



INSIDE...

HIGHLIGHTS

pp. 2-5

NTIA Seeks New Home for ERMAC
Hearings on Glenn's Radiation Bill
Link Between RF/MW and Cancer
Found Inconclusive
Multnomah County RF/MW Standard
RCA's Satcom EIS: Critical Comments
Cool Reception for Calcium Review
Side Effects Working Group Meets Again;
Ocular Effect Disclosed
Pregnancy Problems in Ottawa
RFI Amendments to Communications Act
NBS Workshop on EM Calibration
US-USSR Health Effects Workshop
Research Papers from the Soviet Union

LETTERS

p. 8

UPDATES

pp. 5-7

Biological Effects
Communications
Compatibility & Interference
EMP
Government
Litigation
Medical Applications
Military Systems
Ovens
Power Lines
Satellite Communications
Technology
VDTs
Etc.

DoD Reviewing RF/MW Health Standards

The Department of Defense (DoD) has initiated a review of its exposure standards for radiofrequency and microwave (RF/MW) radiation. Spurred by the proposed revision of the RF/MW standards of the American National Standards Institute (ANSI) and of the American Conference of Governmental and Industrial Hygienists (ACGIH), DoD has asked representatives of the air force, army and navy to submit position papers evaluating these proposals.

Colonel Frank E. McDermott, a radiological health consultant in the army's Surgeon General's office, is responsible for coordinating the reports of the three services into a DoD policy. In a telephone interview, McDermott said that he hoped to have all the comments in by early May and to complete his proposal by the middle of the month.

In addition to preparing the DoD policy statement, McDermott is also in charge of the army's participation in the review. The leads for the air force and the army are Lieutenant Colonel David Wood and Lieutenant Roby Enge respectively.

All three services now have essentially the same standard: a maximum exposure level of 10 mW/cm², independent of frequency. The proposals by ANSI and ACGIH are frequency dependent, with a maximum allowable exposure of 1 mW/cm² at their most stringent level. (For the ANSI and ACGIH proposals see *MWN*, May 1981 and September 1981.)

Enge of the navy's Bureau of Medicine and Surgery said that he supported the ANSI proposal but had some reservations about the low frequency end of

(continued p. 8)

Low-Intensity Pulsed Magnetic Fields Stimulate Release of Noradrenaline

Two English researchers have identified a new physical effect induced by a 500 Hz, low-intensity pulsed magnetic field. They found that magnetic fields in the range of 1.6-8.5 gauss could stimulate the release of significant amounts of noradrenaline, a neurotransmitter, from cultured cells. They suggest that their new experimental system can be used as a model for studying the effects of such fields on neuronal functions.

Dr. Richard Dixey of St. Bartholomew's Hospital and Dr. Glen Rein of Queen Charlotte's Maternity Hospital, both in London, report in the March 18 *Nature* that tritium-labelled noradrenaline was released from PC12 cells, a common biological system, by an inductively coupled 500 Hz field at a level comparable with certain other neurotransmitter stimuli. The increase was 27.5% ± 4.9 above the controls.

The magnetic field was generated by passing current through coils, which induced an electric field ranging from +3.8x10⁻² to -1.9x10⁻² V/m. Through an innovative arrangement of petri dishes, they were able to limit the variation

(continued p. 8)

HIGHLIGHTS

NTIA Seeks New Home for ERMAC

The National Telecommunications and Information Administration (NTIA) has not asked for funds to continue working on the bioeffects of non-ionizing radiation in its fiscal year 1983 appropriation request. If Congress approves NTIA's \$12.4 million budget, the Electromagnetic Radiation Management Advisory Council (ERMAC) will go out of existence unless it is transferred to another agency.

Testifying before the Senate's subcommittee on communications on March 22, Assistant Secretary of Commerce for Communications and Information Bernard J. Wunder, Jr., said NTIA proposed "to terminate [its] past role as coordinator of federal research concerning the biomedical and related effects of non-ionizing radiation." This role, he continued, "is important, but it may be more appropriately undertaken by an agency with direct responsibilities in the health, environmental protection or other safety-related fields, not by the Department of Commerce, whose basic mission is to foster business, trade and increased industrial production."

NTIA's spectrum policy, planning and management programs will continue as will the work of the Frequency Management Advisory Council (FMAC). In fact, NTIA's spectrum management activities will grow from \$7.8 million in FY82 to \$8.2 million in FY83.

ERMAC was established in 1968-69 to give advice "on the side effects and adequacy of control of electromagnetic radiation from communications." ERMAC moved to the Department of Commerce in 1978 when the Office of Telecommunications Policy was transferred from the Executive Office of the President to the then newly formed NTIA.

Hearings on New Radiation Bill

A Senate subcommittee held hearings on the Federal Radiation Protection Act of 1982 on April 29. The bill (S.2284), introduced by Senator John Glenn (D-OH), would set up two new interagency panels to coordinate radiation research and regulation. It would cover both ionizing and non-ionizing radiation.

A proposed Federal Council on Radiation Protection would take over the Environmental Protection Agency's authority to set health standards and would review other regulations set by all levels of government. Two special working groups of the council would pay special attention to occupational and medical exposures to radiation.

Its counterpart, a Federal Conference on Research Into the Biological Effects of Radiation, would devise an agenda for all bioeffects research and review all federally sponsored research costing more than \$250,000.

The secretary of the Department of Health and Human Services would be the chairman of the council, and the director of the National Institutes of Health would chair the conference. Two members of the public would sit on each panel.

A staff aide at the subcommittee on energy, nuclear proliferation and government processes of the Senate Committee on Government Affairs called the Glenn proposal an attempt to create a Radiation Policy Council (RPC) "with teeth." The RPC was set up in 1980 by President Carter, but closed down last year when the Reagan administration cut it from the federal budget. (See *MWN*, October 1981.)

Those testifying before the subcommittee on April 29 rep-

resented largely government agencies and private groups interested in ionizing radiation.

