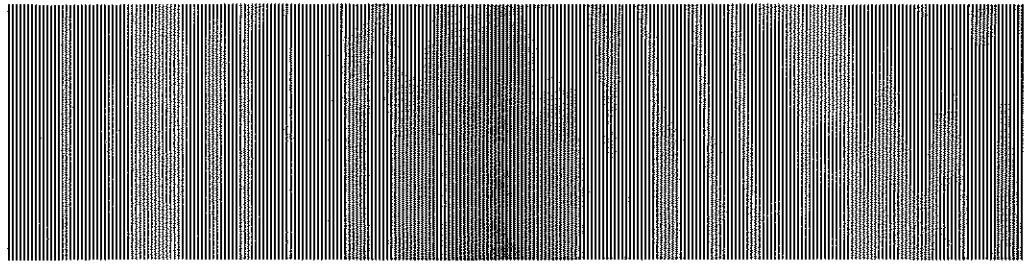


# MICRO WAVE NEWS



Vol. I No. 5

A Monthly Report on Non-Ionizing Radiation

May 1981

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## ANSI News: The Search for Consensus

Work on revising the American National Standards Institute (ANSI C95.1) safety standard for exposure to radiofrequency and microwave radiation (RF/MW) continues, with no firm completion date yet in sight. A new draft of the C95.1 standard is scheduled to be circulated among the full C95 Committee on Radio Frequency Radiation Hazards membership in June, by-passing a separate C95.IV subcommittee vote. "The committee may be able to achieve consensus without another meeting, but if not, the members will assemble again," Professor Saul Rosenthal, chairman of C95, said.

When no agreement on the standard could be reached at last February's C95 meeting, Rosenthal asked Professor Bill Guy's C95.IV subcommittee to try to agree on a new standard. According to a number of sources, a new draft is ready, though no one was sure which changes have been made. Guy has been travelling in Europe and the USSR, and could not be reached for comment.

The current, proposed revision represents some major changes: the standard is 1 mW/cm<sup>2</sup> from 30–300 MHz, rising to a maximum of 5 mW/cm<sup>2</sup> at 1500 MHz to 100 GHz. For lower frequencies, the standard reaches a maximum of 100 mW/cm<sup>2</sup> at 3 MHz. (See p. 5 for full text of the standard, as proposed to the C95

*(continued p. 4)*

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## HOUSE SCHEDULES HEARINGS ON VDTs AND RF SEALERS

Congressman Albert Gore, Jr., democrat from Tennessee and chairman of the Subcommittee on Oversight and Investigations of the House Committee on Science and Technology, is planning to hold hearings on the potential health effects of VDTs and RF sealers and heaters on May 12–13.

Gore said that he was "troubled" that a recent FDA report on radiation from VDTs (see p. 7) "failed to recognize the agency's own scientific conclusion that research information on health effects for the range of frequencies emitted by VDTs is lacking."

With respect to the millions of workers exposed to RF radiation in industry, Gore said that they may suffer blood and central nervous system disorders as well as birth defects.

The hearings will be held in room 2325 of the Rayburn House Office Building, beginning at 2 pm on both May 12 and 13. Among those testifying are the new head of OSHA, Thorne Auchter, John Villforth, director of BRH, Sheldon Samuels, and Drs. Milton Zaret and Paul Tyler.

The complete list of invited witnesses in tentative order of appearance is: **May 12 on VDTs:** Charles Perlik, Jr., Newspaper Guild; Dr. Paul Tyler, Armed Services Radiobiology Research Institute; Dr. Milton Zaret, Zaret Foundation; John Villforth, BRH; Dr. Joe Elder, EPA; Vico Henriques, Computer and Business Equipment Manufacturing Association; George Mine and Dr. Bruce Dickerson, IBM; and a representative of newspaper management, still to be announced. **May 13 on RF sealers and heaters:** Howard Samuel and Sheldon Samuels, IUD/AFL-CIO; Dr. Joe Lary, NIOSH; Drs. Ezra Berman and Ralph Smialowicz, EPA; Dr. David Conover, NIOSH; Thorne Auchter, Dr. Bailus Walker, and Robert Curtis, OSHA; Angelo Vassallo, Solidyne Corp.

# GOVERNMENT

## Reagan Reactivates Project ELF

The Reagan Administration, reversing the recommendation of the Secretary of the Navy, has decided to reactivate the ELF Project antenna in Clam Lake, Ashland County, WI. Last month, there were reports that the Navy had advised abandoning the Project (see *Microwave News*, April 1981). No clear reasons for the reversal have emerged, though Eliot Marshall in *Science* (May 8) suggests that the Navy had "put their efforts into getting new airplanes and let others make the case for the unpopular old ELF." The decision drew immediate criticism from Senators Proxmire of Wisconsin and Levin of Michigan.

The Clam Lake facility, deactivated in January 1979, should be operational by the end of the year. The ELF antenna consists of two 14-mile underground grids. Designed for communicating with submerged submarines, the Project has a budget of \$5.2 million in FY81 and \$34.9 million in FY82.

Reagan's ELF decision is the congressionally mandated report due last April 1, according to a Pentagon spokesman.

Secretary of Defense Caspar Weinberger deferred a decision on a larger 130-mile antenna at K.I. Sawyer AFB in Michigan until later this summer, after a complete review of DOD's overall strategic command and control systems. The two antennas are designed to operate in sync.

Meanwhile, Walter Sullivan of the *New York Times* reported that the Navy and the Defense Advanced Research Projects Agency are investigating the possible use of blue-green lasers as an alternative to the ELF system (April 22). The announcement was made by DARPA's Dr. Douglas Tanimoto at the American Physical Society meeting in Baltimore.

