's legal counsel in Rosemead, told *Microwave News* that the charges "are completely without merit." He added, "We plan to pursue a vigorous defense." Representatives of Koll and Grub & Ellis declined to discuss the case.

Grub & Ellis employees noticed a humming sound and

vibrations for years, according to the complaint, but only found out about the high EMF levels when a new computer system, installed in 1989, began malfunctioning due to magnetic field interference. In late 1990, Koll commissioned an EMF survey, which showed that EMF levels in one area reached 81 mG on the floor and 32 mG at a height of four feet. Stewart's desk was in this area, as was a terminal that was often used by Johsz and Nichols, Della Donna said. She also noted that other measurement results, including readings taken in the fall of 1990 by SCE engineers, were as high as 150 mG.

The vault beneath the Grub & Ellis space contains transformers, switching gear and 12 kV distribution circuits that provide power for two 14-story towers.

In a similar case, a New York City woman filed suit against Consolidated Edison Co. last November, alleging that electrical transformers near her work area at CBS Inc. caused her breast and ovarian cancers (see *MWN*, M/A94).

Two EMF-cancer claims against utilities—both involving outdoor power lines—have gone to trial and been rejected by juries (see *MWN*, M/J93 and M/J94). Della Donna pointed out, however, that “jurors have a perception that power lines are everywhere.” While power lines and substations are highly visible, she said, her clients had no idea that they were being exposed to high EMF levels. “Most people don’t know what’s in the basement of an office building,” she explained. Tinker countered that even if the presence of the electrical facilities in the vault was not known to the plaintiffs, “Everybody has an understanding that we are living in an age in which electrical facilities are everywhere.”

USC Study Finds Small Leukemia Risk for Electrical Workers

Electrical workers were slightly more likely to develop leukemia than those who worked in other jobs, according to a study by Dr. Stephanie London and colleagues at the University of Southern California (USC) School of Medicine in Los Angeles. The workers also experienced a “modest increase” in leukemia risk as their exposures rose, but the researchers cautioned that the trends were only of borderline statistical significance.

London and her colleagues found a significant “weakly elevated” risk of 20-30% for electrical workers, when compared to nonelectrical workers, of all leukemias as well as three subtypes—acute nonlymphocytic, chronic lymphocytic and chronic myeloid (CML). They observed a dose-response trend with average magnetic field exposures and with percent of time spent in fields greater than 25 mG—but not with the percent of time spent in fields greater than 2.5 mG.

Workers who spent the most time in fields greater than 25 mG, or who worked in average magnetic fields of more than 8.1 mG, had a 2.3 times greater chance of developing CML compared to the least-exposed electrical workers. The trend toward higher risk with increased exposure was stronger for CML than for all leukemias combined, but the number of cases involved was small.

The greatest risk of all leukemias—3.2 times expected—was among telephone line workers and splicers, but this find-

NY Homeowners Sue Utilities over Property Devaluation

Five property devaluation lawsuits have been filed in New York since the state’s highest court decided that perception is everything where power lines are concerned. Owners now only need to show that their properties have lost value because of buyers’ concerns about nearby power lines, and do not have to prove that EMFs affect health (see *MWN*, N/D93 and J/F94).

The lawsuits are among the first in what could be an onslaught of litigation against electrical utilities over property devaluation, said Michael Rikon of Goldstein, Goldstein & Rikon in New York City, one of the plaintiffs’ attorneys. Rikon also represented the Criscuolas, whose state Court of Appeals victory set the stage for the new lawsuits.

Four of the cases, all against Consolidated Edison Co. (Con Ed), were filed in June and July in Westchester County Supreme Court. The plaintiffs seek a combined total of more than \$3 million. Another suit, filed in Nassau County Supreme Court in July, asks for \$359,000 from Long Island Lighting Co. (LILCO).

The lawsuits allege that the value of the plaintiffs’ properties plummeted because they were “invaded by EMFs radiating from nearby utility power lines,” according to attorney Eric Bregman of Sive, Paget & Riesel, who, with Andrew Gershon of the same New York City law firm, is working with Rikon. Bregman told *Microwave News* that

one owner already had sold his home at a \$1 million loss.

“This goes one step further than Criscuola, which was an eminent domain case,” said Bregman. “These cases are inverse condemnation and trespass cases. The government or utility doesn’t directly take ownership as with eminent domain, but it invades the property and indirectly takes away value. In this case, it invaded the property with EMFs.”

Con Ed has until July 28 to answer the complaints and LILCO until August 25. Con Ed spokesperson Martin Gitten would not comment about the suit while it is in litigation. A LILCO spokesperson, Elaine Davis, who would not speak about specifics of the case, did point out, however, that the housing market on Long Island is depressed because of a recession. She added that LILCO supports EMF research and is “as interested as anyone in finding the answers. Our employees live, work and raise their families here.”

Bregman said other property devaluation lawsuits are expected to follow within the next several weeks.

Last fall, the Court of Appeals ruled that Joseph and Dominick Criscuola of Downsville could recover damages without linking EMFs to health problems. The New York Power Authority had built a 345 kV power line on a strip of land running through the middle of their property. The Criscuolas settled out of court (see *MWN*, J/F94).

ing was based on only four cases. This group of electrical workers was the only one whose risks were significantly elevated.

London told *Microwave News* that she did not think the results were conclusive in either direction. "It is just another study to be thrown out in the ring and interpreted along with previous studies," she said.

The London study joins a handful of others that estimated workers' magnetic field exposures from actual measurements and not from job titles alone. Four studies—by Dr. Birgitta Floderus, by Dr. Genevieve Matanoski, by Dr. Gilles Thériault and by London—have found a link between leukemia and occupational EMF exposures (see *MWN*, J/A91, S/O92, M/A

93, M/J93, S/O93 and M/A94). Jack Sahl also took measurements but he did not find a higher leukemia risk among utility workers (see *MWN*, M/A93 and J/A93).

The USC study appears in the *American Journal of Industrial Medicine*, 26, pp.47-60, 1994. A preliminary analysis of the data was published by the Electric Power Research Institute (EPRI) in a report, *Electric and Magnetic Field Exposure, Chemical Exposure and Leukemia Risk in "Electrical" Occupations* (No.TR-101723), (see *MWN*, J/F94). In 1991, the USC team, led by Dr. John Peters, showed an association between power lines and childhood leukemia (see *MWN*, J/F91 and M/A91). Both studies were sponsored by EPRI.

HIGHLIGHTS

Harvard Center To Review Cellular Phone, EMF Studies

The cellular phone and electric utility industries have turned to Harvard University to help them evaluate the health risks of microwave radiation and EMFs. In response, the Harvard Center for Risk Analysis (HCRA) has set up two panels that will peer-review cellular phone and power frequency EMF studies.

The HCRA was established in 1989 at the Harvard School of Public Health in Boston "to enhance public health by promoting reasoned public responses to hazards that may endanger the health and safety of workers, consumers or the general population," according to a recent annual report. It is funded by industry, government and foundations.

