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INSIDE...

European Parliament Debates Strict EMF–EMR Exposure Limits

ALARA Approach Draws Support

The European Parliament is discussing a proposal for extremely strict limits on electromagnetic field and radiation (EMF–EMR) exposures for the general public. The proposal is not likely to pass, but Italy's health minister is expected to call for prudent avoidance measures when the Council of Ministers of the European Union (EU) meets in June.

"It is not clear if or when these limits might be adopted," parliament member Gianni Tamino told *Microwave News.* "Our goal is to start a debate."

Tamino, who is also a professor of biology at the University of Padova in Italy, proposed the new rules in a draft report for the parliament's committee on the environment (see p.9). On February 18, the committee rejected the tight numerical limits in the report, but supported its call for applying the "ALARA" approach to non-ionizing radiation issues. Under ALARA, exposure is to be kept "as low as reasonably achievable." The proposed limits will be reintroduced when the full parliament meets in March, Tamino said.

The European Parliament took up the issue after the European Commission (EC) proposed a common standard for all 15 member states of the EU to replace the current patchwork of country-by-country rules (see *MWN,* J/A98). The EC proposal is based on the guidelines adopted by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), which Tamino's

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Sony Recalls Mobile Phones That Exceed FCC RF/MW Limits

Sony Electronics Inc. announced on December 1 that it would recall 60,000 cellular phones that may violate federal radiation standards. This is the first time that a manufacturer is recalling cellular phones because they exceed the radiofrequency and microwave (RF/MW) radiation limits set by the Federal Communications Commission (FCC).

Sony predicted that only "a very small number" of the 60,000 hand-held phones would actually turn out to violate FCC rules. It stated that the problem can be fixed by installing new software, and asked users to bring in their phones for testing and adjustment.

These phones exceed federal limits by only "a minimal amount," said Sony spokesperson Rick Clancy in Park Ridge, NJ. "Our recommendation to the FCC was that this action wasn't necessary at all," he said in an interview. "It's not as if there's any question of anything harmful here." He refused, however, to give any detailed exposure information such as the phones' specific absorption rates (SARs).

"Any noncompliance with the commission's emissions guidelines is a very

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HIGHLIGHTS

« Wireless Notes »

Add **South Africa** to the list of countries where wireless phone users have charged that microwave radiation from their phones made them sick. On December 17, businessman **Terry Hutchings** of Pretoria sued **Vodac** and **M-Tel**, contending that his brain cancer was caused by mobile phone use. M-Tel is South Africa's largest wireless carrier, and Vodac markets cellular phones. Both companies are based in Johannesburg. "I have had a cell phone since the day the networks switched them on," Hutchings told the *Sunday Times* of Johannesburg (December 27), adding that he used his phone "a few hours a month." Surgeons removed a malignant tumor last summer, and Hutchings, who is 47, now expects to live five more years at most. His suit seeks 2.5 million Rand (approximately US$400,000) for personal injury and 500 million Rand (US$80 million) to pay for public warnings on wireless health hazards and to compensate others "who have been adversely affected" by cellular phones.

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Wireless telephone carriers are selling their mobile phone towers to independent companies that specialize in tower construction and management. Outsourcing "seems to be the trend," said **John Bensche**, an analyst at **Lehman Brothers**, an investment bank in New York City. On December 9, **Bell Atlantic Mobile** (BAM) in Bedminster, NJ, announced it will transfer its 1,400 towers, valued at $650 million, to a joint venture with **Crown Castle International Corp.** in Houston. And Nextel, Sprint and Powertel, among others, are looking for buyers, Bensche told *Microwave News.* A driving force behind the trend, he said, is the desire to generate more revenue from towers through collocation—placing several carriers' antennas at each site. Carriers are more willing to rent space on a tower that is not owned by a competitor, he explained. In fact, BAM has said that its new joint venture will actively market space to other carriers. Another factor that may have prompted the deal is that cellular sites have been lightning rods for local controversy and unfavorable publicity. For example, the battle over a proposed BAM tower in Vermont became so heated that it drew the attention of **FCC Chairman William Kennard**. Last March, Kennard, along with Sens. **Patrick Leahy** (D-VT) and **James Jeffords** (R-VT), attended a town meeting in Hardwick, VT, to hear public concerns (see *MWN*, M/A98). The BAM–Crown Castle joint venture, as yet unnamed, will build hundreds of new towers, securing sites and pursuing and obtaining all regulatory approvals on BAM's behalf. Crown Castle will own 62.3% of the joint venture, but BAM will retain ownership of its transmitters and other equipment (see p.18).

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Two and a half weeks before the opening session, **Wireless Technology Research** (WTR) canceled plans for its February 1-2 meeting in Washington to review cell phone research. WTR announced that "logistical difficulties" had forced it to reschedule the meeting for this coming June. But numerous sources told *Microwave News* that they suspected the problem was an expected lack of attendance. Many balked at the $500 registration fee. The *2nd State of the Science Colloquium on the Public Health Impact of Wireless Technology* is now slated for June 19-20 in Long Beach, CA, immediately prior to the Bioelectromagnetics Society's annual meeting....Meanwhile, WTR has published the papers from its first state of the science meeting, held more than three years ago in Rome (see *MWN*, S/O95). Edited by WTR's Dr. **George Carlo**, *Wireless Phones and Health: Scientific Progress* includes sections on dosimetry, biological effects, epidemiology and EMI with medical devices. In his "Colloquium Summation," Carlo contended that, "A new paradigm is needed" for assessing product safety, and stressed the importance of "post-market surveillance." Copies of the 432-page volume are available for $159.00 each, including shipping and handling, from: Kluwer Academic Publishers, 101 Philip Dr., Assinippi Park, Norwell, MA 02061, (781) 871-6600, Fax: (781) 871-6528, E-mail: <kluwer@wkap.com>.

European Health Research Effort Planned; Wireless Industry To Pay Half the Costs

The European Union (EU) has decided in principle to fund studies on wireless phone safety, but it will pay for only half the costs. In response, mobile phone makers are organizing a research consortium that aims to combine EU and industry funding.

The health effects of mobile phones is one of many topics in the EU's Fifth Framework Program for Research and Technological Development (known as FP5), approved by the EU's Council of Ministers on December 22. FP5 has a five-year budget of 15 billion euros (US$16.8 billion), of which 160 million euros (US$179 million) will be spent on "Environment and Health"—including studies of cellular phones.

But FP5 does not guarantee any specific amount for wireless phone research. Kirsi Haavisto of the European Commission (EC) in Brussels, Belgium, told *Microwave News* that all proposals on environmental health will be weighed against one another, and those of the highest merit will be funded. "It will be competitive," said Haavisto, who is with the EC's Directorate General 12 on Science, Research and Development. EU funding for proposals that are approved will cover only 50% of the costs; researchers will have to raise the rest from other sources.

The wireless industry is preparing to fill the funding gap. Its response is being led by a group formed last June, called the Mobile Manufacturers Forum (MMF). The MMF's chair, Peter Harrison of Nokia in Camberley, U.K., said in an interview that the MMF was formed "to discuss and cooperate on basic research in the field of health and safety of radio equipment." Members include Alcatel, Ericsson, Mitsubishi, Motorola and Nokia.

"In the summer of 1998, the MMF established a research

planning committee," Harrison said, "to help industry put some details onto the World Health Organization's [WHO] research recommendations and develop a specific research plan in anticipation of FP5." The committee's members are Dr. Alastair McKinlay of the U.K.'s National Radiological Protection Board (NRPB); Dr. Mays Swicord of the MMF and Motorola; Dr. Bernard Veyret of the European research group COST 244 and France's University of Bordeaux; and Joe Wiart of the GSM Association, a service providers' organization, and France Telecom. They developed a list of study priorities, which they presented to the WHO in December.

Based on that list, the MMF placed an ad in several scientific journals announcing "funding opportunities" on "possible human health effects of microwave exposure." The ad cites ten studies that the MMF wants to see carried out (see box at right), and explains that selected labs "will be grouped into a larger consortium (with the cellular telephone industry as a funding partner) to collectively respond to a call for proposals" from the EC.

Harrison noted that the MMF has held discussions with the GSM Association about both "technical and financial collaboration on [health] research." So far, however, only the MMF has pledged to provide funding.

The head of the WHO's EMF research program, Dr. Michael Repacholi, praised the MMF's list of studies. "The MMF has been working with the EC to promote the WHO's highest-priority RF research," Repacholi told *Microwave News.*

At the MMF's request, the WHO is forming a peer-review panel to judge responses to the ad and decide which labs will be part of the industry-sponsored consortium. Repacholi, who will be a member of the panel, stressed that it would be "independent of the industry funders" and that the MMF would accept its decisions. The panel will meet in Geneva, Switzerland, March 8-9.

The EC's call for proposals on environmental health research is due out in March. Its wording will be general, with cellular phone health effects listed as one of several areas of interest.

The consortium of laboratories envisioned by the MMF will have an advantage over individual labs in seeking EU funding. FP5's rules give preference to joint proposals from separate research institutions in different EU countries. "There's nothing to prevent someone from the University of X doing something totally independent of us," said one observer employed by an MMF member company. "But realistically, if the industry doesn't organize this, then these major studies won't get funded."

In 1996, an EC expert group on mobile phone health issues called for a five-year, 24 million euro (US$27 million) research program (see *MWN,* M/A97), with the cost to be shared by industry. It urged a "fire wall" between industry and the planning of any research effort. It argued that industry "should neither have nor be seen to have any influence over the choice of research studies funded, the conduct or outcome of such studies."

The group's chair, the NRPB's McKinlay, now serves on the MMF-initiated research planning committee. McKinlay told *Microwave News* that the lack of such a fire wall in the MMF effort is not a problem. The independence of EU-funded research will be ensured by the EC's "open call for research proposals, selection assessment and other research administrative procedures within FP5," McKinlay stated.

Cell Phone Makers' List of Research Priorities

The MMF wants to see ten different laboratory studies carried out on cellular phone health effects. They include replication of several studies showing nonthermal effects from RF/MW radiation.

The MMF is asking for two-year cancer studies of rats and mice exposed to GSM digital phone signals, and a shorter rodent study on effects of RF/MW exposure on breast cancer initiated with the chemical carcinogen DMBA. It is also seeking replication of Dr. Michael Repacholi's study with genetically altered mice, which linked RF/MW exposure to a higher risk of cancer (see *MWN,* M/J97 and S/O98).

Also on the list is replication of *in vitro* studies that found RF/MW exposure to be associated with chromosome instability (see *MWN,* M/J92) and with increased activity of the growth hormone ODC (see *MWN,* N/D87 and J/A98).

On noncancer effects, the MMF calls for human provocation studies of headaches, sleep disturbances, skin irritation and hearing problems. In addition, the industry group plans to support an animal behavior study, to measure effects on spatial learning and memory.

The ad that the MMF has placed in various journals (see article on facing page) does not include one item that its research planning committee considered a priority: a large-scale epidemiological study of cancer among cellular phone users. As the committee itself noted, such a study is already being organized by the International Agency for Research on Cancer (see *MWN,* J/F98 and S/O98).

FP5 is strongly oriented toward commercial research, and one of its goals is to "make inroads on the lead taken by the EU's major competitors in their research." FP5's rules on ownership of research results take special care to protect the interests of companies developing new technologies that they may wish to market. Although the rules call for publication of research in scientific journals, it is unclear whether corporate funders of FP5 research could restrict discussion of results prior to publication.

The MMF's Harrison said that, "The research will be conducted according to established EC processes, which include EC monitoring, peer review and publication in scientific journals."

Industry Forms Global Group on Wireless Health Issues

Wireless industry trade associations around the world have joined to form a new organization, the Wireless Information Network (WIN). The group will focus on "health and environmental issues related to the wireless industry," according to Jo-Anne Basile of the Cellular Telecommunications Industry Association (CTIA) in Washington.

