MICRO WAVE NEWS

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INSIDE...

EPA Phasing Out NIER Program; No RF/MW Guidance Planned

The Environmental Protection Agency (EPA) is closing down its non-ionizing electromagnetic radiation (NIER) program and, following a decade-long effort, no longer plans to issue federal guidelines for public exposures to radiofrequency and microwave (RF/MW) radiation.

On September 29, Richard Guimond, the director of EPA's Office of Radiation Programs (ORP), sent letters to the 17 members of the RF/MW interagency working group notifying them that EPA will not issue exposure limits in fiscal years 1989 and 1990 (FY89 and FY90).

"It was a tough decision to make," Guimond told *Microwave News*, "but we had to set priorities. We have been plagued with the problem of too many issues and too few resources." He explained that "stronger evidence of a health problem" would be needed to justify continuing the NIER program, as well as a legislative mandate to address NIER.

EPA officials maintain that there is no constituency for NIER guidelines. But one staffer commented, "If there *is* a constituency, it may surface now." He added that EPA had continued the program "because it was the 'right' thing to do, not because we had to do it."

Government and corporate officials alike expressed surprise and disappointment at the EPA decision. "It's a crying shame after so many people worked so long and so hard. The broadcast and communications industry has consistently screamed for a national guideline for exposure and now EPA is walking away from the issue," said Richard Tell, the former chief

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$66.5 Million Marcy-South Power Line Trial Underway

On September 8, the Marcy-South trial, arguably the most important power line litigation since the Houston Lighting–Klein School case, began in a small courtroom in Goshen, NY. The landmark case, which pits 58 landowners against the New York Power Authority (NYPA), may turn out to be the most expensive as well—in terms of both trial costs and possible awards.

The landowners are suing NYPA for $66.5 million in damages, claiming that the 345-kV power line has created a "cancer corridor" that has destroyed the market value of the land surrounding it, according to their attorney, Jack McBride of Gurda, McBride, Isseks & Smith in Middletown, NY (see *MWN*, M/A87 and M/J88).

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Swedish PMF Studies Again Show Teratological Effects

A new set of Swedish experiments again points to the biological activity of weak pulsed magnetic fields (PMFs). Preliminary data from Dr. Hakon Frölen's laboratory at the Swedish University of Agricultural Sciences in Uppsala support findings he reported last year which showed that PMFs can cause significant increases in fetal death and resorptions (fetal losses) among pregnant mice (see *MWN*, J/A87).

"The interesting result is that PMFs can influence a biological system," Frölen told *Microwave News*. "I did not think it was possible." He went on to say that, "The fetus is most sensitive to PMFs in the early stages of pregnancy."

Swedish researchers acquainted with Frölen's results commented that the effect was now established: "Now we must find out the interaction mechanism," said Dr. Kjell Hansson-Mild of the National Institute of Occupational Health in Umea.

At the National Institute of Radiation Protection (NIRP) in Stockholm, which sponsored Frölen's work, Lars-Erik Paulsson said that further studies were planned both in Frölen's lab and in that of Dr. Bernhard Tribukait at the Karolinska Institute, also in Stockholm.

In 1986, Tribukait showed that PMFs can cause serious malformations among pregnant mice (see *MWN*, M/A86 and M/J86). Frölen said that he too had found an increase in malformations but that it was not statistically significant.

Asked about the implications of his results for pregnant video display terminal (VDT) operators, Frölen said, "I don't think that they are at risk from VDT magnetic fields." He explained that women usually have limited exposure and that the VDT fields are weaker than those he used in his experiment. (See also p.12 for details on new papers related to VDT electromagnetic fields.)

Frölen said that he will next turn his attention to an investigation of whether PMFs can act as cancer promoters.

Frölen's two experiments were identical. In each, he exposed mice for the first 19 days of pregnancy to 15 μT 20 kHz sawtooth PMFs. Each experiment consisted of exposing approximately 3,000 fetuses; there were about 5-6 fetuses to a litter.

Frölen plans to submit a report to the NIRP by the end of the year; a paper in an English-language journal will follow. He said that he would publish the two studies together since the results were so similar.

AMA Investigates EMP

The American Medical Association (AMA) is joining the ranks of those concerned about the effects of electromagnetic pulse (EMP) radiation. A report assessing the EMP risk to medical devices and to hospital operations is scheduled to be presented at the June 1989 meeting of the AMA's governing delegates.

The AMA's Dr. Theodore Doege, who is preparing the EMP report, told *Microwave News* that he is in the process of determining whether a serious problem exists and whether the AMA should recommend precautions. "We are focusing on the vulnerability of electronic medical devices to EMP," he said.

In 1985, the Food and Drug Administration reported that many computerized medical devices are susceptible to electromagnetic interference (see *MWN*, N/D85). The U.S. Army Medical R&D Command has awarded two contracts for the protection of medical devices from EMP (see *MWN*, J/F86 and J/A87).

DOD Confirms Black Hawk Helicopter Susceptible to EMI

The Inspector General (IG) of the Department of Defense (DOD) has confirmed that the U.S. Army's UH-60 Black Hawk helicopter is susceptible to electromagnetic interference (EMI). In a June 1 report, the IG charges that the Black Hawk's EMI vulnerability may constitute a "safety of flight" concern—the Army's highest priority for problems requiring corrective action—and that its investigation into EMI should have been initiated "at least two years ago." The report was spurred in part by Senator Lowell Weicker (R-CT).

The Army's EMI problems are not limited to the Black Hawk. In a second (June 20) report on the Apache helicopter, the IG warns of "an inadequate design for the shielding of EMI effects on all Army helicopters."

The U.S. Senate is also concerned. In a June 24 report (No.100-402) accompanying its 1989 defense appropriation bill, the Appropriations Committee called the Black Hawk's vulnerability to EMI "a serious problem that deserves top-priority attention by the Army leadership." The Senate allocated $2.5 million for an interim upgrade of Black Hawk shielding to U.S. Navy standards and called for the Army to submit a Black Hawk–EMI modification plan by October 1, 1988.

For its part, the Army has now conceded that some Black Hawk subsystems are vulnerable to EMI and it plans to shield the helicopter to withstand electromagnetic fields of up to 200 V/m—the same specifications as the Navy uses for its similar Sea Hawk helicopter. (The Black Hawk is currently designed to operate in fields of up to 20 V/m.) A steering committee made up of Army and Navy staffers has been established to oversee the shielding program.

The IG's Black Hawk report recommends that the Army:

- Analyze the helicopter's overall susceptibility to EMI.
- Complete tests begun—but never finished—at the Vulnerability Assessment Lab (VAL) at the White Sands Missile

Range, NM, so that undetected susceptibilities are identified before any major engineering changes are made.

• Expand current plans for EMI shielding. By restricting its focus to previously identified weaknesses, "the Army appears to be concentrating on the symptom and ignoring the illness."

• Incorporate additional EMI shielding in new production aircraft as well as retrofit existing models and establish a continuing electromagnetic compatibility program for the Black Hawk.

A History of Mishaps

The Army grounded the Black Hawk four times over the last three years to investigate possible design flaws after several fatal crashes—though a number of the incidents still have not been resolved (see *MWN*, N/D87). The latest accident occurred in March, when two Black Hawks collided in midair on a night mission near Fort Campbell, KY, killing 17 soldiers.

In May, after EMI caused the Black Hawk's hydraulic logic module to malfunction and jammed the aircraft's tail-rotor control pedal during test flights in West Germany, the Army sent a classified warning to Black Hawk pilots to stay away from high-powered radio transmitters, according to *Defense News* (May 30) and *Aviation Week* (June 13).

Although the Army does not classify EMI as a safety of flight issue, the Army Safety Center is not so sure, according to the IG report. The center wants to identify the cause of the incidents before structural changes are made.

The IG concurs with the safety center that available test data are not "sufficiently conclusive" and it condemns the "low risk assessment category assigned to the impact of EMI on the Black Hawk."

In the July 7 *Commerce Business Daily*, the Army announced that it will award a sole-source contract to United Technologies Corp.'s Sikorsky Aircraft Division, the manufacturer of the Black Hawk, to investigate "recent field incidents" and the effects of EMI on the helicopter.

FCC Addresses Multiple RF Sources and "Hot Spots"

The Federal Communications Commission (FCC) has proposed new rules to deal with assessing the impact of multiple transmitters of radiofrequency (RF) radiation at one site and to guide the measurement of RF fields. The action came in response to a petition from Hammett & Edison, a consulting engineering firm based in San Francisco, CA (see *MWN*, S/O87).