Dr. John Graham, the director of the HCRA, told *Microwave News* that the two panels will evaluate "the scientific basis of potential risks that are of public concern" and that they fit well with the HCRA's mission. Dr. Granger Morgan of Carnegie Mellon University (CMU) in Pittsburgh is the chair of the HCRA advisory committee, which meets to "assess progress and suggest new directions." Morgan was Graham's thesis adviser at CMU.

The scientific advisory group (SAG) of the Cellular Telecommunications Industry Association (CTIA) appealed to the HCRA to oversee their research agenda after negotiations with the Food and Drug Administration broke down last year (see *MWN*, J/A93). The Harvard Peer Review Board on Cellular Telephones and Human Health will review SAG's research agenda, protocols and studies on possible health effects from portable cellular telephones. The HCRA will function as the "information conduit" between CTIA's SAG on the one hand and the peer-review board on the other, said Dr. Susan Putnam, a research associate at the HCRA and project manager for the two review panels.

The cellular phone work is completely funded by CTIA, which has set up a blind trust that the center can draw on to pay reviewers, Putnam said. SAG spokesperson Michael Volpe said that the HCRA "will assure the scientific rigor of the studies."

The HCRA played a limited role in choosing the members of the cellular phone board. Eight members of the 12-member panel were part of the original group organized by Dr. George

Carlo, head of the CTIA research program (see *MWN*, J/A93). Four additional members were invited by the HCRA. Putnam said that the HCRA wants "to broaden the group" and may create subpanels to review particular studies, if needed.

The Harvard Advisory Committee on EMF and Human Health, as the EMF panel is known, presently has 14 members,

Members of the Panels

The members of the cellular telephone panel are: Dr. Larry Anderson, Battelle Pacific Northwest Labs, Richland, WA; Dr. Patricia Buffler*, University of California, Berkeley; Dr. Philip Cole*, University of Alabama, Birmingham; Sir Richard Doll*, Oxford University, Oxford, U.K.; Dr. Carl Durney, University of Utah, Salt Lake City; Dr. Saxon Graham*, State University of New York, Buffalo; Dr. Don Justesen*, VA Medical Center, Kansas City, MO; Dr. Richard Monson*, Harvard School of Public Health, Boston; Dr. Asher Sheppard, consultant, Redlands, CA; Dr. Andrew Sivak, consultant, Cambridge, MA (former president of the Health Effects Institute); Dr. Dimitrios Trichopoulos*, Harvard School of Public Health, Boston; Dr. Gary Williams*, American Health Foundation, New York. No chairperson has yet been named. HCRA's Putnam said that Dr. Om Gandhi of the University of Utah, Salt Lake City, a member of the original SAG panel, had withdrawn from consideration "by mutual agreement in view of his involvement" in cellular phone research. (Members of the original SAG panel are marked with an *.)

The EMF panel members are: Dr. John Bailar, McGill University, Montreal, Canada; Dr. Harvey Checkoway, University of Washington School of Public Health, Seattle; Dr. Philip Enterline, University of Pittsburgh; Dr. Reba Goodman, Columbia University, New York; Dr. Raymond Greenberg (chair), Emory School of Public Health, Atlanta; Dr. Stephanie London, University of Southern California School of Medicine, Los Angeles; Dr. Genevieve Matanoski, Johns Hopkins University School of Hygiene and Public Health, Baltimore; Dr. Richard Monson, Harvard School of Public Health, Boston; Dr. Indira Nair, Carnegie Mellon University, Pittsburgh; Dr. Russell Reiter, University of Texas Health Science Center, San Antonio; Dr. Richard Setlow, Brookhaven National Laboratory, Upton, NY; Dr. Betty Siskin, University of Kentucky, Lexington; Dr. Paul Slovic, Decision Research, Eugene, OR; Dr. Tom Tenforde, Battelle Pacific Northwest Labs, Richland, WA.

with Dr. Raymond Greenberg of the Emory School of Public Health in Atlanta serving as the chair. Graham said the idea for the panel grew out of discussions on the "need for an independent, objective evaluation of the science" of EMF health effects that he had with the Electric Power Research Institute (EPRI), the Edison Electric Institute (EEI) and Dr. Richard Wilson of Harvard University. Wilson was a member of the Environmental Protection Agency's Science Advisory Board's EMF panel (see *MWN*, J/F91 and J/A91).

Both EEI and EPRI have made unrestricted grants to the HCRA for fiscal 1994. Dr. Stan Sussman, EPRI's EMF manager, told *Microwave News* that EPRI's \$100,000 grant "is providing support for the [HCRA] to work on the scientific advancement of the field of risk assessment, including work on EMF." Sussman said the funding will "support the development of an annual state of the science of EMF report and capability to provide comment on study results when they are released."

Richard Loughery, EEI's EMF issue manager, said in an interview that EEI's \$50,000 grant to the HCRA was not originally intended to fund the EMF panel. EEI did request the HCRA to review Dr. Gilles Thériault's utility worker study (see *MWN*, M/A94), Loughery said, because it wanted "an-

other objective review of the study." He added that EEI expects to request reviews of future studies.

Sussman presented a history of EMF research at the committee's first meeting on July 20 in Boston. Michael Rossler, manager of environmental programs at EEI, was also present.

At the meeting, panel members attempted to clarify the committee's role and critiqued both the Thériault utility worker study and Dr. Dana Loomis's study on female breast cancer and electrical work (see p.5 and *MWN*, N/D93). Putnam said a draft statement of the committee's role and goals had been distributed to its members and would appear in the HCRA's newsletter, *Risk in Perspective*, which is published five to six times each year. She said she was not yet sure how the committee's critique of the two studies would be disseminated. Based on suggestions by those at the meeting, the HCRA may add more members to the 14-member panel, Putnam said.

In interviews conducted after the meeting, members said they were generally pleased with the session, although a few remarked they were not sure what the end result would be.

PCS Phones Face FCC Radiation Testing Hurdles

The Federal Communications Commission (FCC) has ruled that the nascent personal communications services (PCS) industry must comply with radiation safety standards that are more stringent than those that apply to the current generation of hand-held cellular phones. The decision could signal a coming change in FCC testing requirements for all types of wireless devices, including cellular phones.

Under the new rules, which were adopted June 9, hand-held PCS phones are only excluded from radiation testing if they meet two conditions: the maximum power output is less than 100 mW and a 2.5 cm separation is maintained between the user and any "radiating structure." Otherwise, manufacturers need to show that specific absorption rates (SARs) associated with the phones' use meet the levels specified in the American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE) C95.1-1992 guidelines.

Existing hand-held cellular phones are exempt from SAR testing under current FCC rules, which are based on the 1982 version of the ANSI/IEEE guidelines. But this could change. The FCC is considering using C95.1-1992 as its overall standard for controlling radiofrequency and microwave (RF/MW) radiation health risks (see *MWN*, M/A93, J/F94 and M/J94). If the ANSI/IEEE guidelines are adopted without modification, cellular phones will be subject to a power limit of approximately 700 mW and to a 2.5 cm separation to be exempted from SAR testing.

