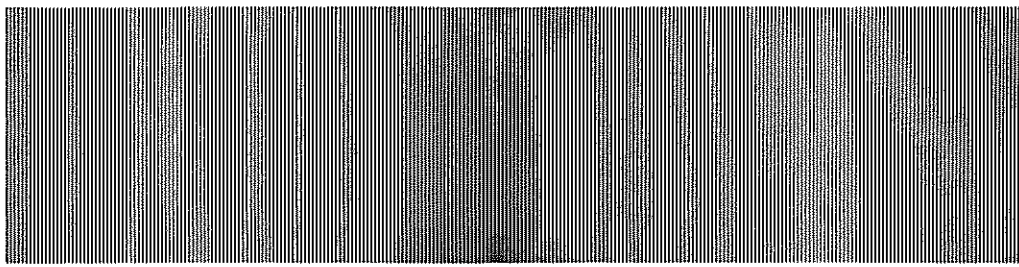


MICRO WAVE NEWS



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A Monthly Report on Non-Ionizing Radiation

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The new ANSI radiofrequency and microwave health standard has finally been approved. See p. 7; details next month.

Microwave News invites letters from its readers. We ask writers to be brief, and we reserve the right to edit contributions for length.

Bioelectromagnetics Society Meeting

Budget Cuts Taking a Toll

The talk among the researchers at this year's Bioelectromagnetics Society (BEMS) conference was about money and where to get it. A cloud hung over the meeting as many of the participants wondered where they would find new grants to keep research projects alive. Some even questioned whether the society itself would survive. Although this seemed to be an exaggeration, the realities of the Reagan budget cuts were underscored by the absence of many familiar faces in the conference rooms of the Beverly Wilshire Hotel in Los Angeles.

The technical papers provided few exciting moments. Reports of new experimental findings did more to muddy than clarify the state of biological effects research. Negative findings where others had found positive ones, and vice versa, left many of the participants unable to explain their results. The search for mechanisms appeared as elusive as ever.

Interviews with government officials responsible for sponsoring bioeffects research indicated a period of austerity. The Office of Naval Research is the one exception, with some new money for work on biomedical applications, synergistic effects and complex field interactions. Otherwise, the programs at the Air Force School of Aerospace Medicine, the Bureau of Radiological Health and the National Institute of Environmental Health Sciences are staying at last year's levels. These are comparatively well off compared to those of the Environmental Protection Agency (EPA), the Department of Energy and the Naval Medical R&D Command, all of which are cutting back. EPA's Dr. Joe Elder said that the funding outlook was "very bleak."

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VDTs:

Eighth Cluster of Pregnancy Problems

A new cluster of pregnancy problems among Canadian video display terminal (VDT) operators has heightened concern over the safety of the terminals. Five out of six pregnancies among clerks in the accounting department of Surrey Memorial Hospital in Vancouver, British Columbia, have had adverse outcomes. This is the eighth unexplained cluster reported in the last two years. (See *MWN*, November 1981, January/February, April and May 1982.)

According to Jean Greatbatch of the Hospital Employees' Union, among the six pregnancies there were two miscarriages, one infant with a club foot and in need of eye surgery, one infant with bronchitis, one premature birth and one healthy baby. All the women worked in the same room and each had a VDT on her desk. Detailed information on the age and medical history of the affected women is not yet available.

The union maintains that the machines have not been proven safe and has

(continued p. 8)

HIGHLIGHTS

Leukemia Associated with Occupational Exposure to Electric and Magnetic Fields

A statistical survey of mortality among workers in Washington state has revealed an association between leukemia and exposure to electric and magnetic fields.

In a letter published in the July 22 issue of the *New England Journal of Medicine*, Dr. Samuel Milham, Jr., of the Washington State Department of Social and Health Services, reports that ten of eleven occupations with "presumed" exposure to these fields had a higher than expected death rate due to leukemia.

Electricians, power-station operators and aluminum workers all had statistically significant, elevated rates of leukemia mortality. (Aluminum workers are exposed to strong magnetic fields induced by direct currents used in the aluminum reduction process.) Among the seven other occupational classes were power and telephone linemen, television and radio repairmen and motion picture projectionists. (The last category of workers work near step-up transformers.) For these groups, the sample sizes were too small to detect a statistically significant relationship.

In a telephone interview, Milham said that, while he had not been able to document a cause and effect relationship, his analysis did indicate a "suspicious association." The next step, he went on, is to do an epidemiological study of one of these occupations. He said that his preferred population was electric power substation workers. Milham has already begun negotiations for such a study with the International Brotherhood of Electrical Workers.

Although Milham is the first to associate leukemia with occupational exposures to electrical and magnetic fields, Drs. Nancy Wertheimer and Ed Leeper published a paper showing a correlation between exposure to electric power lines and leukemia among children in the *American Journal of Epidemiology* in 1979. In that same paper, they reported a significant increase in cancer rates among occupational categories, which "seemed likely to include men frequently exposed to AC magnetic fields," when compared to the general population — based on data collected by the US Public Health Service.

In a telephone interview, Wertheimer said that "Milham's study adds more weight to the hypothesis that there is a connection between power line radiation and cancer." ●

Baltimore Sun Study: No Verdict on VDT-Cataract Connection

A study of Newspaper Guild employees at the Baltimore *Sun* has failed to resolve if video display terminals (VDTs) are inducing cataracts. In its preliminary report, the National Institute for Occupational Safety and Health (NIOSH) found no "significant association between VDT use... and the prevalence of eye abnormalities, including cataracts." The authors concluded, however, that "our survey may well have been inadequate in terms of the amount of exposure to VDTs.... Thus, the issue of VDT-associated cataracts is *not* resolved by our study." The survey did connect eye and muscle strain to workplace lighting and VDT design.

NIOSH's Dr. Alexander B. Smith, the chief investigator for the study, explained that the survey could not identify a VDT-cataract link, assuming one exists, because VDT users at the *Sun* averaged only 3.8 years on the sets. He said this period is "too brief to allow conclusions if one postulates that the

incidence of cataracts increases with time spent on VDTs."

Another problem is that 16 percent of the study's current non-user population had worked on VDTs in the past, but the questionnaire failed to ask for a history of their VDT use.