WIN, said Basile, will be "a vehicle to exchange information worldwide" through which wireless industry groups can "share the techniques they find to be most effective in responding to media inquiries and the public." The group will neither

sponsor nor attempt to coordinate research.

Established at a meeting in London on December 10, WIN includes industry representatives from Australia, Austria, Canada, Denmark, France, Germany, Ireland, Italy, New Zealand, Norway, Sweden, the U.K. and the U.S. Basile told *Microwave News* that the London meeting was initiated jointly by the CTIA and the U.K.'s Federation of the Electronics Industry (FEI).

Basile stated that WIN was formed because "this is a global industry, and scientific research knows no geographic boundaries." More immediately, she explained, it was spurred by "increased attention to wireless issues by the media." That attention has been especially acute in the U.K., where, Basile noted, the FEI "has been on the front lines for a while now" (see also *MWN*, J/A98 and N/D98).

Those at the meeting discussed the state of wireless health and environmental issues in each country represented. According to minutes of the meeting, participants from Canada and Italy reported that the concept of prudent avoidance has become part of the public debate, and they expressed concern that the term "electrosmog" is now used frequently. In contrast, a representative from the U.S. stated that the question of health effects has been replaced by issues of electromagnetic interference and safe driving. Local government control and public participation were identified as hot topics in Austria, Canada and Sweden, and base stations were cited as flash points in many countries.

Gerd Friedrich of Germany's Forschungsgemeinschaft Funk (FGF), in Bonn, gave a presentation on public perception of RF/MW issues in Germany. Friedrich warned that "'opposition' groups have become sophisticated in their geographical organization and communication methods (e.g., Internet)," according to the minutes.

In a presentation on current health research, Dr. Mays Swicord of Motorola in Ft. Lauderdale, FL, reported that most studies to date are reassuring, but that "some positive unreplicated results" need further investigation. Swicord said that the 2003 IARC review of cancer evidence and the 2004 WHO review of noncancer health effects will each have a major impact.

Basile told *Microwave News* that WIN plans face-to-face meetings at least once a year. She said these could be timed to coincide with other meetings that WIN members may attend, such as the annual meetings of the Bioelectromagnetics Society.

WIN includes the following industry groups: the Australian Mobile Telecommunications Association, Austria's Forum Mobilkommunikation, the Canadian Wireless Telecommunications Association, Denmark's Association of Telecommunications Hardware Suppliers, Germany's FGF, the New Zealand Telecommunications Organization, Norway's Elektronikkbransjen, the U.K.'s FEI, the U.S.'s CTIA, the Mobile Manufacturers Forum (an international manufacturers group) and the GSM Association (an international group of service providers). Three individual companies—France Telecom/CNET, Ireland's Eircell and Italy's Telecom Italia Mobile—are also members, with the understanding that each will aim to represent its country's wireless industry as a whole.

Sony Recalls Noncompliant Phones *(continued from p.1)*

serious matter," declared an FCC statement. "We will closely monitor Sony's [recall] program," it continued, "and will not hesitate to take additional action if necessary."

Sony initially argued that the phones were close enough to the limit that they did not pose a clear-cut violation of FCC rules. "We felt there was some gray area with regard to the regulations," said Sony spokesperson Scott Westover in San Diego, "but the FCC clarified for us that this was not the case."

Kwok Chan of the FCC said that it is a matter of black and white. "An FCC limit is like a speed limit—you can't go above it," Chan told *Microwave News*.

Clancy stressed that when Sony did take action, it was voluntary—not the result of a federal order. "We're not calling it a recall, we're calling it a notification program," he said. "It's up to consumers to decide whether or not they want to take any action." In contrast, the FCC's December 1 statement held that Sony "has a responsibility to ensure that consumers have phones that adhere to the...guidelines," and noted that it had so advised the company.

The problem first came to Sony's attention in late August, according to Clancy, when some phones were brought in for service for unrelated problems. Technicians found that four models had been manufactured with power settings that were sometimes too high, which Westover ascribed to "an internal error on Sony's part." All four models were "dual-mode" phones produced jointly with Qualcomm Inc. of San Diego, designed to use Qualcomm's digital CDMA technology where it is available and analog service elsewhere. The problem affects the phones only in the analog mode.

Under the FCC's self-certification program, Sony had already submitted test results to the FCC claiming that these phones met federal exposure standards. Such a submission is required of any manufacturer before it puts a new phone on the market.

After the excessive power levels were discovered, Sony hired a succession of labs to evaluate whether the phones really do violate FCC limits, said Gretchen Griswold of Sony in San Diego. Sony first went back to PCTEST Engineering Laboratory in Columbia, MD, which had done the original compliance testing on these phones. Next it hired the lab run by Dr. Om Gandhi at the University of Utah in Salt Lake City. Finally, Sony contracted with Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland.

All three labs came up with different results, according to both Sony and the FCC. Dr. Niels Kuster of the ETH in Zurich, who is a principal in SPEAG, told *Microwave News*, "I am bound by a nondisclosure agreement, and therefore cannot comment on the test results." But Gandhi said in an interview that "some phones did exceed the [FCC] standard" in measurements by his laboratory.

"This is a general problem in compliance testing," said Chan. "It's not just Sony." Gandhi said conflicting results occur because, "There is not a standard protocol to test these devices." Now the Sony recall has brought this issue to a head. Two days after the recall was announced, FCC Chairman William Kennard

FCC Moves To Tighten Compliance Testing Methods

The FCC is concerned about the lack of agreed-upon methods for testing RF/MW exposure from mobile phones. The commission is pressing its own staff and a standards-setting committee to resolve the problem.

The FCC is revising its own guidelines for determining compliance with exposure limits, with a new version due out by March. In addition, FCC Chairman William Kennard wrote to the IEEE subcommittee on certification of wireless handsets, urging that it complete its work as soon as possible.

The importance of the compliance problem was underscored by Sony's cellular phone recall (see p.1). "Certain recent events have made us acutely aware of the need for immediate and specific guidance" on compliance testing, Kennard wrote on December 3—two days after the Sony recall was announced. In his letter to the IEEE group, known as Standards Coordinating Committee 34 Subcommittee 2 (SCC-34 SC-2), Kennard highlighted the inconsistent results among different labs, and urged SC-2 to complete its testing protocols as quickly as possible (see also *MWN*, M/A97 and N/D98).

A response from SC-2, obtained by *Microwave News*, stated that subcommittee members would "expedite the progress of their work." In a January 21 letter to Kennard, SC-2 chair Howard Bassen predicted that a first draft on measurement procedures would be ready by early spring, and invited the FCC to adopt it as an interim measure. Bassen, who is with the Food and Drug Administration's Center for Devices and Radiological Health (CDRH) in Rockville, MD, added that SC-2 would complete its final draft later this year and expects approval by the IEEE in 2000.

"The intent of the letter was to prompt the subcommittee to work faster—and it seems to have succeeded," Dr. Robert Cleveland of the FCC's Office of Engineering and Technology (OET) said in an interview. The fact that the letter was signed by Kennard, he noted, "made a lot of people sit up and take notice."

"I'm sure the Sony recall was what prompted Kennard's letter," said the chair of SCC-34, Ron Petersen of Lucent Technologies in Murray Hill, NJ. "In a way it was good, because people are starting to realize that this is a serious problem," Petersen told *Microwave News*. "Most phones have SARs on the order of 1 W/Kg, so you don't have a lot of leeway. If there are large uncertainties, you really need to know about it."

FCC rules for mobile phones limit SARs to 1.6 W/Kg, and Bassen's letter noted that very small changes in measurement procedures can change SARs "by a factor of two or more."

In a January interview, OET's Kwok Chan stressed that this problem was much bigger than the Sony recall. In the two years since the FCC adopted RF/MW limits for cellular phones (see *MWN*, J/A96), Chan said, it has been "not uncommon" for two labs testing the same phone to have varying results. The FCC's testing guidelines were "originally worded in a loose way so that things could get done," he noted. "We've learned quite a bit since then, and now it's time to tighten it up."

But the Sony recall clearly raised the FCC's concern to a new level. "The chair of the FCC doesn't normally write to standard-setting committees," a member of SC-2 told *Microwave News*. "The only reason the letter was sent to us was because there was a problem—the Sony recall."

Some of the key factors that the FCC and SC-2 must consider are the position in which a phone should be tested, the shape of the model head and the dielectric properties of the material inside. Of these, said Petersen, the position is the most important (see *MWN*, N/D97). Petersen said that SC-2 should come to an initial agreement on these issues at its next meeting, February 25-26, at the CDRH in Rockville. "We really want to move forward on this," he said.

The revision of the FCC's own testing guidelines, contained in Supplement C to OET Bulletin 65 (see *MWN*, S/O97), is not moving as quickly as originally hoped. The revised supplement "should be issued in January," according to Kennard's letter. But in January Chan said that late February was "a good target."

"The Sony incident is very important," said another member of SC-2, Dr. Jacek Wojcik of Aprel Laboratories in Nepean, Ontario, Canada. "The cost of recalling 60,000 phones is small compared to the cost of planting a seed of doubt in the public mind. Something like this can happen only because we still don't have the proper engineering tools for compliance testing."

took action to ensure that testing labs produce consistent and repeatable results (see box above).

Howard Bassen, chair of an IEEE subcommittee on compliance testing, has commented that SAR measurement is "an extremely complex process." Bassen recently told the FCC that "even small variations" in testing parameters "can lead to a change in the total measurement results by a factor of two or more."

Sony's mistake, according to Chan, was that its engineers were interpreting FCC rules in the same way that they would an internal industry standard. "Companies agree on industry standards so their systems can work together," Chan explained. "They have to meet those standards within a certain tolerance, plus or minus." But, he said, "FCC limits are different—a limit is a limit."

The recalled phones were produced in the first half of 1998, and are no longer on the market. About 52,000 of them went to customers of PrimeCo Personal Communications, whose main markets are in Florida, Illinois, Louisiana and Wisconsin. The rest were used by Sprint PCS customers in markets across the country.

Sony has established what it calls "software upgrade centers" to handle the recall; most are located in hotels. Sony's Westover said that 44 such centers have been set up in PrimeCo's service area. As an incentive to get users to bring in their phones, Sony is offering a $50 credit towards airtime. Users who do not respond will be sent follow-up mailings.

Although industry publications such as *Mobile Phone News* (December 8) suggested that the recall might bring more attention to wireless safety issues, the story has been ignored by the mass media. "It's been very quiet," commented Sony's Clancy.

The phones being recalled are model numbers CM-B3200, CM-B3200PRC, CM-B2200PRC and CM-B1201SPR. They carry either of the FCC identification numbers L5ACMDB and L5ACMDB2.

Magnets Help Foot Pain Among Diabetics, Claims New Study

Pain, numbness and tingling in the feet are common complications of severe diabetes. Now Dr. Michael Weintraub, a neurologist practicing in Briarcliff Manor, NY, reports that his recent study suggests that a static magnetic field may reduce these symptoms.

The study was published in the January issue of the *American Journal of Pain Management (AJPM, 9*, pp.8-17, 1999) and was covered by both the Associated Press and the *New York Times* on January 6.

Weintraub, who is clinical professor at New York Medical College in Valhalla, NY, told *Microwave News* that he chose to study diabetic peripheral neuropathy (DPN) for two reasons. "Pain is heterogeneous," he said. "It has a lot of different causes. But here the cause is clearly diabetes, so there are no other variables." Also, he said, "most patients with DPN don't respond to any established therapy."

In an earlier, 14-person pilot study published last year in *AJPM (8*, pp.12-16, 1998), Weintraub found that foot pads with a 475 G static magnetic field produced significant improvement among those with DPN, but smaller gains among those with other types of foot pain. The current study, with ten diabetics and nine volunteers with other types of foot pain, used the same type of foot pads and tried to examine a possible placebo effect—but both participants and the researcher could tell which pad was magnetic and which was the placebo.