## Two More PAVE PAWS?

The Air Force is considering building two more PAVE PAWS radar installations in the southeastern and southwestern US, and has tentatively budgeted \$75 million for FY83 and \$100 million a year for FY84-86 for the project, according to a report in *Aviation Week & Space Technology* (April 13, 1981). Two phased array radars are already in operation: one on Cape Cod, Massachusetts (Otis AFB), and one in California (Beale AFB); they monitor the Atlantic and Pacific oceans respectively.

The PAVE PAWS radars (PAVE is an AF code word and PAWS stands for Phased Array Warning System) are designed to detect and track submarine launched missiles at distances as great as 3,000 miles.

A spokesman for the AF Systems Command HQ at Andrews AFB in Maryland said that a decision on whether or not to proceed will be made by the Secretary of Defense this summer, and any funding request would then be forwarded to the Congress this fall. No particular sites have yet been surveyed, he added.

## BRH Reconsiders Oven Amendment

The Bureau of Radiological Health is reconsidering a recent amendment to its microwave standard. (*Federal Register*, April 24, 1981, p.23233 and p.23266.) The amendment, dealing with instruments to measure leaks, was promulgated last November (45 FR 79028), and would have become effective on November 30, 1981. The comment period has been reopened.

Last December, the Association of Home Appliance Manufacturers (AHAM) petitioned BRH to review its decision, partly because the new rule would change the rejection level of new ovens, according to a BRH spokesman. While the Bureau did not agree with AHAM, it decided that "there was enough disagreement and misunderstanding to open it up again," he said.

## EMP News

The Defense Department continues to seek contractors for electromagnetic pulse (EMP) work. The Defense Nuclear Agency has scheduled a May 19 briefing at Kirtland AFB, NM, on needed support for the advanced research EMP simulator (*Commerce Business Daily*, April 17). The Air Force has already sought R&D proposals for its EMP weapons lab (*CBD*, April 16) and decided to extend its EMP contract with the Mission Research Corp. in La Jolla, CA (*CBD*, April 17). Meanwhile, *Aviation Week & Space Technology* (April 13) reports that the AF wants to spend \$20 million on EMP hardening for B-52's.

## BRIEFS

EPA's Dave Janes has been appointed acting director of the Surveillance and Emergency Preparedness Division in the Office of Radiation Programs, and is now working out of Crystal City, VA (703) 557-8217. Roger Mattson, the past director, has returned to the NRC. Ric Tell is now acting branch chief, but is still in Las Vegas. . . . The *BRH Bulletin* has changed to a monthly publication schedule as an economy measure. . . . The FCC has opened the way for the rapid development of cellular mobile telephone systems. In an April 9 ruling, the Commission assigned 40 MHz (825-845 and 870-890) for the new communications system. . . . On April 21, the FCC ruled that direct broadcast satellite service is in the public interest and will now review COMSAT's application. . . . NASA scheduled a second industry briefing on its Advanced Communications Satellite program (30/20 GHz) May 6-7 in Washington, DC. . . . NASA Lewis Research Center is looking for a contractor to study the role of satellites in wide-area land mobile radio services. . . . The Office of Naval Research is negotiating a contract with Scientific Research Associates of Glastonbury, CT, for research on computer modeling of microwave devices and one with Research Triangle Institute of Research Triangle Park, NC, for additional study of "pulsed radiation effects in contemporary devices and integrated circuits" . . . Hanscom AFB is soliciting R&D proposals for a system for "automatic network analysis of microwave devices and antennas" . . . NTIA has awarded \$93,763 to Booz, Allen and Hamilton, Inc. of Bethesda, MD, to analyze common carrier microwave communications systems.

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# AT THE WORLD TRADE CENTER

The Port Authority (PA) of New York and New Jersey has released some monitoring data on the non-ionizing radiation levels atop the World Trade Center (WTC) in downtown New York City. Robert Silliman, from Silliman and Silliman of Washington, DC, made the measurements for the PA. (See *Microwave News*, March 1980, for a detailed report on the WTC.)

The monitoring reports were released to Joyce Feldman, a radiation specialist in the Environmental Protection Agency's (EPA) New York office, in a March 17 letter from Robert Linn, deputy director of the PA for world trade. The reports were also made available to *Microwave News*.

The readings were taken on the south tower while two UHF TV stations were broadcasting at 50% power from the north tower, and one FM station (WTFM—operating with 3.9 kW ERP) and one TV translator (W60AI) were transmitting from the south tower. Two VHF TV stations (WCBS-2 and WNEW-5) were also in operation but were not included in the PA survey because, according to Silliman, their contribution was insignificant. Another FM station (WKCR—0.76 kW ERP) was located on the same mast as WTFM, but was not on the air. (The monitoring methodology used by Silliman is explained in the Linn letter, which is excerpted below.)\*

When WTFM was turned on, Silliman found radiation levels as high as 540  $\mu\text{W}/\text{cm}^2$  on the WTC roof. The PA installed a 22-foot protective "wagonwheel" shield between WTFM and WKCR in order to eliminate such hot spots. Figure 1 compares the total radiation levels with and without the wagonwheel shield. Figures 2 and 3 show the radiation levels from WTFM and WKCR respectively with the shield in place. (WKCR was turned on for testing purposes only, and its signal is not included in Figure 1. These are only two of eight figures released.) While the shield reduced the WTFM radiation levels, WKCR radiation increased from about 130  $\mu\text{W}/\text{cm}^2$  to 1200  $\mu\text{W}/\text{cm}^2$  on the roof.

In his letter, Linn calls the WKCR radiation levels "unacceptably high," and states that "despite WKCR's desire to go on the air, they will not be permitted to commence operations until this problem is rectified . . . . The [PA] is presently going through the final engineering required to implement the necessary changes to WKCR to reduce the EMR levels in this area to within the 100 microwatt interim standard adopted" by the PA.