The Newspaper Guild is not satisfied with the report. Mary Knudson, a union spokeswoman at the *Sun*, criticized the protocol for the eye examinations, which she said resulted in large differences in the number of cataracts found by the three ophthalmologists doing the testing. "We still need a good study to resolve this issue," she said. Her concerns were shared by the Guild's National Director of Research and Information David Eisen, who said that the question of cataracts remains open.

Among the guild participants, 56 of the 203 VDT users and 22 of the 79 non-users had some form of cataracts. Only three operators and two non-users, however, had "clinically significant" conditions that affected their vision.

The Guild was happier with the ergonomic portion of the survey and is planning discussions with management on improving workplace conditions linked to health problems. NIOSH found that changes in eye function and pains in the back, neck and shoulders were associated with office lighting and VDT screen characteristics.

The final report, which will be essentially the same as the preliminary version, should be available by September from Dr. Alexander Smith, NIOSH, 4676 Columbia Parkway, Cincinnati, OH 45226. ●

Yannon v. RCA Suit Dismissed; NY Telephone Appeal Denied

A New York state judge has dismissed Nettie Yannon's \$3.5 million breach of warranty and negligence suit against RCA. Mrs. Yannon alleges her husband, Samuel, died from microwave radiation exposure received while tuning low-power transmitters built by RCA. As a New York Telephone Co. technician, Yannon worked on the equipment at an Empire State Building facility from 1957 to 1968.

After a week-long hearing on an RCA motion for dismissal, Judge Richard Goldberg of the New York Supreme Court, Richmond County, ruled on July 7 that Yannon was sane in 1968 and therefore capable of bringing suit within the three year statute of limitations. Mrs. Yannon filed her suit in 1976. Her lawyers maintain that her husband was unable to manage his own affairs and to make decisions by the time he was transferred from the Empire State Building and therefore could not protect his legal rights. Samuel Yannon was terminated by the phone company in 1971 because of ill health; he died three years later.

Mrs. Yannon intends to appeal. "I won't stop until justice is done," she said. Her lawyers, Jerome Ellis and David Pauly of Staten Island, NY, must submit a notice of appeal to the State Supreme Court Appellate Division within 30 days of the lower court's judgment. As of July 30, they had not yet officially received Judge Goldberg's ruling.

RCA had no comment on the case.

In a separate action last month, the Appellate Division of the State Supreme Court denied New York Telephone's request to appeal a workers' compensation award to Mrs. Yannon. The court had affirmed an earlier ruling upholding the award on May 6. (See *MWN*, June 1982.) The company is now seeking permission for another appeal from the Court of Appeals, the state's highest court.

Excerpt of Decision

Upon the credible evidence adduced at this hearing, I find that plaintiff has not met her burden of proof concerning decedent's alleged insanity as defined in *McCarthy v. Volkswagen of America, Inc.*, supra. A careful review and analysis of all the evidence compellingly leads the court to conclude that Samuel A. Yannon was indeed functioning normally, or at least at a level sufficient to manage his own affairs and to protect his legal rights and interests in December, 1968, the date the causes of action accrued.

In sum the court finds that the decedent, Samuel Yannon, was not insane within the purview of CPLR §208, and that the statute of limitations was not tolled at the time the subject causes of action accrued. ●

US and USSR Agree to Run Identical Experiment at 2450 MHz and 10 mW/cm²

At a workshop held in Research Triangle Park, NC, on May 25-28, scientists representing the US and the USSR agreed to carry out an identical experiment in their respective laboratories. The experiment will involve the short-term exposure of male rats to 2450 MHz microwave radiation for seven hours at a power density of 10 mW/cm². The objective is to show that American and Soviet scientists will find the same effects on the animals' central nervous system and behavior.

The proposal to run the experiment at 10 mW/cm² came from the head of the Soviet delegation, Dr. Mikhael Shandala of the Institute of General and Communal Hygiene in Kiev. A number of American scientists were surprised by Shandala's initiative, given that the Russians have consistently reported behavioral effects at much lower power levels than American researchers. While US studies have focussed on exposures in the milliwatt range, the Russians have been more interested in looking for effects at microwatt levels, a factor of a thousand lower.

But as Dr. Donald McRee explained: Shandala wanted to pick an experiment that could test each country's experimental protocols quickly, and this could be best accomplished at a high exposure level. McRee, who is with the National Institute of Environmental Health Sciences (NIEHS) and who chaired the American delegation, said that the agreement "is really a step forward in the ability of both countries to validate each other's work."

McRee and Dr. Clifford Mitchell, also of NIEHS, will be the joint principal investigators for the US side of the study. The Bureau of Radiological Health is considering taking an active part in the experiment.

At the workshop, scientists from both countries presented papers describing their recent work. The Soviet papers are being translated and the proceedings of the workshop—nine American and seven Soviet papers—will be published in early 1983. Another workshop is scheduled for June 1983 to compare the results of the parallel experiments.

The papers presented by members of the Soviet delegation were:

- "Comparative Evaluation of Behavioral Methods of Research in Exposure to Microwave Radiation," by M.I. Rudnev.
- "Changes in Conditioned Reflex Activity in Albino Rats as a Criterion for Evaluating the Bioeffects of Ionized Air," by M.G. Shandala.
- "Behavioral Reactions of the Animal Organism During Exposure to Pulsed Electromagnetic Fields (2750 MHz)," by Y.D. Duman-skii, M.G. Shandala and V.N. Soldatchenkov.
- "The Effect of Electromagnetic Waves on the Organism as Judged by the Results of Works of Armenian Researchers," by U.G. Pogosyan.
- "The Importance of Considering the Reaction of Cerebral Bio-

electric Activity in the Hygienic Evaluation of Microwave Radiation," by V.V. Varetsskii.

- "Combined Changes of Neurophysiological and Heart Rate Processes During Long-Term Microwave Exposure," by N.N. Vasilevskii.

- "Behavior of White Rats in Stationary Electric Fields," by V.Y. Akimenko.