A similar measure (S.1938) was introduced in 1979 by Senators Glenn and Abraham Ribicoff (D-CT). Hearings were held on March 20, 1980. The bill was never passed.

Link Between RF/MW and Cancer Found Inconclusive

A blue-ribbon committee in Multnomah County, OR, has determined that Dr. William Morton's study linking the incidence of certain cancers and radiofrequency/microwave radiation levels is inconclusive. The group of public health professionals was set up to review Morton's statistical study of Portland residents after he reported preliminary findings late last year.

The committee found two major weaknesses in the study. First, it questioned the accuracy of extrapolating exposure levels for areas of the city from 36 fixed point measurements. Second, the committee challenged Morton's comparison of cancer rates in different parts of the city. The area with the strongest association between cancer and radiation had a small population and a very small number of cases, making the rate of cancer highly susceptible to change.

In its recent report to the county, the committee recommended that studies be done with more data on exposure levels. It also asked that the county require operators of broadcast facilities to measure and keep records of RF/MW radiation levels.

Morton, of the University of Oregon's Health Sciences Center in Portland, submitted his report earlier this year to the Environmental Protection Agency's Experimental Biology Division, which is conducting its own review. (See *MWN*, January/February 1982.)

Multnomah County To Propose RF/MW Standard

The Multnomah County Planning Commission expects to recommend a general population radiofrequency/microwave (RF/MW) exposure standard to the Board of County Commissioners this month. A preliminary proposal modeled after the pending Massachusetts standard sets a 200 $\mu\text{W}/\text{cm}^2$ limit for the 30-300 band, rising to a maximum of 1 mW/cm^2 for frequencies above 1500 MHz and to 20 mW/cm^2 for those below 3 MHz. The averaging time for measuring exposures would be one hour, rather than the 30 minutes proposed for Massachusetts. (See *MWN*, March 1982.) In addition, a peak power limit would be set at ten times average power levels.

According to Larry Epstein of the county's Department of Environmental Services, the board should rule on a standard by June 1. Multnomah's moratorium on new broadcast sources expires in the end of May. (See *MWN*, January/February 1982.)

Microwave News will provide a full report on the standard next month.

RCA's Satcom EIS: Critical Comments

Reviewers of the draft environmental impact statement (EIS) for RCA's proposed satellite communications station on Bainbridge Island, WA, contend its report on microwave bioeffects is biased, incomplete and misleading. The document, prepared by CH2M Hill Inc. of Seattle, will now be

edited before Kitsap County issues the final version. Though no major revisions are planned, Rick Kimball of Kitsap's Department of Community Development said the final document expected this June should show "the full range of opinion on the health effects issue."

Responses to the EIS came from members of the microwave community, local agencies and Bainbridge residents. As of the end of April, an assessment by the Environmental Protection Agency's (EPA) Richard Tell and Dr. Joe Elder was still awaiting the approval of EPA's regional administrator in Seattle.

Almost all of the reviewers addressing radiation issues focus on the statement's health effects report prepared by the Battelle Human Affairs Research Center in Seattle, WA. (See also letters on p. 8.) These comments were solicited by Jerome Hellmuth, a leader of the local group opposing RCA. The reviewers strongly criticize the Battelle report for stating that continuous low-level microwave exposure is safe without noting that very little low-level effects research has been done.

Comments on the Battelle Review

Paul Brodeur, author of *The Zapping of America*: "The section of the draft EIS entitled 'Battelle Review of the Biological Effects of Microwave Radiation' is so full of errors, omissions, and unfounded assertions as to be almost worthless as a document for assessing the possible consequences of chronic exposure to low-level microwave radiation."

Allan Frey, Randomline, Inc.: "This EIS reads to me like a cut-and-paste job from the statements and writings of those who have been paid to testify that exposure to such energy is safe." Frey charges that the authors took the views of Dr. Jana Pazderova-Veljkova on Eastern European epidemiological studies out of context and presented them in a misleading way.

Dr. Rochelle Medici, a psychologist in private practice in San Marino, CA: "This review is stunningly incomplete and misleading. It is biased in the sense that negative results are stressed over and over again; results are all interpreted in terms of heating phenomena; major and key studies are omitted; Soviet studies are set up as 'straw men'..." Medici also criticizes the review for repeatedly assuming that the relationship between non-ionizing radiation exposure levels and possible bioeffects is linear: "It is precisely the question of nonlinearity of effect that has *not* been resolved by the research now available."

Professor Nicholas Steneck, a historian at the University of Michigan: "The EIS does not meet even minimum criteria of objectivity..." It presents "an adversarial position, not a value-free survey that can be used to debate and establish policy." He concludes that the review's flaws "render the objective material presented in the EIS unusable."

Dr. Milton Zaret, an ophthalmologist in Scarsdale, NY: "The EIS purports to be a learned study but, unfortunately, it is not. Instead of science it is merely propaganda couched in scientific language." Zaret cites the work of Dr. Maria Sadikova. He also registers a complaint over placing his work in a section titled "Journalistic Coverage".

* * *

Hellmuth has compiled more than 100 pages of comments, including those excerpted above, and will supply the volume at cost (\$20). Contact: Jerome Hellmuth, Bucklin Hill School, PO Box 356, Bainbridge Island, WA 98110.

Cool Reception for Review of Calcium Research

A review of the effects of non-ionizing radiation on calcium in the brain is causing a furor in the microwave community.

Writing in *Neuroscience & Biobehavioral Reviews* (5,503,1981), Drs. Robert Myers and David Ross challenge the reliability of key research on calcium efflux in brain tissue by low frequency modulated fields. The work in question was begun by Drs. Ross Adey and Suzanne Bawin some ten years ago and has since been replicated by Dr. Carl Blackman.