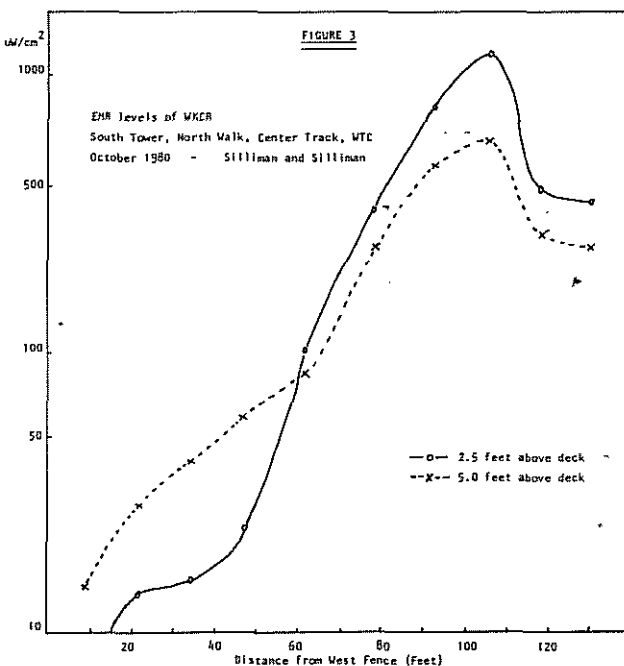
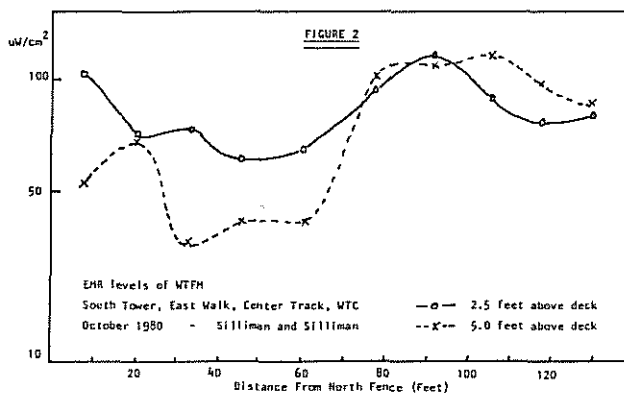
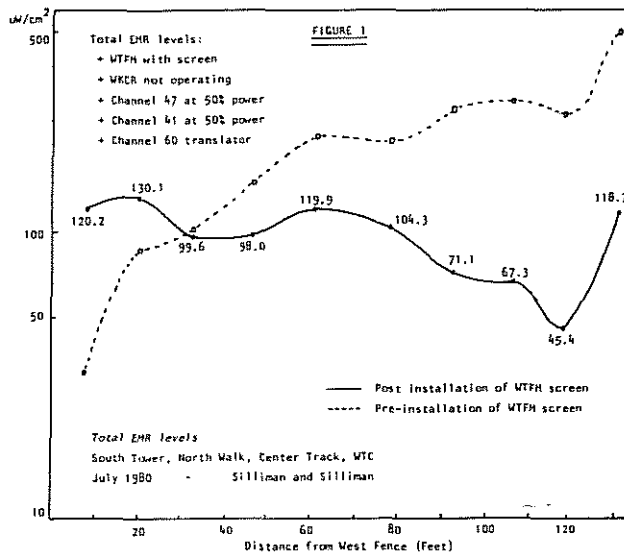
Asked about the error margins associated with these measurements, Silliman said that his instruments were accurate to within  $\pm 1$  dB, but agreed with an EPA estimate that an accuracy of  $\pm 3$  dB (a factor of 2) was a fair estimate under field conditions.

Tom Sorensen, broadcast coordinator at the PA, said that two more TV stations (WOR-9 and WPIX-11) would begin broadcasting from the main mast by the end of May, and that WNET-13 would be on the air from the WTC by the fall. (WABC-7 is already broadcasting from the WTC.) No work on the other FM stations is now going on, he said.

\*The [chart] recorder and field intensity meter are set up for one station and the receiving antenna carried over the path oriented for maximum sensitivity in one receiving direction . . . . Next, the process is repeated for an orthogonal direction . . . . Then a third pass is made, oriented for vertical polarization . . . . The analysis of the chart is made by segments such as from the start to the first checkpoint and from one checkpoint to the next checkpoint. The highest response is noted within the span and its position within the span noted. The EMR levels for the other two components are observed at the same point in the span and added to give the EMR level from one source.

When it comes to adding the EMR level from two or more stations, the following procedure is followed. 1. For each sector and measurement height, the analysis of each station is scanned and the source having the highest analysis for the sector noted together with the position within the sector at which the highest level occurred and its value. 2. The values for the other stations to be added are then determined for the same height and the position within the sector at which time the highest level for the highest source was determined. Once again, the levels for the three orthogonal orientations were added.

The sum so determined is reported as the estimated peak EMR level to be expected for the several stations for the particular segment analyzed. Each additional segment of the path is analyzed in the same manner.



committee last February.) The 1966/1974 exposure standard is not frequency dependent, and only specifies a maximum exposure of 10 mW/cm<sup>2</sup> for frequencies between 10 MHz and 100 GHz.

The C95.IV subcommittee has been revising the old 10 mW/cm<sup>2</sup> standard for a number of years. The original standard, which was adopted by the Occupational Safety and Health Administration, was established in 1966, and revised with only minor changes in 1974. (According to the ANSI charter, all standards must be revised or reaffirmed every five years. Note that while the subcommittee number is C95.IV, the standard number is C95.1.)

Earlier this year, the full C95 committee voted on the new RF/MW standard: of 43 voting members, 32 returned ballots, with 25 ayes, 5 nays, and 2 abstentions. While a clear majority favored the new standard, some leading organizations—including the Bureau of Radiological Health (BRH), the Environmental Protection Agency (EPA), and the Electronic Industries Association (EIA)—did not approve it. Some votes have been recently added and changed, but the next official tally will come with a new vote this summer.