On September 19, the FCC announced that it wants to create a new category of RF sources to "focus attention on the *major* emitters at a site rather than on low-powered newcomers whose overall effect would be negligible."

The new category would be made up of any new or modified broadcast facilities whose operation would not cause an increase, in any accessible area, of more than 1% of the allowed limits—presently the 1982 American National Standards Institute (ANSI) guidelines. Those transmitters fitting this criterion would be exempt from the FCC's RF rules. For instance, in the 30-300 MHz band, a station that does not contribute 10 $\mu W/cm^2$ would be exempt.

Members of this 1%-or-less class would also be exempt from responsibility for compliance when a number of transmitters cause RF levels to exceed the ANSI limits. Under the proposal, remedial action would be shared among all licensees whose transmitters contribute more than 1% of the limits.

RF Levels in McFarland, CA: None Detected by NIOSH

A survey by the National Institute for Occupational Safety and Health (NIOSH) in McFarland, CA, failed to detect any levels of radiofrequency (RF) radiation above the detection limits of the meters.

NIOSH's Eugene Moss, accompanied by Bob Curtis and Kevin Cummins, both of the Occupational Safety and Health Administration's Salt Lake City, UT, office, made the measurements on May 19 at the request of Dr. Raymond Neutra, the chief of the Epidemiological Studies and Surveillance Section of the California Department of Health Services. Two members of Neutra's staff were also present.

Neutra is in charge of the investigation into the possible cause of a cluster of cancer cases among children living in McFarland. The NIOSH survey came in response to concerns that RF signals from the Voice of America (VOA) station in nearby Delano may play a role in the etiology of the cluster (see *MWN*, J/F88).

Moss's group took measurements at five locations in McFarland using a Holaday Model 3001 electric field probe with a lowest meter indication level (LMIL) of 5 V^2/m^2 and a Model 3002 magnetic field probe with an LMIL of 0.005 A^2/m^2. The equivalent power densities for these electric and magnetic field LMILs are 1.3 $\mu W/cm^2$ and 190 $\mu W/cm^2$, respectively. An electric field level of 25 V^2/m^2 was measured at the fence of the VOA station. Body currents were also measured, but none were detected.

In addition, Moss checked the microwave radiation levels using a Narda Model 8616 monitor fitted with an 8621D isotropic probe, which has an LIML of 0.01 mW/cm^2. No detectable signals were identified.

The Environmental Protection Agency will send a measurement team to McFarland later this fall (see *MWN*, J/A88).

Dane Ericksen of Hammett & Edison said that he was "pleased" with the FCC decision. Although he had asked for a 5% exemption criterion, he said that he "could live with 1%." Ericksen said his firm had filed the petition because the problem of small sources came up "repeatedly." As an example, he cited the case of a small college station adding a transmitter on Mount Wilson (outside Los Angeles), where there are already 28 high-powered stations.

The FCC explained that the Environmental Protection Agency (EPA) had argued against the 5% proposal because a 50 $\mu W/cm^2$ contribution is "not trivial" and the commission agreed that it is a "significant amount."

The proposal is part of the commission's continuing process of determining how to implement its responsibilities under the National Environmental Policy Act, which, under certain circumstances, can require the preparation of environmental impact statements (see *MWN*, A85, M/A87, J/F88 and J/A88).

Measurement Distance from Re-Radiators

The petition, which was originally filed on July 15, 1987, also requested clarification on how to measure fields near re-radiating conductive objects that can create "hot spots." The FCC recommended a separation distance of "at least 10-20 cm" between the sensing element of a measuring device and a conductive object in order to get data relevant to whole-body exposures.

The FCC's Dr. Robert Cleveland said that this distance was based on the comments received on the petition and on the EPA's recommendation of 10 cm (see *Federal Register*, July 30, 1986, p.27,333). He stressed that the commission still wants both average and maximum values to be reported.

At press time, the FCC's official proposal had not yet been released. A 60-day comment period will follow its announcement in the *Federal Register*. For more information, contact: Dr. Robert Cleveland, FCC, 1919 M Street, NW, Washington, DC 20554, (202) 653-8169.

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Swedish Agency Sets Limits for VDT Magnetic Fields

The Swedish Telecommunications Administration (STA), the nation's largest purchaser and user of video display terminals (VDTs), has set stringent electromagnetic standards for the purchase of all new terminals. In an interview with *Microwave News*, STA scientist Dr. Olov Ostberg also noted that the agency will retrofit existing terminals at a cost of $500 each for its heavy VDT users, namely 3,500 directory assistance operators.

The STA requires a maximum time rate of change of the magnetic field of 25 mT/s at a distance of 50 cm from any point around the set. At present, there is no specific limit for the maximum magnetic field. For most VDTs, the limit for the time rate of change is approximately equivalent to a maximum magnetic field of 50 nT (peak-to-peak), according to Lars-Erik Paulsson of Sweden's National Institute of Radiation Protection (NIRP).

These limits are stricter than those recommended by Swedish government officials in 1986. At that time, a maximum time rate of change of the magnetic field of 50 mT/s was recommended; a maximum magnetic field of 200 nT was also specified.

The STA calls for a maximum surface potential of 500 V—this limit was derived from the previous 1 kV/m guideline for electrostatic charge, according to Paulsson.

Sweden is the only country with guidelines for VDT magnetic fields.

JVC Designs Low Magnetic Field VDT

Four or five companies are now either selling or planning to introduce low magnetic field terminals that will meet the STA's requirements, but only one color set can do so. JVC, the Japanese electronics giant, has designed the unit and TeleNova, a subsidiary of the STA, is marketing it in Sweden.

The specifications sheet for the JVC-TeleNova terminal states that the time rate of change of its magnetic field is 8-12 mT/s at 30 cm from the screen, its magnetic field is 16-24 nT at the same distance and the surface potential is less than 500 V. The NIRP has certified that the unit meets the STA guidelines, Ostberg said.

The JVC-TeleNova unit, which costs approximately 9,000 Swedish crowns (less than $1,400), does not generate a counterbalancing magnetic field to produce a low field at the operator position, as do many of the early low-field VDTs. Rather, the electronics were entirely redesigned to reduce the field.

Contrary to expectations, the JVC-TeleNova model enhances—rather than impairs—readability. "It's a success story," Ostberg said. "When JVC redesigned the set to reduce the magnetic field, it also improved the picture quality."

Another large purchaser of VDTs, the Swedish Agency for Administrative Development, publishes a yearly list of terminals that meet its criteria for radiation, picture quality and other factors. Government agencies must choose from among this list of approved units, Ostberg said.

« Power Line Talk »

The program for the upcoming **annual review of DOE and EPRI's research on power line bioeffects** leaves little doubt that cancer is on everybody's mind. EPRI has recruited some of the leading experts to speak at a special **tutorial on cancer biology and EMFs** on October 30, the day before the review gets under way. For instance, Dr. Russell Reiter will talk about the role of the endocrine system and Dr. Thomas Slaga will describe current theories on cancer promotion. With respect to the EMF-cancer link, EPRI has tapped two well-known members of the ELF community, Drs. Tom Tenforde and Bill Kaune. Tenforde recently joined Battelle and Kaune is a recent Battelle alumnus. The next morning, Dr. Ross Adey will present an overview of the general cancer problem; members of his lab in Loma Linda, CA, will follow with updates on their latest experimental results. Dr. Reba Goodman will then review her latest findings on oncogene activation by EMFs. The meeting will close with a number of progress reports on the various epidemiological studies now underway in the U.S., U.K., Sweden and Taiwan.

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The **cyclotron resonance hypothesis** is going to be tested again. The DOE has funded a group at the University of Rochester in New York to repeat Drs. **Abe Liboff** and **John Thomas**'s 1984 experiment which showed that weak magnetic fields can have profound effects on rat behavior if the static and time-varying magnetic fields are tuned to cyclotron resonance conditions (see *MWN*, N84 and J/A88). Drs. **Sander Stern** and **Victor Laties** at the university's Environmental Health Sciences Center have been awarded a two-year, $170,000 contract to replicate the study and, if possible, extend it. In a telephone interview, Stern said that his interest in repeating the study was prompted by the "reliability and magnitude" of the original result. For his part, Liboff hopes that the Rochester group will not stop at replication. He explained that his research was discontinued because of a funding cutoff, even though "there were many aspects involving this phenomenon that were crying out to be done." In their experiment, Liboff and Thomas tuned their exposure system to the cyclotron resonance frequency of the lithium ion—leading some observers to ask: "Where's the lithium?" Dr. **Bob Smith** of the VA Hospital in Kansas City, MO, has an answer. In the next issue of *Bioelectromagnetics* (Vol.9, No.4), Smith writes that lithium is indeed a normal and a "conserved" element in mammalian tissues, especially in the neuroendocrine organs.