The members of the US delegation were: Drs. Ross Adey, Ernest Albert, Carl Blackman, Don Justesen, Richard Lovely, Donald McRee, Shin-Tsu Lu, Clifford Mitchell, Jack Monahan and Howard Wachtel. ●

Highway Project Raises Radiation Concerns in Hawaii

Plans to build a highway under a coast guard antenna in Oahu, HI, has focussed public attention on radiation hazards. The controversial proposal to complete a 10.3-mile gap in the island's highway system would route a four-lane road under the Omega antenna spanning the Haiku Valley near Honolulu and over a portion of its grounding system buried in the valley floor.

The dispute has also touched off fears among residents on the northern part of the island living near a navy communications station at Lualualei. According to a recently completed navy study, the nearby communities are not at risk from non-ionizing radiation.

The 10-kW Omega antenna transmits time-sequenced signals at 10 to 14 kHz. It is one of eight Omega stations worldwide, which together form a radionavigational positioning system for shipping.

In response to an April 8 District Court ruling, the state's Department of Transportation (DOT) has circulated a draft supplement to its environmental impact statement for the H-3 highway, which contains studies and comments on the Omega antenna. According to engineering studies performed by Boynton Hagaman of Kershner & Wright, Springfield, VA, highway construction and use would be safe, though the road would require shielding to eliminate shock hazards. Hagaman estimates shielding would reduce average electric and magnetic fields above the highway to 300 V/m and 0.32 A/m.

The potential bioeffects of the very low frequency (VLF) signal were evaluated by Professor A.W. Guy of the University of Washington in Seattle. Noting that no standards cover exposures to 10 kHz radiation and that "there is very little information concerning biological effects at that frequency," Guy concluded that "existing scientific data and projected international safety standards" at other frequencies indicate that exposures would cause no harm.

Guy also evaluated the antenna's potential effect on pacemakers, which was a concern to DOT. After testing a widely used model from Medtronic Inc., he concluded exposure levels on the highway, once shielded, would not cause problems.

The analyses circulated in the draft supplement have come under sharp attack. Mark Hagmann, visiting professor at the University of Hawaii, has argued that there are not enough data to conclude projected exposures are safe. He also questioned the feasibility of safely constructing the proposed shield and cautioned that electric sparks could cause explosions during the refueling of equipment used for highway construction.

Paul Lane, a sales consultant for Medtronic Inc., said the sequential Omega signal could inhibit a pacemaker and cited a company statement warning that "a field intensity of 200 V/m is a danger to life and pacemakers may be affected before this intensity is reached."

An independent analysis of Hagaman's calculations has questioned the estimated exposure levels on which other evaluations are based. Dr. Jeremy Raines, a consulting electrical engineer in Rockville, MD, found that the electric fields near the highway have not been conclusively determined and could be higher than 300 V/m. Shock hazards also might be greater than reported.

Comments on the draft supplement were due July 26 and DOT hopes to have a final EIS by mid-August. If there are no delays, DOT would begin construction on the \$480 million highway in 1985 and complete it in 1990-91. Given the ten-year old legal battle to stop the project, however, more delays are anticipated. The Stop H-3 Association plans to appeal the District Court's lifting of a construction ban to the US Ninth Circuit Court of Appeals.

The highway controversy has created concern near another military base. Maili and Nanakule residents, on the north side of the island, fear that low frequency radiation from the navy's Lualualei Radio Transmitting Facility could be increasing the incidence of cancer and hyperactivity in their children. Houses and an elementary school are within one half mile of the station's VLF antennas.

To reassure the public, the navy has performed a study of radiation levels within the station grounds. In a press conference last month, Captain C.W. Jauss, commander of the Naval Communications Area Master Station at Wahiawa, announced that levels at the facility are low and pose no health risks. At the same briefing, Guy, who verified the navy's measurements, supported Jauss's conclusion. The navy plans to release the study in mid-August.

Local residents are not happy with what they consider a limited and potentially biased study. Citizens Concerned for the Future of Our Children has decided to conduct its own survey to determine whether the community has unusual health problems. According to the group's Steward Meacham of Nanakuli, the University of Hawaii's Cancer Center is helping design the survey. ☼

Bioeffects Bibliographies

The air force has issued the first two reports on its new effort to publish reviews of key papers on the biological effects of radiofrequency and microwave radiation. Together the reports assess 80 studies, with special emphasis on their validity and significance. The reviews, which include information on exposure conditions, the author's abstract and an appended critique, were prepared by Louis Heynick of SRI Interna-

tional in Menlo Park, CA, under contract from the Air Force School of Aerospace Medicine at Brooks Air Force Base.

The air force has just signed a new \$522,700 contract with SRI to continue the service for the next three years. According to the AF's James Merritt, SRI will now hire consultants to help make judgments on which papers should be included in the survey. At the current level of effort they intend to review 80 papers a year.

Copies of the reports, *USAFSAM Review and Analysis of Radiofrequency Radiation Bioeffects Literature*, No. SAM-TR-81-24 and SAM-TR-82-16, are available free while supplies last. Contact: James Merritt, USAF School of Aerospace Medicine, Brooks AFB, TX 78235, (512) 536-3583. Afterwards they will be sold by the National Technical Information Service, Springfield, VA 22161. The air force is storing the reviews in a PDP 11/70 computer and is developing software to allow their retrieval by on-line users next year.

The latest issue of the National Telecommunications and Information Administration's (NTIA) *Biological Effects of Non-Ionizing Electromagnetic Radiation: A Digest of Current Literature*, October-December 1981, Volume VI, No. 2, (No. NTIA-CR-82-19), has been released. This is the last BENER report covered under a current contract, which has yet to be renewed. Given NTIA's stated desire to transfer its responsibility for non-ionizing radiation bioeffects coordination (see *MWN*, May 1982), the future of the digest is in question. The digest is available from NTIS.

The Bioelectromagnetics Society (BEMS) is in the process of putting the BENER data base onto a computer to allow on-line searches of the bibliographic entries. For more information on this new service contact: Dr. Tom Rozzell, Office of Naval Research, Code 4, 800 Quincy Street, Arlington, VA 22217, (202) 696-4053.