A number of unresolved issues must be settled before the standard can be approved:

- **Population v Occupational Standard:** The proposal now applies to "non-occupational as well as occupational exposures." Many officials from federal, health-oriented agencies would prefer to limit the standard to the workplace. Last September, John Villforth, director of BRH, did not approve the standard, writing, in part, "If interpreted literally, the standard could endorse non-occupational exposures of any number of members of the general public for indefinite durations, even continuously, at the proposed guide levels. It seems incongruous that the greatest risk and stress, if any, could be exerted on members of the community who might be least qualified to take the risk, under circumstances having the least control." Indeed, in 1973, BRH's Henry Rechen and EPA's Dave Janes both refused to endorse the ANSI 10 mW/cm<sup>2</sup> standard because of an absence of cautionary language regarding its application to the general public.

In an effort to satisfy these objections, some new language has been introduced—this is italicized in the full text. Now, some parties on both sides are unhappy. For instance, Morris Shore of BRH still favors an additional safety margin for population exposures while others believe that the standard provides safety for all and that the new language unduly undermines the standard.

How BRH will finally vote is still an open question, but Dave Janes will abstain as long as the standard includes the general population.

- **Exclusion Clause:** (also italicized in the text) The standard excludes sources that have a maximum input power of seven watts or less. This was introduced, among other reasons, so that the millions of hand-held radio users would not be in violation of the standard. Allan Eckhaus of Consumers Union finds this exemption "confusing." "The standard is an exposure standard, so why are emissions from certain electronic products excluded?" he asks.

A second element in the exclusion clause is also problematic: the standard can be exceeded if the exposure conditions can be shown to produce whole body specific absorption rates (SARs) below 0.4 W/Kg and peak SAR's below 8 W/Kg. As one C95 member complained at the last meeting: "Where do I find a SAR meter?" Some members of EIA voted against this new addition to the exclusion clause because "it necessitates the use of a laboratory procedure for making measurements in the field." Only a couple of labs across the country are believed to have the expertise to make the measurements necessary to grant the exemption. Dr. Quirino Balzano of Motorola, on the other hand, is pleased with the SAR clause: "The standard now recognizes that, in the near field, high electric field readings do not necessarily cause biological effects," he said in an interview. He stressed that it is easy to produce near field levels which exceed the ex-

posure guides, even for very low power devices. The SAR language was inserted to deal with the near field problem, he added.

Others are uncertain about the basis for the 20:1 ratio between the peak to whole body average SAR's, and the lack of specificity about the absorbing organ—especially the eye.

- **Averaging Time:** The standard's six-minute averaging time is causing some confusion. "If you allow 8 W/Kg for six minutes, you can allow 16 W/Kg for three minutes, 32 W/Kg for a minute and a half and so on," CU's Eckhaus argued. He went on to object to the standard's failure to specifically deal with pulsed sources. At the last C95 meeting, no one was really sure about the origin of the six-minute averaging time. At issue here is the thermal basis for the standard.

### Other Objections

On a more general level, there are disagreements about the overall scientific basis for the standard—some say the numerical exposure limits are too high, others say too low, and still others disagree with the complex frequency dependency.

RCA's Howard Johnson, the EIA representative on C95, does not think that ANSI should be in the health standard setting business at all. "I believe that the government, not a voluntary standards setting organization, should establish public health standards," he said. (EIA representatives will meet to consider its vote when the new draft arrives.)

Even the "voluntary" nature of ANSI participation has been called into question. Given the budget cuts for travel, many interested parties can no longer attend all the meetings, and most public interest organizations simply cannot afford to participate in the lengthy and expensive process.

Finally, some members have found inconsistencies in the "Rationale Document," which accompanies the ANSI standard. These too will have to be cleared up.

### Administrative Notes

For a history of the C95.IV work on the new standard, through summer 1979, see Guy's testimony before the Subcommittee on Natural Resources and Environment of the House Committee on Science and Technology, July 12, 1981: *Research on Health Effects of Nonionizing Radiation*. The minutes of the last two subcommittee meetings, in San Antonio in September 1980 and Bethesda in October 1980, have not yet been distributed. The minutes of the February C95 meeting will be sent out as soon as they are completed. All those who attended the meeting will be receiving a copy. Others should contact the C95 secretary Stephen Caine, Dept. of Navy, Naval Electronics Systems Command, ELEX 832, Washington, DC 20360.

Guy has announced his intention to resign as the chairman of C95.IV as soon as the new standard is approved.

### NIOSH & ACGIH

In other standard setting news, the National Institute for Occupational Safety and Health (NIOSH) continues to work on its RF/MW criteria document. According to its latest schedule, it should be released for review in the early fall.

The American Conference of Governmental Industrial Hygienists (ACGIH) is also in the process of revising its 10 mW/cm<sup>2</sup> standard. Proposals will be discussed at the annual American Industrial Hygiene Conference, to be held in Portland, OR, May 25-29, 1981.

Some recent developments among the other C95 subcommittees include:

- **C95.I:** A new "Recommended Practice for the Measurement of Hazardous Electromagnetic Fields—RF and Microwave" (C95.5-1981) was approved on March 16, 1981, and is in the process of being published. This document discusses the problems associated with measuring RF/MW in the near field. The subcommittee now intends to combine the far field standard (C95.3-1979) with C95.5 into one document.
- **C95.II/III:** Glenn Heimer has retired as chairman and been replaced by Dr. John Osepchuk. The comment period for the new RF radiation hazard symbol (C95.2) runs until June 2, 1981. For more information contact: Ms. M. Lynch at the IEEE, 345 East 47 Street, New York, NY 10017.
- **C95.V:** Florian Janoski has resigned as chairman due to work pressures and has been replaced by Ramie Thompson. The subcommittee is continuing its work towards a standard for electro-explosive devices.
- **C95.VI:** At the February C95 meeting, the subcommittee was retired.
- **C95.VII:** In the absence of an agreed set of early indicators for RF/MW hazards, the subcommittee is still trying to develop some guidelines. Dr. Tyler, the chairman, was looking forward to seeing the new OSHA report on medical surveillance (see *Microwave News*, February 1981).