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EPRI is sponsoring a special workshop on **circadian rhythmicity and EMFs** next February in Boston, MA. Dr. **Martin Moore-Ede** at Harvard University's Institute for Circadian Physiology has received $101,000 to organize the meeting, with the objective of reviewing current research and outlining future needs. Attendance is by invitation only.

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In its August 22 issue, ***Newsweek*** told the public what utility professionals have long known: There is a virtual moratorium in the U.S. on building new high-voltage power lines because of "community opposition and environmental worries." In an article on electrical power transfers—utilities with power deficits buying from those with surpluses—the magazine noted that building new lines, the most obvious solution for dealing with the increased demand, is "pretty much out of the question." What's to be done? Three opinions will be presented in the next issue (Winter) of ***Forum for Applied Research and Public Policy,*** a quarterly published by the University of Tennessee with help from the TVA. Research is on everybody's list—though there is some difference of opinion on how long it will take to get some answers. In one article, Dr. **Keith Florig** of Carnegie-Mellon University writes, "Uncertainties about the health effects of power-frequency fields are likely to be with us for some time." In contrast, EPRI's Dr. **Leonard Sagan** is more optimistic: "It is likely that answers will emerge in the next few years." Dr. **David Carpenter** makes a strong case for more money to be given to the "best available scientists," and adds that the research should be "administered and interpreted by cancer and health authorities who have no relation to the financial interests of the utilities."

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A panel of experts set up by the **International Electric Research Exchange**, a consortium of national agencies, has prepared a report assessing 17 epidemiological studies, primarily related to cancer incidence among those exposed to EMFs. **EPRI** is distributing copies to its members, but refuses to release the report to the public.

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The **Public Service Commission (PSC) of Wisconsin** is considering innovative solutions for reducing power line EMFs. At a September 14-16 hearing, various suggestions were proposed, including requiring local utilities to estimate magnetic fields for a number of different configurations before a new line could be approved, according to Michael Jaeger, director of environmental analysis for the PSC. Also discussed was the possibility of utility-sponsored bioeffects studies, similar to those completed in New York and planned in California (see p.7). Among those appearing at the hearing

were Dr. **Leonard Sagan** of EPRI, Dr. **David Carpenter** of the New York Department of Health, **Dan Driscoll** of the New York PSC and **Robert Banks**, a consultant based in Minneapolis, MN. At the hearing, it emerged that line workers at one local utility who had seen EPRI video tapes on magnetic fields said that they were not worried about potential health risks, but that they would become concerned if future studies demonstrated a stronger association. Most of them said that they had already learned of potential problems from the news media and from previous safety meetings. According to the utility, the majority of the workers do not favor showing the tapes to the public because they "raise far more questions than they answer" and therefore, could be "more of a problem than a help."

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Angry parents in **Boca Raton, Florida**, are up in arms over the Palm Beach County school board's plans to open an elementary school within 230 feet of five power lines, and they have organized **Citizens Endorsing a Safer Environment (CEASE)** to mobilize public opinion to their side. Having succeeded in prompting an EMF review, CEASE is now critical of the one issued by Dr. Bernard Kimmel, a West Palm Beach physician hired by the board. In his report, Kimmel states that, "At present there is absolutely no scientific evidence that EMFs can cause cancer, either in adults or children" and recommends that the school be completed in "a timely fashion." But Kimmel also writes that, "It is probable that EMFs do have effects on the human body in various ways, many of which are not understood and all of which need further study." He then goes on to suggest that, in the future, the board locate schools and playgrounds as far as possible from power line rights-of-way and, whenever possible, bury transmission and distribution lines. CEASE President Phyllis Atler thinks Kimmel's report is contradictory: "How can he say that there is no health risk to our children from power line EMFs and then recommend that the school board bury the lines? If it's safe, why take precautions?" Atler claims that some parents, herself included, will keep their children at home rather than send them to the school. In the meantime, the board has scheduled a workshop for October 26 and will invite expert witnesses. Among the speakers suggested by Kimmel are many who have already appeared at the marathon hearings held by the state Department of Environmental Regulation over the last few years and others who are testifying on behalf of the New York Power Authority at the Marcy-South trial in New York (see p.1).

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The hearing room will be crowded next March 27-31, when the **Maryland Public Service Commission** holds hearings on ELF health effects. The proceeding will be the latest in **Potomac Electric Power Company's (PEPCO)** 12-year legal effort to build an 11.2-mile 500 kV power line (see *MWN*, M/A88). PEPCO's testimony is due on October 14. Dr. **Margaret Tucker** of the National Cancer Institute's Environmental Epidemiology Branch in Bethesda, MD, will probably be the company's witness, but PEPCO would not confirm this and Tucker did not return numerous phone calls requesting comment. (Tucker has testified on behalf of PEPCO in the past, and she will testify for the NY Power Authority at the Marcy-South trial on October 13 and will later appear in federal court on behalf of the Mississippi Power Company in another trial.) Meanwhile, the **Maryland People's Counsel** (MPC), which represents the interests of state residents, has hired Dr. **Charles Polk**, a professor of electrical engineering at the University of Rhode Island. According to the MPC's Kirsten Burger, Polk will present the health effects case. The Department of Natural Resources' Division of Power Plant and Environmental Review will also be at the hearing and is negotiating with Dr. **Bill Bailey** of ERI in New York City to present its case. **Thomas Magette**, administrator of site evaluation, said the agency favors approval of the line but will not take a position at the hearing. "More research should be done, but it's not necessary to justify the line; the need outweighs the risks, which are very small," he said. Among the other intervenors are the Brighton Community Association, local landowners and Howard County which rejected PEPCO's zoning application. PEPCO is now appealing that decision in the county circuit court of appeals.

Overhead vs. Underground Lines: Field Levels and Costs

The panel examining the proposed 220 kV Brunswick-Richmond line in Victoria, Australia, has compared the magnetic field levels and costs associated with different types of overhead and underground power lines (see *MWN*, M/A88 and J/A88).

Using the disputed line as a model for its calculations, the panel found that, for a typical load of 600 A, the maximum magnetic fields near each type of line are approximately the same—40 mG from a single circuit overhead line and 48 mG from an underground cable. For extreme loadings of 2,890 A, the fields can be as high as 193 mG and 231 mG for overhead and underground lines, respectively.

The magnetic field from an underground cable dissipates more rapidly than the field from an overhead line. At 50 meters from a single circuit overhead 600 A line, the field is 2.8 mG, but it is only 0.25 mG for an underground cable.

The panel released a report on May 30 which spells out the various alternatives and explains the trade-offs between field levels and costs. Burying a line, for example, can increase the cost by a factor of from five to seven. Panel members include representatives from the State Electricity Commission of Victoria

(SECV), which is trying to build the line, and from the government, unions and community groups.

For overhead lines, a double circuit design can approximately halve the magnetic field level, but at an added cost of 12%—excluding the cost of the extra easement. For underground cables, the cost depends on the spacing of the conductors and on how the cables are placed in the trenches.

The panel's well-illustrated report, *Electromagnetic Fields from Overhead Transmission Lines and Underground Cables*, sets out the alternatives in clearly written English. The chairman of the panel is Associate Professor W.J. Bonwick of the Department of Electrical and Computer Systems Engineering at Monash University in Clayton, Victoria.

According to its work plan, dated July 1988, the panel is scheduled to make recommendations to the Victoria government in April 1989.

SIDS: A Melatonin Effect?

Sudden Infant Death Syndrome (SIDS) may be linked to fluctuations in levels of melatonin, a hormone produced by the pineal gland.

The mysterious killer has long defied explanation. Now, researchers from the Rhode Island Medical Examiner's office in Providence and from the Massachusetts Institute of Technology (MIT) in Cambridge think they may have an important clue. "There was a disparity of melatonin levels among babies who died of SIDS as compared to those who died from other causes," Dr. William Sturner, Rhode Island's Chief Medical Examiner, told *Microwave News*. "The SIDS babies' melatonin levels were severely depressed." The cause of the suppression is unknown—but a number of stimuli *are* known to suppress melatonin production, including daylight, stress, alcohol and electromagnetic fields (EMFs). Studies linking low-level EMFs to melatonin inhibition were carried out at the Battelle Pacific Northwest Labs in Richland, WA (see *MWN*, M/J88).