In the first month, participants wore a sham magnet on one foot and a real one on the other. In the second month, the pads were reversed, and in the last two months, only real magnets were used. At the end of the study, 90% of the diabetics but only 33% of the nondiabetics showed improvement. In contrast, the two groups' responses to the sham magnets were lower and more closely matched.

"It is unlikely that the beneficial effects over four months represent [a] placebo effect," Weintraub contended. He explained that if they did, "both groups should have improved the same amount" with the real magnets. Instead, he said, diabetics showed significantly more improvement.

Weintraub conceded that there were many weaknesses in his study, especially its small size. He is now planning a larger one with an improved design, which would involve 300 to 400 participants, all diabetics. Controls would use only sham magnets for the duration of the study.

New Investigation into Norwegian Birth Defects Cluster

The Norwegian government has opened a new investigation into a cluster of birth defects among children born to men who served aboard the torpedo boat *Kvikk*.

Inge Sellevåg of *Bergens Tidende*, the daily newspaper in Bergen, Norway, reports that the new investigation will be led by STAMI, the National Institute of Occupational Health. Sellevåg says that no decision has yet been reached on the mandate of the new study, or on the status of the original report by the Norwegian navy.

The navy's report, issued last year, found no link between the birth defects and exposure to radar and communications radiation aboard the ship. But a subsequent investigation by *Bergens Tidende* uncovered numerous inconsistencies and omissions in the navy's study (see *MWN*, M/J98 and N/D98).

Cell Towers Prompt Debate in U.K. Parliament

Members (MPs) of the U.K. Parliament are concerned about the siting of wireless telephone towers and about possible health effects of RF/MW radiation from such installations.

In a January 18 House of Commons debate, Phil Willis, a Liberal Democrat from northern England, criticized the government's tower siting guidelines as "weighted too much in favor of industry and not of the environment." Willis called instead for a precautionary approach to tower siting, arguing that, "Any minister would be foolish to rule out the possibility of a health risk" from RF/MW radiation.

Other MPs expressed similar concerns. Jackie Lawrence, a Labor member from Pembrokeshire, added that the U.K. National Radiological Protection Board's (NRPB) guidelines in some cases allow RF/MW exposures several times higher than ICNIRP's recommended limits (see also p.9). The NRPB "is becoming increasingly isolated in its approach" to limiting public exposures, she warned.

Nick Raynsford, who is Parliamentary Under-Secretary of State for Environment, Transport and the Regions, responded for the Labor government, declaring that it is aware of public concern about "alleged adverse health effects" associated with cellular towers, and that it "takes that concern seriously." But, Raynsford contended, wireless base stations operate "typically some thousands of times inside the exposure limit" set by the NRPB. And Raynsford defended the NRPB's limits, maintaining that, "Their basis is broadly consistent with other international guidelines, such as those of ICNIRP."

Apart from modifications to permitting procedures, such as requiring carriers to post a public notice when they plan to build a new tower, Raynsford gave no indication that the government is considering changes in tower siting policy. He did promise that the U.K. will continue to pursue research on RF/MW health effects by supporting the WHO's International EMF project (see *MWN*, J/F97).

The Liberal Democrats' Willis proposed a mandatory independent health risk assessment for each new tower, to be made at the carrier's expense, as well an independent evaluation of the need for a new tower to fill a coverage gap.

At times, Willis's knowledge of the issue appeared to be shaky. For instance, he incorrectly claimed that in the U.S., "Thirty-nine states have stopped erecting masts until the authorities have greater confidence in the technology."

NIEHS Draft Report on RAPID Program Ignores Cancer Risk

There are now strong indications that the National Institute of Environmental Health Sciences (NIEHS) will tell Congress that EMFs do not pose cancer risks. Essentially all federal funding of EMF health research ended last September 30, and the NIEHS appears likely to argue that there is no need for a new EMF research program.

As of late February, a report to Congress from NIEHS Director Dr. Kenneth Olden was still under internal review. But a preview of the advice Olden is getting from his staff may have been provided in December.

NIEHS staff distributed a 352-page document, *EMF RAPID: Program Report*, at the final meeting of the National EMF Advisory Committee (NEMFAC), held jointly with the EMF Interagency Advisory Committee in Washington on December 14. The draft report describes studies carried out under the EMF RAPID research program that Congress mandated in 1992 (see *MWN*, N/D92), and concludes that they "provide substantial evidence that there is not a robust biological effect of EMF exposure at environmentally relevant levels."

The draft report was written by four NIEHS staffers led by Dr. Gary Boorman, who heads the EMF RAPID program at the NIEHS in Research Triangle Park, NC. It goes on to state that, "These data, when taken together with the National Academy of Sciences report, provide a basis for concluding that environmental EMF exposures, at the levels at which human exposure occurs in the environment, do not demonstrate an effect on critical biological processes and functions that could be expected to adversely affect human health." It also opposes earmarking any more funds for EMF research.

Boorman's report never mentions the conclusions of an NIEHS Working Group on EMFs, which met last June 16-24 near Minneapolis (see *MWN*, J/A98). The 30-member international panel voted 19 to 9 in favor of categorizing EMFs as "possible carcinogens." That designation was based largely on the results of epidemiological studies pointing to higher rates of leukemia among children exposed at home and among workers exposed on the job. The Working Group classified EMFs as presenting a cancer risk similar to that from carbon tetrachloride, chloroform, DDT and lead.

Many members of NEMFAC were dismayed by Boorman's decision to leave out the advice of NIEHS' own experts. It is "shocking," said Shirley Linde, NEMFAC's chair. Margaret Seminario, director of the AFL–CIO's Department of Occupational Safety and Health in Washington, called it "stunning." Dr. Peter Bingham, recently retired from Philips Laboratories, said, "You would think we were in a different universe."

The Boorman report does note that the NIEHS spent more than $2,500,000 to run the Working Group meeting and three previous science review symposia—close to 10% of all funds spent under the EMF RAPID program. But while it states that the Working Group issued a report of its own, it contains no reference to the Working Group's conclusions.

There appears to be some dissent within the NIEHS, however. Dr. Christopher Portier, an NIEHS risk analyst who organized the Working Group meeting, refused to endorse the draft report—even though he is listed as its coauthor. When asked directly whether he agreed with the report's conclusion, he replied, "I have no comment."

Several members of NEMFAC observed that Boorman's report could easily be mistaken for Olden's forthcoming report

Meta-Analysis Finds "Relatively Strong and Consistent Support for a Somewhat Weak Elevated Risk of Leukemia for Children"

Dr. Daniel Wartenberg did a meta-analysis of 11 childhood leukemia studies for the National Academy of Sciences (NAS) panel on EMFs (see *MWN*, N/D96). He has now published it in the December *American Journal of Public Health (88*, pp.1,787-1,794, 1998), adding some data from four more recent studies.

Overall, the 15 studies "provide relatively strong and consistent support for a somewhat weak elevated risk of leukemia for children living in proximity to power lines," Wartenberg writes. "The data cannot be explained statistically on the basis of random fluctuations alone." He points out that the overwhelming majority of studies show an increase in risk. And in his analysis of combined data from the original 11 studies, he found statistically significant risks nine times more often than would be expected due to chance. "For [this] observed excess to be due to publication bias," Wartenberg adds, "there would have to have been at least a dozen unpublished, negative studies."

Wartenberg, of the Environmental and Occupational Health Sciences Institute in Piscataway, NJ, reports that the results for each exposure metric are relatively consistent. Childhood leukemia studies based on wire codes, distance from power lines or historically reconstructed field measurements tend to show an increased risk, while those based on direct magnetic field measurements do not.

The contradiction between spot measurements and other metrics "remains an enigma," writes Wartenberg. "Exposure misclassification, which typically biases the results towards the null [i.e., no effect], may play a role." Alternatively, he writes, some other factor unrelated to magnetic field strength may be involved. But he notes that various candidates for this "Factor X" have been investigated, and none explained the association.

The four studies published since the release of the NAS EMF report in 1996 include one by the National Cancer Institute (see *MWN*, J/A97, N/D97 and M/J98). "When the results of these studies are included in the meta-analysis," writes Wartenberg, "only small changes are found." The risks associated with wire codes, distance and calculated historical exposure decline, but only slightly. "The spot-measure results moved from slightly protective...to slightly risky," due mainly to NCI's results.

"Another case-control study would likely be very expensive and only marginally informative," Wartenberg concludes. Instead of more general studies, he argues for research that would focus on "high-exposure individuals."

to Congress. It includes a cover letter from Olden, which begins: "I am pleased to provide this report on the Electric and Magnetic Fields (EMF) research and communication activities that have been conducted over the past six years...."

In response to NEMFAC criticism, Boorman agreed to make some changes in his report. But many observers see Boorman's draft as an indicator of what Olden will say.

The National Electrical Manufacturers Association (NEMA) declared that, "This draft report will figure prominently in the final report to Congress." NIEHS DRAFT REPORT FINDS NO LINK BETWEEN EMF, CANCER was the headline on the front page of NEMA's magazine, *Electroindustry,* of January 15. The president of NEMA, Malcolm O'Hagan, called the Boorman report "very encouraging news."

Olden's report is required by law. With the end of the EMF RAPID program, the NIEHS must report to Congress on whether "exposure to EMFs produced by the generation, transmission or use of electric energy affects human health."

Last summer, in its press release announcing the Working Group's decision to classify EMFs as possible carcinogens, the NIEHS featured a quotation that if EMFs did in fact present a health risk, it would be a small one—even though risk assessment was never discussed by the Working Group. At the time, some NEMFAC members expressed concern that the press release was an early indication that the NIEHS would try to bury the EMF question (see *MWN,* J/A98; also J/F98).

[Dr. Louis Slesin, editor of Microwave News, *was a member of both NEMFAC and the NIEHS Working Group on EMFs.]*

New Epidemiology on Brain Tumors and Breast Cancer

Swedish Study of Occupational EMFs

EMF exposure at work was associated with an increased risk of brain cancer in a case-control study by Drs. Anders Ahlbom and Susan Preston-Martin and colleagues.

Men who had ever worked in a job with average exposures above 4 mG showed a risk of glioma that was twice as high as that of others, as well as a 50% higher risk of meningioma. Those with five years or more of such exposure were twice as likely to develop glioma, but only half as likely to have meningioma.

Writing in the *European Journal of Epidemiology (14,* pp.563-569, 1998), Ahlbom, of the Karolinska Institute in Stockholm, Sweden, and Preston-Martin, of the University of Southern California in Los Angeles, note that a weakness of their study is "the small number of exposed subjects, which results in wide confidence intervals." But overall, they conclude, the results "give some support to previous findings" linking brain tumors with EMF exposures on the job (see also *MWN,* J/F97). "Information was available regarding several potential confounders," they add, "but none of them seemed to be of any importance."

The researchers used cancer registry data and hospital records to examine every case of the two types of brain cancer diagnosed from 1987 to 1990 among half a million men aged 25 to 74 living in central Sweden near Uppsala. The study included 84 men with glioma, 20 with meningioma and 155 controls. The study is one of ten on adult brain tumors that are part of the Surveillance of Environmental Aspects Related to Cancer in Humans (SEARCH) program of the International Agency for Research on Cancer in Lyon, France.

For exposure assessment, Ahlbom and Preston-Martin used a common list of "electrical occupations" as well as measurements of typical exposures for different jobs from a previous study by Dr. Birgitta Floderus. Most men in their study who worked in high-exposure jobs, according to the Floderus measurements, were not listed as electrical workers. These included forestry and logging workers, railway workers and mail carriers.

Ahlbom and Preston-Martin found higher brain cancer risks among welders and those working at VDTs. They note that a previous SEARCH study of VDT users in Australia found an increased brain cancer risk among women but not among men (see *MWN,* J/A92), and that an earlier study by Preston-Martin found an excess risk among male computer programmers in Los Angeles (see also *MWN,* M/A90).

