

INSIDE...

EMF NEWS pp.2-6

Power Line Talk:

NAS-NRC Report Delayed Again • FPL
Wants Legal Fees from Glazer • Warnquist
Seeks New Venue • Michaelson Meeting •
Sage EMF Epidemiological Guide

California Supreme Court Ruling
Halts EMF Property Devaluation Claims
Excerpts from the Covalt Decision

Milham on Office Worker Cancer Cluster
Ongoing EMF-Breast Cancer Studies

HIGHLIGHTS pp.7-13

Cellular Phone Notes:

Towers & Schools • New Moratoriums •
PCS Lampposts in NYC • Reflections and
Phone Dosimetry • Towers Multiply in U.K.
• Union's Siting Manual • Aircraft Hazards

New Zealand Bans Antennas near Schools

Harvard's Graham Discounts Phone Risks

FCC's RF/MW Rules Challenged

Sir Richard Doll: EMF Research "Urgent"

San Francisco Adopts Antenna Moratorium
MW Exposures from a PCS Antenna

New ICNIRP Leadership

Latvian Collection of Radar-Health Papers

Canada Adopts Airplane EMI Rules

FROM THE FIELD pp.12,14-16

Clippings from All Over

Mayr on Swiss Shortwave Exposures

Letters to the Editor:

Preece on Electric Fields • Héroux on
Exposure Assessment • Adey and
Balzano on Motorola Cell Phone Research

Flashback: 5, 10, 15 Years Ago

UPDATES pp.16-18

RF/MW and Asthma • EMF Hypersensitivity •
OrthoLogic Answers FDA "Warning Letter" •
EC Report • People in the News

VIEWS ON THE NEWS p.19

Physicists Stumped by Oscillons • Latvia
and Croatia Eclipse U.S. Radar Health
Effort • Police May Get EMP Guns

Female Breast Cancer Linked to EMFs for the Third Time

Association Still Viewed Cautiously

A third epidemiological study has linked electromagnetic fields (EMFs) to female breast cancer. The finding has sparked renewed interest in the association, but researchers are hesitant to draw any firm conclusions. Nevertheless, the new study has put magnetic fields firmly on the list of possible risk factors for breast cancer.

Writing in the September issue of *Epidemiology* (7, pp.459-464, 1996), Dr. Patricia Coogan and coworkers at the Boston University School of Public Health reported a 43% increase in breast cancer among women with a high *potential* for occupational exposures to magnetic fields, notably those working with main-frame computers.

"This study lends credence to the idea that EMFs might influence breast cancer risk," Coogan told *Microwave News*. She warned, however, that there were only a small number of women in the "high potential for exposure" category, and thus the reported risk estimates are "somewhat imprecise." Nevertheless, Coogan believes that the findings represent a step forward in understanding the relationship between EMFs and breast cancer.

"It's a tantalizing finding," said Dr. Richard Stevens in a telephone interview from his office at the Battelle Pacific Northwest Labs in Richland, WA. "This is the strongest female breast cancer occupational study done so far." Dr.

(continued on p.5)

FAA Is Again Urged To Restrict Use of Portable Electronics on Board Aircraft

For the second time in eight years, an advisory committee has issued a report that calls on the Federal Aviation Administration (FAA) to impose consistent, industry-wide restrictions on the use of portable electronic devices (PEDs) aboard aircraft. But the FAA has failed to enforce its existing rules on PEDs and may not respond to the new call for action, according to John Sheehan, the committee's chair.

"Although interference from PEDs is extremely rare, the very fact that it can *possibly* occur should give the FAA and airlines pause about their unrestrained use," said Sheehan, chair of Special Committee 177 (SC-177) of RTCA Inc. Formerly known as the Radio Technical Commission for Aeronautics, RTCA is a nonprofit industry group whose advice has formed the basis for many of FAA's technical standards.

Similar recommendations from an RTCA committee in 1988 (see *MWN*, N/D88) were never implemented by the FAA, and Sheehan is not optimistic

(continued on p.12)

« Power Line Talk »

“It’s been one fiasco after another.” That is how one close observer described the process surrounding the long-delayed report on EMF health effects from the **National Academy of Sciences-National Research Council** (NAS-NRC). The report was mandated by Congress in 1991, but the panel assigned to prepare it was not selected until 1993. Since then, the NAS-NRC has variously predicted the report’s release by 1995, “early” 1996 and late April, July and early September of this year (see *MWN*, S/O91, M/J93, M/A95, S/O95, J/F96, M/J96 and J/A96). As we went to press, the NAS-NRC news office said that the report’s release is now scheduled for **October 31**. However, only prepublication copies will be ready then. The actual published report will not be available until the end of the year. The most recent delays have been due to a failure by the **Department of Energy** (DOE) to pay the NAS-NRC for the committee’s work. DOE’s Dr. **Imre Gyuk** told *Microwave News*, “Our procurement office has taken a long, long time for reasons known only to them.” In September, Gyuk said that he had authorized a \$24,000 payment last March. The NAS-NRC confirmed that it received this money on September 30—the last day of the federal government’s fiscal year.

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Florida Power & Light (FPL) wants **Leonard Glazer** to pay for the costs of defending itself against Glazer’s EMF–cancer lawsuit. The utility won a dismissal in May, a decision which is now under appeal (see *MWN*, M/J96). Taking advantage of Florida’s “loser pays” statute, FPL secured the order for reimbursement as part of the ruling dismissing the case, explained an attorney for Glazer, **Howard Talenfeld** of Colodny, Fass & Talenfeld in Ft. Lauderdale. A headline in the September 14 *Miami Herald* read, “FPL SUES DYING MAN FOR LEGAL FEES,” but the action was just “standard procedure,” according to FPL spokesperson **Kathy Scott**. “If we didn’t try to recover those costs, they would have to be paid by our customers,” she emphasized. “As we have always said,” Scott added, “we are very sympathetic to Mr. Glazer over his illness. It’s very unfortunate that he has leukemia. But it’s always been our position that this was not caused by FPL equipment.” The utility is demanding payment of \$268,000—an amount that FPL’s court papers describe as “only a fraction” of its total expenses, since not all costs are recoverable under the law. For example, court papers indicate that FPL spent \$402,000 on its expert witnesses, but is only asking to be reimbursed for \$174,000 of that amount. FPL’s expert witness fees include: \$29,000 for Dr. **Philip Cole** of the School of Public Health of the University of Alabama, Birmingham (at \$400/hr); \$127,000 for **Fred Dietrich** of Electric Research and Management in Pittsburgh (at \$200/hr); \$65,000 for Dr. **Paul Leaverton** of the College of Public Health of the University of South Florida in Tampa (at \$200/hr); \$33,000 for Dr. **John Moulder** of the Medical College of Wisconsin in Milwaukee (at \$130/hr); and \$116,000 for **Michael Silva** of Eneritech Consultants in Campbell, CA (at \$185/hr). Asked if FPL would drop its payment demand if Glazer agrees to drop his appeal,

FPL’s Scott declined to comment. “That’s something they’d probably want my client to think about,” said Talenfeld, “but I don’t think it would matter. Leonard believes in what he’s doing.” Glazer’s wife, Elsa, died of leukemia in 1988. The order to pay costs is on hold until Glazer’s appeal is resolved. Oral arguments in the case are scheduled for November 4 in the Third District Court of Appeal in Miami.

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“It was time to do something different and improve the quality of my life.” So said **Mark Warnquist** after leaving his full-time lawyering job in the Denver office of **LeBoeuf, Lamb, Greene & MacRae**. He will continue to consult on EMF issues for LeBoeuf, Lamb on an exclusive, part-time basis. Warnquist has helped utilities win two high-profile leukemia cases: the *Glazer* personal injury suit in Florida (see above and *MWN*, M/J96) and the *Pilisuk* workers’ compensation claim in Washington state (see *MWN*, M/J95). Before joining LeBoeuf, Lamb in 1993, Warnquist worked with Tom Watson at Crowell & Moring for nine years. Warnquist said that he had grown tired of touring the country, living out of a suitcase and taking depositions.

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Dr. **Asher Sheppard** was the keynote speaker at the **3rd Annual Michaelson Research Conference**, held in Colorado Springs, CO, August 10-11. Sheppard, a consultant based in Redlands, CA, spoke on models of interaction. Dr. **Linda Erdreich** of Bailey Research Associates in New York City was invited to address risk assessment for RF radiation health effects other than cancer. The organizers of the conference, named after Dr. Sol Michaelson, who died in 1992, were formerly known as the “Circle of Friends” and began as a splinter group of BEMS. At one point, there were suggestions that they might break off from BEMS, but this never happened (see *MWN*, M/J93).

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Sage Associates, an environmental consulting firm, is offering a comprehensive **guide to the EMF epidemiological literature**. Two color-coded, multipage charts detail the health risks noted in the 96 occupational and 40 residential papers that were completed between 1979 and the present. Sage also included, when provided by the authors, other key information, such as types of exposures, job descriptions, dose–response relationships and the levels of statistical significance. “We hope these charts will be helpful in putting knowledge of EMFs into the hands of decision-makers in a concise and understandable format, so that they can independently assess the weight of the evidence,” said Cindy Sage, who designed the charts. To order, send a check or money order (\$37.00 for *Residential Epidemiologic Studies* and \$84.00 for *Occupational Epidemiologic Studies*) to: Sage Associates, 1225 Coast Village Rd., Suite G, Santa Barbara, CA 93108. Add \$10.00 for orders outside North America. For questions, contact Sage at: (805) 969-0557, Fax: (805) 969-5003, E-mail: <sageassoc@aol.com>.

California Supreme Court Stops EMF Property Claims; Landmark Decision May Also Limit Personal Injury Suits

In a unanimous ruling, the California Supreme Court has held that EMF property devaluation lawsuits cannot be considered by the state courts because such cases fall only within the jurisdiction of the state's Public Utilities Commission (PUC).

The decision means that California home owners can no longer seek compensation if their houses have declined in value due to nearby power lines. The PUC does not have the power to award such damages, according to Art Mangold of the PUC's Environmental Division, and with this ruling a home owner can no longer file a lawsuit in the state courts.

The high court's opinion deals only with property values, but the court may well apply the same logic to personal injury cases in the future. "I think this is the end of EMF litigation in California," said attorney Joel Lamp of the San Francisco firm of O'Connor, Cohn, Dillon & Barr, which represents San Diego Gas & Electric Co. (SDG&E).

"This decision is a frontal attack on the fundamental right to private property in California," declared plaintiffs' attorney Michael Withey in a statement to the press. "We will look to the federal courts to vindicate the important notion that private property should not be taken without just compensation."

Withey represents Martin and Jean Joyce Covalt in a suit charging that power lines owned by SDG&E lowered the value of the Covalts' home in San Clemente, CA (see *MWN*, M/A95 and N/D95). Withey, of Schroeter, Goldmark & Bender in Seattle, indicated that he is considering appealing the case to the U.S. Supreme Court. A final decision on an appeal must be made by mid-November.

"The supposed judicial conservatives on the court have sided with big government and the monopolies to the detriment of the little guy," Withey contended. But Lamp has a different view of the decision's political context: "It was written by Stanley Mosk, one of the court's most senior members, who tends to lean to the liberal side in his opinions. Mosk's positions have not always been favorable to business in California, and the fact that he authored this opinion is significant."