Myers, of the University of North Carolina medical school, and Ross, of the University of Texas, set out to evaluate the data from an "unbiased and 'non-involved' viewpoint" and conclude:

In this field, a number of questionable practices render many of the reports published thus far extremely difficult to interpret: the discarding of variant data, the conversion of actual data into percentage or other scores, debatable statistical procedures used by workers in this field, and the variation in [calcium] ion efflux of a sham control. Because of these uncertainties, the issue of whether calcium flux in CNS tissue is determined by a radiation "window" for frequency and amplitude remains open to further research.

Their analysis of research on the possible breakdown of the blood brain barrier (BBB) by microwaves led them to believe that "results published to date strengthen the view further that a local deflection in cellular temperature or other tissue artifact may be responsible for a regionally selective violation of the BBB."

Many members of the bioelectromagnetics community were upset by the paper — though most were unwilling to speak on the record. Dr. Don Justesen, of the VA Medical Center in Kansas City, MO, did say however that the paper would be discussed at the BEMS meeting in Los Angeles in June. "A decision will be made on whether there should be a response at that time," he said.

Reached at his office in San Antonio, TX, Ross said the calcium research should be able to withstand review from outside the field. John Mitchell of the air force, which sponsored the review, said that it was only a "small part" of the air force's calcium work. "The objective is to determine how much research the air force should be doing in this area," he said.

Some critics of the article questioned whether it had been peer reviewed. A spokeswoman for the journal confirmed that all papers are reviewed before publication.

Side Effects Working Group Meets Again; Ocular Effect Disclosed

After a long hiatus, the Side Effects Working Group met in Washington, DC, on April 20 to brief participating federal agencies on recent developments in radiofrequency and microwave (RF/MW) radiation programs. The National Telecommunications and Information Administration's (NTIA) Janet Healer chaired the meeting attended by representatives of some 13 agencies.

At the meeting, a representative of the navy disclosed that research it sponsored at the Johns Hopkins University's Applied Physics Laboratory (APL) had found cellular changes

in the corneal endothelial layer of the rabbit's eye following exposure to 2450 MHz radiation at 10 mW/cm² for four hours. APL's Dr. Samuel Koslov first disclosed this finding last December but refused to specify its precise nature at that time. (See *MWN*, January/February 1982.)

Most of the meeting was devoted to reviewing the research and regulatory budgets of the agencies; many of these have suffered in the present budget climate. There were also updates on the proposed Massachusetts standard and the US-USSR cooperative research agreement.

This was the first meeting of the inter-agency group in at least five years. The next meeting is tentatively scheduled for July.

The working group is part of the Technical Subcommittee of NTIA's Interdepartment Radio Advisory Committee (IRAC), which was set up in 1922 to manage the electromagnetic spectrum. Dr. Paul Tyler of the Defense Nuclear Agency is the secretary of the working group.

Pregnancy Problems in Ottawa

Seven out of eight pregnancies among workers at the solicitor-general's office in Ottawa have ended abnormally. During the last three years, four women have miscarried, one has given birth two months early and two babies have been born with respiratory diseases. All seven women worked on video display terminals (VDTs). An eighth woman who did not use a VDT gave birth to a healthy baby.

Dr. Ian Marriott, senior consultant for the health department's public health service, said there will be a three-week investigation of employee health problems in the office. Marriott has already ruled the terminals out as a possible concern, however, because, as he told the Canadian Press news service, the study of VDT health hazards "has been done so often by so many people around the world."

The Public Service Alliance of Canada, the union representing the women, has requested an independent inquiry and is seeking official assurances that pregnant women can be reassigned to non-VDT work. According to the union's Stewart Skinner, the official policy of the solicitor-general's office is that there is no need for transfers because no hazard exists. Unofficially, however, pregnant women have been granted alternate work since last November. The union has asked Donald Johnson, president of the Treasury Board, which acts as the employer for the federal government, to clarify this policy.

Since news of the cluster broke in the Ontario press April 7, employees at the Ontario Workmen's Compensation Board (Local 1750 of the Canadian Union of Public Employees) and at the Ontario Legislature's library have won the right to non-VDT work during pregnancy.

Other clusters of pregnancy problems among clerical workers have been reported in Canada from two work places in Toronto and one in Montreal, and in the US from offices in Dallas, TX, Atlanta, GA, and Renton, WA. (See *MWN*, November 1981, January/February and April 1982.)

RFI Amendments to the Communications Act

New amendments to the Communications Act would permit the Federal Communications Commission (FCC) to contract with private laboratories to test transmitters for radio-frequency interference (RFI) potential and would end the licensing of CB operators, among other provisions.

The mark up of the Communications Technical Amendments Act of 1981 (H.R.5008) by the House subcommittee on telecommunications, consumer protection and finance is scheduled for early May. The measure is designed to increase the efficiency of the FCC; it has nothing to do with restructuring the nation's telecommunications system, which is being considered by the same subcommittee.

The proposal introduced by Congressmen Timothy Wirth (D-CO) and Allan Swift (D-WA) would let laboratories test new equipment in order to speed up the FCC's approval process. The rapid growth in the number of new devices has created a backlog of applications. At present, the FCC provides the testing service free of charge, but that might change.

A companion measure, the Amateur Radio Service and Private Land Mobile Radio Services Act of 1981 introduced by Senator Barry Goldwater (R-AZ), passed the Senate by a voice vote on September 25. The Senate bill (S.929) would require the FCC to set performance standards for audio and visual devices to reduce their susceptibility to RFI. If the Wirth amendments are approved, the two bills will go to a House-Senate conference to iron out their differences.

An earlier visit of the House amendments would have empowered the FCC to turn off interfering RF transmissions. This provision was dropped when the FCC accomplished the same goal by administrative rule. (See *MWN*, January/February 1982.)

Wirth, the chairman of the House subcommittee, held hearings on H.R.5008 on November 19, 1981.

NBS Workshop on Electromagnetic Calibration

The National Bureau of Standards (NBS) has scheduled a workshop to work out the technical requirements for accrediting laboratories that provide electromagnetic calibration services. The workshop will run from 1:00 pm on July 1 to 5:00 pm July 2 at NBS in Boulder, CO.