The FCC's Dr. Robert Cleveland noted that the reference to the "radiating structure" of a device, in the separation provision of the guidelines, does not simply mean the antenna. "For existing cellular phones, the whole unit, including the case, may be radiating," he explained. The potential regulatory problems posed by the 2.5 cm separation have yet to be addressed. Neither is it clear whether the radiating structure of a hand-held phone must be kept 2.5 cm from the user's hand.

ARRL Bioeffects Committee Quits in RF/MW Controversy

The Bioeffects Committee of the Amateur Radio Relay League (ARRL), which included several prominent scientists, quit *en masse* on June 1 to protest what it claimed was the league's misuse of the committee's reputation and disregard of its expertise. ARRL President George Wilson III, the focus of much of the committee's ire, maintains that the committee resigned because of "perceived ego slights."

The controversy centers on the FCC's request for comments on its proposed adoption of the ANSI/IEEE C95.1-1992 RF/MW radiation standard. The committee's opinion on the standards was not solicited, according to the committee chairman, Dr. Ivan Shulman, so four members—Dr. Ross Adey, Wayne Overbeck, Dr. David Rodman and Shulman—jointly filed comments with the FCC independently of the league. Drs. Samuel Milham and Thomas Rozzell also were on the committee.

Following submission of the four committee members' comments, Wilson dismissed Overbeck, an attorney and the principal author. The dismissal, combined with other disagreements, led to the mass resignation.

In contrast to subsequent comments filed by the league, the committee members' suggestions had included adoption of some stricter RF/MW radiation standards, although both Shulman and Wilson said that this was not the central point of the dispute.

Adey told *Microwave News* that, "The ARRL headquarters has a long history of reluctance to examine and accept RF radiation health risks, and this current situation confirms that history."

HIGHLIGHTS

The 100 mW PCS exclusion is more restrictive than the low-power exclusion clause in C95.1-1992. Under the formula outlined in the 1992 standard for "uncontrolled environments," the power limit for exempting a device from SAR testing drops as frequency increases; the limit would be over 300 mW at the 1850-1990 MHz frequencies used by PCS. "We decided to be more conservative," said Cleveland.

In fact, the exclusion clause in the 1992 guidelines does

Cellular Phone Companies Fund EMC Research Center

AT&T Corp., McCaw Cellular Communications Inc., Motorola Inc. and Southwestern Bell Mobile Systems have established the Center for the Study of Wireless Electromagnetic Compatibility (EMC) at the University of Oklahoma, Norman. The interim director of the center, Dr. Adejide Badiru of the university's School of Industrial Engineering, explained that the four companies have provided an initial \$250,000 to set up the center and have committed to supporting it for at least five years. Other companies are interested in joining the effort, Badiru said, estimating that the center's five-year budget could reach \$2 million.

As one of its first projects, the center is organizing a conference on medical device EMC in Dallas, September 29-30. The meeting is being cosponsored by the Cellular Telecommunications Industry Association and the Health Industry Manufacturers Association.

A number of reports, including a page-one story in the *Wall Street Journal* (June 15), have highlighted malfunctions in respirators, incubators, heart monitors and other hospital equipment that have been linked to portable wireless devices (see *MWN*, J/A93 and N/D93). EMI to wheelchairs has also been reported (see p.17). Noting that press accounts have cited as many as five deaths due to medical device EMI, Rep. Gary Condit (D-CA) has requested a study from the General Accounting Office (GAO), the research arm of Congress. In a June 16 letter, he asked the GAO to examine "whether EMI from cellular telephones and other wireless devices causes sensitive electronic medical devices to fail."

Most of the center's research will be in direct response to company needs, Badiru said. The results of some studies will be made public, but other findings will be proprietary for the company that requests the research. Walter Patterson, a spokesperson for Southwestern Bell Mobile Systems in Dallas, added that the center will also coordinate EMC standards efforts.

"Industry is saying, 'Let's not make this the bogeyman of unexplained medical device problems,'" said Dr. Ed Berbari, who helped set up the center. He noted that the cellular industry believes a number of hospitals have banned the use of cellular equipment without a clear understanding of the problem. Berbari recently moved from the University of Oklahoma to Purdue University in Indianapolis, but he will remain a consultant to the center.

not apply above 1500 MHz. The FCC asked the IEEE to rule on whether an extrapolation to higher frequencies was "technically supportable." Dr. Eleanor Adair, cochair of the IEEE panel that revised C95.1, responded in an October 11, 1993, letter to the FCC that extending the provision to these frequencies "would be conservative."

Since the general RF/MW rulemaking could take months or years to complete, the FCC decided to apply C95.1-1992 to PCS, "to avoid holding up approval of certain of the new PCS rules," Cleveland told *Microwave News*. The agency also wanted, if possible, to avoid having to change the PCS rules to conform with the general RF/MW regulations that are ultimately adopted, said Cleveland, who is with FCC's Office of Engineering and Technology in Washington. He pointed out that, in comments on the general RF/MW rules, the Food and Drug Administration objected to C95.1-1992's low-power exclusion (see *MWN*, J/F94).

It is not yet known what proportion of PCS devices will be covered by the 100 mW exemption. Mark Golden, acting president of the Personal Communications Industry Association in Washington, told *Microwave News* that he expected most hand-held PCS equipment to fall below the limit. He added that he was satisfied with the RF/MW provisions in the PCS rules: "It gives us a benchmark." In comments on the general RF/MW rules, however, Apple Computer Inc. warned of a "recent shift of the prevailing vision of PCS" toward higher power outputs.

The RF/MW provisions for PCS are part of a broader set of FCC rules governing frequency allocations and other issues. The FCC set the maximum power for PCS base stations at 1640 W equivalent isotropically radiated power. In its *Memoandum Opinion and Order*, which gives the reasoning behind the rules, the FCC explains that this is equivalent to 1000 W effective radiated power—double the effective radiated power allowed for cellular phone base stations on a per-channel basis. PCS base station transmitter output power is being limited to 100 W to encourage the use of high-gain antennas.

PCS is expected to compete with existing cellular phone and pager companies and to provide wireless links for portable computers, fax machines and other equipment.

Cellular Phones and Pacemakers (continued from p.1)

News that the scope of the testing program has not yet been set, but that the agency will likely begin by examining whether the digital phones that are now being introduced in some U.S. markets interfere with pacemakers. He added that the FDA has not received many reports of pacemaker EMI problems due to existing analog cellular phones.

(The cellular phone industry, reacting to recent publicity about cellular phone EMI, has established a research center at the University of Oklahoma; see story at left.)