Annee Della Donna of the Santa Ana, CA, firm of Wylie Aitken said in an interview that, "At this point in time we do not think that *Covalt* applies to personal injury actions." But Della Donna, who represents plaintiffs in the *Younkin* and *Johsz* EMF-cancer cases (see *MWN*, M/J95, J/F96 and J/A96), conceded that *Covalt* has changed the legal landscape in favor of the utilities. "There are a lot of statements in it that are very disconcerting," she said.

"The decision will definitely apply to personal injury," responded Lamp, who is also involved in the *Younkin* and *Johsz* cases as counsel for Southern California Edison Co. (SCE). "The clear reasoning of the opinion," he told *Microwave News*, "is that allowing any EMF litigation to go forward in the civil courts will interfere with the PUC's jurisdiction." Lamp predicted that no new EMF lawsuits would be filed in California.

The Supreme Court's decision, issued on August 22, starts with an 11-page review of the basic physics of EMFs. This section begins with a quote from a 1989 report from the U.S. Con-

gress's Office of Technology Assessment: "Although 'electric and magnetic fields' may sound mysterious or ominous to some people, scientists have had a good understanding of them since the nineteenth century."

The opinion then defines the scope of the PUC's authority, emphasizing that California law provides very few opportunities for judicial review of PUC actions. It cites a 1974 state Supreme Court decision, which allows lawsuits against public utilities only if "an award of damages would not hinder or frustrate the commission's declared supervisory and regulatory policies." In that case, a real estate broker had sued Pacific Telephone, claiming that poor phone service had caused her to suffer a major financial loss. PUC policy limited the phone company's liability to the amount that it charged the customer for phone service, and the Supreme Court rejected the broker's attempt to sue for damages above and beyond that amount.

The *Covalt* opinion finds that the PUC acted within its authority in developing a policy on the regulation of EMFs. The Supreme Court cites a 1993 PUC decision in which the commissioners stated that the existing evidence "had not led them to believe that an EMF health hazard actually existed"—but that "public concern and scientific uncertainty remain" and "the body of scientific evidence continues to evolve." This "Interim Opinion" by the PUC ordered utilities to fund a state-sponsored EMF health research program, and to take no-cost and low-cost measures to reduce EMFs on new power lines (see *MWN*, N/D93). The *Covalt* ruling concludes that for a court to award damages to the plaintiffs "would plainly undermine and interfere with" this interim PUC policy.

The Covalts' appeal did not seek to prove that EMFs cause cancer, but only that, because of public fear of EMFs, SDG&E's lines had reduced the value of their property. The Supreme Court ruling rejects the claim that such a loss would constitute a "damaging" of the Covalts' property, entitling them to compensation. The judges point out that zoning decisions often affect the market value of property, but that this does not entitle owners to compensation.

"The court was very impressed by the fact that no physical damage to the property was cited," said Curtis Renner of Watson & Renner in Washington, whose firm has represented utilities in many EMF lawsuits, including the *Altoonian* case (see *MWN*, N/D93, N/D95 and M/J96). But Michael Rikon of Goldstein, Goldstein & Rikon in New York City, who represents New York property owners in several EMF devaluation cases (see *MWN*, J/A94 and N/D94), contended that, "There is a physical invasion when any excess EMFs come onto the land."

It is unclear how much effect *Covalt* will have in the rest of the country, according to Renner. "It's likely that other state courts will take note of it," he said. But Renner also pointed out that a recent ruling in the *Glazer* case in Florida "runs directly contrary to the *Covalt* decision." In April, before that suit was dismissed on other grounds (see *MWN*, M/J96), an appellate court rejected the argument that Florida's Public Service Commission

(PSC) had exclusive jurisdiction over EMF issues.

"It was very important to the California Supreme Court that the California PUC had taken an active role in developing a policy around EMFs," Renner told *Microwave News*. "But the Florida PSC has also been very active. It's a good indication of how you can get different results in different states."

"Maybe *Covalt* will prompt the Florida Supreme Court to overturn the appellate court on this point," Lamp, SDG&E's attorney, speculated. "Certainly a unanimous opinion from the California Supreme Court is something that other state courts will take a look at."

But in Rikon's opinion, *Covalt* will have little influence in the rest of the country. "I'm not even sure it precludes the right kind of personal injury case being won before a California jury," he said in an interview. "In, say, a juvenile leukemia case, the scientific evidence is there." The question in California, however, is now whether such a case could even be presented to a jury—or only to the PUC.

Office Worker Cancer Cluster Shows Dose–Response Trend

An epidemiological analysis of a real estate office at the center of two EMF–cancer lawsuits shows that the longer employees worked there, the greater their odds of developing cancer. Dr. Samuel Milham, a consultant in Olympia, WA, reports this finding in an article slated to appear in the December issue of the *American Journal of Industrial Medicine*.

"If you can equate duration of employment with exposure, then you've got a remarkable dose–response relationship," Milham said in an interview. Formerly with the Washington state Department of Health, Milham served as an expert witness for plaintiffs in the two lawsuits, *Johsz v. Koll* and *Younkin v. SCE*. The two suits were brought by different groups of workers who contracted cancer after working in an Orange County, CA, real estate office with high EMF exposures.

The Covalt Decision and the State of the Science

Below are excerpts from the California Supreme Court's ruling in the Covalt case, dealing with the state of scientific knowledge about EMFs and the policy of the California PUC. The full text of the 74-page decision is available on SDG&E's EMF Litigation Home Page, <<http://www.sdge.com/emf/>>.

[T]o award such damages...the trier of fact would be required to find that reasonable persons viewing the matter objectively (1) would experience a substantial fear that the fields cause physical harm and (2) would deem the invasion so serious that it outweighs the social utility of SDG&E's conduct. Such findings, however, would be inconsistent with the commission's conclusion, reached after consulting with [the Department of Health Services], studying the reports of advisory groups and experts and holding evidentiary hearings, that the available evidence does *not* support a reasonable belief that 60 Hz electric and magnetic fields present a substantial risk of physical harm, and that unless and until the evidence supports such a belief, regulated utilities need take no action to reduce field levels from existing power lines....

A superior court determination that essentially the same evidence is sufficient to [conclude] that such fields are in fact dangerous would plainly undermine and interfere with that policy.

Apparently seeking to show that the scientific evidence before the superior court would be significantly different from that reviewed by the commission, plaintiffs claim, "There have been many positive studies of EMF–cancer (i.e., epidemiological studies finding a 'positive association' between such fields and cancer) reported in the scientific literature since the 1993 PUC order." Plaintiffs cite only one such study, however—a study reported in 1995 that found an increased incidence of brain cancer (but no increase in leukemia) among electric utility workers.*

While interesting, the report of a single positive epidemiological study (or even a number of such studies) in 1995 has not changed the broad scientific consensus on which the commission predicated its policy decision in 1993: For example, in the same year (1995), at least three noteworthy expressions of that consensus reiterated the view that the scientific evidence is still insufficient to establish that electric and magnetic fields are a health hazard.

First, a report prepared by the Oak Ridge National Laboratory and published by the [NIEHS] and the [U.S. DOE] stated that, "We do not know at this point whether EMF exposure from power-frequency

sources constitutes a health hazard. Therefore, we cannot determine levels of exposure which are 'safe' or 'unsafe'."[†]

Second, the APS recently issued a formal statement declaring that, "The scientific literature and the reports of reviews by other panels show no consistent, significant link between cancer and power line fields.... While it is impossible to prove that no deleterious health effects occur from exposure to any environmental factor, it is necessary to demonstrate a consistent, significant and causal relationship before one can conclude that such effects do occur. From this standpoint, the conjectures relating cancer to power line fields have not been scientifically substantiated."[‡]

Third, [the] AMA likewise adopted a policy statement declaring that the association "will continue to monitor developments and issues relating to the effects of electric and magnetic fields, *even though no scientifically documented health risk has been associated with the usually occurring levels of electromagnetic fields*...."[§]

[Footnote to the above:] The same conclusion is expressed in an *amicus curiae* brief filed in this court by 17 prominent physicists, epidemiologists, biochemists and physicians, including among their number six Nobel laureates.[¶]

*David Savitz and Dana Loomis, "Magnetic Field Exposure in Relation to Leukemia and Brain Cancer Mortality Among Electric Utility Workers," *American Journal of Epidemiology*, 141, pp.123-134, January 15, 1995. See *MWN*, J/F95.

[†]National Institute of Environmental Health Sciences (NIEHS) and the U.S. Department of Energy (U.S. DOE), *Questions and Answers About Electromagnetic Fields Associated with the Use of Electric Power*, January 1995. See *MWN*, M/A95.

[‡]Council of the American Physical Society (APS), *Power Line Fields and Public Health*, April 1995. See *MWN*, M/J95 and J/A96.

[§]American Medical Association (AMA), *Effects of Electric and Magnetic Fields*, 1995 (California Supreme Court's emphasis). See *MWN*, J/F95 and J/A95.

[¶]Robert Adair et al., *Brief of Amici Curiae in Support of Petitioner San Diego Gas & Electric Co.* (prepared by Atlantic Legal Foundation, Attorneys for *Amici Curiae*), 1995. See *MWN*, N/D95 and M/A96.

Named as defendants were Southern California Edison Co. (SCE), building owner Koll Co. and the Grubb & Ellis real estate firm (see *MWN*, M/J95, J/F96 and J/A96).

From 1980 through October 1994, a total of 410 workers were employed in the office, which was located directly above three 12 kV electrical transformers. Milham reports that before 1992, magnetic fields were as high as 190 mG on the office floor, and 90 mG at four feet above floor level. After some of the electrical equipment beneath the office was moved in 1992, peak magnetic fields were reduced to 32 mG at floor level, and 12 mG at the level of the workers' chairs, according to Milham.

Over this period of time, 8 invasive cancers developed among the real estate firm's employees—including melanoma and cancers of the brain, breast and colon. Milham's calculations indicate that within this group only 4.2 such cancers would normally be expected.

Milham then compared those who had worked in the office for less than two years to the rest of the workforce. Of the 8 cases of cancer, only 1 occurred among the 254 people who had worked in the office for less than two years. Milham found that people who had worked for two to five years were nine times more likely

to develop cancer than those who had worked there less than two years—and those who had been in the office for more than five years had a fifteen times greater cancer risk.

"Since many buildings are designed with internal electrical substations," Milham writes, "the exposure situation described here may be fairly common." He notes that in epidemiological studies that use job titles as the basis for EMF exposure assessment, these office workers would be classified as "non-exposed." "This exposure misclassification," Milham argues, "leads to [an] underestimation of risk" (see also *MWN*, J/A96).

An expert witness for SCE had analyzed data for these same workers and found no increased cancer risk. Milham said that one point of disagreement between the two analyses was whether it was legitimate to look at the combined incidence of different types of cancer together.

The *Johsz* suit was dismissed in June and is currently on appeal. Oral arguments are not expected before next spring at the earliest. The next hearing in *Younkin* will come in January, when an appellate court reviews sanctions imposed on the plaintiffs' attorneys after one of the defense's expert witnesses refused to testify (see *MWN*, J/A96; see also p.3).