A new index of the bioeffects literature covering some 5,000 papers will be published in September. The literature was compiled by Dr. Zory Glaser and indexed by Julie Moore. The papers include those covered in the original report issued by the Naval Medical Research Institute in 1971 and the nine supplements released through 1978. In addition, the index will include those references published in the *BEMS Newsletter* during the last few years. The *Cumulative Index to the Bibliography of Reported Biological Effects and Clinical Symptoms Attributed to Microwave and Radiofrequency Radiation Exposure* will be available from Julie Moore & Associates, 3319 Avalon Street, Riverside, CA 92509, (714) 684-0441. Through August, the pre-publication price is \$17.75, and \$25.00 afterwards. ☼

UPDATES

Biological Effects. . . The first issue of the *Journal of Bioelectricity* is out. Two of the papers, by Drs. John Lester and Dennis Moore of the University of Kansas medical school in Wichita, address the possible connection between microwaves and cancer. In a study of cancer incidence in Wichita, they find that "it appears related to the probability of exposure to radar," though they note that the results "cannot be interpreted to indicate that radar causes cancer." Rather, they argue that their findings justify more research. In a similar study, they look at radar from air force bases (AFB) and conclude that "counties with an AFB, when compared to population-matched counties without an AFB, have a significantly higher incidence of cancer mortality for the period 1950-1969." Here again their evidence is not strong enough to confirm a connection between radar and cancer, though they argue it is suggestive and urge more research. The journal is available from Marcel Dekker Inc., 270 Madison Avenue, New York, NY 10016,

(212) 889-9595. Subscriptions are \$75.00 for institutions and \$37.50 for individuals; there will be three issues in Volume I. . . . Professor Stanislaw Szmigielski's study on the co-carcinogenicity of 5-15 mW/cm², 2450 MHz microwaves and benzopyrene, first reported in these pages last year (see *MWN*, May 1981), has been published in the latest issue of *Bioelectromagnetics*, Volume 3, Number 2.

Communications. . . EPA's Richard Tell has reviewed the proposed shortwave installation to be built by the World Christian Broadcast Corp. (WCBC) near Anchor Point, AK. According to his "detailed analysis" of the TCI model 611 curtain antenna system operating in the locations WCBC proposed to the FCC August 28, 1981, "the electromagnetic fields will not exceed 15 percent of the proposed ANSI

standard" beyond the perimeter of WCBC property at any height within ten feet of the ground. While metallic fences may cause local enhancement of the fields, none of these will exceed the new ANSI guideline. Tell does indicate that fields inside the property boundaries are "likely" to exceed the OSHA 10 mW/cm² standard. He notes that there is a "possibility of inadvertent detonation of electroexplosive devices used close to the site (within probably 0.7 miles)," and that "interference to radio and television reception is a possibility, particularly within one mile of the proposed system." . . . Walden, NY, approved Highland Telephone Co.'s plans for a new transmitting tower at a July 7 hearing. Drs. Herbert Pollack and Sol Michaelson testified for the company and assured apprehensive residents that the facility would be safe. . . . The FCC authorized five companies to build digital electronic message services on July 15 Air radionavigation and safety communications received additional spectrum space from the commission on June 7. . . . In a June 23 notice of inquiry, the FCC solicited comments on using the spectrum between 17.7 and 40.0 GHz for fixed and mobile services. Comments are due September 7 and reply comments by October 7. . . . National Public Radio and Mobile Communications Corp. of America are setting up a national paging system. Their new company, National Satellite Paging Inc., will use satellite links to NPR radio stations to send its customers' beeps. . . . The July 29 *Wall Street Journal* reports a similar joint venture planned by MCI, American Express, Metromedia and Communications Industries. . . . Seiko has developed a wristwatch with a 1.2 inch black-and-white TV. According to the June 17 *Journal*, it will sell for about \$400 in Japan. . . . A California supermarket chain is using FM radio to send messages to its 92 stores. Messages travel on a sideband of station KBIG and are received, decoded and printed with equipment in each supermarket. Details appear in the June 16 *Management Information Systems Week* The June *IEEE Spectrum* explains how low-power TV will work, how much it will cost and how it will support itself.

Compatibility & Interference . . . Will the government go ahead and build Radio Marti for broadcasting news to Cuba? If so, will it stick to the proposed 1040 kHz frequency, or will it use 1610 kHz at the top of the AM band, or pick shortwave frequencies? Will the FCC or NTIA be responsible for the allocation? Will the Cubans retaliate with a powerful interfering signal that could, as Congressman Timothy Wirth (D-CO) has warned, jam as many as 200 American AM stations? The saga goes on in the halls of Congress with no clear result in sight. At the end of July, debate had begun on the House floor, with the Senate Foreign Relations Committee still holding hearings The FCC has exempted certain types of medical electronic equipment from its RFI regulations. The Commission ruled that the costs of testing for compliance would be severe, especially since most medical equipment is not likely to cause interference. The action came in response to a petition from GE. (See 47 *FR* 31267, July 19.) . . . The FCC has extended the comment period for its proposal to remedy blanketed interference near FM transmitters. (See *MWN*, May 1982.) Comments are now due on September 29, and reply comments by October 29. . . . Radio astronomers in England are worried that RFI from a proposed third airport outside London will disrupt their research. See Jane Wynn's item in the June 3 *Nature*. . . . Tecknit will sponsor a free seminar on "Selecting and Applying EMC Shielding Materials," on September 7 just prior to the *International Symposium on Electromagnetic Compatibility* to be held in Santa Clara, CA. For more information, contact: Peter Grant, (201) 272-5500.