A team led by Bernhard Eicher, head of the research group on biological effects of electromagnetic radiation at Swiss Telecom PTT in Berne, examined 39 patients with implanted pacemakers. When a hand-held cellular phone was used in the normal operating position, near the head, none of the pacemakers malfunctioned. When the phone was placed on the chest close

(continued on p.12)

Cellular Phone Workshop: The Obvious Sinks In

The lesson of the *Workshop on the Safety of Mobile Communications*, held in Copenhagen, Denmark, on June 17, was one that has been apparent since David Reynard made international headlines by alleging that his wife's brain tumor was caused by a hand-held cellular phone: There are no easy answers to questions about cellular phone safety.

No one was clearer about this than Dr. George Carlo, who is coordinating health research for the Cellular Telecommunications Industry Association (CTIA) through his scientific advisory group. "There are a lot of data gaps in this area," he told the attendees. Though obvious, this was a sharp departure from past CTIA statements that thousands of studies published over the past 40 years show that "radio transmissions from cellular telephones pose no health risk" (see *MWN*, J/F93). Last year, CTIA committed \$15-25 million for a three-to-five-year research program to "reassure" the public that cellular phones are safe (see *MWN*, J/A93).

In an interview, Carlo told *Microwave News* that the research program is a "massive undertaking" and that \$15 million is not going to be enough to resolve the safety issues. "After \$25 million, we will have a database to make some further decisions," he said. He stressed that, "I have been told that I'll have enough money to do the job if the studies are rigorous and peer-reviewed." Carlo, an epidemiologist and a lawyer who is the chairman of the Health & Environmental Sciences Group in Washington, plans to issue an overall research strategy at the end of August.

So far, the CTIA program has been moving slowly. A year and a half after CTIA announced the initiative, only one research contract has been awarded—to Drs. Kenneth Rothman and Nancy Dreyer of Epidemiology Resources Inc. of Newton Lower Falls, MA, to develop a database on the use of cellular phones for future epidemiological studies.

Two other contracts, announced by Carlo last December, have not yet been finalized. These are dosimetry studies by Dr. C.K. Chou of the City of Hope National Medical Center in Duarte, CA, and by Dr. Om Gandhi of the University of Utah, Salt Lake City (see *MWN*, J/F94). Carlo explained that he was waiting for an agreement on the exposure protocol before signing the contracts. "First, I've got to get some feedback from Harvard on standardizing the dose," he said, referring to the Harvard Center for Risk Analysis, which has set up a panel to review CTIA's research program (see p.8).

Because of the almost total lack of funds for health research in the U.S., very little new biological data were reported at the meeting. Studies from Dr. Ross Adey's lab at the VA Hospital in Loma Linda, CA, funded by Motorola, were a notable exception. In his talk, Adey warned that getting a handle on the cumulative effects of long-term microwave exposures would be extremely difficult. Motorola's Dr. Quirino Balzano told *Microwave News* that the company is planning more research projects.

German Telekom has allocated \$3 million for health research. Telekom's Dr. Thomas Damboldt, based in Darmstadt, outlined thirteen ongoing projects at nine institutes. Though quick to say which studies failed to show any biological responses, he neglected to point out that one group, at the University of Mainz, sponsored by Telekom, had just two weeks earlier reported that cellular phone radiation could affect sleep patterns (see *MWN*, M/J94)—which shows, no doubt, that the issue is controversial on both sides of the Atlantic.

With respect to dosimetry, Gandhi, who late last year announced surprisingly low specific absorption rates (SARs) in the bodies and brains of simulated phone users, has now raised his estimates by a factor of about ten—the precise level of energy deposition depends on the type of phone and how it is used. For a quarter-wave antenna, Gandhi's peak SAR reached 2.27 W/Kg with a maximum in the brain of 1.18 W/Kg. Gandhi's figures are now much closer to the estimates of other researchers from Australia, Switzerland and the U.K., all of whom presented papers in Copenhagen.

"We have flattened the ear," Gandhi explained. That is, he is now placing the phone closer to the head—a much more realistic model than the one he used in his work for McCaw Cellular Communications Inc., which sounded a premature "all clear" last December (see *MWN*, J/F94).

Perhaps the most obvious indications that microwave radiation from a cellular phone can penetrate the skin and be deposited inside the human body—contrary to some industry claims that all the radiation is absorbed in the skin or is reflected away—were reports from Switzerland and Italy that the phones can interfere with *implanted* cardiac pacemakers (see p.1).

Dr. Michel Coleman, an epidemiologist with the Thames Cancer Registry in Sutton, U.K., cautioned the audience to avoid "glib" responses to questions of health risks. "It's a complex problem," he said. As an example, he cited what he called a "beautiful fallacy": claims that there could be no link between EMFs and cancer because there has been no epidemic of childhood cancer although use of electricity has grown exponentially. Coleman noted that one of the members of Carlo's advisory panel subscribed to this fallacy, but he declined to reveal his or her identity.

The most obvious point of all was that much is riding on the outcome of cellular phone health research. In the opening talk, Motorola's Ray Millington predicted that the worldwide market for cellular phones would hit 50 million units in 1995 and 100 million by the year 2000. "There is still a big market out there," he said. And to bring home the potential liabilities the industry could face, Robert Kane, who is alleging that a prototype cellular phone caused his brain tumor (see p.16 and *MWN*, J/F94), was sitting in the audience with his attorney, taking pictures of each slide as it was projected on the screen.

Cellular Phones Can Disrupt Implanted Pacemakers (continued from p.10)

to the device, however, seven pacemakers were affected — some were inhibited, others sped up. “It is difficult to assess the risk,” Eicher explained at the workshop, “but a user could place the phone on the chest.”

No irreversible damage occurred. That is, when the phone was turned off, the pacemakers resumed normal operation.

Six different pacemaker models were represented among Eicher’s study subjects, and four different phones were used—three 2 W peak hand-held phones and one 8 W peak portable. (In the U.S., hand-held cellular phones operate at 0.6 W peak power.) The hand-held phones caused interference when placed directly on the chest, while the more powerful portable phone disrupted pacemaker operation from 1-2 cm away. Eicher noted that a power-saving mode known as DTX made the problem worse, with the hand-helds causing an effect at 1-2 cm and the portables interfering from a distance of about 10 cm.

Eicher has also begun laboratory tests with the same pacemaker models in an anechoic chamber.

Dr. Vincenzo Barbaro and colleagues at the Istituto Superiore di Sanità in Rome also found that “repeatable EMI effects were detected.” They tested more than 30 different models of implanted pacemakers, from nine manufacturers, using two different hand-held phones, and they found that half of the pacemakers could be disrupted by cellular phone emissions. The researchers operated the phones within a few centimeters of each patient’s chest. Like Eicher, Barbaro found that the EMI did not permanently damage the functioning of the pacemakers.

Laboratory tests of many of the same models showed “good agreement” with the results obtained for the implanted devices, Barbaro concluded.

The phones used by both teams operate on the European

GSM standard, emitting a pulsed digital signal. Eicher, in particular, stated that these phones are more likely to cause EMI problems than analog wireless systems since the radio-frequency signal is amplitude-modulated with a repetition rate of 217 Hz.