Female Breast Cancer Linked to EMFs for the Third Time (continued from p.1)

Scott Davis of the Fred Hutchinson Cancer Research Center in Seattle commented that, "I find it quite interesting as another small piece of evidence in support of the EMF-breast cancer link."

Coogan's is the second U.S. study to find an association between breast cancer in women and EMFs. In 1993, Drs. Dana Loomis and David Savitz of the University of North Carolina, Chapel Hill, announced a 40% higher breast cancer mortality rate among female electrical workers than among the general female population (see *MWN*, N/D93). In a 1995 study, Dr. Kenneth Cantor, an epidemiologist at the National Cancer Institute in Bethesda, MD, used the same data set as Loomis and Savitz, but analyzed it differently and observed no breast cancer link (see *MWN*, M/A95). To date, several studies have shown a connection between EMFs and male breast cancer.

"The hypothesis of an association with magnetic fields remains quite speculative and no firm conclusions can be drawn at present," Dr. Tore Tynes of the Cancer Registry of Norway in Oslo told *Microwave News*. In 1994, Tynes found that female radio and telegraph operators had a breast cancer risk almost twice as high as that of controls (see *MWN*, J/A94). Tynes reported that women who had their licenses for up to nine years had an 80% higher breast cancer risk than did controls, while the risk for women certified for over 20 years was more than twice that of controls.

In an editorial accompanying Coogan's paper (*Epidemiology*, 7, pp.457-458), Dr. Susan Preston-Martin, an epidemiologist at the University of Southern California in Los Angeles, stressed that the possibility of a magnetic field-breast cancer association "has an edge over other hypotheses." She pointed to the melatonin hypothesis, which holds that the pineal gland's production of cancer-inhibiting melatonin is reduced by magnetic fields.

To be sure, Preston-Martin is still far from convinced that the

link is proven. She called the findings "the latest in a series of ambiguous epidemiologic studies that indicate, weakly, that occupational exposure to magnetic fields increases breast cancer risk."

"I think [the melatonin hypothesis] is the most intriguing specific mechanistic hypothesis that we've got going now," Preston-Martin said in an interview, "because in other areas [of EMF research] nobody's really quite clear what the effect is due to, whereas this is something that is really quite specific and, therefore, more promising to investigate."

Preston-Martin noted that, as with many epidemiological studies, Coogan's report raises as many questions as it answers: For example, "Does it mean that there is something else in these occupations that actually does relate to breast cancer risk?"

Dr. Thurman Wenzl, a member of Coogan's team, also interpreted the results with caution. "This study indicates that we should believe that there is some aspect of electrical or electronic work that seems to be associated with breast cancer risk, but it's not clear whether it's EMFs or not," said Wenzl, who is now a research industrial hygienist at the National Institute for Occupational Safety and Health in Cincinnati.

Wenzl stressed that Coogan's use of incidence—rather than mortality—data was a crucial improvement. He noted that the incidence of breast cancer is not always accurately revealed in a mortality study and that, more importantly, Coogan was able to interview the study subjects and ascertain pregnancy history—which is critical to breast cancer risk.

Dr. Stephanie London of the National Institute of Environmental Health Sciences in Research Triangle Park, NC, agreed. "Certainly, in a female occupational study going back maybe 30 or 40 years, you have to consider that having any full-time occupation for a long time probably correlated with not having children, having few children or having children late," she told *Microwave News*. "In this study, they had all these variables." Lon-

don's own report is due in the year 2000 (see table below).

Cantor pointed out that Coogan and coworkers collected more detailed data than his team did on a number of potential risk factors. "They included age at the birth of the subject's first child and age at menopause. All this is very important in assessing breast cancer risks and needs to be looked at."

Coogan also found that the rate of breast cancer among premenopausal women with high potential for exposures was twice as high as for controls. Postmenopausal women with high potential for exposures had only a 33% increase. "It is interesting that the highest risk was shown for premenopausal breast cancer," Tynes said. "Loomis and Savitz found the highest risk in the 45-55 age group, and in our radio and telegraph operator study we found the highest risk in the 45-54 age group."

Coogan's data were taken from a larger case-control study on breast cancer and various health risk factors. In her study, which served as her doctoral dissertation at Boston University, she investigated 6,888 women with breast cancer and 9,529 controls, all under 75.

The subjects' "usual occupations" were coded into three categories—low, medium and high potential exposure to 60 Hz magnetic fields—based on 25-minute interviews about their work histories. "These exposure categories are quite imprecise," Wenzl said. "But the jobs with high potential for EMF exposure are thought to have average exposures more often above 3 mG."

In contrast, Loomis-Savitz and Cantor relied on death certificates for estimating exposures. Coogan "had better information on the nonoccupational risk factors for breast cancer and may have done a somewhat better job of determining the women's occupations," Loomis conceded.

Coogan asked each woman to name a "usual occupation" representative of her work history. Davis, who is completing an EMF-breast cancer study (see table), believes the generality of this question avoided potential bias. "There was no indication at all to the people answering this question that EMFs were the interest," he

said. "So that's good, and the fact that it's direct interview information from the participants themselves is also very good."

Nevertheless, Coogan and her coauthors cited misclassification of magnetic exposure levels as "the major limitation" of the findings. "Although workers in electrical occupations have higher exposures to magnetic fields than nonelectrical workers," they stated, "there is considerable variation in exposures between occupations included in the same aggregate exposure category, and also within the same occupation." They concluded, however, that these limitations most likely led to an underestimation of the EMF risk.

But, as Preston-Martin stressed, this study was not intended to investigate an EMF-breast cancer link. "It just happened that they had information on both breast cancer and usual occupation in another study designed for something else entirely," she cautioned. "I don't think you ought to hang your hat on these results at all."

The association between EMFs and breast cancer is stronger among men—especially young men—than among women. Dr. Genevieve Matanoski of the Johns Hopkins University School of Hygiene and Public Health in Baltimore was the first to observe excess male breast cancer—a very rare disease—in young telephone employees in 1989 (see *MWN*, N/D89 and M/A91). A year later, Dr. Paul Demers of the Hutchinson Cancer Research Center found a sixfold increase in risk among young electrical workers (see *MWN*, J/A90 and S/O91).

Also in 1990, Norway's Tynes and Dr. Aage Andersen found that the breast cancer risk among electrical transport workers was twice that expected (see *MWN*, J/F91). Loomis saw a doubling of breast cancer deaths in his 1992 study of male electrical workers younger than 65 (see *MWN*, J/A92). A 1994 railway worker study by Dr. Birgitta Floderus of the National Institute for Working Life in Solna, Sweden, revealed an eightfold increase in male breast cancer among engine drivers and a fivefold increase for drivers and conductors combined (see *MWN*, M/J94).

Ongoing Breast Cancer-EMF Studies

| Institution | Principal Investigator(s) | Sponsor | Study Type: No. of Cases/Controls | Approx. Date of Completion | Comments |
|--|--|------------------------|-----------------------------------|----------------------------|---|
| Fred Hutchinson Cancer Research Center, U.S. | Dr. Scott Davis ¹ | NCI | CC: 800/800 | Spring 1997 | Focus on both magnetic fields and light-at-night |
| Karolinska Institute, Sweden | Drs. Maria Feychting & Anders Ahlbom ² | Swedish Cancer Society | Nested CC: 700/700 | May 1997 | Based on a 500,000-person cohort of Swedes living in a 300-meter transmission line corridor |
| SUNY Stony Brook, U.S. | Drs. Cristina Leske & Elinor Schoenfeld ³ | NCI & NIEHS | CC: 600/600 | 1999 | EMF exposure assessment based on interviews and measurements |
| USC, U.S. | Drs. Stephanie London & John Peters ⁴ | NIEHS & DOD | Nested CC: 500/500 | 2000 | Subjects mainly African-American and Latina women in Los Angeles |

1. See *MWN*, J/F87 and J/A93; 2. See *MWN*, J/A93; 3. See *MWN*, N/D93; 4. See *MWN*, N/D94.

Abbreviations: CC: Case-control; DOD: Department of Defense, Breast Cancer Research Program; NCI: National Cancer Institute; NIEHS: National Institute of Environmental Health Sciences; SUNY: State University of New York; USC: University of Southern California.

HIGHLIGHTS

« Cellular Phone Notes »

Local governments across the country have been scrambling to work out their role in antenna siting in light of the new telecom law, which preempts them from adopting RF/MW standards stricter than those set by the FCC (see p.9 and *MWN*, M/A96 and J/A96). **Greenburgh, NY**, has passed an ordinance that institutes a multitiered system designating levels of preference for locating antennas. "We do not prohibit transmitting antennas anywhere in town; we simply encourage them to be sited in areas more acceptable to the community," **Francis Sheehan**, a Greenburgh resident and coauthor of the ordinance, told *Microwave News*. For example, cellular phone companies must first consider commercial locations for their antennas. If the applicants reject these sites, a public hearing follows before they can look at other sites. By forcing cellular providers to go through separate hearings at each level, Greenburgh officials hope to discourage telecommunications providers from building antennas on sites in the bottom tier—within 350 feet of schools and day care centers. When asked why schools were put in the most sensitive level of the system—even below residences—Sheehan said, "There are other health issues involved with antenna sites, and the 350-foot setback from areas where children commonly play protects against those issues, such as the antenna tower becoming a climbing challenge for the children." Under the new rules, a five-member advisory board will review the status of the antennas and, if necessary, amend the ordinance. In addition, all permit and rental fees from cellular phone companies will be used for future zoning enforcement....

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...Meanwhile, several communities have followed the lead of **Medina, WA**, and have passed moratoriums that give them more time to amend existing zoning laws. In mid-September, **Eugene, OR**, and the **San Juan Islands, WA**, banned new applications for periods of four and six months, respectively. Four cellular and PCS providers had threatened to sue Eugene over its moratorium, but agreed not to when the city exempted their 13 pending applications. On September 20, **US West**, which had been seeking to install antennas on the San Juan Islands for a year, filed a lawsuit in federal court. On September 26, **San Francisco** (see p.10) passed a moratorium that halts antenna siting in residential areas for 18 months. **Spokane, WA**, had a moratorium in place, but lifted it in early September in favor of an ordinance allowing antennas to be placed without a special permit if they are put on existing support structures. Medina adopted its six-month ban just five days after the telecom law was signed (see *MWN*, M/J96). The city won a lawsuit brought by Sprint Spectrum when a federal judge ruled that the six-month period constituted "a reasonable period of time," as stated in the telecom law. In August, Medina passed an ordinance that calls for wireless facilities to be set back from property lines at a distance equal to the height of the tower and the antenna.