Government . . . The FCC has extended the deadline for filing comments on its proposal to consider RF/MW radiation hazards in its environmental rulemaking (see *MWN*, March 1982). The action came in response to a petition by the Association for Broadcast Engineering Standards. The Commission was also influenced by OSHA's decision to revoke all of its advisory standards, including the 10 mW/cm² RF/MW guideline, on which the FCC intended to rely. (The OSHA proposal was published in the May 28 *Federal Register*, see *MWN*, April 1982.) Comments are now due on August 16, and reply comments on October 18. . . . Meanwhile the FCC has issued a bulletin, *Questions and Answers about Biological Effects and Potential Haz-*

ards of Radiofrequency Radiation. Bulletin OST 56 is available from the FCC Consumer Assistance Office, Washington, DC 20554, (202) 632-7000. . . . The FDA has announced its intention to merge the Bureau of Medical Devices (BMD) with the Bureau of Radiological Health (BRH). A decision on a name for the new unit has yet to be made, though the inside favorite is the National Center for Medical Devices and Radiological Health. BRH Director John Villforth has already been named the director of BMD and will take over the new center after an opportunity for public comment on the proposal and its formal approval by HHS. . . . And EPA has decided to restructure its Office of Radiation Programs (ORP) to provide a "stronger focus on standard setting." The Surveillance and Emergency Preparedness Division, headed by David Janes, has become the Analysis and Support Division. Janes stays on as its director. How all the branches, including the non-ionizing radiation branch, will fit in the new scheme has not yet been worked out. Details are expected within a few weeks. . . . At the request of Congressman Richard White (D-TX), the General Accounting Office has issued a report (No. AFMD 82-74, May 24, 1982) critical of the way the Armed Forces Radiobiology Research Institute uses its computer systems. The institute is part of the Defense Nuclear Agency. . . . The Army Armament R&D Command in Dover, NJ, has issued a guide to the security classification for railgun systems information. It recommends that data developed on electromagnetic propulsion technology be released to the public in 1995-2000. . . . The International Trade Administration has determined that RF power amplifier assemblies and components, designed for uplinks in the C, X and KU bands from fixed satcom earth stations with power outputs of more than 1 kW, are likely to be sold in the US for less than fair value. A ruling from the International Trade Commission is expected soon.

Measurement . . . More than 40 people attended NBS' workshop on the development of a laboratory accreditation program (LAP) for electromagnetic services on July 1-2 in Boulder, CO. A summary of the meeting together with a list of the attendees is available from Robert Gladhill, Room B06, Technology Building, NBS, Washington, DC 20234, (301) 921-2427. Gladhill hopes to have the formal announcement for the establishment of the LAP by the end of the year. . . . The proceedings of the 1982 *Conference on Precision Electromagnetic Measurements*, held in Boulder on June 28-July 1, will be published in the March 1983 issue of the *IEEE Transactions on Instrumentation and Measurement*. A digest containing summaries of the papers is available now for \$32. Contact: Wallace Alsopach, NBS, Mail Stop 723.00, 325 South Broadway, Boulder, CO 80303. . . . BRH and NBS have initiated a calibration intercomparison program for microwave survey meters used in compliance testing of microwave oven and diathermy machines. From now on, NBS will supply the microwave standard to industry. BRH has also started similar comparison programs with the Japan Machinery and Metals Inspection Institute and the Canadian Radiation Protection Bureau in order to ensure that imported microwave products comply with domestic standards. . . . BRH has published a new report, *Performance Evaluation of RF Electric and Magnetic Field Measuring Instruments*. (No. FDA 82-8158) It is available from NTIS, Springfield, VA 22161. Accession No. PB 82-195009, \$7.50 paper, \$4.00 microfiche. Among the units tested are meters from Instruments for Industry and Narda. . . . And NBS has just published the proceedings of the first national conference on electrical measurements of pulse power systems. The 420-page report, *Measurement of Electrical Quantities in Pulse Power Systems*, (SP 628), is available from the Superintendent of Documents, Government Printing Office, Washington, DC 20402. Stock No. 003-003-02403-1; \$9.50.

Medical Applications . . . At the BEMS conference (see p. 1), Maria Stuchly of Canada's Radiation Protection Bureau reported on the measurement of RF fields near the Magnetrode hyperthermia system. The device operates at 13.56 MHz with an output power of up to 1000 watts. Based on tests with saline-filled phantoms and human subjects, she advised that the operator should be at least 1-2 meters from the unit, depending on the electrode used and the meter setting, to meet the Canadian and proposed ANSI exposure standards. . . . And

BRH's Dr. Whit Athey discussed safety aspects of NMR medical imaging systems. He measured operators' exposure to magnetic fields from a Fonar unit, a low-field device, which uses a vertical, main magnetic field. The maximum exposure was 0.0059 tesla or 59 gauss. Athey recommended special care for patients with pacemakers or implanted electrodes and for stroke victims and pregnant women. In response to a question from the audience, he said that BRH had no intention of issuing a new guideline for exposures to time-varying magnetic fields from NMR units. BRH's current guideline is more stringent than other proposals. (See *MWN*, April 1982.)... Researchers at the University of Utah are working on systems to measure lung water content: active and passive microwave radiometers and NMR imagers. At BEMS, Dr. Magdy Iskander reported that the passive radiometer can detect changes of 3-4 percent in water concentrations. While the microwave units are cheap, portable and allow continuous monitoring, they can only register changes in water content. An NMR imager can detect absolute water levels; however these devices are larger, more expensive and not continuous. The Utah team published a paper on the NMR technique in the June 18 *Science*... In Britain, a clinical NMR research group has been set up in the Department of Biochemistry at the University of Oxford with a \$500,000 grant from the British Heart Foundation... And Picker International, a subsidiary of the General Electric Co. (UK), is planning to spend \$15.6 million to develop, manufacture and market NMR imagers, according to an item in the July 5 *Electronic News*... NMR is one of the topics to be discussed at the FDA's symposium, *Recent Advances in Analytical Methodology in the Life Sciences*, scheduled for August 16-18, in Bethesda, MD. Contact: Dr. Constantine Zervos, (301) 443-4490... A meeting on the use of electricity in regeneration was sponsored by the IEE (UK) in London; the June 10 *New Scientist* features an article on the conference... The Public Health Service's Office of Health Research, Statistics and Technology is assessing the safety and clinical efficacy of thermography for the diagnosis of breast lesions. For more information, contact: Dennis Cotter, Room 17A55, Parklawn Bldg., 5600 Fishers Lane, Rockville, MD 20857, (301) 443-4990... John Jenkins has been elected president and CEO of Clini-Therm Corp., a developer of hyperthermia equipment, Phillip Berry becomes chairman of the board of directors.