### C95 Committee on Radio Frequency Radiation Hazards

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- VI. Safety Levels and/or Tolerances with Respect to Flammable Materials  
Subcommittee retired in February 1981, past chairman:  
Joseph Thiel of the Texas Dept. of Health

VII. Medical Surveillance  
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## Draft C95.1 Standard—February 1981

### Safety Level with Respect to Human Exposure to Radio Frequency Electromagnetic Fields (300 kHz–100 GHz)

#### 1. SCOPE AND PURPOSE

Recommendations are made to prevent possible harmful effects in human beings exposed to electromagnetic fields in the frequency range from 300 kHz to 100 GHz. These recommendations are intended to apply to non-occupational as well as occupational exposures. These recommendations are not intended to apply to the purposeful exposure of patients by or under the direction of practitioners of the healing arts.

#### 2. DEFINITIONS

Radio frequency protection guide (RFPG): The radio frequency field strength or equivalent power density ( $\text{mW}/\text{cm}^2$ ) which should not be exceeded without (1) careful consideration of the reasons for doing so, (2) careful estimation of the increase energy deposition in the human body, and (3) careful consideration of the increased risk of unwanted biological effects. Measurements to determine adherence to the recommended protection guides shall be made at distances 5 cm or greater from any object (refer to ANSI C95.3-1979 for RF measurements).

#### 3. RECOMMENDATIONS

For human exposure to electromagnetic energy of radio frequencies from 300 kHz to 100 GHz, the radio frequency protection guides, in terms of equivalent plane wave free space power density, and in terms of the mean squared electric ( $E^2$ ) and magnetic ( $H^2$ ) field strengths as a function of frequency, are given in Table 1.

For near field exposure, the only applicable radio frequency protection guides are the mean squared electric and magnetic field strengths given in Table 1, columns (3) and (4). For convenience, these guides may be expressed in equivalent plane wave power density.

For both pulsed and non-pulsed fields, the power density and the squares of the field strengths, as applicable, are averaged over any 0.1 hour period and should not exceed the values given in Table 1. For mixed or broadband fields consisting of a number of frequencies for which there are different values of radio-frequency protection guides,

TABLE 1  
RADIO FREQUENCY PROTECTION GUIDES

(1) Frequency Range (MHz)	(2) Power Density ( $\text{mW}/\text{cm}^2$ )	(3) $E^2$ ( $\text{V}^2/\text{m}^2$ )	(4) $H^2$ ( $\text{A}^2/\text{m}^2$ )
0.3–3	100	400,000	2.5
3–30	$900/f^2$	$4,000 (900/f^2)$	$0.025 (900/f^2)$
30–300	1.0	4,000	0.025
300–1500	$f/300$	$4,000 (f/300)$	$0.025 (f/300)$
1500–100,000	5.0	20,000	0.125

Note: f is the frequency, in Megahertz

(continued p. 6)

## FDA Wants More Data on Hyperthermia Unit

The Food and Drug Administration did not approve a pre-market application for a hyperthermia unit for use in cancer therapy, according to Dr. Lillian Yin, director of the FDA's Division of OB-GYN and Radiology Devices in the Bureau of Medical Devices. The FDA action came after an advisory panel sought additional safety and efficacy data. The unit, developed at UCLA Medical School and to be marketed by Henry Medical Electronics in LA, is the first tumor heat treatment device for which pre-market approval has been sought.

At its April 3 meeting, the Radiology Section of the OB-GYN and Radiological Device Panel decided that it wanted more information on potential exposures of clinical personnel to electric and magnetic fields from the RF device and on the distribution of heat in tumor and healthy cells. The minutes of the meeting are being prepared and will be available soon.

F. Kristian Storm, assistant professor of surgery at UCLA Medical School, a developer of the hyperthermia unit, said that the data requested by FDA are already available and must simply be rewritten for submission. "The FDA is playing this one strictly by the book," he said in a telephone interview. "They are being extraordinarily careful and we agree that they should. We have no qualms about the FDA request." Storm expressed concern that the new therapeutic device be used only by qualified personnel.

Storm said that a new application for pre-market approval would be submitted within 90 days. Similarly, a spokeswoman for Henry Medical Electronics said that she had no doubt the unit would gain approval soon.

The UCLA-Henry unit, trademarked Magnetrot, operates at 13.56 MHz and induces an electrical field inside the body by imposing an external magnetic field with a single turn loop.

## Questions About Healing with Pulsed EM Fields

In a lead editorial titled "Electromagnetism and Bone," the prestigious British medical journal, *Lancet* (April 11, 1981), called for more rigorous study of the healing of non-union bone fractures with pulsed electromagnetic fields. After noting the absence of firm experimental data on the efficacy of this increasingly popular type of treatment, the editorial makes three points: "First, despite the published reports on the therapeutic efficacy of electromagnetism in persistent non-union, opinion remains divided; second, the healing of fresh fractures in animals is not comparable with healing of established non-union in man; third, some experimental electric fields may delay rather than encourage fracture healing." The editorial goes on to argue for a double-blind controlled study of the effects of electromagnetism on healing of non-union in man, as distinguished from the effects of immobilization, and for the definition of more precise laboratory methods and indices for research in this area.

In so arguing, the editorial challenges past assertions by Dr. Andrew Bassett, professor or orthopedic surgery at Columbia University medical school in New York City and one of the field's leading researchers. Bassett did not return numerous calls for comment from *Microwave News*.