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Many **New York City** residents have been reluctant to lease their rooftop and apartment property to support the influx of PCS systems. The situation prompted **Charles Hoffman** of Sprint Spec-

trum to tell the *New York Times* (August 19; see also p.12) that, "New York is the toughest market in the world." The wireless industry has discovered, however, that some of the posh Central Park West and Fifth Avenue penthouses it had been surveying may no longer be needed, since Mayor **Rudolph Giuliani** has allowed the PCS antennas to be put on 3,000 lampposts and traffic lights throughout the city. Phone companies will pay monthly fees of \$100 per lamppost and \$200 per traffic light. With each provider allowed 3,000 sites, the city could bring in upwards of \$3 million annually. In spite of this windfall, the announcement brought harsh criticism from some residents, one of whom, **Arthur Firstenberg** of Brooklyn, contends that the antenna placement would transform the city streets into "cancer alleys." Firstenberg, chairman of the Cellular Phone Taskforce, an organization of electromagnetically hypersensitive New Yorkers, told *Microwave News*, "There has never been this concentration of sources of electromagnetic energy in the public streets before.... It's just frightening" (see p.9). Since the emissions from PCS antennas are about 1,000 times lower than the FCC's standards for public exposures, the city is unable to regulate them, **Sunny Mindel**, a spokesperson for the city's Department of Informa-

New Zealand Bans Cellular Antennas at Public Schools

New Zealand's Ministry of Education has issued a policy statement preventing cellular phone antennas from being built at public schools.

"Of paramount importance to the ministry is the provision of an environment where boards of trustees, parents, teachers, pupils and other occupants of the school site can feel comfortable. For this reason the ministry has decided cell phone transmitters will not be sited on Crown-owned school sites in the future," John Simpson, the ministry's national property manager, wrote in the one-page statement. The ban does not apply to private schools or to antennas that are already in place on school property.

A knowledgeable source called it "one of the most bizarre policy statements in terms of its tone and presentation." In particular, the source noted that the directive immediately follows quotes from the National Radiation Laboratory, which state that cellular transmitters operate below the New Zealand RF/MW radiation standard, that residents living near antennas are exposed to less than 1% of the limits for the general public set in the New Zealand standard and that there is no evidence that exposures at low levels are harmful.

The ministry cited safety concerns from the public as the impetus for the new policy. Antenna siting was the focus of a symposium held last November in Christchurch, at which attendees urged a "precautionary approach on the most vulnerable groups in our society" (see *MWN*, N/D95).

Last year, the California Public Utilities Commission reached a similar decision, advising cellular telephone companies not to build antennas near schools or hospitals (see *MWN*, N/D95).

HIGHLIGHTS

tion Technology & Telecommunications, said in an interview. "The other thing to remember is that these things are already out there. There are landlords renting space for them," she added.

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Professor **Paolo Bernardi** of the **University of Rome "La Sapienza"** has added a new layer of complexity to the task of estimating the energy absorbed by the head of a cellular phone user. In a paper published in the August 1996 issue of the *IEEE Transactions on Electromagnetic Compatibility*, he shows that the presence of a nearby reflecting wall can radically change the specific absorption rates (SARs). Computer calculations show that a vertical reflecting wall can increase SARs, while a horizontal one can decrease them—in each case, the change in the SAR can be larger than a factor of two. The effect depends on what the wall is made of: A metal structure produces a major change, while a glass wall has only a minor effect. "When a portable phone is used inside a car, scattering surfaces are present and become important in determining the SAR distribution in the exposed head," according to Bernardi.

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Mobile phone towers, which, reportedly, are being built at a rate of three to five a week in the U.K., are increasingly drawing the ire of local residents. The proliferation of transmitters in Britain—where there are now more than 7,600—was made easier in the 1980s by legislation that allows four companies to put them anywhere they choose, according to the September 1 *Independent on Sunday* (U.K.). Many communities have balked at the prospect of the four providers each building a separate communications system. The *Independent* detailed the failure of one of these companies, **Mercury One 2 One**, to demonstrate to residents of a town in Kent the importance of a 77-foot tower in filling a void in its network. During a presentation by Mercury to the local opposition, a public relations staffer's mobile phone began to ring. "That inopportune call made it clear to us that the tower was not really necessary at all," **John Gandon**, an environmental campaigner, told the *Independent*. As a result, the local council rejected the permit. "The phone company has now left us in peace and has apparently decided not to lodge an appeal," Gandon said.

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The **Communications Workers of America** (CWA) and the **EMR Alliance** are preparing a manual on how communities can oppose the siting of cellular towers. The introduction states that due to the cellular industry's "mad frenzy" to build antennas, the handbook is being written "to help communities mobilize against the placement of cell sites or facilities where they believe placement would adversely affect their health, safety, property values and the aesthetics of their community." **David LeGrande**, the CWA's health and safety director in Washington, told *Microwave News* that one goal is to increase awareness of RF/MW radiation exposures and bring more attention to potential risks faced by the CWA's members who work near transmitters. "I'm especially concerned about the exposure from other kinds of devices besides cellular antennas," LeGrande said, adding, "Some transmitters on these towers may entail even more

Safety of Cellular Phones: The View from Harvard School of Public Health

On August 20, Dateline, an NBC television news magazine, aired a segment on cancer risks that focused on cellular phones. Among those interviewed by Robert Bazell, NBC's science correspondent, was Dr. John Graham, director of the Center for Risk Analysis at the Harvard School of Public Health in Boston. Graham's work on cellular phones is sponsored by the Cellular Telecommunications Industry Association through Wireless Technology Research, a fact not mentioned by Bazell. Here is an excerpt from their exchange:

Graham: In the media, you're looking for the mysterious, the novel, the unfamiliar story, and what better than exotic theories like brain cancers and cellular telephones? Unfortunately, the media doesn't always focus on big killers. They focus on the little ones and the speculative ones that the surgeon general would regard as insignificant.

Bazell: And once something has been flagged as a possible cancer risk, it is almost impossible to dispel the fear, no matter what studies are done. You remember what happened with saccharin? First, fears that it could cause bladder cancer, and then studies saying, "Don't worry, it won't." Well, 33% of the people we polled say they still consider saccharin a risk factor for cancer. So, what about the scientists themselves? Do they play a role in creating our misconceptions?

Graham: A lot of us scientists have motivations as we build our careers to exaggerate a particular possible cause of cancer that we're advancing as our own scientific hypothesis.

Bazell: But you're saying that scientists would exaggerate the cancer-causing danger of a chemical to advance their own career?

Graham: Bob, if I'm the person trying to prove that cellular phones cause...brain cancer, imagine what it does for my career to be the first person to show definitively that cellular phones cause brain cancer.

potentially harmful RF/MW exposures." He said that a lack of accurate information on health effects from RF/MW radiation made the document necessary: "I'm not convinced that all the data from these cellular companies—the CTIA in particular—are incredibly accurate."

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While cellular antenna height has long been an aesthetic concern for communities across the country, it has increasingly drawn attention from the aviation industry as a potential safety hazard. On August 12, the **Federal Communications Commission** (FCC) fined **Centel Cellular Co. of North Carolina** \$2 million for building a 187-foot tower in 1993, which, it contended, posed a "serious hazard" to aircraft traffic for the Greensboro/Piedmont Triad International Airport. The FCC had originally sought \$3 million for not notifying the Federal Aviation Administration (FAA), for not installing safety lighting and for not obtaining FAA approval, but after an appeal Centel Cellular had the third violation dropped and the fine reduced. "This decision underscores the commission's concern for public safety. Every licensee should heed the message that a license is a public trust that carries a high duty to serve the public and to operate safely," said Beverly Baker, chief of FCC's Compliance and Information Bureau. Earlier this year, the Helicopter Association International began a campaign to give the FAA "uncompromised authority" in cellular tower siting cases (see *MWN*, J/A96).

Industry, Activists Challenge FCC's New RF/MW Rules

Seventeen petitions have been filed with the Federal Communications Commission (FCC) asking it to reconsider the new radiofrequency and microwave (RF/MW) radiation regulations that it approved on August 1. A dozen criticize the new rules as too restrictive, while the rest assert that they are too lenient. Parties on both sides of the issue are considering lawsuits if the commission does not bend in their particular direction.

"We'll respond to most or all of the petitions by late October or November," said FCC's Dr. Robert Cleveland, who led the agency's effort to draft the new rules. The period for public comment on the petitions runs through October 13.

The FCC is again being asked to preempt local and state regulation of the siting of *all* RF/MW transmitters. The Telecommunications Act of 1996 requires such federal preemption for cellular phone and personal communications services (PCS) facilities, but the FCC has so far rejected calls to extend this preemption to other RF/MW sources—such as radio and TV stations (see *MWN*, J/A96). The renewed requests come in petitions from the Electromagnetic Energy Alliance (EEA)—whose members include AT&T, General Electric, Motorola, Raytheon and the National Association of Broadcasters—and from the American Radio Relay League, the amateur radio group.

Ameritech Mobile Communications is calling on the FCC to preempt "state and local regulation of the *operation* of [personal wireless] facilities" (Ameritech's emphasis), and to rule on the issue of liability for "the environmental effects of RF emissions." These two steps would protect wireless operators against any lawsuits as long as the companies comply with federal standards (see p.12).

The Cellular Phone Taskforce, a citizens' group in New York City, argues that the FCC standard fails to protect electrosensitive individuals. Its petition asks the commission to set a $10 \mu\text{W}/\text{cm}^2$ standard above 100 MHz. According to a September 19 statement, the group is raising money to fund a class action lawsuit "on behalf of the electrically sensitive and others, with the goal of keeping transmitters out of residential neighborhoods."

Much industry criticism is aimed at the FCC's decision to combine elements of two standards, one from the National Council on Radiation Protection and Measurements (NCRP) in 1986, and the other from the American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE) in 1992. For example, US West asserts that "it appears the commission made a decision to ignore science" in choosing the hybrid, and insists that the FCC must "adopt an unadulterated 1992 ANSI standard." The Department of Defense's petition also criticizes the FCC for not sticking with the ANSI rules.

In their attacks on the hybrid standard, the EEA and US West cite the opinions of specialists such as Drs. Eleanor Adair, C.K. Chou and Bill Guy, all of whom lobbied hard for the ANSI criteria (see *MWN*, M/A96).

Most observers think it is very unlikely that the FCC will reverse itself. But by filing objections now, industry maintains its right to challenge the FCC in court in the future.

The Cellular Telecommunications Industry Association

(CTIA), which had previously been very active on behalf of the ANSI standard, chose not to file any objections to the FCC's new rules. "We feel it's a workable plan," said CTIA spokesperson Tim Ayers in Washington, even if there is still room for improvement. "In the give-and-take atmosphere of rule-making," he told *Microwave News*, "you don't always get 100% of what you want—but you get to a point where it's acceptable." Ayers would not comment on which particular changes were important to the CTIA, but added that, "Certainly there'll be no problems meeting these standards."

The new FCC limits are above levels that have been shown to cause adverse health effects contends a petition from the Ad Hoc Association of Parties Concerned About the FCC's RF Health and Safety Rules in Olympia, WA. It cites effects ranging from cancer to sleep abnormalities, and it calls on the FCC to cut its limits to 40% or less of the current figures. In general, the group proposes, emissions should be mandated to be "as low as reasonably achievable."

A petition from the nonprofit Ergotec Association in Arling-

Advice from U.K.'s Sir Richard Doll: Need for EMF Research Is "Urgent"

Sir Richard Doll, the U.K.'s leading epidemiologist—in 1992 the New Scientist called him "the greatest epidemiologist ever"—is once again stressing the need for continued research to determine whether power frequency EMFs entail a cancer risk. (For some of his past comments, see MWN, M/A94, J/A94 and J/F95.) Excerpted below is Doll's advice on EMFs and RF/MW radiation in his commentary, "Nature and Nurture: Possibilities for Cancer Control," from the February issue of Carcinogenesis (17, pp.177-184, 1996).