After looking at the levels of melatonin in the blood and cerebrospinal fluid (CSF) among a group of SIDS victims, Sturner and his colleagues from MIT found that many of the babies had dramatically low levels of melatonin. Interestingly, most SIDS babies die at night, when melatonin levels are normally elevated, but even those who died during the day had lower levels than expected, Sturner observed. "We targeted melatonin for investigation because of its role as a sleep regulator," he said. Sturner is currently preparing his results for publication.

SIDS and Waterbeds

In a letter to the *New England Journal of Medicine* (June 23, 1988), researchers from the University of Wisconsin in Madison and from the Sudden Infant Death Center in Minneapolis, MN, report six SIDS cases in which the infants died on electrically-heated water beds. They attribute their findings to the possibility that the infants were unable to lift up their heads to breathe.

The issue of sleeping position and its possible relationship to SIDS has also been discussed in the pages of *The Lancet*. In the July 9 issue, researchers from the University of Sheffield Medical School in the U.K. and from the University of Tasmania in Australia report finding an association between babies who slept on their stomachs and SIDS. Responding in the August 27 issue, a researcher at the Adelaide Children's Hospital in South Australia writes that after examining the data of SIDS fatalities, she found that significantly fewer SIDS infants slept supine than did controls.

CA EMF Health Effects Bill Signed into Law

On September 29, California Governor George Deukmejian signed into law a bill requiring state utilities to fund a two-year, $2 million research project on the effects of electromagnetic fields. These funds are in addition to $100,000 already allocated in the governor's current budget (see *MWN*, M/J88).

The initiative, prompted by the results of the New York Power Lines Project, will allow for an independent evaluation of health risks. All electrical utilities with revenues over $25 million will help finance the research.

The new law, chapter 1551, which was proposed by Senator Herschel Rosenthal, calls for the Public Utilities Commission and the Department of Health Services to run the project as a joint effort. The agencies must submit a status report by December 1, 1990.

Copies of the law are available from: Senate Energy Committee, Room 2035, State Capitol, Sacramento, CA 95814, (916) 445-9764.

"Nine Farm" Study on Stray Voltage and Dairy Cows

In Wisconsin, dairy production losses have prompted a new look at stray voltage on the farm. A recent "nine farm" study prepared by the Stray Voltage Analysis Team (SVAT) —a state-appointed voluntary group of farmers, utility representatives and veterinarians—recommends that farmers experiencing milk production problems consult with utilities to find workable solutions. (Livestock ailments are also associated with stray voltage.)

Among the SVAT's recommendations are that utilities improve existing primary electrical systems by adding grounding rods to the neutral conductors and that power line wiring

be aboveground for easy inspection. For farmers, the SVAT advises periodic assessments of their electrical systems and regular communication with utility representatives.

Although the SVAT describes the volunteer effort as "successful" on an individual farm basis, it calls for future studies to be more formally organized and coordinated.

The report was submitted to the Stray Voltage Task Force of the Wisconsin Department of Agriculture, Trade & Consumer Protection and to the Wisconsin Public Service Commission. The task force was set up in January 1987.

For more information, contact: Bob Ehart, Executive Assistant, Wisconsin Department of Agriculture, Trade & Consumer Protection, 801 West Badger Road, PO Box 8911, Madison, WI 53708, (608) 267-9423. The report was initially released in November 1987 and was reprinted in the spring.

DOE EMF Bioeffects Budget Set at $3 Million

The U.S. Congress has allocated $3 million for ELF bioeffects research at the Department of Energy (DOE) for fiscal year 1989 (FY89), according to DOE's Dr. Imre Gyuk. The Reagan Administration had initially requested $2.2 million, and the House of Representatives had proposed $4 million (see *MWN*, M/J88). A House-Senate conference reached the $3 million compromise and, to the surprise of many, the final budget bill was signed on time —as FY89 began October 1.

The budget will allow the DOE to continue with its current programs, said Gyuk, a program manager at DOE's Office of Energy, Storage and Distribution. He admitted that he had hoped for more: "It would have given us elbowroom to initiate new research initiatives—this program is clearly in the national interest." He dismissed the $2.2 million request as unrealistic; it would have forced "considerable cuts."

New Research Papers

W. Ross Adey, "Cell Membranes: The Electromagnetic Environment and Cancer Promotion," *Neurochemical Research, 13*, pp.671-677, 1988.

A general overview of Adey's research leading to the conclusion that "cancer promotion may involve a distorted inward signal stream from cell membranes to intracellular organelles, including the nucleus."

Robert Banks, F.S. Perry and L. Pearl, "Letters to the Editor," *Public Health, 102*, pp.393-394, 1988.

An exchange of views on Perry and Pearl's paper linking depression to ELF exposure in high-rise buildings (see *MWN*, N/D87 and M/J88).

Frank S. Barnes, "Mechanism of Interaction of Magnetic Fields with Biological Systems," *IEEE Transactions on Magnetics, 24*, pp. 2101-2104, July 1988.

A short introduction to possible mechanisms, with some order-of-magnitude calculations, especially with respect to environmental and occupational exposures.

Robert O. Becker, "Comments on 'Biological Effects of Power Line Fields,' " *Journal of Bioelectricity, 7*, pp.103-118, 1988.

Critique and review of the final report of the New York State Power Lines Project (see *MWN*, J/A87).

Carl F. Blackman et al., "Effect of Ambient Levels of Power-Line-Frequency Electric Fields on a Developing Vertebrate," *Bioelectromagnetics, 9*, pp.129-140, 1988.

These intriguing experimental results, first reported in 1986 (see *MWN*, J/F87), show that 10 V/m (rms) E-fields—a level "typically found inside buildings"—can have an effect on brain tissue. For eggs exposed to 60 Hz EMFs during incubation, the chick brains responded to 50 Hz, but not to 60 Hz, fields. For eggs exposed to 50 Hz, the chick brains did not respond to either 50 or 60 Hz fields.

Joseph D. Bowman et al., "Exposures to Extremely Low Frequency (ELF) Electromagnetic Fields in Occupations with Elevated Leukemia Rates," *Applied Industrial Hygiene, 3*, pp.189-194, June 1988.

Measurement data from the team at the University of Southern California (see *MWN*, J/F88).

Craig V. Byus et al., "Increased Ornithine Decarboxylase Activity in Cultured Cells Exposed to Low Energy Modulated Microwave Fields and Phorbol Ester Tumor Promoters," *Cancer Research, 48*, pp.4222-4226, August 1, 1988.

This, the second EMF-ornithine decarboxylase (ODC) paper, shows that cells respond not only to 60 Hz fields, but also to 450 MHz radiation amplitude modulated at 16 Hz. 60 or 100 Hz modulations were not effective, however (see *MWN*, N/D87).

H. Keith Florig and M. Granger Morgan, "Measurements of Housing Density Along Transmission Lines," *Bioelectromagnetics, 9*, pp.87-93, 1988.

Based on aerial photographs, the density of houses within 200 m of high- and low-voltage power lines was found to be smaller than in the rest of the service area, to increase with distance from the line and to be inversely correlated with line voltage.

Jukka Juutilainen, Esa Läära and Keijo Saali, "Relationship Between Field Strength and Abnormal Development in Chick Embryos Exposed to 50 Hz Magnetic Fields," *International Journal of Radiation Biology, 52*, pp.787-793, 1987.

This Finnish team found a strong suggestion of a "sharp threshold" between 0.9 and 1 A/m (1.1-1.3 μT) for the abnormal development of chick eggs exposed to 50 Hz sinusoidal H-fields. This threshold effect is not explainable by induced currents. (See also *MWN*, M/J86.)

J. Juutilainen, E. Pukkala and E. Läära, "Results of Epidemiological Cancer Study Among Electrical Workers in Finland," *Journal of Bioelectricity, 7*, pp.119-121, 1988.

Final data from the study, which shows an increased rate of cancer among Finnish electrical workers (see *MWN*, M/A87).

William T. Kaune and William C. Forsythe, "Current Densities Induced in Swine and Rat Models by Power-Frequency Electric

Fields," *Bioelectromagnetics, 9*, pp.1-24, 1988.

Dosimetry data for models of swine and rats exposed to E-fields, which, the authors believe, will provide an improved rationale for extrapolating biological data across species.