The workshop is designed to encourage discussion on the criteria to be used to evaluate labs under the National Voluntary Laboratory Accreditation Program (NVLAP). Last January, NBS formally agreed to include electromagnetic calibration services as part of NVLAP. (See *MWN*, January/February 1982.)

The workshop is open to the public, though interested parties must notify NBS of their intention to attend by June 1. NBS is expecting from 20 to 50 participants. For more information contact: Robert Gladhill, NVLAP Project Leader, NBS, Technology Bldg., Room B06, Washington, DC, 20234, (301) 921-2427.

US-USSR Behavioral and CNS Effects Workshop

The National Institute of Environmental Health Sciences (NIEHS) will host a workshop on the behavioral and central nervous system (CNS) effects of microwave radiation for American and Soviet scientists May 25-28 in Research Triangle Park, NC. The meeting is part of the on-going US-USSR cooperative program on biological effects of microwave radiation. Professor Michael Shandala, the director of the Institute of General and Communal Hygiene in Kiev, will head the Soviet delegation.

The workshop will review recent research results on the effects of both microwave and power line radiation. Dr. Donald McRee, the chairman of the US delegation, said that he anticipated there would be discussions on the design of sensitive

tests for behavioral and CNS effects at the meeting.

The other US scientists invited to attend the workshop are: Drs. Ross Adey, Ernest Albert, Carl Blackman, Don Justesen, Richard Lovely, Sol Michaelson, Clifford Mitchell, Mays Swicord and Howard Wachtel.

The workshop is open to the public. For more information contact: Dr. Donald McRee, NIEHS, PO Box 12233, Research Triangle Park, NC 27709, (919) 541-3382.

Research Papers from the Soviet Union

The Ukrainian Ministry of Health in Kiev, USSR, published a slim volume, *Hygiene in Populated Areas*, in 1981 (No. 20 in the Republican Interdepartmental Collection). The papers address a variety of environmental issues including air and water pollution, chemical wastes, pesticides and radiation. Listed below are those papers dealing with non-ionizing radiation. The titles were translated by *Microwave News*.

- Yu.D. Dumansky, L.G. Andrienko, N.P. Gordynya, S.A. Lyubchenko, "Electric Transmission Lines as a Source of Radiation of an Electromagnetic Field, and Questions of Environmental Hygiene."
- I.S. Bezdolnaya, "The Effect of 50 Hz Electromagnetic Fields on

the Formation and Flow of Complex Forms of Conditioned Reflexes in White Mice."

- M.G. Shandala, M.I. Rudnev, E.I. Obukhan, V.Ya. Akimenko, N.N. Chernenky, "The Effect of an Electromagnetic Field in the Superhigh Frequency Range (2375 MHz) on Various Functional and Morphological Indices in Ontogenesis."
- G.I. Vinogradov, N.M. Gonchar, N.G. Belonozhko, A.A. Zheleznyak, E.I. Vinarskaya, "Immunological and Hematological Effects of Low-Intensity Electromagnetic Fields in the Superhigh Frequency Range."
- S.M. Kochergin, "The Hygienic Study of an Electromagnetic Field of 20-22 kHz Frequency (Electric Construction)."
- S.V. Zotov, "Conditioned-Reflex Behavior in Animals Under the Influence of a Low-Intensity Pulsed Electromagnetic Field in the Superhigh Frequency Range."
- I.P. Los, L.A. Tomashevskaya, N.G. Nikitin, "Comparative Characteristics of the Biological Action of Electromagnetic Fields in the 3 cm and 8 mm Ranges."

Michael Shandala, a well-known microwave researcher, is also the co-author of a paper titled "The Quantitative Dependence of Indices of the Health of a Population on the Quality of the Environment."

UPDATES

Biological Effects. . . . Dr. C.E. Easterly of Oak Ridge National Laboratory's Health and Safety Division has just issued a report, *Biological Effects of Static Magnetic Fields: A Selective Review with Emphasis on Risk Assessment* (No. ORNL/TM-7860). He concludes that "three areas exist for which adequate information can be found to begin modelling: disease induction, reproduction and development, and cardiovascular response." It is available from the National Technical Information Service (NTIS), Springfield, VA 22161 . . . The Office of Naval Research (ONR) has awarded Professor William F. Pickering of Washington University, St. Louis, MO, \$212,000 for a 30-month study of the effects of "monochromatic and polychromatic" electromagnetic radiation on the membrane system of Characean algae. Pickering will be measuring the resting potential of the cells following exposure to bursts of CW and trains of pulsed radiation at frequencies between 10 MHz and 1 GHz as well as in the X-band (8-12 GHz) . . . Volume V, Numbers 2-4 of NTIA's digest of the bioeffects literature from October 1980 to June 1981 has been published. The report covers the period when work on the digest was temporarily suspended. (See *MWN*, April 1982.) The report (NTIA-CR-82-16) is available from NTIS . . . Dr. Howard Wachtel of the University of Colorado, Boulder, is scheduled to talk on "Microwave Modulation of Neural Activity" in Bethesda, MD, on May 11 at the seminar series funded by ONR . . . Wachtel will also be the moderator of a workshop on "Resolving Problems Associated with Electrodes with EM Fields" at the BEMS meeting to be held in Los Angeles at the end of June. Two other workshops are also planned: "Hyperthermia" and "Measurement Techniques for 60 Hz Electromagnetic Field Exposure Systems," moderated by Drs. F. Kristian Storm of UCLA and William Kaune of Battelle respectively. For more information contact: Pat Wright, BEMS, 1 Bank Street, Gaithersburg, MD 20878, (301) 948-5530 . . . The use of NMR to study the eye, featured in last month's issue, was also a cover story in the April 3 *Science News*.