“The fact that these phones are digital is critical,” agreed FDA’s Howard Bassen. When the user is listening, not talking, GSM digital devices emit a signal that is pulsed at between 2 and 11 Hz, Bassen told *Microwave News*. This may be recognized as a heartbeat by the pacemaker, he explained. Most existing cellular phones in the U.S. operate with an analog signal, but new digital services in some large markets use an 11 Hz pulsed signal, explained Bassen, who will be leading CDRH’s investigation of cellular phone EMI and pacemakers.

Dr. Ken Joyner of Telecom Australia reported that he found no effect on implanted pacemakers when he exposed patients to a 25 W simulated digital signal at a distance of 20 cm. Previous tests at his lab on devices that were not implanted showed that interference could occur at peak field strengths of about 80 V/m.

For hospital equipment, Joyner found that most devices were immune to peak field strengths as high as 7 V/m, meaning that a hand-held digital cellular phone would not interfere at distances greater than 1 m. He noted, however, that some particularly sensitive devices were affected by fields as weak as 1 V/m, “and appear to be interfered with by all mobile transceivers.” Joyner also reported that noise could be caused in hearing aids by a 2 W digital phone as far as 18 m away. Joyner is manager of the electromagnetic compatibility section at Telecom Australia’s research laboratories in Clayton, Victoria.

Radar and Office EMFs Suspected in Brain Tumors at Census Bureau (continued from p.1)

Evelyn Jordan, president of Local 2782 of the American Federation of Government Employees, which represents the Census Bureau workers, said the number of known brain tumor cases at the Suitland offices from the late 1960s to the present is now close to 20. Last year, the bureau gave FOH the names of 13 present and former employees who were thought to have been diagnosed with brain tumors. Only seven of these were included in the FOH analysis, however. The others were dropped because a “knowledgeable individual”—the employee or a surviving relative—could not be reached.

“We were not able to get enough information to do a thorough study,” conceded Dr. Patricia Walcyk, an occupational health specialist brought in by FOH to lead the investigation. Walcyk’s statistical analysis determined that 1.1 malignant brain tumors would be expected among the Census Bureau’s 2,195 Suitland employees for 1986 to 1993—the years in which the cases she included were diagnosed. Of the seven people for whom sufficient information was available, one had a different type of cancer and was excluded, while two others had benign brain tumors (meningiomas) and were also excluded. The four remaining cases—all of whom had worked at the bureau since at least the mid-1960s—represented a brain tumor incidence 3.6 times the expected rate. This is “just short of being statistically significant,” according to FOH’s January 11, 1994,

report. “The figures are crude but do give an indication that there may be an abnormal cluster of cases,” Walcyk and her co-workers concluded.

Jordan argued that the investigation was shoddy and should have included many more people with brain tumors. “They don’t want to track anyone down,” she said. She also pointed out that the brain tumor cases all occurred among people who had worked in one section of one building. Other employees made similar comments. “From my point of view, it was a whitewash,” said Tom DiNenna, a former director of the computer services division, who was diagnosed with a brain tumor in 1993. He said he was not asked by the investigators to help lo-

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Similar Radar Suspected in Florida Disease Clusters

The radar that was located near the Census Bureau offices in Suitland was the same type of air traffic control radar that has attracted scrutiny in South Patrick Shores, FL, as a possible cause of clusters of Hodgkin's disease, a lymphatic cancer, and amyotrophic lateral sclerosis (Lou Gehrig's disease) (see *MWN*, J/F92, M/J93 and S/O93).

The Suitland radar was an ARSR-2, operated by the FAA. The Florida radar is also operated by the FAA and is less than a quarter-mile from the nearest homes. It has the military designation FPS/66A and is part of the same family of radars as the ARSR-2.

Employees at the Suitland complex remember the persistent electromagnetic interference (EMI) problems the radar caused. Similarly, the Florida radar was the subject of repeated EMI investigations—both at Patrick Air Force Base, where it is located, and in nearby homes.

cate brain cancer cases, though he knows of more than a dozen.

Any possible hazards in the Census Bureau offices have been taken "very, very seriously as an issue of concern among our employees," countered Jane Callen, a spokesperson for the agency. She pointed out that much of the information about the brain tumors and about possible radiation exposures was "confused" and was "on the level of rumor."

FOH, which is a branch of the Public Health Service, measured EMFs in areas occupied by the computer services division, where most of the reported brain tumor cases worked. In a six-page summary of the survey results, dated September 1993, Mike Cecil, a consultant in Port Republic, MD, hired by FOH, wrote that magnetic fields throughout the offices were in the 4-8 mG range. In an interview with *Microwave News*, he described this as a "typical background level" for offices.

Cecil also found much stronger fields near various types of electrical equipment: 250 mG fields were measured near the power supply for a mainframe computer, near an electrical transformer and near ventilation equipment; the fields were 25-100 mG one foot away from the equipment. Video display terminal magnetic fields were 6-8 mG at the operator's position. Noting that International Radiation Protection Association guidelines allow exposures of up to 5,000 mG in workplaces, Cecil concluded that the magnetic fields in the Suitland offices "do not represent an increased health risk to occupants."

Neither FOH nor the Census Bureau assessed possible RF/MW exposures. This was a major concern among bureau staffers, however. More than a half-dozen employees contacted by *Microwave News* mentioned that the computer services division had been shielded, sometime in the 1970s, to address computer interference problems. The wall that was shielded faces the former site of the radar, according to James Pepal, a retired director of computer services. Shielding was also required to protect the computers in the offices of the National Oceanic and Atmospheric Administration (NOAA), in an adjacent building, closer to the radar.

FAA's Paul Laude said that the radar, an ARSR-2 (Air Route

Surveillance Radar), operated at 1280-1350 MHz, with a peak output power of 5 MW and an average power of 3.6 kW. It was manufactured by Raytheon, he said.

The RF/MW radiation levels a quarter-mile from an ARSR-type radar can reach 600 $\mu\text{W}/\text{cm}^2$, according to *The RF Radiation Environment: Environmental Exposure Levels and RF Radiation Emitting Sources*, a report issued by the Environmental Protection Agency in 1986 (see *MWN*, N/D86).

The Census Bureau employees also said that there may be other radiation sources nearby, pointing out that there are a number of unidentified antennas on the buildings occupied by NOAA and the Office of Naval Intelligence. Walcyk agreed that there were RF/MW facilities at Suitland that had not been examined, noting that her efforts were limited because some activities at Suitland are classified.

No further investigation of the cancer cluster is planned at this time, according to Callen. Though the FOH report suggests that a larger study "might possibly provide more conclusive information," it also notes that this would be dependent on "the development of a firmer scientific knowledge base" on the possible connection between non-ionizing radiation exposure and brain tumors.

Dr. Neal Present, a coauthor of the report, was not optimistic about what could be learned from further study. "It would be a lot more expensive to go further," he explained. "Radio waves have never really been associated with this type of cluster," he added. Present is clinical director of FOH Region III in Washington.