Bengt Knave and Birgitta Floderus, "Exposure to Low-Frequency Electromagnetic Fields—A Health Hazard?" *Scandinavian Journal of Work, Environment & Health, 14*, pp.46-48, 1988.

A brief overview of ELF cancer studies with special emphasis on the two major Swedish epidemiological projects underway (see *MWN*, M/J87).

John R. Lymangrover et al., "Direct Power-Frequency Electric Field Effects on Mammalian Endocrine Tissue," *Environmental Research, 43*, pp.157-167, 1987.

In vitro 60 Hz E-field exposure significantly enhanced the steroidogenic response of rat adrenocortical tissue. The overall conclusion is that there are possible "optimum field intensities and exposure durations for each bioeffect."

M. Malter et al., "Tumoricidal Cells Increased by Pulsating Magnetic Field," *Anticancer Research, 7*, pp.391-394, 1987.

50 Hz H-fields were found to enhance the tumor-destroying activities of "killer" white cells in rat livers *in vitro*. Leukemia cells of mice were "insensitive" to H-fields.

M. Granger Morgan et al., "Controlling Exposure to Transmission Line Electromagnetic Fields: A Regulatory Approach That is Compatible with the Available Science," *Public Utilities Fortnightly*, pp.49-58, March 17, 1988.

The authors propose an economic incentive strategy for reducing the number of people exposed to power line EMFs: charging utilities an "exposure fee" for each individual living within a set distance from a line to encourage siting new power lines as far away from the public as possible.

I. Nordenson et al., "Chromosomal Effects in Lymphocytes of 400 kV-Substation Workers," *Radiation and Environmental Biophysics, 27*, pp.39-47, 1988.

A replication of Nordenson's 1984 study, this report also shows a significantly increased rate of chromosomal aberrations in blood cells of substation workers exposed to EMFs and spark discharges.

Koichi Shimizu, Hideto Endo and Goro Matsumoto, "Visualization of Electric Fields Around a Biological Body," *IEEE Transactions on Biomedical Engineering, 35*, pp.296-302, May 1988.

Describes a system to visualize the ELF E-fields surrounding complex shapes, such as biological bodies, using an optical sensor and a microcomputer-controlled automatic scanner, to help the study of bioeffects.

R.M. Stern, "Cancer Incidence Among Welders: Possible Effects of Exposure to Extremely Low Frequency Electromagnetic Radiation (ELF) and to Welding Fumes," *Environmental Health Perspectives, 76*, pp.221-229, December 1987.

Stern, formerly with the Danish Welding Institute and now with the WHO in Copenhagen, found a higher than expected incidence of respiratory tract cancer, but not of leukemia or acute leukemia among welders who are routinely exposed to ELF H-fields and to metallic aerosols. He concludes that his finding "does not support the hypothesis that the observed excess risk for leukemia or acute leukemia among workers in the electrical trades is due to their ELF exposure, which on average is lower than that of welders."

FROM THE FIELD

Boeing Memo on EMP

The following memorandum was released during the discovery phase of Robert Strom's claim for workers' compensation and lawsuit against the Boeing Co., in which he argues that exposure to electromagnetic pulse (EMP) radiation caused him to develop leukemia (see MWN, *J/A88).*

October 4, 1979

To: Jack Gebhart

From: William E. Morgan, Chief, Radiation Health Protection

Subject: EMP exposure limits for Boeing personnel

Because of the unknown factors associated with the biological effects of electromagnetic pulse (EMP) radiation, the Boeing Company has taken a conservative stand on the maximum permissible exposure limits.

We do not believe that an exposure limit should only be based on the "thermal" effects of RF radiation absorbed in the body. This becomes more evident from indications that the whole chemical balance within the body is disturbed by the electromagnetic field of the peak radiation.

The non-thermal effects must be included in any safe level established for personnel. Until firm data is produced as to the effect of the electromagnetic pulse on the body, Boeing personnel will be exposed only to the following limits:

A. Chronic Exposure Level

The chronic exposure level should be maintained at *less than 5 kV/m for continuous exposure of 40 hours per week.* The pulses should be limited to *one pulse per minute.*

B. Acute Exposure Level

An acute exposure level on an intermittent basis should be maintained at *less than 50 kV/m* when responsible engineering controls or administrative procedures cannot limit exposures to less than 5 kV/m.

C. General Population Exposure Level

The general population exposure level should be maintained at *less than 1 kV/m for continuous exposure.*

Baseline physical examinations should be given to all Boeing personnel who are planning to be chronically exposed to EMP radiation over a period of 30 days. Baseline exams should also be given to anyone who could possibly have an acute exposure to the EMP radiation.

UPDATES

BIOLOGICAL EFFECTS

RF and Endocrine Glands... Soviet researchers have detected subtle changes in the membranes and in the glycoprotein-polysaccharide cell walls of rabbits whose endocrine glands were exposed to 460 MHz radiation at local SARs of 6.2-20.8 W/Kg. "Our experiments demonstrated the high sensitivity of the thymus cells to EM emissions, both with exposure of the thymus itself and with the action of [RF] on separate parts of the hormone regulatory system," said Dr. V.M. Bogolyubov. Bogolyubov and coworkers at the Ministry of Health in Moscow found that, after adrenal gland exposure, "changes in the thymocyte cell membrane are preceded by changes in the cell nucleus." Their paper appears in the July 1988 issue of *Radiation Research* (*115*, pp.44-53).

COMPATIBILITY & INTERFERENCE

Pacemaker EMI... Much has been done to protect cardiac pacemakers from EMI, but some units are still unable to reject powerful signals with characteristics similar to those generated by the heart, cautions an advisory prepared by the Canadian Centre for Occupational Health and Safety's (CCOHS) Physical Hazards Group. For instance, pacemakers may be susceptible to EMFs from high-voltage power lines, theft and weapon detectors, high-power antennas and NMR imagers. Strong fields may cause pacemakers to reject normal cardiac signals and pace in competition—rather than in coordination—with the heart's natural beat. In addition, EMFs can confuse the pacemaker by mimicking cardiac signals. There are no reported cases of EMI causing pacemakers to stop completely, says CCOHS, but interference can also cause dizziness and accelerated heartbeats. The brief report, *Possible Health Hazards for Cardiac Pacemaker Wearers from Exposure to Electromagnetic Fields* (P88-5E), is available in both French and English from: CCOHS, 250 Main St. East, Hamilton, Ontario L8N 1H6, Canada, (416) 572-2981. Single copies are free for Canadians and cost $3.00 (U.S.) for all others. ...With respect to low-power sources such as microwave ovens and electronic security devices, there is little to worry about, *Consumer Reports* advises in its October 1988 issue. (See also *MWN*, J84 and J85 for more on ELF EMI and J/A86 for MRI EMI to pacemakers.)

FCC Actions... The commission has denied a request from Linear Corp. to reconsider its position on RF lighting. Last year, the FCC decided not to go forward with a proposal to regulate emissions below 30 MHz (see *MWN*, M/J86 and N/D87). In a decision issued September 19, the commission said that Linear had not presented any information not previously considered....On August 24, the commission dismissed a petition filed by the Association of Maximum Service Telecasters seeking a second look at the FCC's policy to exempt ISM equipment from the technical requirements of Part 15, subpart J....And on August 17, the FCC's laboratory in Columbia, MD, dismissed applications under Part 15 rules for five computer devices—including one from Toshiba Corp.—because the equipment had been modified.

GOVERNMENT

NBS Becomes NIST... On August 23, the National Bureau of Standards (NBS) was transformed into the National Institute of Standards and Technology by President Reagan when he signed the Omnibus Trade and Competitiveness Act into law. Along with a new name, the institute now has greater responsibilities, including starting a program to assist the transfer of technology to state and local governments and to help government officials set technology policy. The NIST has until December 21 to submit a new organization plan to Congress. No changes in NBS's traditional measurement services are anticipated and, like NBS, NIST will be part of the of Department of Commerce.