Communications. . . . The FCC's FY83 budget request has been cut by \$2,454,000 from FY82 to \$74,446,000. But \$538,000 has been added for processing some 6,000 low-power TV applications . . . If you missed the March 31 Private Operational-Fixed Microwave Forum, the FCC will copy its videotape onto your 3/4" or 1/2" video cassettes. Contact: John Small, FCC Private Radio Bureau, (202) 632-7179 . . . MCI Communications Corp. plans on joining ICS Communications in a new company to provide mobile radio in Los Angeles, CA . . . Europeans are interested in cellular radio markets too. SRA

Communications of Sweden is now offering its switching, control and base station system in the US . . . To minimize frequency coordination needs, the US and Canada have divided up the 806-821/851-866 MHz bands along the border . . . Dr. Robert K. Crane from the Thayer School of Engineering at Dartmouth College, Hanover, NH, gave an April 21 tutorial in Washington, DC, on propagation limits at 1-300 GHz for the FCC's Office of Science and Technology. Propagation phenomena, such as absorption and scattering, affect the reliability and interference potential of transmission systems . . . The April 8 *New Scientist* explains Britain's frequency crunch and the mounting friction between the BBC and mobile radio users. The BBC is lobbying to speed up WARC's timetable for clearing mobile users from the 97.6-108 MHz band by 1995.

Compatibility & Interference. . . . The FCC has proposed a rule defining FM broadcasters' responsibility for remedying blanketed interference. This occurs when receivers near an FM station are unable to pick up other stations and is exacerbated when FM transmitting antennas are located in downtown urban areas. In 1980, the commission received more than 800 interference complaints. FCC action came in response to a petition from the Association of Federal Communications Consulting Engineers. Comments are due June 29 . . . The FCC has issued a bulletin on its rules for computers. Bulletin OST 54, March 1982, describes the regulations that limit radio emissions from computers and other devices using digital circuitry that could interfere with radio and TV communications. The FCC notes it received a complaint from the police of a western state alleging that a coin-operated electronic game was disrupting highway police communications at 42 MHz. Another case of RFI involved a popular personal computer which affected TV reception in nearby homes. The bulletin is designed to accompany OST 52, issued in June 1981. Copies are available from the FCC's Consumer Assistance Office, Washington, DC 20554, (202) 632-7000 . . . NBS has published *Methods of Suppressing Automotive Interference* (SP 480-44). It focuses on radio systems using narrow-band FM communications in the 25-900 MHz frequency range and the most common sources of RFI, including ignition systems and electric motors. It is available from the National Technical Information Service, Springfield, VA 22161 for \$6 (prepaid), order No. PB 82-165259 . . . The record of the June 4 and 10, 1981, hearings before the subcommittee on international operations of the House Committee on Foreign Affairs, *Region 2 Administrative Radio Conference on Medium Wave Frequency (MF) Broadcasting*, is now available. The subcommittee addressed two

principal issues at the hearing: channel spacing for AM radio and the problem of interference from Cuban stations. Among the documents entered into the record are interference maps for Florida broadcasters prepared by Jules Cohen & Associates of Washington, DC. . . . The FCC has tested the effects of a 1 kHz reduction in channel spacing on receiver performance and sensitivity. The results are reported in a technical memorandum (No. OST TM82-1), *AM Receiver Performance for 10 kHz and 9 kHz Signal Spacings*. For more information contact FCC's Hector Davis at (301) 725-1585 . . . The Radio Technical Commission for Aeronautics (RTCA) has issued a report on the interference of FM stations to airborne systems. Report No. DO-176, *FM Broadcast Interference Related to Airborne ILS, VOR and VHF Communications* recommends ways of limiting the problem. A copy is available for \$16 plus \$3 postage and handling in the US, Canada and Mexico or \$6 elsewhere from RTCA, Suite 655, 1717 H Street, NW, Washington, DC 20006, (202) 296-0484. All orders must be prepaid. . . . The *New York Times* reports on the growing interference from unlicensed pirate radio stations in its April 24 issue. The piece cites WBUZ-FM operating out of Long Island, NY, at 103.1 kHz.

EMP . . . The AF's Electronic Systems Division is developing a new nuclear-resistant communications technique that uses ground wave and operates at low frequencies, slightly below the commercial radio broadcast band, according to a report in the April 26 *Aviation Week and Space Technology*. The system, developed by R&D Associates of Marina del Rey, CA, will soon connect SAC and Aerospace Defense Command HQ with 11 SAC bomber bases . . . Clay Burdick of SAI Technology in San Diego, CA, describes the design of VDTs and keyboards that can survive EMP and other nuclear radiation in the March *Military Electronics/Countermeasures* . . . In contract news, the air force in Kirtland, NM, has awarded BDM Management Services Co. of McLean, VA, \$16.3 million for EMP testing, and the Naval Surface Weapons Center in Silver Spring, MD, is negotiating with Kaman Science Corp. of Colorado Springs, CO, to support its tacamo EMP hardness assurance program.

Government . . . ERMAC and FMAC are still working on their statements which would assure the public that there is nothing to fear from low levels of non-ionizing radiation. (See *MWN*, January/February 1982.) ERMAC's Dr. Sam Koslov has completed a draft which is a synthesis of the council member's submissions. The present draft does not specify a number at which exposures are safe. Instead, it refers to those levels found in EPA surveys of US cities as being without risk. Koslov's version will now be reviewed by the full ERMAC membership. FMAC discussed its statement at a meeting held in Washington, DC, on April 30. It appears they have not progressed as far as ERMAC. A NTIA spokesman said that FMAC has no firm timetable for completing its draft. . . . Senator Clairborne Pell (D-RI) described the case of Charles Day to the members of the Senate Judiciary Committee's subcommittee on agency administration on April 14. Some believe that microwaves were responsible for Day's death (see *MWN*, April 1982) . . . The new agreement among FDA's Bureau of Radiological Health, Bureau of Medical Devices and Bureau of Biologics became effective on April 1. BRH will now assume greater responsibility for radiation-emitting devices such as those used for NMR, hyperthermia and diathermy. The radiology section of the Obstetrics-Gynecology and Radiologic Devices Panel will be transferred from BMD to BRH and will be converted to an advisory committee for all BRH devices. For a copy of the agreement contact: Documents Management Branch (HFA-305), FDA, Room 4-62, 5600 Fishers Lane, Rockville, MD 20857. And for more information contact BRH's Robert Phillips, (301) 443-3426 . . . The FCC has proposed that authorization for speed-detection radar units be included as part of the mobile radio station authority issued to police licensees in an effort to reduce paperwork. (See 47 *FR* 16661, April 19.)