A number of studies have shown an association between long-term exposure to EMFs and brain tumors. The possible link between brain cancer and EMFs has been investigated in several locations where clusters of the disease have been found, including the Ford House Office Building in Washington and the offices of the *St. Louis Post-Dispatch* (see *MWN*, M/A93, S/O93 and M/J94; see also, p.6). Much less research on the health effects of RF/MW radiation has been done, though allegations have arisen recently concerning the possibility that hand-held cellular phones could cause brain tumors (see p.11).

FROM THE FIELD

European Parliament Seeks To Control EMFs

The European Parliament has taken a strong, official stand on controlling non-ionizing electromagnetic radiation [NIER] by adopting a resolution calling for new regulations and standards, environmental impact assessments, rights-of-way for all high voltage lines and research, including epidemiological studies.

Approved on May 5, the resolution, On Combating the Harmful Effects of Non-Ionizing Radiation, recognizes that "the difficulty of demonstrating a relationship between dose and effect of [NIER]...does not prevent the adoption of legislative measures" to protect workers and the public. Its 11 recommendations outline an aggressive program covering all sources of electromagnetic fields (EMFs) from power lines to household appliances and office equipment. One recommendation calls for the adoption of the Swedish MPRII emissions guidelines for video display terminals.

Clippings from All Over

The possibility that there is some association between mean exposure to electromagnetic fields produced by extremely low frequency radiation and the risk of developing leukemia must be taken very seriously. It has been found in many studies, which have led to generally similar conclusions, irrespective of the method employed. It is suggested for childhood leukemia by studies of the incidence of the disease in children who have lived close to high-power transmission lines and for leukemia in adults by studies of the incidence of the disease (or the mortality from it) in men who have been specifically exposed to such fields in the course of their work. The findings in individual studies could, however, all be dismissed on one ground or another...In these circumstances, we need many more data obtained in response to a clearly stated prior hypothesis before a small relative risk of the sort that is now predicated for all types of leukemia can be accepted as established. Because the issue is of such public concern, we need them urgently.

—**Sir Richard Doll, chairman, Imperial Cancer Research Fund, Oxford, U.K., “Epidemiological Studies of Effects of Extremely Low Frequency Radiation,” presented at *Limites d’Exposition aux Rayonnements Non-Ionisants*, a symposium held in Paris, France, May 25-26, 1994**

With electric and magnetic fields fear often wins over facts, so utility communication on EMFs needs to be carefully planned, say experts on the topic.

—**“EMF Communication May Be More Important than Facts,” *Electric Light & Power*, p.3, July 1994**

As one of the most regulated industries in the country, electric utilities are particularly sensitive to problems with the regulatory process. Supporting regulatory reform and the use of risk assessment, comparative risk analysis, and cost-benefit analysis is a

benefit to us, as well as to the goal of reinventing government.

—**Michael Rossler, manager of environmental programs at Edison Electric Institute, Washington, “Assessing Risk Assessment,” *Electric Perspectives*, p.64, July-August, 1994**

They have no basis for concluding that breast cancer may be linked to electric and magnetic fields in the work environment. There are no data there to say that.

—**Dr. Eleanor Adair, John Pierce Laboratory, New Haven, CT, commenting on Dr. Dana Loomis’s breast cancer study (see p.5), *CBS This Morning*, June 15, 1994**

About eight years ago, one of our writers would show up daily, strap on a weighty lead shield that resembled a flak jacket and lower her several-months-pregnant self into her chair to work. Scared silly by groups like the National Organization for Women and 9to5, this woman believed that harmful radiation emanating from her computer screen would endanger her child. Despite the fact that there was no credible evidence to that end. Despite the fact that the TV she and millions of others watched nightly emitted more “harmful” radiation than did the VDT. Do you ever wonder why the furor over VDT emissions petered out to a barely audible whimper? The hysteria was quelled by a lack of evidence. More recently, the ergonomics movement has drawn a bead on repetitive stress injury (RSI), a very real disorder caused by faulty keyboard design and/or bad typing habits. This time it isn’t national groups but various vendors that are trying to exploit the situation....Wherever hysteria can be created, there will be those ready and willing to exploit it. Better to head them off at the pass and make the workplace more productive with reasonable approaches to safety.

—**“Hype-ochondria,” editorial by Bill Laberis, Editor-in-Chief, *Computerworld*, p.32, June 27, 1994**

The resolution was written by Parliament member Paul Lannoye of Belgium, who was president of the Groupe des Verts (Green Party) in the European Parliament from late 1992 to July 1994. It was introduced into the Environmental Committee by Parliament members Carlos Pimenta and Maria Amelia Santos, both of Portugal, and Jacques Vernier of France.

The legislation is being forwarded to the European Commission, the European Council and the 12 member states for review. The commission will develop proposals to fulfill its requirements, according to Jean Kutten, an assistant to Lannoye.

The complete text, which appears below, is part of the Parliament’s official minutes of its May session in Strasbourg, France. Also, On Combating the Harmful Effects of Non-Ionizing Radiation, A3-0238/94, May 5, 1994, will be recorded in the Official Journal of the European Communities, Luxembourg.

The Resolution

The European Parliament,

—having regard to the motion for a resolution tabled by [Ms.] Santos, Mr. Vernier and Mr. Pimenta on measures to reduce the harmful effects of [NIER] (B3-0280/92),

—having regard to Rule 45 of the Rules of Procedure,

—having regard to the report of the Committee on the Environment, Public Health and Consumer Protection and the opinion of the Committee on Energy, Research and Technology (A3-0238/94),

A. having regard to the significant increase, in the environment, of the power density of [NIER] in the various frequency ranges, associated with technological development over the last few decades,

B. having regard to the precautionary principle included in Article 130r of the Treaty establishing the European Community and the [as-low-as-reasonably-achievable] principle, according to which it is necessary, where appropriate, to maintain exposure to [NIER] at acceptable levels,

C. having regard to many, hitherto scientifically unconfirmed reports of the harmful effects of [EMFs] on human health,

D. whereas exposure to [EMFs] generated by high-tension and low-frequency transmission lines and household electrical appliances is attracting the public’s attention because it has been implicated in an increase in the incidence of cancer,

E. whereas interpreting the results of epidemiological studies is a difficult task and deducing the relationship between cause and effect requires a vast body of scientific evidence, particularly when numerous synergic and distorting environmental factors cause random variations in the results,

F. whereas synergy phenomena must be expected between [NIER] and other physical or chemical agents,

G. whereas the use of domestic electrical appliances, display screens and communications equipment results in [EMFs], often without the user realizing,

H. whereas the difficulty of demonstrating a relationship between dose and effect enabling the effect of [NIER] to be quantified does not prevent the adoption of legislative measures designed to establish a system for limiting the exposure of workers and the public that would take into account the possibilities offered by treating the problem at source and using decentralized electricity generation,