## BRIEFS

The Space Shuttle used the Microwave Scanning Beam Landing System (MSBLS) during its smooth touchdown last month. MSBLS supplied position information to the astronauts and the Autoland Guidance System, which could have achieved a "hands-off" landing . . . . Papers on the latest developments in microwave aquametry, a method for measuring the water content of solids and liquids, are featured in a special issue of the *Journal of Microwave Power* (December 1980) . . . . An April 21 article in the *Wall Street Journal* describes the

latest anti-shoplifting devices which use radio-frequency and microwave technology. One manufacturer said there are over 600,000 potential US customers for electronic article-surveillance systems . . . . John Strohbehn, from Dartmouth's Thayer School of Engineering, discussed his work on a microwave heating system for treating tumors at the New York Academy of Sciences on April 8 . . . . IEEE Microwave Theory and Techniques Society will publish a special Transactions issue on microwave filters in September 1981. Papers should be submitted by November 30, 1981 to: A.E. Williams and A.E. Atia, Guest Editors, MTT Special Issue, COMSAT Laboratories, 22300 Comsat Drive, Clarksburg, MD 20734.

## ANSI News (continued from p. 5)

the fraction of the radio-frequency protection guide incurred within each frequency interval should be determined, and the sum of all such fractions should not exceed unity.

*Exclusion: At frequencies between 300 kHz and 1 GHz, the protection guides may be exceeded if the maximal input power of the radiating device is seven watts or less. Furthermore, at frequencies between 300 kHz and 100 GHz, the protection guides may be exceeded if the exposure conditions can be shown to produce specific absorption rates (SARs) below 0.4 W/Kg as averaged over the whole body, and peak SAR values below 8 W/Kg as averaged over any one gram of tissue.*

## 4. EXPLANATION

Exposure to electromagnetic fields in the range of frequencies under consideration is but one of several sources of energy input into the body, which requires wide ranges of energy production and dissipation in order to function. For situations involving exposure of the whole body, the radio-frequency protection guide is believed to result in energy deposition (as averaged over the entire body mass for any 0.1-hour period) of about 144 joules per kilogram (J/Kg) or less. This level is equivalent to a specific absorption rate (SAR) of about 0.40 watts per kilogram (W/Kg) or less, as spatially and temporally averaged over the entire body mass.

Biological-effects data applicable to human beings for all possible combinations of frequency and modulation do not exist. The radio-frequency protection guide, therefore, has been based on the best available interpretations of the literature and it is intended to eliminate adverse effects on the functioning of the human body.

*However, because of the limitations of the biological effects data base, these guides are offered as upper limits of exposure, particularly for the general population, and are not recommendations of levels for exposures of indefinite duration.*

The exclusion to the protection guides can be used in relation to fields from low power devices such as hand-held, mobile, and marine radio transceivers. These devices may emit localized fields exceeding the protection guides, but will result in a significantly lower rate of energy absorption than allowed for the whole body. Thus, exposure to fields emitted by devices operating at 1 GHz or less and at less than 7 watts of output power would not be restricted unless focal absorption of energy exceeded a time-averaged SAR of 8 W/Kg for any given gram of tissue. Devices with output powers in excess of 7 watts require a case-by-case analysis, and exposure to any device that exceeded the maximal localized absorption stipulated by the exclusion would not be permitted.

Where exposure conditions are not precisely known or controlled, reduction of exposure should be accomplished by reliable means to values as low as are reasonably achievable. Exposures slightly in excess of the radio-frequency protection guides are not necessarily harmful; however, they are *not* desirable and should be prevented whenever possible.

### Bureau of Radiological Health Study

BRH has completed its major study of VDT radiation emissions: *An Evaluation of Radiation Emissions from Video Display Terminals*, (February 1981, FDA 81-8153). Tests of 34 VDTs for x-ray through RF radiation—and previous monitoring data from 91 units for x-ray radiation only—indicate the terminals “should not pose a radiation risk.” BRH goes on to suggest that “work conditions be given serious consideration as the primary cause of VDT-user complaints.”

The report's conclusions were challenged by Congressman Gore, and will be the subject of House hearings on May 12—see p. 1.

The Teleram 2277, Ontel OP-1/32k/50 and Ontel OP-1/R produced the highest RF radiation readings. Ninety-five percent of the radiation was in the 15 kHz to 125 kHz frequency range (between the fundamental frequency of the flyback transformer and its fifth harmonic). Maximum E- and H-fields were 21–64 V/m and 0.65–0.69 A/m respectively, measured at 5 cm from the VDT face, the primary source of radiation. The highest single reading—over 1,000 V/m—was taken on top of the Teleram, near the high voltage transformer with an EFS-1 meter.

X-ray radiation from eight units (3 models) previously tested under worst-case conditions exceeded the 0.5 mR per hour limit for emissions from TVs. Ball Brothers Research Corp., Conrac Corp., and Ikegami Electronics (USA), Inc., the manufacturers of these units, have either fixed the three problem models or taken them off the market.

The 62-page report lists the 31 manufacturers of the terminals tested.

### Bell Canada

Bell Canada will allow women to stop working with VDTs during pregnancy. In an agreement worked out with the Communication Workers of Canada, Bell employees, upon request, may switch jobs or take an extended maternity leave. In a letter to the union, a company official wrote that no significant medical evidence suggests a health hazard exists, but that “where a pregnant employee is deeply concerned about such issues she will be obliged to act according to what she sees as the best course for her unborn child!”

### NRC to Study VDTs

The National Research Council's Committee on Vision has begun a 15-month, NIOSH-sponsored study of the effects of VDTs on workers' vision. The 14-member study panel is chaired by Dr. Edward Rinalducci from the Georgia Institute of Technology's Department of Psychology. NIOSH's Dr. Eugene Moss and Bert Stammerjohn are serving as technical advisors.