INTERNATIONAL

U.K. Report on NIER... Current evidence indicates that "chronic low-level exposure to the non-ionizing radiations appears to be generally harmless," writes Dr. J.M. Harrington in his preface to a report prepared by the Industrial Injuries Advisory Council for the U.K.'s Department of Health and Social Security. But, he adds, the council "accepts that there is concern about the potential long-term effects of some relatively new forms of technology...and will continue to monitor...this area." The December 1987 report addresses various types of NIER—RF/MW and ELF fields from power lines and VDTs—and related health concerns. The report continues to uphold the 10 mW/cm^2 safety standard and points out that, although there is "some evidence associating low intensity RF/MW with cataracts and other eye damage, the risks appear to be limited to higher-than-normal occupational exposures." It further concludes that studies linking chronic low-level RF/MW exposures to a range of health effects, such as headaches and concentration and memory lapses, are inconclusive. With respect to power lines, the report describes the studies linking power lines to childhood cancer as "conflicting," and concludes that, in general, there is insufficient evidence to link EMF exposures to any harmful effects on humans. Similarly, for VDTs, the report finds that, "Recent studies have not shown a causal relation between use of VD[T]s and an increased risk of miscarriage" or any other condition due to EMFs from VDTs. Although possible conditions associated with VDT use include cataracts and eyestrain, facial dermatitis, back problems and repetition strain injuries, these are attributable to factors unrelated to radiation, the report concludes. A copy of the report, *Non-Ionizing Radiation* (CM253), is available for £2.60 from: Her Majesty's Stationery Office (HMSO), Publication Center, PO Box 276, London SW8 5DT, U.K., (01) 622-3316.

IRPA Proceedings... The International Radiation Protection Association's International Non-Ionizing Radiation Committee

(IRPA-INIRC) has published a book assembled for a workshop held as part of IRPA's April 1988 congress (see *MWN*, S/O87). Written by members of the INIRC, the text covers the spectrum from ELF fields through RF/MW radiation to UV radiation and includes reviews of standards and risk perception, as well as a discussion of VDTs. Copies of *Non-Ionizing Radiations: Physical Characteristics, Biological Effects and Health Hazard Assessment*, edited by Dr. Michael Repacholi, are available for $50.00 plus postage and handling from: Dr. Colin Roy, Australian Radiation Lab, Lower Plenty Rd., Yallambie, Victoria 3085, Australia. Invoices will be sent with the book.

MEASUREMENT

EMFs from ESD... The NIST (née NBS, see p.10) has developed a way of measuring the EMFs radiated by electrostatic discharges (ESD). The measurement of ESD EMFs has long been hampered by the lack of commercially available antennas with enough bandwidth to measure fast pulses. Now, institute staffers have overcome the problem—at least for electric fields. Using a new broadband antenna, the NIST's Perry Wilson and coworkers found that the strongest fields are radiated by relatively low-voltage (2-4 kV) discharges. In a new report, *Electromagnetic Fields Radiated from Electrostatic Discharges: Theory and Experiment* (TN 1314), they note that "the spark fields can pose a significant interference threat to electronic equipment into the gigahertz range." The radiated magnetic field could not be measured because there is still no broadband H-sensor. The report is available for $3.50 (prepaid) from: Government Printing Office, Washington, DC 20402; Order No.003-003-02864-9.

Test Sites... You can now rent an anechoic chamber or shielded test room for FCC or antenna testing. Ray Proof Shielding Systems Corp. has introduced a test facility leasing program offering anything from a small TEMPEST room to a full-scale aircraft testing chamber—prices range from $500 to $100,000 a month. For more information, contact: Jim Graham, Ray Proof Shielding Systems Corp., 50 Keeler Ave., PO Box 5060, Norwalk, CT 06856, (203) 838-4555....Ray Proof has also just finished building a 68' x 34' x 28' chamber for IBM's Product Lab in Endicott, NY, for testing computers and other electronic devices....Or you can use the NIST's 28' x 12' x 16' anechoic chamber in Boulder, CO. The Electromagnetic Fields Division has expanded the frequency range for EMI testing, previously 200 MHz-18 GHz, up to 40 GHz. For more information, contact: Galen Koepke, Division 723.03, NIST, Boulder, CO, 80303, (303) 497-5766....In Minnesota, the EMC testing business is also booming. Amador Corp. is launching its third open area test site near Millville, 20 miles northeast of Rochester, where IBM has an office. The 32' x 66' all-weather facility features a 14' remote-control turntable with a capacity of up to 10,000 lbs. For more information, contact: Daniel Hoolihan, Amador Corp., Wild Mountain Road, Taylors Falls, MN 55084, (612) 583-3322.

MEETINGS

Charge and Field Effects... The *International Symposium on Charge and Field Effects in Biosystems* will be held June 4-9, 1989, at Virginia Commonwealth University (VCU) in Richmond. VCU's Dr. Steven Cleary, who is one of the organizers, says that the symposium will bring together—and encourage communication between—various scientific disciplines in the fields of bioelectrochemistry, bioenergetics and bioelectromagnetics. The meeting will be a follow-up to the 1983 symposium held at the University of Nottingham in the U.K. Plenum Press will publish the proceedings. For more information, contact: Conference Coordinator, Continuing Studies & Public Service, Box 2041, Virginia Commonwealth University, Richmond, VA 23284, (804) 367-8421.

Bioelectricity Society... The International Society for Bioelectricity will hold its second meeting at the University of North Texas in Denton, March 10-12. According to the society's president, Dr. Andy Marino of LSU Medical Center, the meeting will span the entire range of bioelectricity—including basic science and clinical medicine. He pointed out that biology is the key to progress: "It seems to me that since the field began, each significant advance has come from biological research as opposed to physical and engineering approaches." For more information, contact: Patricia Burnett, Dept. of Orthopaedic Surgery, LSU Medical Center, PO Box 33932, Shreveport, LA 71130, (318) 674-6180..

MILITARY SYSTEMS

News Roundup... The USAF has embarked on the third phase of its GWEN system, an EMP-resistant communications network (see *MWN*, J/F86, N/D86 and N/D87). Contel Federal Systems of Fairfax, VA, has been awarded a $30 million contract for the design and installation of 40 additional relay towers—30 fewer than originally planned by the USAF. The system is scheduled to be completed in 1992....The Naval Air Systems Command has released a draft environmental impact statement (DEIS) for its Mid-Atlantic Electronic Warfare Range (MAEWR), which will provide tactics and survival training for combat aircrews in a "hostile" environment. Although the DEIS states that the Space and Naval Warfare Systems Command and the Naval Electronics Systems Command will be responsible for the calculation of the RF/MW exposure levels from the host of different simulators to be used on the North Carolina range, it does not give any specific numbers. For more information, contact: Charles Maguire, Atlantic Division (Code 203), Naval Facilities Engineering Command, Norfolk, VA 23511, (804) 445-2307....Terry O'Laughlin reports on his visit to Project ELF's Wisconsin Transmitter Facility in the April 1988 issue of *Popular Communications*. Project ELF, the U.S. Navy's land-to-submarine communications system, operates at 76 Hz with transmitter sites at Clam Lake, WI, and on Michigan's upper peninsula. The Wisconsin antenna has been operational since 1985, broadcasting with

wavelengths of 2,500 miles at powers of up to 2.3 million watts. The Michigan facility is due to be completed later this year. Project ELF has long been controversial: Attempts to halt it were foiled in 1984 when the U.S. court of appeals overturned a lower court order requiring a supplemental EIS and suspended an injunction against further construction (see *MWN*, S84)....The July 25 *Defense News* describes Israel's efforts to protect against EMP and its export of EMP simulators to a number of European countries....The July 2 *New York Times*'s patents column notes that the U.S. Army has developed a portable EM gun....The *Armed Forces Journal International* features an item on RF weapons in its May 1988 issue....And the Associated Press reported on September 27 that Eaton Corp., the manufacturer of electronics systems for the B-1 bomber, has estimated that it would cost an additional $520 million to fix the plane's EMC problems.

OVENS

A Moveable Feast?... Cooking fish in a microwave oven may not kill all existing bacteria and other parasites, according to Drs. C. Darrell Lane, Ronald Master and Ralph Tietbohl of the Reading (PA) Hospital and Medical Center. In a letter to the *Journal of the American Medical Association* (July 15), they cite the example of a woman and her son who ate a piece of haddock cooked in a microwave oven and left the remaining fish to cool on the kitchen table. Soon after, they noticed some movement in the uneaten fish—small, tan, worm-like organisms which were later identified as *Anisakis* larvae, forerunners of a parasitic disease found in seafood known as *anisakiasis*. Neither contracted the disease, however. The physicians also note the case of a doctor who developed trichinosis from eating pork cooked in a microwave oven (see *MWN*, Ju81 and A82). They emphasize that users of microwave ovens should be aware that microwave preparation may not be sufficient to eliminate microorganisms and parasites from food. Adequate cooking requires raising food temperature to 60°C for a minimum of five minutes, they advise.