Litigation . . . The trial of *Leo Schuerman v Pacific Telephone* has been continued from May 10 to September 27. Schuerman is charging the telephone company with nuisance, trespass and conducting a haz-

ardous activity in the building of a point-to-point microwave relay system from Los Angeles to San Diego. (See *MWN*, April 1982.)

Medical Applications . . . NCI has prepared a transcript of the March 17 pre-solicitation conference on its hyperthermia quality assurance program. The institute has also assembled a short list of references on the state-of-the-art and the facilities available at BRH. For more information contact: Dr. Thomas Strike, Division of Cancer Treatment, NCI, Bethesda, MD 20205, (301) 496-5297. . . . Cline-Therm Corp. announced that it has temporarily suspended its engineering operations, including its work on hyperthermia systems, pending the completion of new financing. In a telephone interview, Phillip Berry, the company's president, said he expects some good news soon. . . . Scientists at Corning Glass Works in Corning, NY, have been granted a patent for the use of iron crystals to focus RF energy in cancer heat treatment. More work on the new system will be carried out at Mount Sinai Hospital in New York City. . . . The *IEEE Transactions on Bio-medical Engineering* is planning a special issue on hyperthermia and cancer therapy. A late 1983 publication date is anticipated. For more information contact: Dr. John Strohbehn, Thayer School of Engineering, Dartmouth College, Hanover, NH 03755 . . . There is a report on the first Oxford meeting on topical NMR in the April 22 *New Scientist* . . . A group from University College, London, and Oxford Research Systems survey the NMR applications to *in vivo* studies of muscle composition and metabolism in the March 27 *Lancet* . . . The *Journal of Microwave Power* is planning a special issue on electromagnetic techniques in medical diagnosis and imaging. For more information contact: Dr. Carl Durney, Department of Electrical Engineering, University of Utah, Salt Lake City, UT 84112 . . . The workshop on *Medical Applications of Electromagnetic Energy* scheduled for June 18 in Dallas, TX, will feature three invited papers: Dr. Ian Pykett of MGH in Boston on NMR, MIT's Dr. Alan Barrett on radiometry and imaging, and Dr. Gilbert Nussbaum of the Mallinckrodt Institute on hyperthermia. For more information contact: Dr. Gordon Short, BSD Medical Corp., 420 Chipeta Way, Salt Lake City, UT 84108, (801) 582-5550 . . . Researchers at the University of Pennsylvania have devised an electrical device to straighten teeth in half the time now required, according to an item in the April 16 *Wall Street Journal*. The device emits a tiny electric current that stimulates movement of the bony sockets holding the teeth. It may one day be used to treat gum disease and to help denture wearers.

Military Systems . . . The AF's Electronic System Command at Hanscom AFB is testing a new radar that can automatically diagnose its own problems. The AN/FPS-117 radar is designed to replace those at the Alaskan Air Command. The fully automatic unit can give range and position of aircraft 200 miles away at a height of up to 100,000 feet. . . . DoD cancelled its Autodin II military data transmission system. Western Union was the prime contractor for the new automatic digital network which became operational last year. DoD has awarded Bolt, Baranek & Newman a contract to set up a new network. Western Union has protested the decision to GAO. . . . The use of synthetic aperture radar on the F-15 fighter is described in the April 26 *Aviation Week & Space Technology* . . . The AF has awarded three \$4 million contracts for designs of the new Milstar satellite communications system to TRW, Lockheed and Ford Aerospace, according to the April 19 *Aviation Week* . . . Lt. Col. John Alexander told a reporter for *Omni* that he sometimes carries around a matchbook-size transmitter, an ELF generator, to interfere with Russian ELF radiation attempting to jam our brain signals. The Pentagon official is quoted in the magazine's April issue.

Ovens . . . DOE has decided not to set energy efficiency standards for most major household appliances including microwave ovens. In announcing its proposed rule (47 *FR* 14424, April 2), DOE states that such standards "would not result in a significant conservation of energy or be economically justified." Congressman Richard Ottinger (D-NY) condemned the move as "among the worst and most conspicuous anti-consumer actions taken by this administration." He announced that he would introduce legislation that would give the

states the authority to set their own efficiency standards. DOE will hold hearings on its proposal in Chicago May 11-12 and in Washington, DC, May 18-21. Written comments are due by June 16 and reply comments by August 2. . . . Microwave oven shipments in March were up a little from March 1981: 304,600 vs. 299,800. The total for the year is 918,000, down nearly ten percent from last year.

Power Lines. . . . DOE's power lines research program has been cut out of the administration's FY83 budget, though Congress could restore the funds later this year. Meanwhile, program head Alec Bulawka has moved over to the department's photovoltaics project and has been replaced by Ken Klein. Copies of last year's *Project Resumé: Biological Effects From Electric Fields Associated with High Voltage Transmission Lines*, are available from Klein: DOE, Forestal Building, Mail Stop 5E 052, Washington, DC 20585. . . . The New York State Overhead Power Lines Project will allocate up to \$500,000 for epidemiological studies of 60 Hz radiation. It may attempt to replicate Dr. Nancy Wertheimer's study of 60 Hz fields and the incidence of childhood cancer, but the state will delay issuing an RFP until it completes a reanalysis of Wertheimer's data. Fifteen other research contract awards were announced at an April 27 meeting in Albany. (See *MWN*, April 1982.) . . . The Minnesota Environmental Quality Board (MEQB) has approved the first stage of a \$86,000 retrospective study of dairy cattle health and performance near power lines and is continuing from last year its monitoring of electric fields and ion currents near the lines. According to George Durfee, manager of the state's Power Plant Siting Program, the board will use the data as well as the final recommendations of a scientific advisory panel to reevaluate power line siting and operating permit requirements late this year.