Breast Cancer on Cape Cod

A study of breast cancer on Upper Cape Cod has revealed some increases in risk among women with occupational or residential EMF exposures, but the increases are far from statistically significant. The researchers conclude that the data "did not support" a link between breast cancer and 60 Hz magnetic fields.

Women who had ever lived within 500 feet of a power transmission line or substation had a 50% greater breast cancer risk than did controls, Drs. Patricia Coogan and Ann Aschengrau report in the October 1998 *Archives of Environmental Health (53,* pp.359-367). The authors, both of the Boston University (BU) School of Public Health, found an increase of 70% for those who lived near a power line or substation for over five years.

Two other sources of residential exposure, electric blankets and electric heat, were not associated with any increased risk.

Among women who held jobs likely to involve high EMF exposures, Coogan and Aschengrau found a 20% greater breast cancer risk. The combination of high exposures on the job and above-average residential exposures did not result in any further increase in risk.

The authors do not view the elevated risks as evidence of a causal relationship. "There wasn't really anything there," Aschengrau told *Microwave News.* She and Coogan write that the study is "limited by small numbers." It included 259 women from breast cancer cases on the Upper Cape reported to the Massachusetts Cancer Registry from 1983 through 1986, and 738 controls.

The study was part of a three-year, $3.6 million investigation of breast cancer on Cape Cod led by the Silent Spring Institute in Newton, MA, and used data from an earlier study of the incidence of various cancers on the Upper Cape by Aschengrau and Dr. David Ozonoff, also of BU (see *MWN,* J/F92 and J/F98). The Massachusetts Department of Public Health funded both studies in an effort to identify the cause of elevated cancer rates on Cape Cod. To date, no explanation has been found for the 20% excess of breast cancer in the area for 1982-1994.

report criticizes for ignoring nonthermal and long-term effects.

Some industry groups oppose the ICNIRP limits as too restrictive, and are lobbying against the EC proposal. "A huge number of products would need to be withdrawn from the market" if ICNIRP's limits are adopted by the EU, according to a statement from Philips, Sensormatic, Siemens and several other companies. As examples, they cite "kitchen appliances, welding equipment, retail anti-theft systems, airport security devices...etc."

The fate of the EC's proposal will be decided by the EU Council of Ministers. The powers of the European Parliament are limited, and in this case its role is only advisory. But its review of the EC proposal is required by law, and last July the issue was assigned to the parliament's Committee on the Environment, Public Health and Consumer Affairs. Tamino, a committee member who is also vice chair of the parliament's Green Group, was asked to prepare a report.

Tamino's draft report, dated November 6, 1998, notes that the European Parliament's 1994 resolution on EMF–EMR issues (see *MWN*, J/A94) supports ALARA and "the precautionary principle, which states that in the event of doubt, risks should be avoided." The draft report objects to the fact that the EC proposal is "less strict than the legislation already existing in various member states," such as Italy, Luxembourg and Sweden. It sharply criticizes the EC proposal for ignoring research studies that support the existence of nonthermal effects.

"Risks start appearing on chronic exposure (for example, eight hours per day) to EMFs at levels above 0.3 μT," Tamino concludes. His report therefore advocates that a limit of 0.25 μT (2.5 mG) be phased in over a ten-year period for the 1 Hz-2 kHz frequency range. Equally severe restrictions are proposed for higher-frequency fields.

Tamino's proposed rules "do not appear to have any health basis," declared Dr. Michael Repacholi, who heads the World Health Organization's (WHO) EMF program. "It is likely that if any health consequence of EMF exposure is found, it will be quite subtle," Repacholi stated in a letter to a parliamentary staffer which was obtained by *Microwave News*. Tamino's limits "are between 10 and 10,000 times lower than the levels suggested by ICNIRP," he wrote, and they would cost "hundreds of billions of dollars." Repacholi was the chair of ICNIRP when the limits now proposed by the EC were developed.

As for the Tamino report's support for ALARA and for the precautionary principle, Repacholi stated that the WHO has no position on either one. "While it makes good public hygiene sense to keep EMF levels down to those actually needed to allow the technology to function," he wrote, limits that are much stricter than ICNIRP's "will probably have no health benefit."

Last year, Repacholi declined to endorse prudent avoidance measures, saying that "it is not WHO's job" to make such recommendations (see *MWN*, N/D98).

Tamino's report was also opposed by the German mobile phone company Mannesmann Mobilfunk, which warned that it would result in "destroying the basis of mobile telecommunications." The European Broadcasting Union objected that the limits in the draft report "could cause significant changes in lifestyle to become necessary."

Philip Whitehead, a member of the environment committee who is part of the European Parliament's Socialist Group, had a more mixed reaction. In an interview, Whitehead expressed skepticism about Tamino's proposed numerical limits, saying they are "so drastic" that they would "entirely stop the use of domestic appliances." On the other hand, he said, not enough is known about the health effects of EMFs: "Over the long term, we are part of an experiment, and the jury is still out." Whitehead, who represents Staffordshire East and Derby in the U.K., called for more research and "active monitoring of the facts."

When the environment committee voted on February 18, the limits proposed by Tamino were defeated. But language on ALARA and the precautionary principle was approved, as well as amendments offered by Whitehead that call for regular review of the issue in the future, by both the parliament and the EC.

Whitehead told *Microwave News* he is particularly concerned about mobile phones, which he called "the major subject of debate in the committee." The committee approved an amendment by Whitehead stating that limits should be reviewed in the future, "in light of increased patterns of usage of devices" that emit electromagnetic radiation.

In the wake of the committee vote, Tamino said that the parliament's Green Group would reintroduce the lower limits when the full parliament meets in March. He added that he will try to find a majority for an amendment dealing with possible long-term effects.

But whatever position the parliament takes, it is not binding on the Council of Ministers. Before the ministers take a vote on June 8, a council working group will discuss its own amendments to the EC proposal. Tamino said that he expects the Italian delegation to propose language on possible long-term effects and the precautionary principle. He noted, however, that the U.K. and France are completely against this, and would probably vote against the EC's ICNIRP-based guidelines if they are changed to reflect the Italian position.

Although Tamino hopes that the EC proposal will be modified to take a step in his direction, he said that, "It's not possible to get the proposal changed a lot." As a result, the Italian minister of health will probably vote against the proposal in June, on the grounds that it is too weak.

Tamino said that the lack of clear lines of political responsibility has made progress more difficult. For example, on the national level, the EMF–EMR health issue is assigned to the health ministry in Italy, the environment ministry in Germany, and in Austria to the ministry for consumers' and women's affairs.

Companies and industry groups opposed to the EC proposal have focused their criticism on the ICNIRP limits. The U.K.'s Electricity Association (EA) has argued that ICNIRP's standards are stricter than those of Britain's National Radiological Protection Board (see p.6). For electric fields, the EA stated that 15%-50% of its aboveground transmission lines would not meet this standard, and would require expensive modifications, even though most are in sparsely populated areas.

The environment committee passed an amendment that partly addressed the EA's concern, calling for limits focused only on areas "where the public live and spend significant [amounts of] time."

The joint statement by Philips, Siemens and others rejected

the EC's argument that adoption of the ICNIRP standard would strengthen public confidence: "The public's concern about EMFs...is almost entirely related to worries about long-term effects, which are NOT the subject of the [EC] proposal." Where the ICNIRP standard is stricter than existing national limits, the companies contended, it deals only with short-term effects "such as tingling feelings or overheating," and the latter can be dealt with by "the normal thermoregulatory mechanisms of the body."

Whatever happens to the EC proposal, Tamino said, "This is just the beginning of the debate." That prospect appears to worry Britain's EA, which complained that modifications to its transmission lines required by the EC proposal would force public hearings. Such hearings, it warned, "could have a needlessly alarmist effect, by creating unnecessary doubts in people's minds."

Excerpt from the Draft EMF–EMR Report of the European Parliament's Committee on the Environment

Below is the "Explanatory Statement" from Draft Report on the Proposal for a Council Recommendation on the Limitation of Exposure of the General Public to Electromagnetic Fields, 0 Hz-300 GHz, *prepared for the European Parliament's Committee on the Environment, Public Health and Consumer Protection by Prof. Gianni Tamino, member of the European Parliament from Italy, who served as rapporteur.*

November 6, 1998

1. Introduction

EMFs have been in the news for many years now—particularly since 1979, when Nancy Wertheimer carried out an epidemiological study on 344 children who had died of cancer in Denver, CO—and people exposed to sources of electrical, magnetic and electromagnetic fields are extremely concerned about their possible effects. It has now been established that such sources are to be found not only outside people's houses (electricity transmission lines, radar, television transmitters, etc.), but also inside, where such fields are also generated by electrical appliances such as microwave ovens, hair dryers, electric razors, television sets, VDUs and cellular phones.

It is precisely for the above reasons that, in response to a motion for a resolution tabled by Mr. Vernier, Mr. Santos and Mr. Pimenta, Parliament has already considered a report on the matter by Mr. Paul Lannoye and, on May 5, 1994, adopted a resolution on combating the harmful effects of non-ionizing radiation. This resolution covered both low frequency sources (electricity transmission lines) and high frequency sources (electrical appliances, VDUs, communications systems, etc.) and called on the Commission to propose measures, including regulations and standards, to limit the exposure of workers and the public to non-ionizing electromagnetic radiation. It also called for the revision of Directives 90/220/EEC and 92/75/EEC, on the health and safety of workers exposed to VDUs and the labeling of household appliances, respectively. In response to that resolution, on June 11, 1998, the Commission submitted a proposal for a Council Recommendation on the limitation of exposure of the general public to electromagnetic fields 0 Hz-300 GHz.

2. The Commission Proposal

In addition to listing the various sources and types of electromagnetic fields and outlining the provisions taken at national and Community levels, the proposal for a recommendation and the opinion of the Scientific Committee, which was consulted by DG XXIV, focus mainly on assessing the effects which EMFs have on health, which may be considered from a standpoint of both field frequency and the type of effect produced (thermal, nonthermal, acute or long-term).

1) Thermal Effects

These are acute effects, which are easily measurable, [of] exposure to high frequency EMFs. The most common effect is heating, which occurs when cellular phones are used for long periods. Tissues become heated as a result of the action of electromagnetic waves on electrically charged molecules, and this process therefore depends on the types of tissues through which the waves travel. These are the only effects about which researchers have no doubts and for which DG XXIV's Scientific Committee proposed, at its meeting of June 25 and 26, 1998, that threshold values be adopted, owing to the fact that these effects were borne out by sufficiently conclusive scientific evidence. The same conclusion was reached by ICNIRP and is also endorsed in the explanatory memorandum to the Commission proposal.

2) Nonthermal Effects

Both the explanatory memorandum to the proposal for a recommendation and the opinion of the Scientific Committee conclude that there is insufficient scientific evidence to establish a clear link between exposure to electromagnetic fields and long-term nonthermal effects. The recommendation therefore lays down exposure limit values only for acute thermal effects and makes any future preventive action against long-term effects, such as cancer and leukemia (particularly among children) and alterations to the workings of the nervous, endocrine and immune systems and the production of melatonin and cellular activity, dependent on the production of more convincing scientific evidence.

3. Scientific Research into the Biological and Health Effects of Electromagnetic Fields

A broad survey of the findings of research into the biological and health effects of non-ionizing radiation has already been submitted to Parliament in the Lannoye report, which I feel can be taken as read by Parliament. That report states that, "All these results undoubtedly help to provide a reliable scientific basis on which the decision-makers must rely in defining standards and regulations." It also points out that even if the mechanisms causing biological injury have not been clearly elucidated, we have today sufficient information to adopt the standards and regulations on the basis of two guiding principles:

1. The precautionary principle, which states that, in the event of doubt, risks should be avoided, *inter alia*, by adopting the zero option;

2. The WHO's ALARA principle, under which exposure to radiation must be as low as reasonably possible, which excludes avoidable exposure to radiation.