### Toronto Cataract Case

Toronto's Workmen's Compensation Board has denied a government employee's claim for compensation for cataracts she believes were caused by radiation from VDTs. (See *Microwave News*, March 1981.) The case, brought by Darlene Weiss, will be appealed.

The Ontario Public Service Employees Union (OPSEU) maintains the Board based its decision on questionable information from Weiss's regular ophthalmologist. According to Robert DeMatteo of OPSEU, Weiss was never told she had cataracts and no mention of them appears in the medical record her doctor supplied to the union. His statement to the Board, however, says he observed the beginning of “complicated” cataracts in Weiss in 1971, years before she began working on VDTs.

Weiss saw two other doctors when her vision began to deteriorate after she began VDT work in 1978. The first said she had complicated cataracts, but the second, Dr. Milton Zaret, diagnosed capsular cataracts.

The case will now go to an appeals adjudicator. If the claim is denied again, DeMatteo said the union will then take the case before the full Workmen's Compensation Board.

**Litigation . . .** Frederick Nepa, a patrolman for the Port Authority of New York and New Jersey since 1973, has filed a worker's compensation claim for cataracts he thinks are the result of radiation from a walkie-talkie. Angelo Gucciardo, who handled the Yannon case, is representing Nepa and Franklin Bass is on the case for the PA. The claim was filed in 1979. Gucciardo: Israel, Adler, Ronca & Gucciardo, 160 Broadway, New York, NY 10038, (212) 227-1350. . . . A marine serving at the Moscow Embassy in 1971–72 is suing the government over his son's birth defects. The boy was born soon after Sgt. Watson's Moscow tour of duty. Citing the *Feres* doctrine, the government has filed for dismissal. According to Peter Danelo, Watson's lawyer, the judge has taken the motion under advisement and may postpone his decision until another case involving the *Feres* doctrine is settled in the Ninth Circuit Court of Appeals later this year. Danelo is co-counsel with Charles Peery, listed in last month's directory of plaintiff attorneys. Danelo: 24th Floor, 4th & Blanchard Building, Seattle, WA 98121, (206) 464-1490. . . . The mother of a 19-year-old boy who died of lymphatic cancer filed a complaint against Magic Chef in 1978, claiming his cancer was caused by a leaking microwave oven. Wallace D. Stephens, her lawyer, thinks the case will be active again soon. Stephens: Stephens, Kosach, Knight & Edwards, 401 Ryland Street, Suite 330, Reno, NV 89502, (702) 786-5776.

**Around the Country . . .** COMSAT is planning to build a large satellite communications center in Columbia County, PA, but has met some resistance from local residents. . . . *Powerline: The First Battle of America's Energy War*, a new book about 765 kV lines in Minnesota by Barry Casper and Paul Wellstone, has been published by the University of Massachusetts Press. . . . The Scientific Advisory Panel of the NY State Department of Health study on the effects of radiation from overhead transmission lines elected Dr. Michael Shelanski as its chairman and spokesman at its first meeting March 23. The Panel plans to reconvene in early June to define specific areas of study. . . . **and the World . . .** The Department of National Revenue, Customs and Excise is probing into charges that countertop microwave ovens from Japan and Singapore were dumped in Canada.

### VDT BRIEFS

NIOSH has issued the results of its January 1980 Bay Area study of VDTs. As earlier releases have already revealed, the terminals did not emit hazardous levels of radiation and, therefore, NIOSH does not recommend routine monitoring of the units. . . . VDT-related provisions in the Newspaper Guild's Collective Bargaining Program include periodic surveys for radiation, ophthalmological tests and a host of ergonomic requirements. For details, see the *Guild Reporter*, March 13, 1981. . . . Blue Shield of California has agreed to meet the local Professional Employees International Union's demands to redesign 300 VDT work stations in its San Francisco office. . . . A partial bibliography of materials used to prepare the WNYC-FM special program on VDTs and an audio cassette of the forty-minute series are available from the station. For a cassette, send \$10 to Video Display Terminals, WNYC Radio, One Centre Street, New York, NY 10007. The bibliography is free, but include a self-addressed, stamped envelope. Independently, the Cold Type Organizing Committee is offering a transcript of the series. Send \$5 to PO Box 40, Jerome Avenue Station, Bronx, NY 10468. . . . A report on the second HUSAT conference on VDTs appears in the April 9 issue of the *New Scientist*. . . . Systems Integrated will supply metal shields for their ET960 VDTs at the *San Jose Mercury News* free of charge, according to *Editor & Publisher*, April 25. The plastic cabinet units created concern after RF radiation tests by NIOSH found high readings near their transformers. . . . The Maine Press Assoc. and the Maine Daily Newspaper Publishers Assoc. intend to oppose the VDT bill (LD #1049) introduced in the State Legislature, according to the *Guild Reporter* (April 24).

## BIOLOGICAL EFFECTS

### Microwaves and Benzopyrene: Co-Carcinogens

Professor Stanislaw Szmigielski of the Center for Radiobiology and Radioprotection in Warsaw, Poland, is continuing his studies on the co-carcinogenic properties of non-thermal microwave fields. In a paper presented at last summer's Paris Symposium, "Ondes Electromagnetiques et Biologie," and soon to be published in *Bioelectromagnetics* (no publication date has yet been set), Szmigielski showed that mice exposed to 3,4-benzopyrene (painted on the skin) and 2450 MHz microwaves at power levels of 5 and 15 mW/cm<sup>2</sup> for 2 hours a day for 3 to 6 months showed accelerated development of both spontaneous and chemically-induced cancers. The experiment showed similar advancement of the cancers when the mice were exposed to prolonged stress due to overcrowding.