Satellite Communications. . . . Hughes Aircraft's proposal for a satcom station in Brooklyn was approved by local Community Board 5 on April 28. The New York City Planning Commission will now hold a public hearing on the plan May 19. Another hearing before the Board of Estimate will follow. (See *MWN*, April 1982.) . . . The King County Department of Planning and Community Development will hold another hearing on Alascom's proposed satcom station for Vashon Island, WA, on May 4 in Seattle. . . . The hearing record for *Satellite Communications/Direct Broadcast Satellites*, held December 15, 1981, is now available from the House Energy and Commerce Committee. . . . According to an FCC report prepared to help form US policy for the International Telecommunications Union conference next year, the US will need between 68 and 205 DBS channels by the year 2000. . . . Oak Industries has leased transponder space from Telsat Canada for the direct-to-home pay TV it plans to offer in 1983. United Satellite acquired its satellite space for DBS earlier this year. . . . "Biznet," the two-way satcom service being launched by the US Chamber of Commerce, worries some public interest groups. An article in the April 13 *Wall Street Journal* examines their fears. . . . Hughes Aircraft has captured a billion-dollar contract to build up to 16 Intelsat VI satellites despite strong protests from Ford Aerospace and Communications. . . . The Intelsat VIs will "act like giant telephone switchboards in the sky," explains an April 15 article in *New Scientist* on how the satellites will route calls to different destinations from space. . . . A report on last month's IASU conference in Dallas, TX, appears in the April 12 *Broadcasting*. . . . FCC Commissioner Joseph Fogarty believes the domestic satellite market should be regulated until a truly competitive marketplace exists. In an April 22 speech, Fogarty said RCA's failure to lease five out of eight transponders offered for \$13 million each demonstrated that the tariff was excessive.

Technology. . . . OTA Director John Gibbons told the transportation subcommittee of the House Appropriations Committee that the FAA's National Airspace System Plan is a "significant and bold" proposal but lacks a "clear statement of priorities and contingencies." He based his assessment on the new OTA study, *Airport and Air Traffic Control System*. The FAA is planning a 10-year, \$10-billion upgrading of the system, including widespread use of the microwave landing system. The report concludes that the MLS "will provide more precise and reliable guidance for landing in adverse weather conditions" and "will lead to more efficient airport

capacity." . . . The possibility of using RF heating of oil shale to tap the huge deposits in Western states is reviewed in the February 22 *Chemical Engineering*. Texaco, Raytheon, and IITRI are all working on processes. . . . MIT's Henry Kolm and Peter Mongeau review rail-gun technology in the April *IEEE Spectrum*. . . . The use of lasers instead of microwaves to transmit energy collected by solar power satellites is discussed in a series of papers in the most recent issue of *Space Solar Power Review* (Vol. 3, No. 1). . . . An AP story filed from Peking on April 30 discloses that China has started using radar to catch speeders. . . . Ronald Seaman and Michael Studwell of Georgia Tech will present a paper on "Electromagnetic Surveillance of Baggage for Agricultural Contraband" at the May 12 meeting of the University of Kentucky's 16th annual conference on security technology.

VDTs. . . . Several of the Bell Canada VDTs that emitted X-rays above background levels in company checks (see *MWN*, April 1982) are being rechecked at the government's special, low-level X-ray testing facility in Ottawa. Dr. Ernest Letourneau of the Health Protection Branch of Canada's Department of Health and Welfare said the initial readings were probably the result of a procedural error and that the new tests are just a precautionary measure. Bell's readings ranged from 0.08 to 0.23 mR/hr, with a variation of 0 to 0.14 mR/hr above background. . . . In a new program started in December, Letourneau's branch has tested about 50 other VDTs for low-level X-rays. . . . Toronto City Hall VDTs will be tested regularly for radiation leaks. According to a brief notice in the April 15 *Toronto Star*, the city's executive committee decided on the move because some of the terminals are already ten years old. (A cluster of miscarriages among workers at a provincial government office in Toronto's Old City Hall received wide publicity last month.) . . . An *International Forum on the Effects of Low-Level EM Radiation and the Question of VDTs* is scheduled for June 4 at the University of Ottawa to coincide with the *First International Symposium on the Biological Effects of Electromagnetic Radiation*. Registration before May 20 is \$175 (Canadian) and \$200 (Canadian) thereafter. Contact: Professor William Kuhns, Department of Communications, University of Ottawa, Ottawa, Ontario K1N 6N5, (613) 231-3365. . . . COMAR's position paper on VDTs is slated to come up for approval before the IEEE Technical Activities Board in late May. The paper concludes: "There is no cause for concern regarding hazards associated with emissions of ionizing and non-ionizing radiation from video display terminals. Improved application of stress-reducing biotechniques and the education of the operator are the areas where expenditures of additional resources would be most beneficial." . . . "Tomorrow's Technology, Today's Headache," a slide-sound presentation on VDTs produced for NYCOSH, is available for rental (\$25) or sale (\$75). Contact: Shop Talk Productions, 155 West 72 Street, New York, NY 10023, (212) 580-1881.