I. whereas it is difficult to establish a relationship between dose and

effect to quantify the effects of [NIER],

1. Calls on the commission to propose measures for the various technologies generating [EMFs], including regulations and standards and seeking to limit the exposure of workers and the public to [NIER], taking account of current scientific results;
2. Calls in particular, as regards display screens, for the application of the standards in force in Sweden to be included in Council Directive 90/270/EEC on the minimum safety and health requirements for work with display screen equipment;
3. Calls on the commission to submit a survey and assessment of current research in the member states and relevant industrialized states dealing with the [EMFs] produced by various technologies and their possible effects on human health;
4. Calls, where necessary, for additional Community research into the effects of [NIER] on health, for the purpose of epidemiological studies at Community level, and research on the mechanisms of action of [EMFs] on living organisms;
5. Considers that corridors within which there would be a ban on all permanent activity and *a fortiori* all dwellings must be recommended for high-tension electricity transmission lines;
6. Considers that any proposal to set up new transmission lines or new transformer substations must be subjected by the authorities of the member states concerned to an environmental impact assessment and calls on the commission to provide for this requirement in its next proposal for amendment of Directive 85/337/EEC on impact assessment;
7. Calls on the commission to submit a draft amendment to Directive 92/75/EEC on the indication by labeling and standard product information of the consumption of energy and other resources by household appliances so as to include an obligation to inform consumers about fields generated by electrical household appliances as a function of distance and type of use;
8. Calls on the council to issue recommendations to the member states with a view to the introduction, in areas crossed by high-tension lines, of measures to protect and inform, as well as systems of indemnification and compulsory purchase in favor of the population concerned;
9. Calls on the commission to propose a harmonized system for measuring and calculating [EMFs] and power densities in dwellings and workplaces so as better to monitor the exposure of the public and of workers;
10. Calls for a specific research program to be established on the effects of [NIER] on health, so as to allow epidemiological studies to

be carried out at Community level, *in vivo* and *in vitro* studies as part of European collaboration and research on the mechanisms of action of [EMFs] on living organisms;

11. Instructs its president to forward this resolution to the commission, council and the member states.

A New Direction for EMF Research

To the Editor:

I have recently been reflecting on the need for an EMF research effort that will bring some of the key issues to closure. For good historical reasons, over the past two decades, EMF research has been exploratory and followed a "let's try everything plausible and see if we can uncover any EMF effects." I suggest that an alternative path is now appropriate for achieving significant progress in answering the burning questions about EMFs and human health.

The main features of my plan include:

- Taking a portion of the annual EMF funding, approximately \$1.5 million a year, to create an EMF Center for Excellence. The center would bring together prominent researchers with multidisciplinary interests;

- Choosing a specific area for intense team study at the center, e.g. the effect of EMFs on a specific type of cancer. Proposals would be solicited which would incorporate team membership and a multidisciplinary approach. All research reports would be peer-reviewed.

We have a unique window of opportunity. The National Energy Policy Act of 1992 provides impetus for private and public funds to be used cooperatively to make significant progress in the understanding of EMF health effects. My proposal focuses EMF research efforts at this critical time and is consistent with the National EMF Research and Communication Draft Plan, published in 1993 by the U.S. DOE.

I hope my comments will encourage further discussion on ways to approach future EMF research.

Sincerely,

Kenneth Klein

4427 Glenn Rose St.

Fairfax, VA 22032

After 26 years with the Cleveland Electric Luminating Co., Klein worked for the DOE for 15 years. As the director of DOE's Office of Energy Storage and Distribution, he ran DOE's EMF research program. He is now a consultant to Energetics Inc. in Columbia, MD.

UPDATES

CANCER REVIEW

U.K. Panel Updates Cancer Report...The National Radiological Protection Board's (NRPB) advisory group on non-ionizing radiation, chaired by Sir Richard Doll of the Imperial Cancer Research Fund in Oxford, remains skeptical of the possible EMF-cancer link. The group now concedes, however, that there is growing evidence for an association with childhood leukemia. In a short statement on the recent Canadian-French utility worker study (see *MWN*, M/A94) and the 1993 Finnish childhood cancer study (see *MWN*, S/O93) the panel concludes that there is "an urgent need for large and statistically robust epidemiological studies based on objective measurements of exposure to EMFs..." (In contrast, the group dismisses the need for further research on the possible hazards of VDT EMFs; see p.18.) Compared with other recent occupa-

tional studies, the results of the Canadian-French effort, led by Dr. Gilles Thériault, are "neither consistent in the type of leukemia found to be increased nor consistent in finding a progressive increase with increasing exposure," the group states. In examining the Finnish research, the panel refers to its earlier assessment of the Swedish and Danish residential studies that were released in the fall of 1992. Doll's panel now concludes that all three were well controlled and marked a significant improvement over earlier work: "The studies do not establish that exposure to EMFs is a cause of cancer but, taken together, they do provide some evidence to suggest that the possibility [of a link] exists in the case of childhood leukemia." The NRPB established the advisory group in 1990, and it in 1992 it reported that there was "no reason to suggest that a carcinogenic effect of any sort is at all likely" (see *MWN*, M/A 92). The group reviewed more recent research and reiterated

its conclusions late last year (see *MWN*, N/D93). Recent statements from Doll have hinted that his views on the EMF-cancer controversy are changing (see p.14 and *MWN*, M/A94). The group's two-page statement, "EMFs and the Risk of Cancer," is published together with the larger assessment of VDT radiation risks in *Documents of the NRPB*, Vol.5, No.2, 1994. It can be ordered in the U.S. for \$30.00 plus \$3.00 postage and handling (order no. HM13769) from: UNIPUB, 4611-F Assembly Drive, Lanham, MD 20706, (800) 274-4888. For more information, contact: NRPB, Chilton, Didcot, Oxon OX11 ORQ, U.K., (44+235) 831600.

CELLULAR PHONE LITIGATION

Reynard Moves to Federal Court...The lawsuit brought by David Reynard, who alleges that use of a cellular telephone caused his wife's death from a brain tumor, was refiled May 19 in U.S. District Court for the Middle District of Florida, in Tampa. Reynard's attorneys have withdrawn the suit they filed in state court over two years ago (see *MWN*, M/J92). The Supreme Court's decision last year in *Daubert v. Merrell Dow Pharmaceuticals* on the admissibility of scientific evidence makes federal court a more attractive place to pursue the claim, explained John Lloyd Jr. of St. Petersburg, FL, who represents Reynard. In *Daubert*, the court changed the rules on the admissibility of scientific evidence, allowing individual judges more latitude to decide whether the rationale or methodology underlying an expert's testimony is scientifically valid. When Reynard's suit was begun, prior to the *Daubert* decision, "We feared that we might be attacked for using expert testimony that some people consider to be out of the mainstream," Lloyd said. The change of courts probably will not affect the progress of the case, which is in the discovery phase, Lloyd added. Named as defendants in the new complaint are: NEC America Inc. of Richardson, TX; its Japanese parent company, NEC Corp.; and GTE Mobilnet of Tampa, which is part of GTE Corp. in Stamford, CT. Edward Gerecke of the Tampa law firm of Carlton, Fields, Ward, Emmanuel, Smith & Cutler, who represents NEC, declined to discuss the specifics of the case.