Since 1994, the views set out in the Lannoye report have been endorsed by authoritative, well-publicized scientific studies which, however, appear to have been ignored both by the author of the proposal for a recommendation and by the experts on DG XXIV's Scientific Committee (as is apparent from the bibliography which appears in the committee's opinion).

No mention is made of the effects of low frequency EMFs (generated by electricity transmission lines) on cell membrane receptors, which pass on into the cell itself and trigger off enzymatic activity and the production of chemical messages which can activate genetic transcription. The relevant data are, nonetheless, to be found both in the conclu-

sions of the European Community symposium on *Electromagnetic Transmissions: The Latest Scientific Evidence, Potential Threats and Strategies To Reduce Risk*, held in London on October 27, 1994, and in the collective work published by Springer Verlag in 1995 under the title *On the Nature of Electromagnetic Field Interactions with Biological Systems* (edited by A.H. Frey).

These effects are of fundamental importance in understanding exactly how EMFs may be involved in the process of carcinogenesis, which is considered to involve two stages: *initiation*, when the initial genetic damage occurs (to DNA) and *promotion* of the proliferation of cancerous cells.

Normally, the agents involved in the process of initiation (ionizing radiation, alkylating agents, etc.) are not active in the subsequent promotion stage, which is triggered by agents which may either interact with membrane receptors or inhibit natural mechanisms designed to eliminate cancerous cells (for example, the immune system).

A large number of laboratory studies indicate that EMFs are instrumental in the promotion of tumors (see, *inter alia*, the research by W. Löscher and others, referred to in the Scientific Committee's opinion, which concludes that there is limited evidence from laboratory studies in support of the theory that EMFs promote tumors).

Furthermore, research has shown that 50 Hz EMFs have the effect of depressing the immune system and reducing melatonin secretion, which are of vital importance in understanding how EMFs might promote tumors. In this connection, the work carried out by R. Liburdy (which is described in the aforementioned book edited by Frey) is of particular interest, in that it demonstrates that melatonin continues to have an oncostatic effect at an exposure level of 0.2 μT, while that effect is blocked at 1.2 μT.

These *in vitro* and *in vivo* studies provide us with a better understanding of the findings of epidemiological research. The research conducted by Maria Feychting of the Karolinska Institute in Stockholm is of particular interest in this connection, in that it points to a link between EMFs and child leukemia, thus backing up similar findings in other parts of the world, and, more recently, between EMFs generated by electricity transmission lines and breast cancer.

Other research work has highlighted a link between EMFs and nervous depression, which may be caused by an imbalance in the calcium ions in nerve cells—an effect which has been identified *in vitro* in cells exposed to EMFs.

All such research indicates that risks start appearing on chronic exposure (for example, eight hours per day) to EMFs at levels above 0.3 μT. In this connection, it might be useful to analyze the report which M. Linet published for the U.S. NCI on July 3, 1997, which has sometimes been used as evidence to back up the claim that there is no relationship between child leukemia and electricity transmission lines. In actual fact, the report excludes only one type of child leukemia, while in general demonstrating that at 0.2 μT there is an increase of 52%, which is insignificant, but which becomes more significant at 0.3 μT (72%) and extremely significant between 0.4 μT and 0.5 μT (600%).

Many of the effects of exposure to low frequency EMFs which have been described have recently also been found to be caused by high frequency EMFs, such as those generated by communications systems, cellular phones and many household appliances (see the book by R. Santini entitled *Telephones Cellulaires: Danger?*, published by M. Pietteur in 1998, which contains an extensive bibliography).

4. Conclusions

The conclusions reached by the Commission and the committee of experts are clearly at odds with a large number of scientific publications, which have apparently been ignored. While realizing the need for due caution in this matter, the rapporteur feels that attention should be drawn to the recent report by the U.S. NIEHS, quoted in the *British Medical Journal* of July 4, 1998, which states that EMFs can be carcinogenic, even though the risk is perhaps not very high.

It is obvious from a very large number of research findings that one cannot dismiss the oncogenic risk nor the various biological effects. Therefore, as was already stated in the Lannoye report, it is necessary to apply the precautionary principle and the ALARA principle.

Rather than doing so, however, the Commission proposal goes so far as to state that, "There is no convincing experimental evidence that ELF electromagnetic fields cause genetic damage, and it is therefore extremely unlikely that they could have any effect on the initiation of cancer," totally ignoring the possibility of them having a tumor-promoting effect, and concludes that, "[T]he epidemiological data are insufficient to allow the recommendation of an exposure limit." The provisions of the Commission proposal are therefore less strict than the legislation already existing in various Member States, such as Sweden,[1] the Grand Duchy of Luxembourg[2] and Italy.[3]

Your rapporteur takes the opposite view that, in compliance with the precautionary principle (Article 130r of the Treaty), the recommendation should include exposure limits for nonthermal effects which may become apparent in the long term.

In view of the above and taking account of the most recent research findings and of national and regional standards which have already been adopted, the rapporteur proposes that the Commission text be amended to lay down a maximum permissible exposure level, to be achieved over a ten-year period, of a magnetic flux density of 0.25 μT and an electric field strength of 25 V/m in the 1 Hz-2 kHz frequency range and, respectively, 0.03 μT and 2.5 V/m in the 2 kHz-400 kHz frequency range and, lastly, 0.01 μT and 1 V/m in the 400 kHz-300 GHz frequency range.

He also proposes that the Commission be called upon to submit by December 31, 1999, a proposal for the amendment of Directives 90/270/EEC, 73/270/EEC and 92/75/EEC, with a view to protecting the health and ensuring the safety of workers exposed to electromagnetic fields from VDUs, establishing safety standards for electrical equipment likely to produce electromagnetic fields and labeling such products so as to provide consumers with information on the fields generated thereby as a function of distance and the types of uses to which they are put. Lastly, the Member States should lay down minimum safety distances from public buildings, housing and workplaces for the siting of electricity lines, radar and broadcasting and rebroadcasting transmitters, including cellular phone repeaters.

1. The MPR/TCO 92 standard for VDUs.

2. Internal Ministry Circular No.1644 26/94.

3. Decree No.381, of September 10, 1998, published in the Official Journal of November 4, 1998, *Regulation Laying Down Standards for the Determination of Radio Frequency Ceilings Compatible with Human Health*, which will enter into force on January 2, 1999, provides for an exposure limit of 6 V/m for broadcast and cellular phone transmitters [for] buildings in which people live or work for more than four hours per day.

Abbreviations

ALARA—As Low As Reasonably Achievable
VDU—Visual Display Unit
DG—Directorate General
EMF—Electromagnetic Field
ICNIRP—International Commission on Non-Ionizing Radiation Protection
NCI—National Cancer Institute
NIEHS—National Institute of Environmental Health Sciences
WHO—World Health Organization

Note: 0.1 μT = 1 mG

Hot New Papers

David Savitz et al., "Magnetic Field Exposure and Cardiovascular Disease Mortality Among Electric Utility Workers," *American Journal of Epidemiology, 149,* pp.135-142, January 15, 1999.

"The consistency of risks found for continuous dose measures and for categorical analyses and the large numbers of events strongly suggest that the pattern we have observed is not a product of random error." (See *MWN*, J/A98 and S/O98.)

P. Cocco et al., "Case-Control Study of Occupational Exposures and Male Breast Cancer," *Occupational and Environmental Medicine, 55,* pp.599-604, 1998.

"An association between occupational exposure to EMFs and risk of breast cancer has been reported. In experimental animals, EMFs can influence circadian rhythms, which are accompanied by undulatory patterns of melatonin secretion, which suppresses the growth of estrogen-receptor-positive tumors in laboratory experiments. A speculative link between exposure to EMFs and risk of breast cancer was therefore established as due to a reduced synthesis of melatonin. However, we found no association with either probability or intensity of occupational exposure to EMFs. There has been considerable discussion about which method of assessing exposure to EMFs is most suitable for epidemiological use. Our job exposure matrix was not detailed enough to discriminate between various types of EMFs. Therefore, the role of occupational exposure to EMFs in the etiology of breast cancer cannot be ruled out based on the present findings."

David McCormick et al., "Exposure to 60 Hz Magnetic Fields and Risk of Lymphoma in PIM Transgenic and TSG–*p*53 (*p*53 Knockout) Mice," *Carcinogenesis, 19,* pp.1,649-1,653, September 1998.

"The results of the present study demonstrate that the development of hematopoietic neoplasia in PIM and hemizygous TSG–*p*53 mice is not accelerated or increased by exposure to pure, transient-free, linearly polarized 60 Hz magnetic fields. The 60 Hz sine wave is the fundamental component of magnetic fields [associated] with the production, transmission and use of electricity in the U.S. As such, the present data do not demonstrate significant oncogenic or tumor-promoting activity of the major component magnetic fields to which humans are exposed in the U.S. An important limitation to these data, however, is the known presence of harmonics, high frequency transients and other electromagnetic components in environmental magnetic fields; the design of the present studies does not address the possible biological activity of these magnetic field exposure parameters." (See *MWN*, J/F98 and M/A98.)

Nonthermal Millimeter Wave Effects

Andrei Pakhomov et al. [of Brooks Air Force Base, San Antonio], "Current State and Implications of Research on Biological Effects of Millimeter Waves [MMW]: A Review of the Literature," *Bioelectromagnetics, 19,* pp.393-413, 1998.

"The studies reviewed demonstrate effects of low-intensity MMW (10 mW/cm^2 and less) on cell growth and proliferation, activity of enzymes, state of cell genetic apparatus, function of excitable membranes, peripheral receptors and other biological systems. In animals and humans, local MMW exposure stimulated tissue repair and regeneration, alleviated stress reactions and facilitated recovery in a wide range of diseases (MMW therapy). Many reported MMW effects could not be readily explained by temperature changes during irradiation."

U.K. Team Sees Changes in Gene Expression at 80 mG

David Tipping et al., "Observations on the Effects of Low Frequency Electromagnetic Fields on Cellular Transcription in *Drosophila* Larvae Reared in Field-Free Conditions," *Bioelectromagnetics, 20,* pp.129-131, 1999.

"*Drosophila* larvae reared inside a μ-metal box with an internal field strength [of] 0.004 μT [0.04 mG] were treated with a magnetic field of 50 Hz, 8.0 μT [80 mG] for 20 minutes. Controls experienced 0.004 μT....The low frequency EMFs very significantly decreased transcript levels, indicating that experimental responses may be influenced by previous exposure or lack of previous exposure....The magnitude and significance of these data are unusual and may be due to our use of intact organisms compared to cultured cells....Field-free rearing conditions are unnatural, but allow a uniformity of past exposure to EMFs between all larvae. The responses of our larvae compared to those grown in ambient fields [do] not preclude the possibility that EMFs have an effect in nature, because the laboratory conditions required for its elucidation may be subtle. Further experiments may determine whether the responses observed in this study are due to the effects of shielding from EMFs during rearing and may also determine the physiological significance of our findings. Our data indicate that experimental transcription effects of low frequency EMFs may be influenced by previous exposure."

Elizabeth Balcer-Kubiczek et al., "BIGEL Analysis of Gene Expression in HL60 Cells Exposed to X Rays or 60 Hz Magnetic Fields," *Radiation Research, 150,* pp.663-672, December 1998.

"We screened a panel of 1,920 randomly selected cDNAs to discover genes that are differentially expressed in HL60 cells exposed to 60 Hz magnetic fields (2 mT) or X rays (5 Gy) compared to unexposed cells.... In contrast, BIGEL analysis of the same 1,920 cDNAs revealed no differences greater than 1.5-fold in expression levels in magnetic-field compared to sham-exposed cells."

Daniel Read and Granger Morgan, "The Efficacy of Different Methods for Informing the Public About the Range Dependency of Magnetic Fields from High Voltage Power Lines," *Risk Analysis, 18,* pp.603-610, October 1998.