Etc. . . . The IEEE's Committee on Man and Radiation's (COMAR) position paper on "Human Exposure to Microwaves and Radiofrequency Electromagnetic Fields" has been approved by the IEEE and is now available from the institute's Washington office. Contact: Edith Carper, 1111 19th Street, NW, Washington, DC 20036, (202) 785-0017. The paper had been the subject of a dispute between some members of COMAR and the IEEE's Committee on Social Implications of Technology (CSIT)—see *MWN*, October 1981. Since then, CSIT has been upgraded into a full IEEE society (SSIT) with Robert Bogumil as president. Bogumil offers some additional thoughts on the revised COMAR statement in an open letter to COMAR chairman Dr. Om Gandhi. They appear in the first issue of SSIT's new quarterly magazine, *Technology and Society*, dated March. Meanwhile COMAR is completing another position paper on VDTs. See VDT Update for details. . . . The 1981 annual report of the National Council on Radiation Protection and Measurements (NCRP) has been released. One interesting fact buried on page 33 indicates that its report No. 67 on the properties, measurement and biophysical interactions of RF fields (see *MWN*, October 1981) was NCRP's best seller of 1981. . . . French researcher Dr. Andre Berteaud of the CNRS is visiting Professor Ernest Albert's laboratory at George Washington University for six months beginning April 1.

LETTERS

To the Editor: My motive in writing is to point out the irony that after 40 years experience and ten years of escalating research into the biological effects of microwaves, the January/February 1982 issue carries on page five Dr. Koslov's "violent objections" to a standard of 5 mW/cm² ABOVE 1.5 GHz, while on the very next page Professor Grant is quoted as saying that although 10 mW/cm² may be adequate above 1 GHz, it is too high BELOW 1 GHz!

If these workers were economists, this would be quite understandable, but for supposedly scientific experts it seems to underline the degree of prejudiced intuitive interpretation which is going to be typical of this field for some time.

Thank you for your energies in maintaining an informative and balanced source of information in this important area.

Michael Hulley (SM-IEEE)

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To the Editor: Several telephone calls recently have come in from colleagues, all of whom have declared their disbelief that I authored or co-authored the review of biological effects of microwaves for the EIS re RCA's proposed satellite uplink in Bainbridge Island, WA. (See *MWN*, April 1982.) I share their disbelief from the near-perfect perspective of personal knowledge.

The specifics are: RCA contracted with CH2M Hill, Inc., of Seattle, to perform the EIS. CH2M, in turn, obtained the services of Bill Guy as a subcontractor to provide analytical projections of uplink-associated field strengths on Bainbridge Island and to provide a review of the pertinent literature on biological effects. Bill Guy, in turn, asked me to help with the latter, which I did. But my *draft*, never completed, was not used by CH2M Hill in compiling the draft EIS they released for external review in connection with the Bainbridge Island siting. Rather, CH2M Hill contracted with staff of the Battelle Human Affairs Research Center in Seattle, WA for the biological-effects review. Bill Guy had no part in this review, nor did Richard Phillips or any other scientific staff of the Battelle Pacific Northwest Laboratories, which are located in Richland, WA.

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

DoD RF/MW Review (continued from p. 1)

the ACGIH standard. The proposed ANSI standard spans the frequencies between 300 kHz and 300 GHz, while that of the ACGIH reaches down to 10 kHz.

A similar position was taken by John Mitchell, chief of radiation physics at the air force's School of Aerospace Medicine at Brooks AFB, TX. Mitchell submitted comments to McDermott as the chairman of the Tri-Service Electromagnetic Radiation Panel.

Wood said that his report had not been submitted yet, and he refused to comment on the air force position. McDermott refused to discuss the army's view.

The air force is in the midst of revising its own occupational safety and health standard. A proposal by the School of Aerospace Medicine and the Occupational Environmental Health Laboratory at Brooks would bring the air force standard into line with the new ANSI standard. The air force proposal is now under review and should emerge in two or three months.

On February 11, about a dozen representatives of both the medical and user microwave communities assembled at the Pentagon to discuss the new standards.

Meanwhile, the committee that drafted the new ANSI standard has now officially submitted it to ANSI for final approval. The ACGIH standard was to be discussed at a meeting of its physical agents committee on April 22-23. The meeting was cancelled and has been rescheduled for sometime during the week of June 6-11 at the joint conference of the ACGIH and the American Industrial Hygiene Association in Cincinnati, OH.

Pulsed Magnetic Fields (continued from p. 1)

in the current density to $\pm 20\%$ of the mean. The system is similar to one used in clinical trials in England to treat non-union fractures.

This new research builds on the well-known work of Drs. Ross Adey, Suzanne Bawin and Carl Blackman on calcium efflux from brain tissue induced by 16 Hz amplitude modulated radiofrequency fields. In a telephone interview, Blackman commented that this "was very interesting work which opens up a line of research using a well-defined biological system."

Dixey and Rein offer the following hypothesis to explain the induced release of noradrenaline by the pulsed magnetic field: "The cation binding sites on the outer surface of the plasma membrane may be highly sensitive to such weak stimuli and that subsequent cooperative changes in [calcium ion] binding may influence membrane stability, thereby promoting [calcium ion] entry and vesicular release." That is, they suggest weak magnetic fields could damage the surface of the cell membranes.

By adding magnesium ions to the medium, they eliminated the observed effect. They speculate that the release occurs via a secretory mechanism similar to the one in which calcium ion fluxes are involved. They deem this possibility unlikely, however, given the weakness of the electric field.

Further studies will be necessary to test their theory and to explore the frequency of dose dependence of the experimental system. Once replicated, such research on cultured PC12 cells may become a powerful complement to experiments that probe the effects of low frequency pulsed magnetic fields on whole animals.

In 1975, Dr. Bernard Servantie and co-workers reported that white rats exposed to a 3 GHz pulsed microwave field with a pulse repetition frequency (PRF) between 500 and 600 pulses per second for ten days at an average power density of 5 mW/cm² (peak power of 150 kW) resulted in a frequency synchronous to the PRF on the occipital EEG. They found that the frequency persisted for a few hours after the irradiation was terminated. (*Ann. NY Acad. Sci.* 297, 82, 1975)

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