Whether the radiation from other parts of the electromagnetic spectrum [other than ionizing and UV radiation], or the individual electrical and magnetic fields produced, cause any risk of cancer is currently a subject of intensive research. Experimentally, there is no reason to think that they do, or even, in the case of the extremely low frequency electric and magnetic fields, that they produce any biological effect that could be related to cancer, though claims of such effects have been made by individual investigators, as yet unconfirmed in other laboratories. Nor is there any epidemiological evidence of cancer production from the use of cellular telephones, the claim for the production of brain cancer being based on the occurrence of single cases.

There is, however, some good-quality epidemiological evidence that residence near high-power electricity cables producing magnetic fields in houses of the order of $0.2 \mu\text{T}$ [2 mG] and above (the average in houses in this country being of the order of $0.05 \mu\text{T}$) may approximately double the risk of childhood leukemia and perhaps also cause a somewhat smaller increase in childhood brain cancer, and there is some evidence that occupational exposure to similar levels may increase the risk of leukemia and brain cancer in adults. The numbers of cases in the best studies are small, but we must, I think, conclude that the possibility of a risk from such exposures exists, and that we urgently need research to determine whether it does exist or not. The fields concerned are almost wholly man-made and, if the risk is real, there will certainly be an opportunity of reducing them, though at considerable social cost.

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HIGHLIGHTS

ton, VA, asserts that the FCC rules are too lenient, especially given the nationwide proliferation of antennas. This point is also raised by New York's Cellular Phone Taskforce: "A person at a given location may be exposed to the cumulative...emissions of numerous transmitter [sites]. Combined exposure from all could well exceed [FCC's] limits."

Dr. Marjorie Lundquist of Milwaukee faults the FCC limits for "lack of a sound scientific basis." She contends that the rules do not give adequate weight to nonthermal bioeffects. Lundquist wants the FCC to establish a "forbidden zone" around transmitters of all types.

Industry petitions raise a variety of issues on how to ensure compliance at sites where several companies have antennas located together. The FCC ruled that the providers are jointly responsible, but Ameritech, BellSouth and Paging Network argue that responsibility should rest with the site owner.

Several petitions from the telecom industry complain that the grace period before new transmitter rules are enforced should be pushed back from January 1, 1997, given that an FCC technical bulletin on compliance will not be completed until November or December of this year.

The petition from Hewlett-Packard (HP) focuses on the issue of "new, unlicensed millimeter-wave technologies," in which HP is making a substantial investment (see *MWN*, M/A96). HP asks the FCC to relax some of its restrictions on these applications (e.g., wireless computer networks) and to "remain flexible in its environmental regulation of millimeter-wave radiation."

San Francisco Grapples with Siting of Wireless Facilities

On September 26, the San Francisco planning department passed an 18-month moratorium on placing any new wireless transmitters in residential districts.

The ban gives time for the city's general plan to be amended to include guidelines for siting wireless facilities. It was passed shortly after the Board of Supervisors adopted an ordinance establishing a commission to review the city's telecommunications policy, including specifics on the siting of wireless antennas.

"There has been massive opposition from industry to this plan," June Gutfleisch, a staff member with the Board of Supervisors, told *Microwave News*. The primary reason for the commission—which has been in the works for three years—was health, she said.

Other moratoriums, such as those in Medina, WA, and on the San Juan Islands, WA, have led to lawsuits from industry (see p.7 and *MWN*, M/J96).

The commission's five voting members, who will be appointed by the mayor, must include at least two public representatives. Of the other members, one must have a background in public, educational or government access to new technology and another in telecommunications management or engineering. Each will serve a three-year term. The directors of public works, health and planning will attend commission meetings as nonvoting members. Current or former employees of telecom providers that seek to bring their services to the city cannot sit on the commission.

Exposures from PCS Antennas

The greatest RF/MW exposure from a PCS antenna located 40 feet off the ground is not next to the base, but 107 feet away. Hammett and Edison Inc., a consulting firm based in San Francisco, estimated the power density at this location to be $6.2 \mu\text{W}/\text{cm}^2$ for three antennas (sectors) with a combined effective radiated power of 400 W per sector.

Hammett and Edison arrived at this figure using its own proprietary computer program, "RFR.Ground". The calculation was included in an August 24, 1995, report the firm produced for Pacific Bell to win approval for its antennas in San Francisco.

Last year, Pac Bell, which was recently given the go-ahead to install more than 30 PCS antennas in San Francisco (see *MWN*, M/A96), hired Hammett and Edison to determine whether their PCS antennas comply with FCC standards. The company wrote about ten such reports in the last year for several wireless service providers, according to Robert Weller of Hammett & Edison.

On August 15, the planning department adopted siting guidelines that encouraged service providers to install antennas on public facilities, such as police and fire stations, and on industrial or commercial structures.

In June, the Board of Supervisors, responding to public outcry, voted 6-3 not to allow two Pacific Bell PCS antennas in residential neighborhoods in exchange for allowing three in commercial areas. Pac Bell had earlier been given approval to install more than 30 antennas as part of the \$1.5 billion PCS system it is building in California and Nevada (see box above and *MWN*, M/A96).

The "New" ICNIRP

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) has new leadership and some new members.

Dr. Jürgen Bernhardt of the Institute for Radiation Hygiene (IRH) in Neuherberg, Germany, has taken over the chairmanship from Australia's Dr. Michael Repacholi. Dr. Alastair McKinlay of the U.K.'s National Radiological Protection Board in Chilton has been appointed the vice chair of the commission. Rüdiger Matthes of the IRH continues as the ICNIRP's scientific secretary.

Repacholi, who is currently on leave from the Royal Adelaide Hospital to coordinate the World Health Organization's project on the health effects of EMFs and RF/MW radiation (see *MWN*, J/A96), has become the chairman emeritus. "I don't have a vote anymore," Repacholi told *Microwave News*.

Dr. Henri Jammot, the first ICNIRP chairman emeritus, died on August 19 at the age of 76 in Tripoli, Libya. He began his 35-year medical career at the Curie Foundation in 1950 as an assistant in radiotherapy. Eight years later, he took part in the first human bone marrow transplant—on victims of a radiation accident in Yugoslavia. In 1976, Jammot became director of the Radiation Protection Branch of France's Institute of Radiation Protection and Nuclear Safety. He was instrumental in founding the International Radiation Protection Association's International Non-Ionizing Radiation Committee, which he chaired from 1977 to 1988. In 1992, the committee became the ICNIRP (see *MWN*, J/A92). At the time of his death, Jammot was an adviser to the

Atomic Energy Commission, as well as chairman of the International Center of Radiopathology outside of Paris.

In addition to Bernhardt, Matthes and McKinlay, the current voting members of the ICNIRP are: Drs. Anders Ahlbom, Karolinska Institute, Stockholm, Sweden; Ulf Bergqvist, National Institute for Working Life, Solna, Sweden; Jean-Pierre Césarini, Rothschild Foundation, Paris, France; Martino Grandolfo, National Institute of Health, Rome, Italy; Maila Hietanen, Institute

of Occupational Health, Vantaa, Finland; David Sliney, U.S. Army Center for Health Promotion and Preventive Medicine, Aberdeen Proving Ground, MD, U.S.; Jan Stolwijk, Yale University, New Haven, CT, U.S.; Laszlo Szabo, National Research Institute for Radiobiology and Radiation Hygiene, Budapest, Hungary; Masao Taki, Metropolitan University of Tokyo, Japan; and Thomas Tenforde, Battelle Pacific Northwest Labs, Richland, WA, U.S.

Exposed to Russian Radar for Years, Latvians Now Study Effects

A number of groundbreaking papers on the biological effects of radar and other RF/MW signals appear in a special issue of *The Science of the Total Environment*, published by Elsevier in Amsterdam, The Netherlands. The papers are among those presented at *The International Conference on the Effect of RF Electromagnetic Radiation on Organisms*, held in Skrunda, Latvia, in June 1994 (see *MWN*, S/O94). They appear in the journal's February 2, 1996, issue; publication was delayed by a backlog at the printer.

Most of the papers focus on the effects of a military radar station in Skrunda, which was put into operation by the Soviet Union in 1971. Now run by the Russian government, the station is scheduled to cease operation in 1998 under an agreement between the two nations. In the meantime, it has given rise to "a unique study area," in the words of Dr. Guntis Brumelis of the University of Latvia in Riga, guest editor of the special issue. Brumelis explains that the location of the Skrunda radar makes it unusual: "Due to the military nature of these types of radar, they are usually located in remote areas, closed to residents [and] scientists."

The Skrunda station consists of two phased-array radars designed to track missiles and satellites, each operating with a peak power of 1.25 MW with 0.8 ms pulses at 156-162 MHz. A paper by Dr. T. Kalnins and coworkers at the Latvian Academy of Sciences' Institute of Physics in Salaspils states that although the average intensity of the radar's signal is within both IEEE and former Soviet limits, the maximum intensity of each pulse exceeds those limits by a factor of 50.

Children who lived in the path of the Skrunda radar's signal had "less developed memory and attention, slower reaction times, and decreased [neuromuscular] endurance," write Drs. A.A. Kolodynski and V.V. Kolodynska of the Latvian Academy of Sciences' Institute of Biology in Salaspils. The two scientists administered tests for reaction time, memory and switching and focusing of attention, evaluating 609 children 9 to 18 years old who lived within 20 km of the Skrunda station. Of these, 224 lived in areas directly exposed to the radar. A separate group of 357 children in a different area (with similarly low pollution levels) served as controls.

Those who lived in the Skrunda area generally did worse on the tests than the control group. But when only those children living in exposed areas were considered, the observed differences were more significant. These differences showed a weak correlation with distance from the radar station. The researchers note that exposure does not correlate exactly with distance,

due to changes in the shape of the terrain, tree cover, etc.

A study of the growth rings in pine trees in the path of the Skrunda radar beam showed a significant reduction in radial growth, which correlated with the strength of the signal. "The most conclusive evidence...may only be available when the Skrunda [radar] station terminates operation in 1998," write Dr. Valdis Balodis and colleagues at the University of Latvia. "Then it will be possible to determine if radial tree growth recovers."

Needles and cones in pine trees showed increases in the production of resin or its predecessor chemicals, according to Drs. Turs Selga and Maija Selga of the Institute of Biology in Salaspils. They note that "resin formation and secretion are metabolically active responses of pine trees to injury," and point out that related reactions have been observed in pine trees after exposure to gamma radiation.

Other papers report more abnormalities and a shorter life span in exposed duckweed, and more ambiguous results in a study of chromosome damage in exposed cows.

The landmark 15-year study of Polish military personnel and RF/MW exposure (principally from radar) is reported by Dr. Stanislaw Szmigielski of the Center for Radiobiology and Radiation Safety at the Military Institute of Hygiene and Epidemiology in Warsaw, Poland. Szmigielski examined records for 128,000 people per year, and found that the overall cancer risk doubled for exposed personnel. Their risk of leukemia and lymphoma was six times higher than expected—and eight times higher for exposed personnel ages 20 to 49 (see *MWN*, Mr85, J/F87, S/O90 and M/J95).