Motorola's Request for Dismissal Denied...An Illinois judge has declined to dismiss Robert Kane's suit against Motorola Inc., his employer, which alleges that testing of a prototype cellular phone antenna caused his brain tumor. At a June 22 hearing in Chicago, Circuit Court Judge Joseph Casciato rejected Motorola's argument that Kane's claim is a workers' compensation matter and that he is therefore barred from suing the company (see *MWN*, J/F94 and M/A94). Casciato found that Kane had adequately alleged "specific intent" by Motorola to cause Kane's injury. "This is a crucial decision because it enables Bob Kane to pursue punitive damages," Gina Fietsam, one of Kane's attorneys, told *Microwave News*. The judge did agree with the defendants that Kane's complaint in the case failed to directly allege causation, but he allowed the plaintiffs to file an amended complaint to address that problem. Fietsam is with the Chicago law firm of Holstein, Mack & Klein. Motorola is represented by Kirkland & Ellis, also in Chicago. Motorola did not respond to repeated phone calls.

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COMPATIBILITY & INTERFERENCE

FDA Seeks To Limit Wheelchair EMI...Following investigations which showed that electric wheelchairs are susceptible to interference from low levels of RF/MW radiation, FDA's Center for Devices and Radiological Health (CDRH) has asked the makers of these products to insure that they operate normally in fields of up to 20 V/m. Compliance with this recommendation is voluntary, but the CDRH is requiring that warning labels on all new wheelchairs discuss EMI risks, CDRH's Andy Novick told *Microwave News*. The labels must state that 20 V/m "is a generally achievable and useful immunity level," and they must give the chair's own immunity level. The FDA's suggested warning label also lists precautions such as turning off the wheelchair before using a cellular phone and being aware of nearby radio and television transmitters. In a May 26 letter to manufacturers, Dr. Susan Alpert, acting director of CDRH's Office of Device Evaluation in Rockville, MD, notes that the FDA has received "many reports of erratic, unintentional powered wheelchair movement," including some incidents that involved "serious injury." The 20 V/m EMI immunity level reflects a "technological capability that can be immediately implemented by the powered wheelchair industry," Alpert writes. (For more on episodes of wheelchair EMI and the FDA's investigations, see *MWN*, J/A93 and N/D93.)

MEETINGS

Defining Dose in Epi Studies...NIOSH and DOE are convening a workshop, *EMF Exposure Assessment and Epidemiology: Hypotheses, Metrics and Measurements*, in Cincinnati on September 26-28. Topics to be examined include resonances, transients and induced currents and intermittency. For more information, contact: MaryLee Blackwood, Energetics Inc., 7164 Gateway Dr., Columbia, MD 21046, (410) 290-0370.

U.K. EMF Conference...Key figures in EMF research and litigation from Canada, Sweden, the U.K. and the U.S. will speak at the *Electromagnetic Transmissions* conference in London on October 27. The conference will be chaired by Sir Richard Doll, chairman of the NRPB's advisory group on non-ionizing radiation (see p.15). Speakers will include: Dr. Lesley Hawkins, director of the Robens Institute Occupational Health Service, U.K.; Dr. Bengt Knave of the National Institute of Occupational Health, Sweden; Dr. Gilles Thériault of McGill University, Montreal, Canada; and Mark Warnquist of the law firm of LeBoeuf, Lamb in Denver. The one-day conference costs £464.13 (approximately \$720), with discounts for those from academia or nonprofit groups. For more information, contact: Laura Spencer at BICS International, (44+71) 490-2026.

EM Allergies...The EC's project on Biomedical Aspects of EMFs, known as COST 244, is holding a workshop on *Electromagnetic Hypersensitivity*, September 26-27 in Graz, Austria. COST (European Cooperation in the Field of Scientific and Technical Research) is pursuing non-ionizing radiation research initiatives (see *MWN*, J/F92). For more information, contact: Dr. Norbert Leitgeb, Institute for Biomedical Engineering, Technical University of Graz, Inffeldgasse 18, A-8010, Graz, Austria, (43+316) 873-7390, Fax: (43+316) 465348.

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TECHNOLOGY

EM Noise Hypothesis Challenged...Dr. Jukka Juutilainen of the University of Kuopio in Kuopio, Finland, has been trying to repeat the experiments of Dr. Ted Litovitz, who argues that electromagnetic noise can neutralize the action of an EMF signal. This is the hypothesis that is the rationale for the EMX keyboard, which sends out a random field to counter EMFs from a VDT (see *MWN*, J/A93 and J/F94). In a paper presented at the *16th Annual Meeting of the Bioelectromagnetics Society* in Copenhagen, Denmark, June 12-17, Juutilainen reported preliminary results showing that he was unable to replicate Litovitz's findings. Using a noise generator obtained from Litovitz, Juutilainen exposed chick eggs to 50 Hz sinusoidal magnetic fields with and without the noise signal. The incidence of abnormalities in the chick embryos was approximately the same for the 50 Hz field whether or not the noise was present. In an interview with *Microwave News*, Juutilainen stressed that his studies are continuing and that it is too early to draw any conclusions. For his part, Litovitz said that Juutilainen's results are still too sparse and that "any implications drawn from the data are not statistically meaningful," adding that to achieve reliable results, his team "had to expose over ten times as many embryos as Juutilainen." Litovitz's own chick egg results were recently published; see "Superimposing Spatially Coherent Electromagnetic Noise Inhibits Field-Induced Abnormalities in Developing Chick Embryos," *Bioelectromagnetics*, 15, pp.105-113, 1994.

VDTs

Miscarriage Risk Discounted...Research conducted to date "provides no good reason to suppose that low frequency EMFs encountered through the use of VDTs cause any harm to the fetus *in utero*," according to the advisory group on non-ionizing radiation of the U.K.'s NRPB. The panel, chaired by Sir Richard Doll, also concluded that skin rashes "do not appear to be caused" by VDT EMF exposure, while holding open the possibility that existing skin problems may be aggravated by static electric fields. The group found no support for a possible link with cataract formation. In a 75-page report released June 9, the group reviewed nine epidemiological studies of VDT operators, along with the results of several dozen animal studies. The panel emphasized that spontaneous abortions occur relatively frequently and that miscarriage clusters, therefore, "are bound to occur and be noticed when a group of women of childbearing age work together." Overall, the group gave more weight to the amount of time spent working at a VDT than to EMF exposure assessments. The committee noted that only two studies—the NIOSH study directed by Dr. Teresa Schnorr and the Finnish study led by Marja-Liisa Lindbohm (see *MWN*, M/A91 and M/A92)—attempted to assess exposure to VDT EMFs but that "neither made direct measurements in study subjects." Nevertheless, the report concluded that, "[T]here does not appear to be any urgent need for further epidemiological studies." The group's report, "Health Effects Related to the Use of Visual Display Units," appears together with the group's update of its EMF-cancer assessment in *Documents of the NRPB*. To order, see pp.15-16.

CLASSIFIEDS