The paper concludes, in part: "it remains the open question whether or not the tumor-accelerating effect observed in mice exposed to non-thermal (5 mW/cm<sup>2</sup>) MW fields is due to the specific interaction of the radiation at the cellular or subcellular level or to non-specific stress and/or adaptation reaction . . . long-term exposition in MW fields may be recognized as the carcinogenic risk factor and there is an urgent need to answer whether or not this is also true for the far more complicated conditions of environmental and/or occupational exposition to non-ionizing radiation of the MW/RF range?"

In an April 2 letter to *Microwave News* from Warsaw, Szmigielski writes: "Our recent experiments seem to indicate that the acceleration of cancer development in microwave-exposed mice is due to lowering of natural antineoplastic resistance following long-term irradiation—temporary suppression of cell-mediated immunity."

### Major New Bibliography

EPA has just published an extensive bibliography on the biological effects of non-ionizing radiation. Edited by Drs. James Kinn of EPA's Health Effects Research Laboratory in Research Triangle Park and Elliot Postow of the National Naval Medical Center, this highly useful 567-page document lists 3,627 articles covering works published through March 1980. Subjects include dosimetry and design of exposure facilities, as well as biological effects of radiation in the 0-100 GHz range.

The bibliography is divided into three parts: a key word-in-context listing of titles, an author index and a list of complete citations by a code number keyed to the other sections. (Some 1,700 key words, from "ABC" to "ZERO" are used for the title listing.)

*Index of Publications on Biological Effects of Electromagnetic Radiation (0-100 GHz)*, EPA-600/9-81-011, March 1981, is available from the National Technical Information Service. (NTIS #: PB 81181430) Paper: \$38; or microfiche: \$3.50. NTIS, 5285 Port Royal Road, Springfield, VA 22161.

### AF Funds Replication Study on Ca Efflux

The Air Force has awarded a \$180,055 contract to the University of Texas, San Antonio, for research on calcium ion efflux in brain tissue. Professor David Ross, chief of the division of molecular pharmacology, will serve as principal investigator, and will be working in collaboration with James Merritt, a researcher at Brooks AFB. The 28-32 month study is a direct attempt to reproduce Adey and Blackman's findings on calcium mobility in the brain, Ross said. The San Antonio team will look for windows associated with amplitude modulated fields at about 16 Hz and will also look at the effects of pulse modulated radiation.

## CONFERENCES

### CALENDAR

- May 31-June 4: 29th Annual Scientific Meeting of the *Radiation Research Society*, Hyatt Regency Hotel, Minneapolis, MN. Contact: Office of the Executive Director of the Society, 4720 Montgomery Lane, #506, Bethesda, MD 20014.
- June 9-12: 16th Annual *Symposium of the International Microwave Power Institute*, Royal York Hotel, Toronto, Canada. Contact: IMPI, 211 East 43rd Street, New York, NY 10017.
- June 15-19: *IEEE and URSI Symposium*, Bonaventure Hotel, Los Angeles, CA. Sponsored by the Antenna and Propagation Society and the Microwave Theory and Techniques Society of the IEEE and four Commissions of URSI. Contact: IEEE, 245 East 47th Street, New York, NY 10017.
- June 27-July 2: 6th International Symposium on *Bioelectrochemistry and Bioenergetics* and 1st Meeting of the *International Bioelectrochemical Society*, Kibbutz Kiryat Anavim, Israel. Contact: Mrs. R. Goldstein, Secretary, Bioelectrochemistry Symposium, The Aharon Katzir-Katchalsky Center, The Weizmann Institute of Science, Rehovot, Israel.
- June 30-July 4: *International Symposium on Biomedical Thermology*, Palais de la Musique et des Congres, Strasbourg, France. Contact: Dr. M. Gautherie, Laboratoire de Thermologie Biomedicale, Faculte de Medicine, Universite Louis Pasteur, 11 rue Humann, 67085 Strasbourg, France.
- July 13-16: 10th *L.H. Gray Conference: The Biological Action of Radiofrequency, Microwave, and Ultrasonic Radiations*, Oxford England. Contact: Dr. G.R. ter Haar, Physics Division, F Block, Institute of Cancer Research, Clifton Avenue, Sutton, Surrey SM2 5PX, England.
- August 10-12: 3rd Annual *Bioelectromagnetics Society Meeting*, Washington DC. Contact: BEMS, P.O. Box 3651, Arlington, VA 22203.
- August 10-19: 20th *General Assembly of the International Union of Radio Science (URSI)*, Hyatt Regency Hotel, Washington DC. Contact: Mr. Richard Y. Dow, Organizing Committee of URSI General Assembly, National Academy of Sciences, 2101 Constitution Avenue, NW, Washington DC 20418.
- August 11-13: *Microwave Semiconductor Devices and Circuits*, Ithaca, NY. 8th Biennial Conference organized by Cornell University's School of Electrical Engineering and IEEE's Microwave Theory and Techniques Society. Contact: Joanne Davenport, Conference Office, 221 North Campus Union, Cornell University, Ithaca, NY 14853.
- August 19-21: 3rd Annual *Satellite Communications Users Conference*, Regency Hotel, Denver, CO. Contact: SCUC '81, Satellite Communications Magazine, 3900 S. Wadsworth Blvd., Denver, CO 80235.
- September 7-11: 11th *European Microwave Conference*, Amsterdam, The Netherlands. Contact: Microwave Exhibitions & Publishers Ltd., Temple House, 36 High Street, Sevenoaks, Kent TN13 1JG, England.
- November 9-11: 1st Annual Meeting of the *Bioelectrical Repair and Growth Society*, Philadelphia, PA. Contact: Executive Secretary of the Society, 425 Medical Education Building, 36th and Hamilton Walk, Philadelphia, PA 19104.
- December 7-12: 6th International *Conference on Infrared and Millimeter Waves*, Carillon Hotel, Miami Beach, FL. Contact: K.J. Button, MIT National Magnet Laboratory, Cambridge, MA 02139.