"These results confirm our earlier findings that lay people significantly underestimate the rate at which magnetic field strength decreases with distance from a field source. They also demonstrate that a wide range of educational materials can successfully be used to 'calibrate' these erroneous intuitions, and that these changed intuitions persist for at least 24 hours."

Wolfgang Löscher, Meike Mevissen and Alexander Lerchl, "Exposure of Female Rats to a 100 μT, 50 Hz Magnetic Field Does Not Induce Consistent Changes in Nocturnal Levels of Melatonin," *Radiation Research, 150,* pp.557-567, November 1998.

"Our data for rats are in line with previous studies showing a lack of suppressive effects of 50 Hz or 60 Hz magnetic fields on melatonin levels in hamsters, sheep, baboons and human volunteers....[T]he present study failed to demonstrate a consistent effect of 100 μT, 50 Hz magnetic field exposure on melatonin levels in rats. As yet we have no ex-

planation for this lack of robust effects of magnetic field exposure on the function of the pineal gland, which appears to be in contrast to previous reports using the same or similar flux densities."

A.W. Wood et al., "Changes in Human Plasma Melatonin Profiles in Response to 50 Hz Magnetic Field Exposure," ***Journal of Pineal Research, 25,*** **pp.116-127, 1998.**

"The effects of power frequency magnetic fields on nighttime plasma melatonin were studied in a group of 30 adult male human subjects. Exposure consisted [of] 20 μT (200 mG) at 50 Hz (circularly polarized) at certain times in relation to the predicted time of onset of rise in melatonin concentration for a particular individual....When exposure preceded onset of rise, a significant delay in onset time relative to sham exposure of approximately half an hour was observed, with indications (marginally significant) of a reduction in maximum melatonin level....Magnetic fields generated by square-wave currents produce more marked reductions in the maximum level when compared to sinusoidal waveforms, but there was no significant difference in onset time."

J.-L. Chagnaud and B. Veyret, "*In Vivo* Exposure of Rats to GSM-Modulated Microwaves: Flow Cytometry Analysis of Lymphocyte Subpopulations and of Mitogen Stimulation," ***International Journal of Radiation Biology, 75,*** **pp.111-113, January 1999.**

"For the first group of 15 rats exposed at 55 μW/cm^2 and 15 sham-exposed rats, no differences were observed between the activation level of cells from exposed and sham-exposed rats, irrespective of the concentration of ConA. For the second group of ten rats exposed at 200 μW/cm^2 and ten sham-exposed rats, the results were the same. Furthermore, both methods (MTT assay and flow cytometry) gave the same results. This suggests that *in vivo* exposure to GSM-modulated MW did not alter the normal ConA response in lymphocytes. Overall, the results show that GSM-modulated MW did not affect the integrity of the immune system under the conditions used. This is in agreement with current literature, which offers little convincing evidence of the effects of MW on the function of the immune system that are not directly or indirectly related to thermal load."

MRI and EMFs: A Review and Advice

Jerome Beers, Jerry Phillips, Frank Prato and Indira Nair, "Biologic Effects of Low-Level Electromagnetic Fields: Current Issues and Controversies," ***MRI Clinics of North America, 6,*** **pp.749-774, November 1998.**

"Given the ambiguity of the evidence...the authors believe that blanket statements about the safety [of the] MR [magnetic resonance] environment are inappropriate other than that there is no compelling, specific evidence of any hazard if the usual precautions are taken. The authors also believe that, however, in keeping with the concept of informed consent, people who work with MR imaging should, rather than relying on quasi-official declarations, make themselves more familiar with bioelectromagnetics. For example, people who work with MR imaging might reasonably want to know that several epidemiological studies—all intelligently conducted but with obvious and considerable limitations—link electromagnetic occupations with Alzheimer's disease. Similarly, people in imaging departments, which are filled with cables, wires and electromagnetic devices, might want to follow the questioned link of electromagnetic occupations to leukemias and gliomas, even if those possible links prove spurious or prove to have to do with a confounder (a chemical associated with wire insulators, for example)....The authors therefore suggest that radiology organizations and large imaging departments make efforts to track ongoing developments in bioelectromagnetics by following the literature in study groups, by participating in meetings and by inviting to radiology meetings bioelectromagnetic researchers who articulate diverse perspectives; and that radiology journals consider publishing annual or semiannual reviews describing recent developments."

"MICROWAVE NEWS" FLASHBACK

Years 15 Ago

• In a draft report, the EPA finds that RF/MW radiation can cause significant biological effects at specific absorption rates (SARs) as low as 1 W/Kg, four times lower than the threshold used as the basis for ANSI's 1982 exposure guidelines.

• In order to assess the economic impact of possible RF/MW exposure limits, the EPA asks 1,000 broadcasters about public exposures from their FM radio transmitters.

• A federal judge halts work on the U.S. Navy's Project ELF submarine communications system pending the completion of an environmental impact statement.

Years 10 Ago

• The New Jersey Department of Health drops its investigation of a cluster of birth defects in Vernon Township. Local activists believe that the many satellite uplinks in the area may be responsible for the high incidence of Down's syndrome.

• A U.S. Navy electromagnetic pulse (EMP) simulator 15 miles off the North Carolina coast would pose no significant threat to public health, the congressional Office of Technology Assessment (OTA) concludes, but it notes that elevated cancer rates among workers exposed to EMP are a "cause for concern."

• Seattle City Light issues a policy statement saying, "The fact that some studies even suggest a link between [EMFs] and health requires assertive steps by the utility industry and government agencies to answer questions pertaining to possible health effects."

Years 5 Ago

• Leonard Glazer of Coral Gables, FL, sues Florida Power & Light Co., claiming that power lines outside his bedroom caused the leukemia that killed his wife and now threatens his own life (see p.18).

• Questioning whether it would be "sufficiently protective," the EPA advises the FCC not to adopt RF/MW exposure limits based on the 1992 ANSI/IEEE standard.

• In a suit against his employer, Motorola engineer Robert Kane contends that RF/MW exposures from a prototype cell phone caused his brain tumor.

Todd Richards et al., "Bioelectromagnetic Applications for Multiple Sclerosis [MS]," *Physical Medicine and Rehabilitation Clinics of North America, 9,* pp.659-673, August 1998.

"It is possible that [electromagnetic] fields could be developed into a reproducible therapy for both symptom management and long-term care for MS. The long-term care for MS would have to include beneficial changes in the immune system and in nerve regeneration."

Lyle Sasser et al., "Lack of a Copromoting Effect of a 60 Hz Magnetic Field on Skin Tumorigenesis in SENCAR Mice," *Carcinogenesis, 19,* pp.1,617-1,621, September 1998.

"Statistical evaluation of the effects of the magnetic field on tumor incidence and multiplicity did not reveal any statistically significant effects; thus...no promotional or copromotional effect of a 2 mT magnetic field on skin tumor development in SENCAR mice could be demonstrated."

Clippings from All Over

"The reality is that they're an absolute, total and complete waste of time."

—Dr. Alan Bender, Minnesota Department of Health, on investigations of cancer clusters, quoted by Dr. Atul Gawande in "The Cancer-Cluster Myth," *The New Yorker,* p.37, February 8, 1999

" Exactly why it works, we do not know."

—Dr. Orrin Devinsky, New York University-Mt. Sinai Comprehensive Epilepsy Center, New York City, on a device that controls epileptic seizures by stimulating a nerve, quoted by Susan Ferraro in "Implant Can Change the Lives of Epileptics," *Daily News* (NY), p.31, January 25, 1999

"We have no idea how or why the magnets work."

—Dr. Paul Rosch, president, American Institute of Stress, Yonkers, NY, quoted by Holcomb Noble in "Magnets Lessen Foot Pain of Diabetics, a Study Finds," *New York Times,* p.A16, January 6, 1999 (see p.6)

Sawyer: This is Victor Sheymov, a Soviet defector. His job—communications security for the KGB. He told us how Russia has been developing RF devices for years. This is the first time he's given a television interview on the subject. And has the KGB ever used it against the United States?

Sheymov: Yes.

Sawyer: Sheymov told us something shocking—that years ago, the KGB used a primitive RF weapon to start a fire at the U.S. Embassy in Moscow. Was the KGB aware that's what would happen?

Sheymov: Oh, they hoped it would. And it did....

Sawyer: The Swedes sent word to us of something. They have been testing all of these electromagnetic weapons, and they told us that they recently blasted a car from 3,000 feet away with microwaves and not only disabled it, [but also] blew up the headlights. So this new world is at hand.

—Diane Sawyer interviewing Victor Sheymov on *20/20,* an ABC television news show, February 10, 1999

In terms of time and effort, the industry's approach to this subject needs to be modelled on a marathon rather than a sprint.

—From the minutes of the formative meeting, in London, U.K., of the Wireless Industry Global Information Network, now called the Wireless Information Network, an international industry group dealing with mobile phone health and safety concerns, December 10, 1998 (see p.3)

A South African newspaper reports that a man has sued over his brain tumor, claiming cell phone usage caused it. A legal decision in the man's favor...would be worth a lot to activists in the arena of public perception, particularly given the almost total lack of laboratory results from CTIA's moribund $25 million, five-year research program on health effects.

—Dr. Peter Polson, wireless industry consultant, Alameda, CA, in a guest opinion piece, "Public Opposition Expected To Rise About RFR Radiation," *RCR,* p.34, February 8, 1999 (see p. 2)

Adey Speaks Out

Malarek: Professor Ross Adey thought he was onto something as well. While doing research for Motorola, one of the world's largest cell phone companies, he discovered microwave radiation had an effect on the brains of rats. It was actually a good effect, but for Motorola any effect at all was bad news. Adey's contract with Motorola was not renewed.

Malarek: So why did they terminate the support?

Adey: My colleagues say because we were too inquisitive. We were of a scientific turn of mind, and we'd turn over the rocks to find out what was underneath.

Malarek: But that's the job of a scientist, to be inquisitive.

Adey: Of course it's the job of a scientist.

Malarek: And you're tough as a scientist.

Adey: Yes, I think I'm tough—too tough, some people say.

Malarek: As a result, you and your team lost your contract.

Adey: That's correct.

Malarek: Motorola claims it had nothing to do with his results, they simply found a better deal somewhere else. That better deal was with Battelle, a private research group known for keeping its mouth shut. In one celebrated case from the 1960s, Battelle conducted studies showing how nicotine affected the brain, but never talked about it.

—Dr. Ross Adey, University of California, Riverside, formerly of the VA Hospital, Loma Linda, CA, interviewed by Victor Malarek on *The Fifth Estate,* a Canadian Broadcasting Corp. television news show, February 9, 1999 (see *MWN,* M/J96 and J/A96)

"Carriers want to have their cake and eat it too. They want to control their towers but not own them."

—Thomas Lehr, vice president, Airadigm Communications Inc., Little Chute, WI, on the trend toward letting others manage their mobile telephone towers, quoted by Kristen Beckman in "Tower Industry Argues Importance of Size," *RCR,* p.14, January 11, 1999 (see p.2 and p.18)

It would seem, though, the telecommunications industry does not really want to be a good neighbor. If it did, its representatives would not be so quick to make in-your-face comments like, "It's okay if the city wants to do monitoring (of radiofrequency emissions) at its own expense, we're just not going to pay for it." There has been some concern that emissions from cell towers are harmful, just as there has been concern that power line emissions are harmful. While studies of electromagnetic fields have been inconclusive, the concern of some scientists and many parents is still quite real. A responsible company surely would want to take precautions. Asking for emissions monitoring is not unreasonable.

—From an editorial, "Cell Phone Industry Needs To Grow Up," *Boca Raton News* (FL), p.8A, January 29, 1999

CONFERENCES

1999 Conference Calendar (Part II)

Part I appeared in our last issue.