Dr. John Goldsmith of the Ben Gurion University of the Negev in Israel reviews the relatively sparse literature studying radar, and other, RF/MW effects on humans. Goldsmith suggests that epidemiological studies of radar should not only focus on cancer, but must also look at "hematological or chromosomal reactions." He emphasizes that these can occur earlier and may be reversible.

The February 2, 1996, issue of *The Science of the Total Environment*, 93 pages long, can be ordered for \$62.00. In the U.S., contact: Elsevier Science, Customer Service Department, PO Box 945, New York, NY 10159, (212) 633-3750, Fax: (212) 633-3764, E-mail: <usinfo-f@elsevier.com>. In Europe, contact: Elsevier Science, Customer Service Department, PO Box 211, 1000 AE Amsterdam, The Netherlands, (31+20) 4853757, Fax: (31+20) 4853432, E-mail: <ninfo-f@elsevier.nl>.

Clippings from All Over

“With this decision, the state’s highest court has sent a clear signal to plaintiff lawyers that peddling paranoia for profit doesn’t pay.”

—Gregory Barnes, assistant general counsel for SDG&E, on the California Supreme Court decision (see p.3), quoted in a company press release, August 22, 1996

“There isn’t a strong [EMF health] effect, and no one is saying there is. So that means there must be a weak effect, or no effect.”

—Dr. Kenneth Rothman, editor of *Epidemiology*, quoted by John Dorschner in “The Power in the Blood,” *Tropic* magazine, *Miami Herald*, p.19, August 4, 1996

“We have power lines about 150 feet from our house. I like to think that electromagnetic radiation is just the latest scare.”

—James Plosia, an attorney living in Liberty Corner, NJ, who, with his wife, Pat, recently closed on a four-bedroom, 3,000-square-foot colonial for \$245,000, about \$40,000 less than similar houses in the neighborhood, quoted by Jay Romano in “Warning to Sellers: Let the Buyer Be Aware,” *New York Times*, Real Estate Section, p.6, September 1, 1996

“Clearly the biological research and the scientific evidence [on mobile phones are] just not there. There is the question of subjective symptoms such as headaches. The structure we are setting up is independent. Industry would have no influence on the work being done.”

—Dr. Alastair McKinlay of the U.K.’s National Radiological Protection Board in Chilton and chair of the European Commission’s expert group on possible effects of mobile phones on human health, quoted by Marie Woolf in “Mobile Users May Run Cancer Risk,” *The Observer* (U.K.), September 1, 1996

Cellular towers emit about as much radiation as a clock radio.

—Tim Ayers, spokesperson for the CTIA in Washington, cited by Hugh McDiarmid Jr. in “Towers Tough To Beat,” *Detroit Free Press*, p.1B, August 13, 1996

“Manhattan is so hard partly because of the people who live there. There are people who own lots of stock in our company who won’t let me use their buildings for cell sites.”

—George Schmitt, president of Omnipoint Communications, a PCS-service provider, quoted by Mark Landler in “Yipes! Invasion of the 9-Inch Antennas,” *New York Times*, p.D6, August 19, 1996

“People are starting to look at power lines as a hidden asset. They are an area that’s ripe for creative thinking.”

—Richard Henry, former president of the New Hampshire Audubon Society and now president of Solutions Collaborative, a company that mediates between environmental groups and industry, quoted by Royal Ford in “Wildlife’s Power Play: Nature Flourishes Beneath Region’s Electric Cables,” *Boston Globe*, p.A23, August 4, 1996

“The [FCC] should specify a federal rule of liability for torts related to the environmental effects of radiofrequency emissions, so that licensees can avoid unnecessary and conflicting lawsuits by ensuring that they comply with the commission’s guidelines, as they are amended from time to time. As the record in this proceeding has shown, there can be differences of opinion within the scientific community as to what constitutes a harmful environmental effect, and at what level, distance, etc. radiofrequency radiation causes such effects. Therefore, providers of telecommunications services face the danger of liability based on a study which is not necessarily consistent with the standards adopted by the commission. In order for the wireless industry to move ahead with capital-intensive advanced telecommunications services in a highly competitive environment, it is vital that the industry have a single standard to follow, and that it can steer clear of liability by following this standard.”

—From *Petition for Reconsideration and Clarification*, filed by attorneys for Ameritech Mobile Communications Inc. with the FCC, September 6, 1996; see p.9

FAA Is Again Urged To Restrict Use of Portable Electronics on Board Aircraft (continued from p.1)

about how the agency will respond this time. “It’s hard to believe that they would be truly sympathetic and take great action on this,” he told *Microwave News*. “That may sound cynical, but I’ve worked very closely in FAA regulatory affairs for 16 years now. It’ll probably take some action on Capitol Hill to get them to move.”

The FAA did not respond to repeated requests for comment. SC-177 was formed at the FAA’s request—but only after Congress directed the agency to do more to investigate the issue of electromagnetic interference (EMI) from PEDs.

In 1993, shortly after SC-177 was established, a flurry of media attention led airlines to begin adopting voluntary PED restrictions. But Sheehan called the result “a hodgepodge.” While most U.S. airlines now have PED rules in place, and while they often approximate the RTCA recommendations, Sheehan said, “No two sets of rules are the same. The problem is that they’re not consistent, and they’re not mandatory.”

“Our committee’s main recommendation is that the use of PEDs be banned during critical phases of flight, such as takeoff and landing,” said Sheehan, who is also president of Professional Aviation Inc., a consulting firm in Frederick, MD. “During non-critical phases, you have time to check and see what might be

causing a problem. In critical phases you can’t do that.” Cases of EMI from laptop computers, portable video games, CD players and other PEDs are analyzed in the report from the RTCA.

Some committee members wanted the report, which was issued in August, to be stronger. An article in the September 1996 *IEEE Spectrum* quotes SC-177 member Finbarr O’Connor as saying, “If it were up to me, I would shut PEDs down, period.” O’Connor, electromagnetic compatibility manager at R&B Enterprises in West Conshohocken, PA, added, “I would feel better if they were not allowed in the passenger compartment at all....The potential for them to be turned on accidentally is high.” But the report, a consensus document, does not go this far, reflecting the views of representatives of major airlines, aircraft and computer makers, the cellular phone industry, the U.S. Air Force and others.

Current FAA regulations forbid onboard use of a PED unless “the operator of the aircraft has determined [that it] will not cause interference with the navigation or communication system.” But, Sheehan asserted, “The airlines have never performed those tests. Nobody has been complying with this regulation, and the FAA knows it.” Although the FAA is required by law to enforce this regulation, Sheehan said, “It’s now more or less ignored because interference is so rare.”

The reason the FAA's rule has not been followed, in Sheehan's view, is that it is just too difficult. "I have to sympathize with the airlines on that," he said, explaining that it would be "a gargantuan task" to test all types of PEDs. "We found that to be a near futile activity anyway," Sheehan added, "since two devices of the same model may give different readings." This is especially true once a device has been in use for a few years. Dropping a CD player or performing an upgrade on a laptop computer can drastically change the device's electromagnetic signature.

Michael Rioux, who represented the Air Transport Association (ATA) on SC-177, said that a few years ago the ATA had looked into organizing a program through which its member airlines might test PEDs together. "But the cost would have been prohibitive," he told *Microwave News*. "There are far too many kinds of devices out there, and the airlines aren't set up to do this kind of testing."

EMI from PEDs has been not only extremely rare, but also hard to reproduce. The RTCA report notes that, "The likelihood [of reproducing an incident of EMI] is low since it has been impossible to duplicate the original conditions with the same device, aircraft, location, RF environment and the airborne system's settings."

But the committee found a number of cases in which PEDs were clearly at fault. Of the 137 cases of suspected PED interference examined by SC-177, in over 46 the interference disappeared when the PEDs were turned off. In ten of these cases, the PEDs were then turned on again and the interference reoccurred.

The growing use of satellite-based electronics in civil aviation raises the odds of EMI, according to the report: "Aircraft receivers for these systems, such as those of the Global Positioning System, necessarily operate at a very low level of re-

Canada Adopts Rules for PEDs on Airplanes

Canada has just adopted its first air traffic regulations on the use of PEDs. The new rules, which take effect October 10, allow onboard use of PEDs only with permission of the airline, and then only if the device will not "impair the functioning of the aircraft's systems."

Standards that detail how to comply with the new rules have not yet been issued. But Donna Richard of Transport Canada in Ottawa, the agency responsible, said that the standards are expected to ban use of PEDs during "critical phases of flight" such as "takeoff, climb and landing." Richard told *Microwave News* that this language, similar to RTCA's recommendations to the FAA, is currently found in advisory material that the Canadian government issued to air carriers in March 1993. The standards will be issued in the near future, but Richard could not say exactly when.

The new regulations are part of a larger overhaul of the Canadian air traffic code. The sections affecting PEDs are regulations 602.08, 703.38, 704.33 and 705.40. For more information, call Transport Canada's Communications Group at (613) 990-2309. The text of the new rules can be found on Transport Canada's Web site at <<http://www.tc.gc.ca>>.

Game Called on Account of EMI

Below is an excerpt from "Do Portable Electronics Endanger Flight? The Evidence Mounts" by Tekla Perry and Linda Geppert in the September 1996 issue of IEEE Spectrum, describing one incident reported in the Aviation Safety Reporting System database of the National Aeronautics and Space Administration.

In January 1993, on a flight from Denver, CO, to Newark, NJ, the aircraft lost all directional gyros [electromechanical devices that indicate orientation] at cruise altitude. The captain instructed the flight attendant to go through the cabin and tell all passengers to turn off their electronic devices. She reported back that about 25 passengers with portable radios had been listening to a football game and one passenger was using a laptop.

After five minutes, the gyros still failed to operate properly. On rechecking, the flight attendant found that the radios were still on. Using the loudspeaker system, the captain immediately told all passengers using such devices to turn them off because they were affecting the navigation equipment. After 90 seconds, the gyros corrected themselves to the proper heading. But 20 minutes later, they "began moving off the correct heading by as much as 20-30 degrees."

The captain then picked up the mike and told the passengers that if they did not turn the radios off, he would have the flight attendant go through the cabin and confiscate all radios until they reached Newark. Within two minutes, the gyros began to swing back toward the correct heading. No further incidents occurred.

ceived power, and consequently can be more susceptible...to RF interference." It also points out that new opportunities for interference are created by the "proliferation" of new personal communications devices.

Airborne use of cellular phones is banned by the FCC, but for reasons unrelated to flight safety. FAA regulations do not specifically address them, and SC-177 wants the FAA to prohibit all in-flight use of "intentional radiators" of electromagnetic energy.

But as *IEEE Spectrum* points out, "Soon the ability to access satellites directly...will be an integral part of laptops and other personal communications assistants." Sheehan expressed concern that passengers might use such intentional emitters unintentionally: "Many users just don't know what they have." This underlines the importance of another recommendation from SC-177: a campaign "to educate the flying public" about EMI.