Military Systems... Last May 24, the navy tested its ELF transmitter on Clam Lake, WI, by sending a message to the USS Daniel Boone, which was submerged 400 feet off the Florida coast. The test was arranged to convince newspaper publisher John Lavine that the system did in fact work. Lavine, who owns four daily papers, was impressed with the demonstration and told an AP reporter: "There is no doubt that ELF works." He went on to endorse the project. The ELF transmitter is in routine operation 16 hours a day, sending messages to specially equipped navy submarines... Meanwhile, the Naval Electronics Systems Command is negotiating with GTE Sylvania, in Needham Heights, MA, for the full-scale development of Project ELF. (See *MWN*, March 1982.)... Is the ELF communication system an integral part of Pentagon plans for a first strike capability? Thomas Murphy argues that it is—in the July/August issue of *Counterspy* magazine... The June 21 *Aviation Week* reports on the status of the blue-green laser system, which may be an alternative to the ELF transmitter... The air force has signed a \$500,000 contract with SRI International to prepare environmental impact statements (EIS) for its two new PAVE PAWS radars. The air force is considering four sites near Goodfellow AFB in San Angelo, TX. A public meeting is scheduled for August 5 at Angelo State University. The AF hopes to have a draft EIS for the Goodfellow PAVE PAWS out by November, and a site selected by next March. An AF spokesman said that the EIS for the southeastern PAVE PAWS at Robins AFB, south of Atlanta, will be easier to prepare because it will be built on the base. SRI wrote the EIS's for the AF's two other PAVE PAWS installations in Massachusetts and California... The Cobra Judy radar, the world's largest moving phased array radar system aboard the USNS Observation Island, was officially transferred to the Eastern Space and Missile Center by the AF's Electronic Systems Division in June... A few months after Thomas Amlie caused a stir contending that radar could help the enemy by transmitting information on position (see *MWN*, April 1982), the Israelis showed the power of that strategy in their in-

vasion of Lebanon. As the detailed coverage in the July 5 *Aviation Week* explains, the Israelis used drones to insure that enemy radar was turned on, then they unleashed radiation-homing missiles on them... The legislation and national security subcommittee of the House Government Operations Committee held hearings on the development of navy and air force radar warning receivers on June 15. The two services will spend \$1.7 billion buying the receivers from the Tek Corp. GAO's Walton Sheley, Jr., testified that though the navy's ALR-67 and the AF's ALR-74 are practically identical, the services have "essentially ignored" instructions from the Office of Secretary of Defense to use common hardware in their development. The DoD response is unknown at this time because it classified many aspects of the controversy. The hearing was closed soon after it began... Raytheon will test a new high frequency over-the-horizon radar from the AF... A new report by Frost & Sullivan indicates that the US military satellite communications market will be over \$1.2 billion a year through FY87. For more information on report No. 1062, contact: F&S: 106 Fulton St., New York, NY 10038, (212) 233-1080... The July/August issue of *High Technology* describes the Navstar Global Positioning System program. When all its 18 satellites are in orbit at the end of the decade, users will be able to determine their location to within 16 meters.

Mobile Communications... As expected, the FCC received a cascade of cellular radio applications before its June 6 filing deadline. For a complete list, see the June 21 *Electronic News* or the June 14 *Broadcasting*. But not everyone thinks the idea deserves spectrum space. The National Association of Broadcasters has told the commission that available UHF frequencies should be allocated to TV. It recommends that the demand for mobile services be met by using existing technology more efficiently... Meanwhile, the Justice Department's antitrust division may investigate plans by AT&T, GTE and several other telephone companies to divide up cellular markets... The FCC has approved the release of 250 channels in the 800 MHz band for private land mobile radio services.

Ovens... Researchers at Battelle's laboratories in Columbus, OH, have developed a new microwave heating process that can regenerate absorbent materials used in extracting contaminants from gas streams. Battelle's Dr. Eugene Mezey headed the team, which now plans to apply the technique on an industrial scale. The patent office has awarded Battelle a patent for the process... The Justice Department has determined that DOE's proposal not to issue mandatory energy efficiency standards for home appliances, including microwave ovens (see *MWN*, May and June 1982), will not have "any adverse effects on competition in those markets." The ruling came in a May 5 letter to DOE Secretary James Edwards from Assistant Attorney General William Baxter, which is reprinted in the July 15 *Federal Register* (47 FR 30793)... Professors W.A.G. Voss and R. Turner of the University of Alberta in Edmonton, Canada, describe the development, performance and reliability of the Micro-Check microwave oven radiation detector in the March 1982 issue of the *Journal of Microwave Power*. The authors conclude that the device, which uses liquid crystals, is suitable for use by the general public... Last year there were fears that cooking pork in a microwave oven might not kill all trichinae parasites. (See *MWN*, June 1981.) Now word comes from Purdue University's School of Consumer and Family Sciences in Lafayette, IN, that care should be taken in cooking turkeys with microwaves. Professor Bala Swaminathan inoculated turkeys with bacteria and cooked them in a microwave oven. Some of the bacteria survived the heating; he blamed cold spots... 1,727,000 microwave ovens were shipped during the first half of 1982, down 13 percent from 1981, according to the Association of Home Appliance Manufacturers.

Satellite Communications... RCA has tabled its plan to build a satcom station on Bainbridge Island, WA, and is now seeking approval for an alternative site in the Indianola-Kingston area of northern Kitsap County, WA. At a July 22 hearing on the second site, RCA met a new set of opponents — residents who share Bainbridge Islanders'

worries over microwave radiation hazards. The final EIS's for both locations are out. Each contains the controversial RF/MW bioeffects review prepared by the Battelle Human Affairs Research Center in Seattle. Dr. Joe Elder of EPA's Experimental Biology Division critically evaluated the document when it was released in draft form last spring, and concluded: "The authors did a poor job of reviewing and citing the literature and reveal a lack of scientific insight into the complexities of the biological effects of microwave radiation." The regional EPA office in Seattle would only release Elder's evaluation through a Freedom of Information Act request.... The New York City Planning Commission has approved Hughes Aircraft Company plans for a Galaxy Satellite Station in the Spring Creek area of Brooklyn.... The EIS for Teleport, a huge satcom complex sponsored by the Port Authority of NY and NJ and Merrill Lynch, should be out for review in August. Andrews & Clark of New York City is preparing the statement, with the radiation aspects handled by Ammann Whitney, also of NYC.... The FCC has approved Comsat's planned satcom facility in western Pennsylvania. The Roaring Creek Earth Station received local approval from the Cleveland Township Zoning Board last year.... Direct broadcast satellite service (DBS) has finally won FCC approval. Interim rules for DBS appear in the July 21 *Federal Register* (47 FR 31555).... Home Box Office has chosen Scientific Atlanta of Atlanta, GA to supply four uplink stations for a new satcom center it will build in Hauppauge, Long Island, NY.... Scientific Atlanta will also provide new equipment for RCA's Vernon Valley facility in New Jersey.... The FCC approved the private sale of transponders for satellites launched by Hughes Communications, RCA and Western Union Telegraph. Will RCA try another auction?... An Office of Technology Assessment report, *US Civilian Space Policy and Applications*, (GPO No. 052-003-00878-5), supports development of 30/20 GHz satcom systems. Funding for NASA's 30/20 GHz research program has been repeatedly cut. Now both the House and Senate have earmarked money for a test run of the satellite.