February 3-4: **National Seminar on Low-Level Electromagnetic Field Phenomena in Biological Systems (BIOSYS '99),** Jawaharlal Nehru University, New Delhi, India. Contact: Prof. J. Behari, School of Environmental Sciences, Jawaharlal Nehru University, New Delhi 110 067, India, (91+11) 610-7676, ext.2323, Fax: (91+11) 616-5886, E-mail: <jbehari@hotmail.com>.

March 17-18: **The Effects of Ions, EMFs and Magnetism on the Human System (Fred Soyka's 1999 International Symposium),** Toronto Convention Center, Toronto, Canada. Contact: Ticketmaster, (416) 870-8000, Web: <www.ticketmaster.ca>.

March 23-25: **International Exhibition with Workshops on Electromagnetic Compatibility,** Düsseldorf Convention Center, Düsseldorf, Germany. Contact: Dunja Tonnemacher, MESAGO Messe & Kongress GmbH, Rotebuehlstr. 83-85, D-70178 Stuttgart, Germany, (49+711) 619-4675, Fax: (49+711) 661-9775, E-mail: <dunja@mesago.de>.

April 12-14: **1st International Symposium on Nonthermal Medical/Biological Treatments Using Electromagnetic Fields and Ionized Gases,** Norfolk, VA. Contact: Marcie Blanchard, KDH 231, Old Dominion University, Norfolk, VA 23529, (757) 647-6497, Fax: (757) 588-3527, E-mail: <electromed99@ece.odu.edu>, Web: <www.ece.odu/~emed99>.

April 28-30: **1999 International Wireless Communications Expo (IWCE '99),** Las Vegas Convention Center, Las Vegas, NV. Contact: IWCE '99, PRIMEDIA Intertec Exhibitions and Conferences, 9800 Metcalf Ave., Overland Park, KS 66212, (800) 288-8606, Fax: (913) 967-1900.

May 24-26: **Instrumentation and Measurement Technology Conference (IMTC/99),** Venice, Italy. Contact: Robert Myers, 3685 Motor Ave., Suite 240, Los Angeles, CA 90034, (310) 287-1463, Fax: (310) 287-1851, E-mail: <bob.myers@ieee.org>, Web: <www.ims.unico.it/conferences/conferenze/1999imtc>.

June 13-19: **1999 IEEE MTT-S International Microwave Symposium** and **52nd Automatic RF Techniques Group (ARFTG) Conference,** Anaheim, CA. Contact: Robert Eisenhart, Eisenhart & Associates, (818) 716-1995, Fax: (818) 713-1161, E-mail:<r.l.eisenhart@ieee.org>, Web: <www.mtt.org/ims1999>. For ARFTG, contact: Gary Simpson, Maury Microwave, (909) 987-4715, Fax: (909) 987-1112, E-mail: <gsimpson@maurymw.com>.

June 14-18: **Southport '99 International Symposium,** Southport, U.K. Contact: Society for Radiological Protection, Ramillies House, 1-9 Hills Pl., London W1R 1AG, U.K., (0171) 287-4955, Fax: (0171) 287-4906, E-mail: <admin@srp-uk.org>, Web: <www.srp-uk.org/servsouth.html>.

June 22-24: **International Conference on Lightning and Static Electricity (ICOLSE '99),** Centre des Congres Pierre Baudis, Toulouse, France. Contact: Jim Brahney, Society of Automotive Engineers, 400 Commonwealth Dr., Warrendale, PA 15096, Fax: (724) 776-1830.

June 29-30: **7th International Symposium on Performance of Protective Clothing,** Seattle, WA. Contact: Cherilyn Nelson, Dept. of Environmental Sciences, Eastern Kentucky University, 102 Burrier, Richmond, KY 40475, (606) 622-3445, Fax: (606) 622-6274, E-mail: <hesnelso@acs.eku.edu>.

July 11-16: **1999 IEEE Antennas and Propagation Society International Symposium** and **URSI National Radio Science Meeting,** Renaissance Resort, Orlando, FL. Contact: Christos Christodoulou, (407) 823-5831, Fax: (407) 823-5835, E-mail: <cgc@ece.engr.ucf.edu>, Web: <www-ece.engr.ucf.edu/apursi99>.

July 17-21: **34th Microwave Power Symposium,** Washington, DC. Contact: International Microwave Power Institute, 10210 Leatherleaf Ct., Manassas, VA 20111, (703) 257-1415, Fax: (703) 257-0213, E-mail: <info@impi.org>, Web: <www.impi.org>.

July 18-22: **1999 IEEE PES Summer Meeting,** Edmonton, Alberta, Canada. Contact: Ken Warren, (403) 412-3506, Web: <www.ieee.org/power>.

July 18-23: **11th International Congress of Radiation Research,** University College, Dublin, Ireland. Contact: Congress Secretariat, Radiation Science Center, Dublin Institute of Technology, 40-41 Lr. Kevin St., Dublin 8, Ireland, (353+1) 402-4666, Fax: (353+1) 475-6793, E-mail:<icrr@iol.ie>, Web: <www.cjp.com/radres/html/icrr.htm>.

July 26-31: **World Conference on Breast Cancer,** Congress Center, Ottawa, Canada. Contact: World Conference on Breast Cancer, 841 Princess St., Kingston, Ontario K7L 1G7, Canada, (613) 549-1118, Fax: (613) 549-1146, E-mail: <brcancer@kos.net>.

August 2-6: **1999 IEEE International Symposium on Electromagnetic Compatibility,** Seattle, WA. Contact: Janet O'Neil, (425) 868-2558, Fax: (425) 868-0547, E-mail: <j.n.oneil@ieee.org>.

August 13-21: **26th General Assembly of URSI,** University of Toronto, Canada. Contact: URSI GA '99 Secretariat, National Research Council Canada, Ottawa, Ontario K1A 0R6, Canada, (613) 993-7271, Fax: (613) 993-7250, E-mail: <ursi99@nrc.ca>, Web: <www.nrc.ca/confserv/ursi99/welcome.html>.

August 23-27: **12th General Meeting of the Nordic Society for Radiation Protection,** Skagen, Northern Jutland, Denmark. Contact: Dr. Anders Damkjaer, Risö, NUK-114, PO Box 49, 4000 Roskilde, Denmark, E-mail: <a.damkjaer@risoe.dk>.

August 31-September 4: **15th Scientific Meeting of the International Epidemiological Association,** Palazzo dei Congressi, Florence, Italy. Contact: Scientific Secretariat IEA Florence '99, c/o Dipartimento Statistico, Viale G.B. Morgagni 59, 50134 Florence, Italy, (39+55) 4223561, Fax: (39+55) 414277, E-mail: <iea99@stat.ds.unifi.it>, Web: <iea99.ds.unifi.it>.

September 5-8: **11th Conference of the International Society for Environmental Epidemiology and 9th Conference of the International Society of Exposure Analysis (ISEE/ISEA '99),** Athens, Greece. Contact: Institute for Social and Preventive Medicine, 32 Skoufa Str., 106 73 Athens, Greece, (30+1) 645-0870, Fax: (30+1) 360-4894, E-mail: <ISPM@compulink.gr>, Web: <www.uoa.gr/news/isee-isea99>.

September 22-24: **Microwave and RF Fields: Medical Applications and Safety,** Hammersmith Hospital Postgraduate Center, London, U.K. Contact: Dr. Alan Preece, Medical Physics Research Center, University of Bristol, Horfield Rd., Bristol BS2 8ED, U.K., (44+117) 928-2469, Fax: (44+117) 928-2470, E-mail: <a.w.preece@bristol.ac.uk>.

September 25-27: **15th International Symposium on Bioelectrochemistry and Bioenergetics,** Strasbourg, France. Contact: Claude Nicolau, Blood Research and Development Laboratories, Harvard Medical School, 1256 Soldiers Field Rd., Boston, MA 02125, (617) 787-9257, Fax: (617) 787-8977, E-mail: <cnicolau@aol.com>.

October 11-13: **15th International Conference on Applied Electromagnetics and Communications (ICECOM '99),** Dubrovnik, Croatia. Contact: Juraj Bartolic, Faculty of Electrical Engineering, University of Zagreb, Unska 3, HR-10000 Zagreb, Croatia, E-mail: <juraj.bartolic@fer.hr>, Web: <www.rasip.fer.hr/korema>.

October 13-16: **1st Joint Meeting of the Biomedical Engineering Society and the IEEE Engineering in Medicine and Biology Society,** Hyatt Regency, Atlanta, GA. Contact: Web: <bmes-embs99.gatech.edu>.

November 1-4: **1999 International Conference on Computational Electromagnetics and Its Applications (ICCEA '99),** Beijing, China. Contact: Meng-Qi Zhou, PO Box 165, Beijing 10036, China, (86+10) 6828-3463, Fax: (86+10) 6828-3458, E-mail: <mqzhou@public.bta.net.cn>, Web: <www.CIE-China.org>.

November 15-18: **44th Conference on Magnetism and Magnetic Materials,** Fairmont Hotel, San Jose, CA. Contact: Courtesy Associates, 2000 L St., NW, Suite 710, Washington, DC 20036, (202) 973-8668, Fax: (202) 973-8722, E-mail: <magnetism@courtesyassoc.com>, Web: <www.magnetism.org>.

November 20-30: **International Seminar on Biological and Health Effects and Standards for Pulsed Radiofrequency Fields,** Majorana Center, Erice, Sicily, Italy. Contact: Dr. Michael Repacholi, Office of Global and Integrated Environmental Health, World Health Organization, CH-1211 Geneva 27, Switzerland, (41+22) 791-3427, Fax: (41+22) 791-4123, E-mail: <repacholim@who.ch>, Web: <www.who.ch/emf/>.

November 30-December 3: **Asia Pacific Microwave Conference,** Westin Stamford and Westin Plaza, Singapore. Contact: APMC '99 Secretariat, Conference and Travel Management Associates Pte Ltd., 425-A Race Course Rd., Singapore 218671, Republic of Singapore, (65) 299-8992, Fax: (65) 299-8983, E-mail: <ctmapl@singnet.com.sg>, Web: <www.ee.nus.edu.sg/~apmc99/>.

UPDATES

BOOKS

Radar Reference...*Jane's Fighting Ships* was first published in 1898, and today the Jane's Information Group publishes almost 70 different volumes on a multitude of topics. One of them is the most detailed radar reference available without a security clearance. The company describes its yearbooks as "information collected overtly from unclassified sources—although much could be regarded as extremely sensitive or not publicly accessible," and the Tenth Edition of *Jane's Radar and Electronic Warfare Systems* does not disappoint. It presents current military radar systems around the world in great detail, with information such as the range of a unit, the size of its antenna and the frequency and peak power of its radiation. The volume describes air-, land- and sea-based systems, manufactured in countries from Australia to Yugoslavia. They range in size from a portable device that weighs only 4 Kg to an over-the-horizon radar with an antenna 1,500 meters long. Some may be familiar, such as the PAVE PAWS missile tracking system on Cape Cod (see *MWN*, N/D98), while others are obscure. Clearly written introductions help the lay reader understand the basics of radar and electronic warfare, with definitions of dozens of terms. The foreword reviews new technological trends, such as systems that use multiple radar sweeps to penetrate foliage or camouflage. *Jane's Radar and Electronic Warfare Systems* costs $350.00. To order, contact: Jane's Information Group, 1340 Braddock Pl., Suite 300, Alexandria, VA 22314, (703) 683-3700, Fax: (800) 836-0297, E-mail: <info @janes.com>, Web: <www.janes.com>.

Coghill on EMFs, AIDS and Atlantis... Roger Coghill gained a lot of attention from the British press with his lawsuit demanding that cellular phones be labeled with health warnings, which was dismissed last November (see *MWN*, N/D98). A consultant based in Gwent, Wales, Coghill has now put some of his more unusual views before the public in a self-published book, *Something in the Air.* It is an eccentric view of the effects of electromagnetic energy, which includes both widely accepted scientific research and Coghill's unsupported personal theories. Coghill speculates that EMF or RF/MW exposure is causing AIDS, mad cow disease and sudden infant death syndrome. He also argues that Atlantis actually existed and that its inhabitants may well have used electric batteries. The last nine pages of the book are devoted to Coghill's own translation, from the Greek, of the Gospel according to St. John, in which he purports to show that John the Baptist was "offering a highly compressed account of how the natural electromagnetic fields of the planet were once before recognized and harnessed." On a different theological note, the copyright page includes this statement: "The author acknowledges the inspiration of the great god Poseidon, shaker of the Earth, and lord of all waves and vibrations."