If interference from a PED ever did contribute to an accident, would we know it? "I guess it's common knowledge that after [Commerce] Secretary Brown's crash, a special team of investigators was dispatched to look at that very thing," Sheehan said, "especially at whether somebody might have been using a cell phone. But it would be very difficult to know if a PED was being used or not." However, Sheehan stressed that in almost every past accident, the cause has been traced to other factors, and there has never been any particular reason to blame PED interference.

Portable Electronic Devices Carried on Board Aircraft (Document No. RTCA/DO-233) can be ordered for \$60 in the U.S. and \$75 elsewhere (with a \$5 shipping fee in either case) from RTCA Inc., 1140 Connecticut Ave., NW, Suite 1020, Washington, DC 20036, (202) 833-9339, Fax: (202) 833-9434.

FROM THE FIELD

Letters: Electric Fields, Exposure Assessment, Motorola Research

September 23, 1996

To the Editor:

Most EMF studies have used magnetic fields as a measure of exposure. Often, however, both electric and magnetic fields are present together, if independent, by the nature of near-field properties. For instance, this is true for distribution lines.

The Scandinavian residential studies are examples of situations where electric fields are present and elevated but are discounted because of the shielding effect of buildings. I am not certain how valid this assumption is, when children, in particular, may play outside the home.

Miller et al.'s results¹ show that elevated electric fields bear on carcinogenic effects beyond the action of radon daughter products. In our recent paper,² we pointed out that the concentration of radon daughters was simply an illustration of aerosol behavior in high electric fields. Whether these fields are alternating or static may be irrelevant if they concentrate carcinogenic aerosols. A simple illustration: When water drips past a metallic conductor that is charged to a high potential, the droplets are attracted to the conductor, whether the field is static or time-varying.

The electric field exposures in Miller's study are indeed high—measured in 100s of V/m/years—so it is uncertain whether his results could be extrapolated down to domestic levels, which tend to be in the tens of V/m (with an associated reduction in relative risk).

Much of the critical discussion of our paper missed the point we were making. This was that in seeking an association between EMFs and cancer, a biophysicist feels uncomfortable with the concept of direct biological tissue-EMF interaction because of the exceedingly low quantum energy of power frequency EMFs. The notion of electric fields redistributing physical particles, i.e., aerosols, bacteria and viruses, is a much easier concept, which can, and has been, demonstrated in the laboratory. This contrasts sharply with the poor reproducibility of biological *in vitro* experiments.

I look forward to further reinterpretation and analysis of EMF epidemiological studies using electric fields as one of the metrics.

Alan Preece, PhD

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1. Anthony Miller et al., "Leukemia Following Occupational Exposure to 60 Hz Electric and Magnetic Fields Among Ontario Electric Utility Workers," *American Journal of Epidemiology*, 144, pp.150-160, July 15, 1996. See *MWN*, J/A96.

2. D.L. Henshaw et al., "Enhanced Deposition of Radon Daughter Nuclei in the Vicinity of Power Frequency Electromagnetic Fields," *International Journal of Radiation Biology*, 69, pp.25-38, January 1996. See *MWN*, M/A96 and M/J96.

September 24, 1996

To the Editor:

Your commentary on Dr. Anthony Miller's EMF exposure assessment techniques (*MWN*, J/A96) points to a few instances in which less-than-best EMF exposure assessments obliterated useful epidemiological information.

The commentary overlooked an important earlier example. In 1992, Finland's Lindbohm and Hietanen¹ reported an increased risk of miscarriages among workers exposed to more than 0.9 μ T (peak-to-peak) or 0.3 μ T (average) [3 mG] ELF radiation, based on lab measurements of the types of computer terminals (VDTs) that the workers used. Most previous studies had not observed such a risk, but they had estimated exposures on the basis of hours worked at a computer—with no information on magnetic field levels.

Lindbohm and Hietanen explicitly recommended assessing the exposures of VDT operators in their actual working environments to confirm or refute the observed miscarriage risks.

The message for EMF dosimetry is clear. Survey methods applicable to volatile chemicals, for example, may not be sufficiently precise for assessing EMFs from man-made devices and environments. Peculiarities can

heavily influence the levels of exposure if the subjects are in close proximity to a complex field pattern, or if physical structures can contribute effective shielding. Also, for the most part, chemicals leave minute molecular residues *in vivo* after exposures stop. When EMF exposures stop, however, physiological systems relax without a trace of the agent. This makes EMF dosimetry fundamentally more difficult.

Paul Héroux, PhD

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1. Marja-Liisa Lindbohm et al., "Magnetic Fields of Video Display Terminals and Spontaneous Abortion," *American Journal of Epidemiology*, 136, pp.1041-1051, November 1, 1992. See *MWN*, M/A92, M/J92 and N/D92.

September 26, 1996

To the Editor:

We welcome your detailed discussion of the study recently completed in [Ross] Adey's laboratory that assessed possible brain tumor promotion by digital cellular phone fields in a rat model [*MWN*, J/A96]. Your comprehensive review has undoubtedly reached many scientists and engineers now engaged in this and related fields of biomedical and radio engineering development and application, including some who might not otherwise have been aware of details of this study.

For that reason, we feel that it is necessary to emphasize that this study was designed to explore the possibility of tumor-enhancing effects in exposed animals. No such effect was found. As reported at the Bioelectromagnetics Society meeting and announced by Loma Linda, the data included suggestions of a possible tumor-inhibiting effect. As also stated at the time, we have taken a conservative approach, avoiding statistical overinterpretation of quite limited data that lies beyond constraints imposed by our experimental design.

We consider it unfortunate that you have chosen to build a scenario implying a less than collegial, even adversarial, relationship between the investigators and the Motorola corporate research team, with whom the investigators have had a continuing series of strong collaborations over the past six years.

For the investigators, there has been an unfettered opportunity to pursue options in experiment design, based on consultation with world leaders in a broad spectrum of frontier topics in biology, biophysics and bioengineering; and more specifically at the cutting edge of key areas of medical research in the field of cell growth regulation and cancer, and in environmental biomedicine. For Motorola, there is the need to determine whether a risk to human health may exist from the great and growing use of existing and proposed mobile radiotelephone technologies. Motorola is therefore supporting a worldwide research program that covers major scientific issues related to the safety of these RF exposures.

For obvious reasons, the products of this research are treated by the Motorola Corp. as the intellectual property of the researchers. Their quality and credibility must therefore be determined first by their scientific peers.

Thus, as a matter of practice, Motorola allowed the principal investigator to announce and describe his findings. Motorola commented on the research when asked to do so and was confident the significant central outcome—a lack of evidence of tumor promotion—would speak for itself. Again, this decision was consistent with past practice and cannot be described as "a desire to play down the results" or "avoid publicity."

All parties to this work hope that you will continue to favor us with your insightful and informative summaries. Thank you for your interest.

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ELECTROMAGNETIC HYPERSENSITIVITY

RF/MW Radiation and Asthma...Exposure to RF/MW radiation at frequencies commonly used by cellular phones can permanently alter the shape and structure of cells responsible for allergic reactions, according to researchers in Australia. Drs. Peter French and M. Donnellan of St. Vincent's Hospital in Sydney and Dr. John Holt of the Microwave Therapy Center in Perth bathed human mast-cell cultures in 835 MHz microwaves at 9.6 mW/cm², for 20-minute intervals, three times a day for seven days. On the fourth day they noticed an increase in the cells' DNA synthesis and replication. In an abstract of a paper to be presented at the 36th Annual American Society for Cell Biology Meeting in December in San Francisco, the researchers explain that the exposure "may alter signal transduction events in these cells via effects on the cell membrane." Holt believes the results suggest a connection between RF/MW radiation and asthma. "There is no question that factors such as air pollution and other antigens are involved. But I think our findings show that electromagnetic radiation has made it ten times worse," Holt told *The Times* (U.K.). "[U]nder the influence of these radiowaves, steroids and antihistamines do not work," he added. French contends that it is premature to connect RF/MW exposure with asthma. "It should be understood that it can only be speculation at the moment. More research will be needed to identify a connection," he wrote in a letter to Dr. Ken Joyner of Telstra Research Labs in Clayton, Australia. French is currently seeking support from Australian funding groups to continue his studies. "This is a fascinating area for further research and one which may yield many benefits in addition to identifying possible health risks," he told Joyner.

Is It All in the Mind?...Electromagnetic hypersensitivity can be treated effectively with psychological methods similar to those used for headaches and asthma, according to a new study by a team of Swedish researchers from the Karolinska Institute in

"MICROWAVE NEWS" FLASHBACK

Years 15 Ago

- Dr. Gregory Lotz and coworkers at the Naval Aerospace Research Lab in Pensacola, FL, report that exposure to 225 MHz radiation at SARs of 1.5 W/Kg causes greater tissue heating than would be expected based on current interpretations of dosimetry studies.
- OSHA Administrator Thorne Auchter lists RF/MW radiation—which he calls a "serious hazard"—as a second-level priority for the group's health standards staff.

Years 10 Ago

- When ELF bioeffects experts are asked if they would buy a house near a power line—even at a \$25,000 discount—Dr. H.B. Graves, a consultant, responds, "Yes. No question about it," while Dr. Richard Phillips of the EPA says, "No."
- Thomas DiLuzio of Spokane, WA, sues an AM radio station, charging that RF/MW radiation from the station caused the leukemia that killed his wife.
- Dr. Sam Koslov of the Johns Hopkins University Applied Physics

Lab (JHU/APL), who believes that Alzheimer's symptoms in a monkey were due to leakage through the blood-brain barrier (BBB) after exposure to microwave radiation, says that BBB research "should not have been abandoned."

- Women protesting the deployment of cruise missiles at the U.S. Air Force base in Greenham Common, U.K., claim that the military is trying to drive them away by using non-ionizing radiation, which they claim causes menstrual cycle and sleep disturbances, irregular heartbeats, head and chest pains, anxiety and nausea.

Years 5 Ago

- The U.S. Congress appropriates \$600,000 for an NAS-NRC committee review of possible health effects from EMF exposure.
- Pulsed RF/MW radiation with SARs of less than 4W/Kg can cause eye injuries, according to studies by JHU/APL's Henry Kues and FDA's Jack Monahan.
- In a letter to Dr. Tom Budinger of the Lawrence Berkeley Lab, Sue Donaldson of the Seattle City Council expresses concern about the adequacy of the IEEE C95.1-1991 RF/MW guidelines.