PEOPLE

Drs. **Allan Frey, Abe Liboff, Klaus-Peter Ossenkopp, Jerry Phillips** and **Betty Sisken** are joining Dr. **Rugerro Cadossi** as assistant editors of the *Journal of Bioelectricity* beginning with the first issue of 1989. Dr. **Andrew Marino**, the editor of the journal, plans to increase the number of issues published every year....Dr. **Richard Vetter** of the Mayo Clinic has taken over as the editor in chief of *Health Physics*, replacing Dr. **Genevieve Roessler**, who had headed the monthly journal for the last six years....Dr. **Tim Aldrich** has left Oak Ridge National Lab to become the director of North Carolina's new cancer registry. Aldrich is now based in Raleigh. ...**Roger Schneider**, a longtime, senior staffer at the FDA's Center for Devices and Radiological Health has retired.

STANDARDS

Yugoslavian RFI... The Yugoslavian government has proposed rules governing the immunity of broadcast receivers and related equipment from RFI. According to the current schedule, the rules will be adopted on January 1, 1989. For a copy of the new standard, contact: Standards Information Center, NIST, Administration Bldg., Room A629, Gaithersburg, MD 20899, (301) 975-4037; ask for TBT Notification No.88.113.

VDTs

Scandinavian Studies...A group headed by Dr. Mats Berg of the Karolinska Hospital in Stockholm, Sweden, has failed to find any mutagenic response to VDT EMFs—as measured by the widely used Ames Salmonella test. The team ran the experiment using both a VDT in which the electrostatic field had been eliminated and one with a 250 kV/m electrostatic charge. In each case, the response was negative. Berg and coworkers conclude that their results support "the view that there is no increased risk of skin cancer" associated with VDT work. Their findings appear in the *Scandinavian Journal of Work, Environment & Health, 14*, pp.49-51, 1988. Last year, Berg reported that many anti-static VDT screens stop working after six months (see *MWN*, M/J87)....Researchers at the University of Kuopio in Finland report that the concentration of air ions in the vicinity of a VDT decreases rapidly when the unit is turned on—due to its electrostatic charge. S. Konttinen and coworkers could not estimate the importance of their findings because "little is known of the possible health effects of ion-depleted air." The results are in the *Journal of Bioelectricity, 7*, pp.89-95, 1988. (See also *MWN*, N/D85.)

ETC...

IEEE Special Issues...A number of recent IEEE Transactions have been devoted to special topics: The May *IEEE Transactions on Microwave Theory and Techniques* commemorates the centennial of Heinrich Hertz and features a short biography by Professor Charles Süsskind and a review of the "First Century of Microwaves—1886 to 1986" by Dr. John Bryant. ...The June *IEEE Transactions on Antennas and Propagation* covers "Near-Field Scanning Techniques." Of the more than 20 papers, two present brief histories of near-field measurements at NBS (now NIST) and at Georgia Tech. (See also NIST's Dr. Lorant Muth's "Displacement Errors in Antenna Near-Field Measurements and Their Effect on the Far Field" in the journal's May 1988 issue.)...And the August *IEEE Transactions on Electromagnetic Compatibility* is devoted to electromagnetic shielding, including calculations, measurements and enclosures.

of the electromagnetics branch at EPA's ORP who now heads his own consulting firm in Las Vegas, NV.

"All the federal agencies were expecting EPA to be there in the future and I am alarmed that may not be the case," said one federal official with responsibility for NIER who asked not to be named. "It appears that almost all interested parties would like to see a federal standard—that's why it's hard to understand why this decision is being made."

Dr. Jay Brandinger, the president of the Electromagnetic Energy Policy Alliance (EEPA), a Washington, DC, trade association, called the decision a "very unfortunate and giant setback" for the public and for all those who had worked on the guidance. Brandinger, who is with SRI International, warned that without federal guidance from EPA, there will be a proliferation of state and local rules, and he said that the alliance will work to reinstate the program. EEPA, whose members include the National Association of Broadcasters, Raytheon and GTE, among others, has long pressured EPA to set RF/MW radiation exposure limits (see *MWN*, S/O86), preferably those adopted by the American National Standards Institute (ANSI) in 1982.

EPA first announced plans to issue a "guidance" for RF/MW radiation in 1979 and published an "advance notice of proposed rule-making" in 1982 (see *MWN*, J/F83, Mr83 & A83). The agency does not have the authority to set a national NIER standard, but it can adopt safety levels to be followed by other federal agencies—and any guidance limits would become de facto national standards.

As the guidance process got under way, the agency proposed to close down its NIER research lab in North Carolina, where staffers wrote the scientific rationale for the RF/MW limits. After a four-year struggle, the lab would close down for good in 1986 (see *MWN*, J/F83, D84, S/O85, J/F86 & S/O86).

In 1984, EPA was about to propose a limit of 100 μW/cm², when pressure from EPA's policy group forced the radiation office to shelve the initiative. Two years later, EPA outlined four options—100 μW/cm², 200 μW/cm², 1,000 μW/cm² and no action—for dealing with RF/MW radiation risks, but did not specify preferred levels (see *MWN*, J84). A public hearing on the options was held in Washington, DC, in 1986 (see *MWN*, S/O86).

During FY89, which began October 1, 1988, EPA will phase out its NIER activities in Washington, DC. In FY90, all work will stop—except that Ed Mantiply at EPA's lab in Las Vegas, NV, will continue the agency's NIER monitoring studies.

Staffers at EPA's Office of Health and Exposure Assessment are scheduled to release an assessment of the carcinogenic potential of NIER later this year (see box at left). That assessment could influence the perception of the health threat of NIER and the need for NIER regulations.

EPA Preparing Cancer Assessment for NIER

EPA scientists are preparing an assessment of the human cancer threat posed by low- and high-frequency NIER. A draft report should be completed by the end of the year, according to Dr. Robert McGaughy of the Office of Health and Exposure Assessment, who is in charge of EPA's cancer evaluation.

In May 1987, McGaughy completed a preliminary assessment, which was devoted largely to an analysis of Dr. Bill Guy's $5 million chronic exposure study at the University of Washington (see *MWN*, J/A84 and Mr85). That evaluation was inconclusive, leading McGaughy to recommend widening the scope of the effort to include the literature on cancer epidemiology and mechanisms. The preliminary report was transmitted to the Office of Radiation Programs (ORP).

The cancer assessment was initiated as part of the development of the guidance for public exposures to RF/MW radiation, which EPA no longer plans to issue. Asked what he will do if the assessment indicates a NIER-cancer link, ORP Director Richard Guimond said that he will then support a health research program. EPA's research group on NIER was disbanded in 1986, after waging a four-year battle to keep its lab open.

McGaughy said that the new assessment will be peer reviewed if it concludes that there is a cancer risk.

Pressure from EPA's Scientific Advisors

Last June, after EPA officials notified the agency's Scientific Advisory Board (SAB) that it would "defer" all NIER programs, the SAB wrote to EPA Administrator Lee Thomas urging that, "It is imperative that a viable federal presence be maintained" in the area of NIER and that EPA "must not totally abandon its work" on NIER. In its July 19 letter, the SAB noted that if the agency keeps the program alive, it "will provide an inestimable service in the public interest at a relatively small cost in budget and personnel."

The SAB letter cited the publication of the two new epidemiological studies on power line health risks—those of Drs. David Savitz and Richard Stevens—as evidence of "both the continuing interest in this field and the ambiguous nature of most current data." The letter was signed by Dr. Norton Nelson, the chairman of the SAB Executive Committee and Dr. William Schull, the chairman of the board's Radiation Advisory Committee (see p.14 for the complete text of the SAB and EPA letters).

On August 26, Thomas replied that there would be no change in plans, arguing that "deferral is not the same as abandonment." A small working group had been set up, Thomas wrote, "to effect an orderly phase down." EPA's Dave Janes, a division director within the ORP, is chairing the working group, which includes representatives from the re-

gional offices.

Thomas wrote that, "We envision a summary report that contains guidance on exposure levels." How those levels will be released is not yet clear. Guimond suggested that EPA may put out informal guidelines or an RF/MW radiation brochure.

In an interview with *Microwave News* from his office at the University of Texas Health Sciences Center in Houston, Schull, a longtime researcher on ionizing radiation, said that it was "less than wise" for the agency to lose its competence in this area and he predicted that the issue will resurface in the future.