CELL PHONE SARs

More on Wall Boost... Three years ago, Italy's Dr. Paolo Bernardi showed that using a cellular phone near a metal wall could increase radiation exposures (see *MWN*, S/O96). Now a German team has experimental measurements that support Bernardi's computer models. When a dipole antenna emitting a 900 MHz signal is placed between a spherical mannequin "head" and a

metal wall, specific absorption rates (SARs) can rise significantly, report Justin Cooper and Völker Hombach, both of Deutsche Telekom in Darmstadt. In some cases, the Telekom researchers observed SARs greater than the 2.0 W/Kg limit specified in current European and international guidelines, while their transmitter met this standard when there was no wall nearby. "If the maximum SAR values in free space are close to the limits specified in a [standard], the presence of the wall may cause those limits to be exceeded," they write in the November issue of *IEEE Transactions on Electromagnetic Compatibility (40*, pp.377-382, 1998). Significant increases in SARs occurred only when the wall was on the antenna side of the mannequin and perpendicular to a line connecting the mannequin to the antenna. These results are in accord with the calculations by Bernardi, who is at the University of Rome "La Sapienza." Cooper and Hombach observed the greatest increases—up to 60% when averaged over 10 g of tissue, and even higher for smaller averaging volumes—when the mannequin was 15 mm from the antenna and 30 mm from the wall. They contend, however, that such increases are unlikely in real world conditions, noting that the highest SARs occurred when the antenna's radiated power was held constant (at 0.25 W). When an antenna is close to a metal wall, they explain, much more current is required to maintain constant power output than in free space—more, in fact, than a mobile phone's battery is capable of delivering.

OFFICE EMFs

Exposures Can Vary Widely... Despite the proliferation of electronic equipment in the office, EMF levels can still be very low in some settings. Employee concerns about a cancer cluster in a Washington office building led the federal government to commission a study by Dr. Patrick Breysse—who found that average EMF levels were lower than in many homes. Past studies of office environments have found ambient fields as strong as 900 mG and some office workers with average exposures as high as 27 mG (see *MWN*, M/J91 and J/F94). Breysse and colleagues at Johns Hopkins University's school of public health in Baltimore focused their investigation on a six-story building where the Department of Education employs more than 350 people. The team recruited 247 volunteers to wear EMDEX personal exposure meters, which took readings at ten-second intervals throughout the workday. They also measured ambient field levels in each participant's work area and characterized the fields produced by computer monitors, copiers and other office equipment. Full-shift exposures averaged 1.0 mG, Breysse reports in the November issue of *Applied Occupational and Environmental Hygiene (13*, pp.776-781, 1998). More than 65% of the participants had full-shift average exposures below 1.0 mG, and less than 3% had exposures above 2.0 mG. Last spring, Dr. Luciano Zaffanella of Enertech Consultants in Lee, MA, reported in his national assessment for the EMF RAPID program that managers' and professionals' workplace EMF exposures averaged 1.6 mG (see *MWN*, M/J98). In a 1994 study of a group of payroll office workers, Breysse found that exposures averaged 3.2 mG (see *MWN*, J/F94). "Detailed exposure assessments of additional office building environments are needed" to put his latest findings in perspective, Breysse writes.

PEOPLE

Barbara Klein, who had long served as the media contact at EPRI in Palo Alto, CA, took early retirement at the beginning of 1999. EMF queries will now be handled by **Jackie Turner**....Dr. **Dan Bracken**, a consultant based in Portland, OR, and **Patrick Reilly** of Metatec Associates in Silver Spring, MD, have been elected fellows of the IEEE. Reilly is the author of *Electrical Stimulation and Electropathology*....On February 6, **Leonard Glazer** died of leukemia at 63. He and his late wife, Elsa, both developed the same rare form of the disease. They blamed EMFs from Florida Power & Light Co. lines, but failed to make their case in court (see p.13 and *MWN*, J/F94 and J/A97).

PLANT GROWTH

EMFs as 'Physical Fertilizer'?... According to the Chinese government news agency, Xinhua, scientists in northern China have used EMFs and certain frequencies of visible light to make plants grow faster and larger. A February 1 dispatch from Xinhua stated that exposed plants matured about a week faster than unexposed plants and showed a 20%-30% increase in growth in experiments by Prof. Xu Jingzhi of Hebei University. Specific frequencies of light used "in conjunction with" EMFs and sound waves reportedly caused plants to produce more growth hormone. Xinhua's correspondent in Shijiazhuan provided few details, but cited local government interest in "the promising 'physical fertilizer,' which might possibly replace conventional chemical fertilizers in some areas during the 21st century." In the mid-1990s, a study for the U.S. Navy linked EMF exposure to increased growth in red maple trees, a finding that was later hotly contested (see *MWN*, J/F95 and J/A97).

Keeping Current: Follow-Up on the News

◆ On June 10, Dr. Dimitrios Trichopoulos of the Harvard School of Public Health in Boston will deliver the keynote address at the *32nd Annual Meeting of the Society for Epidemiologic Research* in Baltimore. More information is available on the Web: <www.jheph.edu/pubs/jepi/serdates.htm>.

◆ It's the law—for now. The new regulatory framework introduced on February 1 by the Australian Communications Authority (ACA) gives legal force to the 200 $\mu W/cm^2$ "flat" limit for public RF/MW exposures reaffirmed by Standards Australia last year (see *MWN*, M/J98). But the ACA notes that Standards Australia is "currently reviewing the standard" and may drop it in favor of ICNIRP's less stringent limits.

◆ In a letter to *Occupational Medicine (48*, p.472, 1998), Australia's Dr. Bruce Hocking describes two cases in which women suffered a stroke after using a cellular phone. Hocking noted one of the cases in a paper on symptoms associated with mobile phone use, which appeared in an earlier issue of *Occupational Medicine* (see *MWN*, N/D98).

◆ The GOP's loss is the wireless industry's gain: The CTIA has named Christina Martin, who previously was press secretary to then House Speaker Newt Gingrich, as its new vice president for communications.

◆ Esso, a subsidiary of the oil giant Exxon Corp., announced in January that it will prohibit the use of wireless phones at its gas stations in Finland to ensure that radiation from a phone does not ignite gasoline or gas fumes (see *MWN*, M/J98).

◆ The scientific panel assembled by the Massachusetts Department of Public Health to address concerns about the U.S. Air Force's PAVE PAWS missile defense radar on Cape Cod held its first public meeting on February 16 (see *MWN*, N/D98). For information, contact Kevin Costas at (617) 624-5757.

◆ The court date for the challenge to the FCC's limits for RF/MW exposure, which was slated for mid-January, has been postponed yet again (see *MWN*, N/D97 and N/D98). It is now scheduled for April 5.

As We Go to Press

◆ ◆ On February 11, wireless carrier Nextel Communications Inc. announced that it will sell its cellular towers—some 2,000 sites—to SpectraSite Communications Inc. for 17% of SpectraSite's stock and $560 million. Nextel plans to lease space for its antennas from SpectraSite (see p.2). ◆ ◆

VIEWS ON THE NEWS

The Action Moves to Europe

The U.S. government is getting ready to bury the EMF issue (see p.7)—at the same time that the European Parliament is discussing prudent avoidance measures like ALARA (see p.1). The European Union is also likely to fund important studies on cellular phone safety (see p.2)—studies that the U.S.'s WTR has not carried out in six years, with a budget of over $25 million.

There's no doubt about it. On power line EMFs, on cellular phone safety—the action has moved to Europe. But will Europe avoid the mistakes made in the U.S.? Right now it's hard to say.

The debate in the European Parliament is encouraging: The issue of EMF health effects has been placed in a public health context. In America, it has more often been treated as a battle best left to individuals and their lawyers.

The U.S. is so averse to regulation of business activity that the standard response to an uncertain level of danger to public health is to do nothing. In America, industry is generally given the benefit of the doubt. Unfortunately, this too often means that the public ends up serving as guinea pigs, even when low-cost precautionary measures are available.

The European Parliament holds out the possibility of a better approach. The substantial support for ALARA points to a different relationship between public health, private profit and uncertainty. Europe is at least considering a more intelligent response to an uncertain level of risk: "be careful," rather than "do nothing." Ironically, the idea of prudent avoidance was born in the U.S., at Carnegie Mellon University. But it seems to have taken firmer root across the Atlantic.

Uncertainties about health effects can only be resolved through more research. In the U.S., that research has been badly handled. Research on cellular phone safety, for example, has been left in the hands of industry. The result has been a lot of delay, little science and too much spin.

Unfortunately, Europe does appear to be flirting with one of the worst American errors. Two years ago an EC expert group called for a "fire wall" to prevent industry from influencing "the choice of research studies funded, the conduct or the outcome of such studies" (see *MWN*, M/A97). That is a good description of what is needed—but the idea has now been abandoned.

Instead, it has been left to industry to define what a wireless health research plan should cover. And even though half the funding will be public, corporations might be able to restrict researchers' discussion of results prior to publication. Corporate PR departments could then be guaranteed advance notice of troublesome findings, the better to spin the news.

The phone manufacturers say they do not want industry to influence the course of research. They argue that their research agenda is based on that of the WHO, and point out that a WHO panel is to decide which labs will take part.

But the WHO's EMF project has shown that it is not independent of corporations or the military. After a conference on mobile phone safety in Austria, an industry representative escorted the head of the WHO project, Dr. Michael Repacholi, to a meeting with the press at which he downplayed the concerns raised at the conference (see *MWN*, N/D98). The U.S. military has had too much influence on the WHO project's deliberations (see *MWN*, M/A97 and M/J97). And when Repacholi himself found that mobile phone radiation was linked to an increased cancer risk, he gave the experimental results to his corporate sponsor, Telstra, several months before they were made public (see *MWN*, M/J97 and J/A97).

Concerned about this sort of coziness with vested interests, we urged the EC not to delegate its wireless research effort to the WHO. Repacholi responded that, "WHO has neither the resources nor the desire to run such a program" (see *MWN*, M/A97 and M/J97). But now industry is following the WHO's lead on which studies to conduct, and the WHO will choose the labs to conduct them. True, the WHO is not "running" the program; that has been left to the cellular phone industry itself.

European citizens should be uneasy about this sort of corporate influence over research. When scientists receive public funds, private interests must not be allowed to restrict when or how results can be discussed. In each country and Europe-wide, health officials must define and support their own research agendas on non-ionizing radiation. It should not be left to industry to choose which studies are needed to assure the safety of the public.

The U.S has fumbled the issue of non-ionizing radiation and public health. We hope that Europe finds a better way.

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In the past, we have taken Dr. George Carlo to task for his claim that Wireless Technology Research was "moving at the speed of light" (see *MWN*, M/A98). But on February 18, the *New York Times* reported that a Harvard University physics team has succeeded in slowing light down to a speed of 38 miles per hour. According to the *Times*, the team expects "to slow the pace of light still further, to a glacial 120 feet an hour—about the speed of a tortoise." Thus, Carlo's claim may soon prove to be correct.

Wertheimer Wins BEMS Award

We are pleased to report that Dr. Nancy Wertheimer will receive the d'Arsonval Award, the highest honor of the Bioelectromagnetics Society (BEMS). The presentation will be made at the BEMS annual meeting, to be held in Long Beach, CA, in June. Wertheimer is best known for her 1979 hypothesis linking power line EMFs to childhood cancer. Based in Boulder, CO, she has long collaborated with Ed Leeper.

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