Standards... On July 30, ANSI's Board of Standards Review approved the new RF/MW exposure standard (C95.1-1982). *Micro-wave News* will run the full text of the standard next month.... At a meeting in early June, the physical agents threshold limit values (TLV) committee proposed several changes to the ACGIH's RF/MW radiation standard, first proposed last year. (See *MWN*, September 1981.) Among the revisions was the addition of the following language: The TLV's "may be exceeded if the exposure conditions can be demonstrated to produce a SAR of less than 0.4 W/Kg as averaged over the whole body and spatial peak SAR values less than 8.0 W/Kg as averaged over any 1 gram of tissue. For example for frequencies from 3 to 30 MHz, the equivalent power density can be increased by a factor of 10 up to a limit of 100 mW/cm², if it can be assured that exposed individuals are not in contact with the ground plane." And: "At frequencies below 30 MHz, ungrounded objects such as vehicles, fences etc., can strongly couple to RF fields. For field strengths near the TLV, shock and burn hazards can exist. Care should be taken to eliminate ungrounded objects, to ground such objects, or use insulated gloves when ungrounded objects must be handled." The TLV, which would apply to radiation in the 10 kHz-300 GHz frequency range, remains on the ACGIH's Notice of Intended Changes and interested parties have a year to submit comments on the new proposal.... After extended debate, Multnomah County, OR, adopted a general population RF/MW standard on July 20. At its most stringent, in the 30-300 MHz band, the standard specifies a maximum exposure of 200 uW/cm². The County Board of Commissioners had initially supported a more severe 50 uW/cm² limit but backed off in the face of strong opposition from local broadcasters. The standard, as approved, closely resembles the one proposed by the county's planning commission this spring (see *MWN*, May 1982).... In comments submitted to the Massachusetts Department of Public Health on its proposed RF/MW standard (see *MWN*, March 1982), the National Association of Broadcasters (NAB) argues that the regulation would impose "unrealistically stringent limits" and "unnecessary paperwork burdens" on broadcasters—especially those whose radiation levels come nowhere near the proposed ANSI standards. The NAB is worried about the impact

of the Massachusetts standard on broadcasters who use electronic news gathering equipment. The NAB recommends that the proposal be amended to exempt facilities that contain RF machines with input power to the radiating device of up to 25 watts (instead of 7 watts) and those using portable equipment. The comments were submitted by Erwin Krasnow and Barry Umansky.... Writing in the March 1982 issue of the *Journal of Microwave Power*, Professor Herman Schwan finds himself in "essential agreement" with the proposed revision of the ANSI standard. In his analysis, Schwan considers only thermal effects.

Technology... NBS is working on ways of probing oil shale with RF energy to discover the ratio of rubble-to-void in underground caverns. A new report, *Modeling of Oil Shale Retorts for Electromagnetic Sensing Techniques* (No. NBSIR 81-1653), is available from NTIS, Springfield, VA, 22161 for \$7.50. (Order No. PB82-153321.)... NBS scientists working at DOE's Energy Technology Center in Laramie, WY, have applied such RF techniques to accurately measure the dielectric properties of oil shale samples at 500°C over the 5-1000 MHz frequency range.... On another energy front, researchers at the Southwest Research Institute (SwRI) in San Antonio, TX, have devised a way to automatically and continuously monitor the flow and quality of coal in boiler feed pipes using NMR and ESR technology. SwRI did the work under contract from a DOE technology center in Morgantown, WV.... David Rust and Richard Doviak of NOAA's National Severe Storms Laboratory in Norman, OK, review the use of weather radar to study thunderstorms and lightning in the June 10 *Nature*.... Tideland Energy, a company developing solar technology in New South Wales, Australia, have supplied solar power systems for 22 microwave repeater and terminal stations to the Department of Posts and Telecommunications in Papua, New Guinea.

VDTs... A VDT operator in San Francisco has received a workers' compensation award for job-related eye problems. This June, Sybil Barker won standard temporary disability benefits from her employer's insurance company two weeks before a scheduled Workers' Compensation Board hearing on her claim. Barker developed severe eye pains after three months at an architectural firm and was fired when her doctor told her not to return to the VDT.... A booklet rating ten VDT models for health and safety features is now available from The National Association of Working Women. *The Human Factor: 9 to 5's Consumer Guide to the Health and Safety Features of Word Processors* includes an evaluation chart and recommendations to employers, manufacturers and public officials. Copies are \$5 for institutions and \$1.50 for individuals from the association, 1224 Huron Road, Cleveland, OH 44115.... VDTs will be part of a NIOSH study of chronic stress in the office. The study design is currently being scaled down due to a 67 percent cut in funding. For more information, contact NIOSH's Barbara Cohen, Division of Biomedical and Behavioral Sciences, (513) 684-8386.... The Ontario provincial legislature has defeated a VDT safety bill proposed by New Democrat Richard Johnson. (See *MWN*, December 1981.)... Concerns over possible ELF radiation hazards and the risks to pregnant women were the major subjects of discussion at the *International Forum on Low-Level EM Radiation and the Question of VDTs* held in Ottawa on June 4. The proceedings of the forum are being prepared and will be available from: The Planetary Association for Clean Energy, 100 Bronson Avenue, Ottawa, Ontario K1R 6G8, Canada, (613) 236-6265. Audio cassettes are also available.... Delegates at the annual Newspaper Guild Convention in July called for immediate bio-effects research on the low frequency radiation emitted by VDTs—in both the ELF and VLF bands.... Newspaper Guild President Charles Perlik, Jr., has written to NIOSH Director Dr. J. Donald Millar urging more research be done on 15 to 125 kHz radiation.... VDTs are not the only source of low frequency radiation stirring up controversy. Hawaiians are worried about the Coast Guard's Omega navigational system, which radiates signals in the 10-14 kHz band—about the same frequency as that of a VDT flyback transformer. (See story on p. 3.)... The Labor Council of Metropolitan Toronto has launched a quarterly VDT newsletter. Subscriptions are \$5 a year from the council's VDT Committee, Room 407, 15 Gervais Drive, Don Mills,