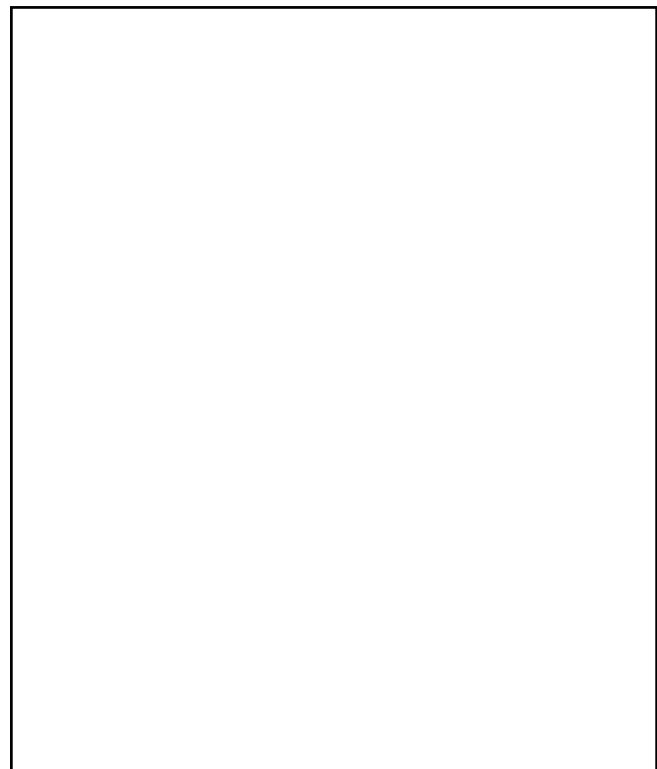
Stockholm. The team also reported that the 17 electromagnetically hypersensitive subjects they tested could not consistently determine whether they were in the presence of an EMF source. The subjects were put in a room for 30-minute sessions in which the 5 Hz to 2 kHz EMF source was either on or off. Each subject was tested at least four times, and only one answered correctly every time. On average, the patients were right about half the time. After the test, nine subjects were immediately treated using "cognitive behavioral" methods consisting of a series of weekly one-hour sessions. The other eight were given the same test about 20 weeks later, followed by the psychological therapy. Those treated immediately reported reduced symptoms, while the others who were waiting reported no change prior to their treatment. The authors of the paper, which was published in the *Journal of Occupational and Environmental Medicine* (38, pp.752-758, August 1996), included Drs. Bengt Arnetz, Mats Berg and Sture Lidén, all of whom have long favored "technostress" as an explanation of symptoms others claim are associated with EMFs and VDTs. For example, they argued at the *Work with Display Units '94* conference held in Milan, Italy, that workers claiming to be hypersensitive differ from others in that they are more stressed at work and tend to feel underused (see *MWN*, N/D94). Last May, Arnetz spoke at the *2nd Copenhagen Conference on Electromagnetic Hypersensitivity* on stress-reduction training, specifically that involving the role of the stress hormone prolactin in hypersensitivity cases (see *MWN*, S/O95).

MEDICAL DEVICES

OrthoLogic Answers FDA Complaints... OrthoLogic Corp. will change its promotional materials in response to FDA charges of issuing "misleading" information (see *MWN*, J/A96). "OrthoLogic believes that it has reached a satisfactory resolution with the FDA on all issues raised in the May 31, 1996, FDA letter. We further believe that the accommodations reached with the FDA will not have a material adverse effect on the company's business," George Oram, OrthoLogic's president, said in a press release. The company announced that it will report a success rate for the device as 60.7% with an average treatment time of six months rather than 78% over 4.1 months as it had previously claimed. In addition, OrthoLogic will not promote its model 1000 Bone Growth Stimulator for uses not approved by the FDA and will not refer to the IGF-II growth factor data in its advertising. "It was our intention solely to use the IGF-II data to explain our magnetic field treatment," Oram told *Microwave News*. "The FDA was concerned that in making those types of claims for non-union fractures, orthopedic surgeons would use it to treat a host of other things." The company will, however, continue to distribute reports containing IGF-II information to anyone who requests it, Oram said.

PEOPLE

Lynne Gillette, who has been managing the RAPID engineering programs at the DOE, is currently on special assignment at the National Academy of Sciences' (NAS) policy office. Gillette will not be working on EMF issues at the NAS. She returns to the DOE at the end of January....**Dr. James Melius**, a member of the National EMF Advisory Committee, has become the direc-



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tor of the New York State Laborers' Health and Safety Trust Fund, which has offices in Albany and New York City. Most recently, Melius was with the Center to Protect Workers' Rights in Washington....Dr. **Dina Simunic** of the University of Zagreb, Croatia, is on a roll. This summer she won a young scientist prize at the International Union of Radio Science's (URSI) meeting in Lille, France, for her paper on the "Side Effects of Magnetic Resonance Imaging." Simunic won a similar award at last winter's European Bioelectromagnetics Society meeting....Dr. **Mary Ellen O'Connor** has been appointed the new editor of the *Bioelectromagnetics Society Newsletter*. O'Connor, a professor of psychology at the University of Tulsa, OK, takes over from **Carol Jordan Evans** of SAIC with the November/December issue. ...**Deborah Weil** has left Bailey Research Associates, but is continuing to do EMF consulting from Bala Cynwyd, PA....**Joseph Jamail**, who has made a fortune as a trial lawyer, is giving a few of his millions back to his native Texas. The 70-year-old attorney recently donated a total of \$17 million to seven Texas universities and museums. Last year, Jamail filed—and then abandoned without explanation—a suit against Houston Lighting & Power Co. and EPRI, in which he was to represent the families of 11 children with cancer (see *MWN*, M/A95 and S/O 95)....**Kim Besly**, a tireless antiwar activist, died on July 14. Besly and other women set up a camp outside the U.S. Air Force base at Greenham Common, U.K., to protest the deployment of cruise missiles. Based on her experiences—and those of others—she became convinced that the women were being harassed with electromagnetic radiation. Military and civilian officials "have tried every way to move us away since the camp was set up more than five years ago," she told *Microwave News* a decade ago (see p.16 and *MWN*, S/O86)....**Shay Cullen** is a missionary with more than one mission. The Irish priest, who was arrested last June for protesting high-voltage power lines near a home for destitute children in Olongapo, the Philippines (see *MWN*, M/J96 and J/A96), recently helped secure the arrest of a German tourist suspected of sexual abuse of a child while visiting the Philippines, the U.K. *Times* reported on August 31.

RESOURCES

EC on Non-Ionizing Radiation...The European Commission's Directorate-General for Employment, Industrial Relations and Social Affairs has published *Public Health and Safety at Work: Non-Ionizing Radiation—Sources, Exposure and Health Effects* (ISBN 92-827-5492-8). The report was written by an ad hoc group from Germany, Italy and the U.K., and was edited by Dr. Alastair McKinlay of the U.K.'s NRPB. It reviews occupational exposure issues from EMFs to lasers, and recommends further research "in two important areas: UV radiation, where adverse health effects including cancer are well established, although there is little public concern; and EMFs...where the evidence for carcinogenesis is weak and inconclusive, but conversely there is considerable public concern." Available in the U.S. for \$30 plus \$4 shipping from: UNIPUB, 4611-F Assembly Drive, Lanham, MD 20706, (800) 274-4888, Fax: (800) 865-3450. For ordering information for other countries, contact: Office des Publications Officielles des Communautés Européennes, 2 rue Mercier, L-2985 Luxembourg, (35+2) 29291, Fax: (35+2) 488573.

VIEWS ON THE NEWS

With this issue, we begin a new regular feature in which the editors offer their comments on the news. Our readers are welcome to respond and to express their own opinions.

Physicists and Brass Balls

Nature put them on the cover of its August 29th issue and the *New York Times* ran two different stories about them. They're called oscillons and they're created when grains of sand or brass are put in a box and vibrated. It's a simple system—little more than balls banging into each other—with an extraordinary result. The picture on the cover of *Nature* is of a precarious-looking peak of brass balls. It looks as if they're being held up by a magnet, but that's not what's going on.

What is? It's a good question, and so far no one seems to know the answer. As *Nature's* own commentator explained: "In fact, despite much active research, no underlying theoretical description for these [granular] materials yet exists."

Sandbox physicists can't say how complex structures emerge from such a simple system, but many of their colleagues feel compelled to tell anyone who will listen that they understand the infinitely more complex processes associated with life. Dr. Robert Adair, for instance, told Jon Palfreman of PBS' *Frontline* that, "There's probably nothing on earth, or in the universe, that we understand as well as EMFs and the interaction of EMFs with matter, including biological matter" (see *MWN*, M/A96).

Clearly, that statement is preposterous. In a newsletter that arrived in our office just before we went to press, Sweden's National Board of Occupational Safety and Health ran the following in bold type: "At times, the debate [over EMF health hazards] has been both intensive and emotional. One reason for this is that still little is known about the potential effects on humans and other living beings of EMFs in their surroundings."

Adair and Palfreman should know better. The fact that they pretend such certainty might be laughable if these politico-physicists weren't selling their very own brand of junk science to the courts.

The California Supreme Court cited both the statement issued by the American Physical Society (APS) last year and the friend-of-the-court brief filed by a group of scientists organized by Harvard University physicist Dr. Richard Wilson in its rationale for dismissing the *Covalt* EMF lawsuit (see p.3).

Lawyers often act as if they are certain their clients are right, even when they know the truth is more complicated. Lawyers are paid to behave that way, but scientists have higher motives—or so they say.

The World Leaders in Radar Health Research

Anyone interested in the health effects of radar radiation should order the collection of papers in the special issue of *The Science of the Total Environment* on the Skrunda radar in Latvia (see p.11).

A quick scan of the papers will convince you that Latvian scientists are among the world leaders in this field. They join the Croatian team at the University of Zagreb's Institute for Medical Research and Occupational Health that has published a comprehensive series of papers on the genetic effects of radar (see *MWN*, M/J92).

Taken together, the Latvian and Croatian studies dwarf the American effort. The U.S. government has never been interested in radar health risks and never will be as long as the military

controls RF/MW health research.

If there were a commitment to public health, it would not be hard to find some areas in which to begin to do some work: a serious look at the alleged link between handheld police radar and cancer, and studies of those who live in the shadow of powerful radars—for instance, the phased array radar (PAVE PAWS) on Cape Cod, MA.

A few years ago, some police officers took their concerns to the U.S. Senate and begged for a cancer study. Practically everyone at the hearing agreed that it would be a good idea. "Senator Dodd and I are going to stick with this until we get some answers," promised Sen. Joseph Lieberman (D-CT) (see *MWN*, S/O92). Sen. John Glenn (D-OH), who, as a former astronaut, knows something about life-threatening risk, said that he was "extremely disturbed" about the problem.

Nothing ever happened.

When it comes to environmental and occupational health, the U.S. does not mind taking a back seat to two of the smallest countries in the world.

Stop That Car or We'll Zap You!

They're the sexiest gadgets in this year's action movies: EMP weapons, which use electromagnetic pulses to zap electronics. They have starring roles in *Goldeneye*, the latest James Bond movie, as well as in *Broken Arrow*, *Escape from LA* and *Eraser*. And soon they may be coming to a police car near you.

Law Enforcement News (September 30) reports that the U.S. Army and the National Institute of Justice are running a \$500,000 field test to see if EMP guns can force a car to stop by disabling its electrical systems. The plan is to use EMP to do away with high-speed chases (another Hollywood staple). This is another example of the growing interest in using nonlethal weapons developed by the military.

In 1990, Boeing Co. agreed to pay \$500,000 to settle Robert Strom's lawsuit, which alleged that he had developed leukemia after being exposed to EMP radiation (see *MWN*, S/O90). As part of the settlement, Boeing agreed to set up a medical monitoring program for 700 employees who had worked with EMP. The results of this surveillance effort may play a key role in assessing the impact of EMP guns on police officers—who are likely to be sensitive on this point after years of controversy over radar guns.

Will the next Hollywood production featuring EMP be a courtroom drama?

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