Professor Charles Süsskind of the University of California at Berkeley, who drafted the SAB letter, said that he was disappointed by the agency's "indifferent response." Süsskind, who is the only NIER expert on the SAB radiation committee, added that he has been notified that he will not be reappointed when his term expires later this year. According to Kathleen Conway, the deputy director of the SAB, Süsskind

Exchange of Letters Between the SAB and EPA Administrator Lee Thomas

July 19, 1988

Dear Mr. Thomas:

The Science Advisory Board's (SAB) Radiation Advisory Committee (RAC) has been apprised of the Office of Radiation Programs' (ORP) proposal to "defer" all agency involvement in non-ionizing radiation (NIER) after the Guidance to limit exposure (now being developed) is issued. The intent is to phase out such smaller programs and focus on larger tasks with perceived higher priorities.

In its report on NIER of January 31, 1984, the SAB recommended periodic review and evaluation of new research, a strengthening of in-house and extramural research, and a continuation of the agency's monitoring of ambient levels and its technical support to other government agencies to assure compliance with its Guidance.

Apart from one periodic review, the agency has not found it possible to carry out any of these recommendations, nor is it likely to do so now, despite renewed nationwide interest in the effects of NIER as a possible cancer promoter and the imminent issuance of a Guidance that is to be implemented by other federal agencies.

At its July 19 meeting, the Executive Committee of the SAB joined with the RAC in the recommendation that the agency must not totally abandon its work in the area of NIER. This recommendation is particularly relevant in the light of two studies dealing with NIER reported in the current issue of the *American Journal of Epidemiology*, which evidence both the continuing interest in this field and the ambiguous nature of most current data.

At a minimum, the agency must continue to monitor research in this field and provide technical support and assistance (including measurement capabilities) to other government agencies, as foreseen in EPA's Notice of Proposed Recommendations, *Federal Register*, p.27,318, July 30, 1986. Some agencies have already expressed a need for such assistance in their implementation of and compliance with the forthcoming Guidance. It is imperative that a viable federal presence be maintained in the area of NIER and the support activity by the agency will provide an inestimable service in the public interest at a relatively small cost in budget and personnel.

In order to clarify these issues, the board requests additional information on the agency's near-term and long-term plans for its own NIER program and specific information about the current and planned levels of support for NIER activities elsewhere in the federal government.

Sincerely,

Norton Nelson, Chairman,
Executive Committee, SAB

William J. Schull, Chairman,
RAC, SAB

August 26, 1988

Dear Dr. Nelson:

Thank you for your July 19, 1988, letter concerning the deferral of the agency's NIER programs beginning in fiscal 1990.

As you know, the agency is faced with a large number of important radiation problems. In the past, we have attempted to work on all of them at once. This has allowed us to remain active in all problem areas, but has limited real progress in reaching solutions. We are now changing our strategy in an attempt to focus enough resources on selected problems to effect their early resolution. This approach provides for real progress and frees resources for other problems when solutions are reached. Such an approach requires some very hard decisions about which problems to address immediately and which to defer. We do not expect that everyone will endorse our selections, but I can assure you that we have not made these decisions without considerable analysis and reflection. It is also important to stress that deferral is not the same as abandonment. After due consideration of a number of factors, including such things as court-mandated activities, resources, and staff skills, we have decided to defer the NIER activities in the ORP beginning in fiscal 1990.

To effect an orderly phase down of what is already a very small program, we have formed a small working group within the ORP with representation from our regional offices. This working group has two principal tasks. The first is the preparation of a fiscal 1989 work plan that allows us to capitalize on our past work in this area. We envision a summary report that contains guidance on exposure levels. The second task is the preparation of a long-term strategy for addressing this important radiation problem so that we will have a plan to implement when resources become available. The working group will meet the latter part of August to prepare the fiscal 1989 plan. A schedule of activities will be complete by late September and long-term strategy written early in 1989. We will be happy to share with you the schedule and drafts of the long-term strategy as they become available.

I hope that you find this letter responsive to your concerns. I deeply appreciate your continued efforts to help us build a strong and scientifically defensible radiation program within EPA.

Sincerely,

Lee Thomas
Administrator, EPA

will be retained as a consultant. Conway said that she plans to schedule one meeting a year to review NIER developments.

The EPA guidance would have addressed only RF/MW radiation—not extremely low frequency (ELF) fields—although, in the past, Congress has requested EPA to work on ELF health risks (see *MWN*, J83). The ORP has never proposed issuing a guidance for ELF fields. Last year, the ORP's Janes said that the responsibility for dealing with ELF exposures was "too diffuse" (see *MWN*, N/D87).

In September, the ORP made national news headlines when EPA recommended that Americans take the health threat of radon gas more seriously and that every home in the U.S. be tested for radon. Before becoming the director of the ORP, Guimond headed EPA's radon division.

Marcy-South Power Line Trial *(continued from p.1)*

NYPA views the situation differently. In a telephone interview, NYPA attorney Tom Watson of Crowell & Moring in Washington, DC, outlined the utility's position: "The landowners want to be compensated for fear of health effects. We're saying that they're not entitled to compensation because they cannot establish that there is a reason for fear, that that fear actually exists and that it affects the value of their property."

By the end of September, when the trial recessed for two weeks, NYPA had spent $1.2 million on attorney and witness fees, according to a NYPA spokeswoman. The utility could not say how much of the money went to legal fees and how much went to expert witnesses. For his part, Watson said, "I never discuss fees except with clients."

At the same time, Michael Gurda, Sr. estimated the plaintiffs' combined expenses at $300,000, of which approximately $65,000 went for expert testimony and $100,000 for land appraisal. Gurda described NYPA's trial expenses as "arrogant," in light of the utility's original offer of $400,000 for easements on the landowners' property.

The trial opened with the expert witnesses for the landowners. Dr. Andrew Marino of the Louisiana State University Medical Center in Shreveport countered NYPA's contention that studies involving frequencies outside of the 50-60 Hz range are irrelevant by drawing an analogy to cigarettes. "If you are studying the effects of smoking, you don't limit your study to one brand of cigarettes. For the purpose of evaluating health risks, cigarettes are cigarettes and magnetic fields are magnetic fields," he said.

Marino also criticized the utility-funded studies as being "largely irrelevant" because they were designed to support corporate opinion. When asked under cross-examination whether he was testifying as an expert witness or as an advocate, Marino replied that he was speaking as "a human being."

Also testifying for the landowners was Dr. Jerry Phillips of the Cancer Therapy and Research Center in San Antonio, TX, who described his work showing that cancer cells proliferate to a greater extent in the presence of power line fields (see *MWN*, J/A86).

Dr. Harris Busch of the Baylor College of Medicine in Houston, TX, stated that, in his opinion, "It is dangerous to live in an area having an electromagnetic field (EMF) level of 3 mG or more." In his pretrial report, Marvin Chatkoff of the University of Texas in San Antonio said that, according to his calculations, fields of 3 mG or more are present at a distance of more than 500 feet from a 345-kV line with 1,250 amps per conductor.

The final witness for the landowners was Dr. Lennart Tomenius of Stockholm, Sweden, author of a 1986 study linking childhood cancer and living near power lines. Under cross-examination, Tomenius explained that his methodology could only show an association and not a causal effect.

NYPA rebutted with their own health experts. Dr. Herbert Terrace, a psychologist at Columbia University in New York City, said that there are no behavioral effects on animals. In a telephone interview with *Microwave News*, Terrace refused to discuss his testimony, saying that "the proper arena is in the courtroom." In a pretrial statement, Terrace wrote that, "Efforts to show that power frequency electric fields influence the performance of learned behavior have proved nil." Missing from his review was a study on behavioral conditioning by Dr. Kurt Salzinger of Polytechnic University for the New York State Power Lines Project—the NY panel called the results "dramatic." Asked why he had not included Salzinger's study, Terrace replied that he had indeed read it, but that there are "theoretical and procedural" problems with the work. He would not elaborate.

Dr. Ken Zaner, an assistant professor of medicine at Harvard Medical School in Cambridge, MA, testified that, from a biophysical point of view, there is no evidence of a health risk from power line EMFs.

During cross-examination, McBride made the point that scientists do not always arrive at the same conclusions based on the same information. "If the experts can't agree, how do we as lay people know whether it's safe or unsafe?" he told *Microwave News*.

With respect to engineering, Watson called NYPA's Len Panzica and Michael Silva of Enertech Consultants in Campbell, CA; according to Watson, Silva testified that the fields from an electric razor are greater than those found near a line such as Marcy-South. Silva himself refused to discuss his testimony.

The case is being heard by Judge Peter McCabe in the New York State Court of Claims. The trial will resume October 11 with the remaining NYPA witnesses and will end in November with testimony from both sides on the real estate issues.

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