Ontario, Canada. . . . Langley-St. Clair Instrumentation Systems Inc. of New York City is marketing a VDT screen X-ray shield. I-Protect, a leaded acrylic sheet fastening to the front of the terminal, comes in two sizes and sells for \$50 to \$60. For information, call (800) 221-7070. (*MWN* does not endorse commercial products.) . . . In a paper prepared for the BEMS meeting (see p. 1), Charles Wallach of Decisions and Designs Inc. in McLean, VA, suggests that ion imbalances in the air around operators and VDT screens could cause a number of health problems. . . . Norwegian researchers found PCB levels in offices with VDTs that were 50 to 80 times greater than levels outdoors. According to a report in the *International Archives of Occupational and Environmental Health*, Volume 49, p. 193, 1982, by Vemund Digernes and Erle Astrup of the University of Oslo, workplace air samples had PCB concentrations of 56-81 ng/m³. PCB's cause cancer in experimental animals. The authors hypothesize that VDT capacitors and transformers may be the source of PCB's and recommend further investigation of the terminals. . . . Are you a cyberphobe? The June 8 *Wall Street Journal* reports on Professor Sanford Weinberg's research indicating that up to 30 percent of US office workers suffer from cyberphobia, the fear of computers. Weinberg is at St. Joseph's University in Philadelphia, PA. ●

BEMS (continued from p. 1)

Calcium efflux research emerged as a new growth industry. A number of researchers, following the lead from Drs. Ross Adey and Carl Blackman, are trying to extend and explain what is known about the frequency and power windows that govern the movement of calcium in the brain.

Blackman reported that he was taking the amplitude modulation to higher ELF frequencies — multiples of the 16 Hz window first identified by Adey and Dr. Suzanne Bawin. Blackman and his co-workers at EPA's lab in Research Triangle Park, NC, found no effect at 30 Hz, but they did measure a response at 45 Hz and 50 Hz. In the process, they uncovered one interesting new dimension to the window phenomenon: power windows appear to become narrower as the frequency increases. At 45 Hz they measured significant calcium changes at 35-50 V/m, but at 50 Hz the power window had shrunk to 45-50 V/m.

Before completing his presentation, Blackman preempted the obvious question: Is there a window at 60 Hz, the power line frequency? That experiment, he said, had not yet been run.

In the one non-technical paper on the program, Professor Nicholas Steneck, a historian at the University of Michigan in Ann Arbor, took aim at the new American National Standards Institute (ANSI) safety standard. He called the final product pro-industry and warned that it "will not attract more supporters than did the old 10 mW/cm² standard."

John Monahan of the Bureau of Radiological Health perplexed his audience with the preliminary results from his experiment involving both the permeability of the blood brain barrier (BBB) and microwave-drug synergy. He injected mice with scopolamine and then exposed them with 2450 MHz radiation at an average SAR of 10 W/Kg for 30 minutes. He saw no leakage through the BBB and, surprisingly, found that microwaves wiped out, instead of enhanced, the effect of the drug.

Describing a three generation study of rats exposed to 80 kV/m, 60 Hz electric fields, Dr. Debbie Majeau-Chargois of Tulane University in New Orleans said that her team had found significant changes in white blood cells (but not red cells) and in the paired organs such as kidneys and testes. In an interview, she said that the overall pattern was one of reaction to "mild stress."

Members of Dr. Bill Guy's group presented progress reports on their three-year, low-level exposure study at the University of Washington in Seattle. Nearly all the tests made after 21 months of exposure revealed no difference between the exposed animals and the controls. One variation was in a few of the screening tests—the significance of this finding will have to await further results. There was also an increase in malignant neoplasia among the exposed animals, but as Dr. L.L. Kunz warned, much more data must be collected before any inferences can be drawn.

The BEMS conference was held the week of June 28 in Los Angeles, CA. At the society's membership meeting, Guy was elected the next president of BEMS. ●

VDTs (continued from p. 1)

called for a moratorium on introducing more VDTs into provincial hospitals. This position puts it at odds with the provincial ministry of health, which is pressing for widespread automation in hospitals.

The cluster at Surrey Memorial has fueled the already intense controversy over VDT safety, though neither federal nor provincial health officials have indicated that potential VDT radiation hazards require investigation. A number of Canadian study groups are looking into the problem, however.

- The Task Force on Micro-Electronics and Employment was briefed on the Vancouver cluster at a hearing last month. Murray Hardie, executive director of the five member group, said the union's report "shows there are potential health problems that have to be addressed. The absence of sound scientific research in this area is a problem." The task force, established by Labor Canada this March with a \$300,000 budget, is focusing on job displacement and health problems created by new office technology. It plans to publish its report and recommendations early this fall.

- A subcommittee of a \$12 million federal project to develop prototypes for the office of the future will review existing VDT studies and could recommend that a new study be done. According to Phil Kinsman of the federal Department of Communications, which is coordinating the project, the group will review radiation issues because "at this point you just can't avoid them." Kinsman said VDTs will be designed to meet user specifications and will be tested for radiation as part of the project. In addition to government funds, two major participating business consortiums will spend over \$50 million on research and development of office systems.

- The VDT task force set up last year by the Ontario Ministry of Labor's Advisory Council on Occupational Health and Safety (see *MWN*, December 1981) is now looking at potential reproductive hazards. According to task force chairman Dr. Gordon Stopps at the University of Toronto, this issue was added to the group's agenda because of "the upsurge in interest and the number of reported clusters." Stopps hopes the group's report will be ready in September. ●

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