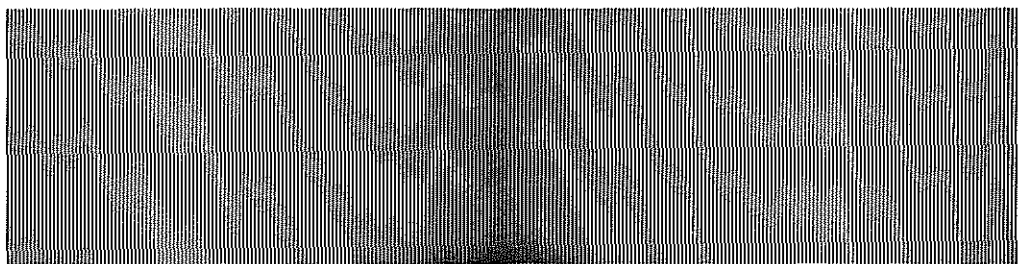


MICRO WAVE NEWS



Vol. II No. 9

A Monthly Report on Non-Ionizing Radiation

November 1982

INSIDE...

HIGHLIGHTS

pp. 2-4

Canadian Task Force Recommends
VDT Safety Rules

Trial Date Set in Engell Case

RCA's Satcom Station Blocked Again
in Seattle Area

Swedish Study on Power Line Cancer Link

BRH Issues Report on Controlling
RF Sealer Exposures

More Siting Problems for Microwave
Communications Sources

UPDATES

pp. 4-7

Biological Effects

Communications

Compatibility & Interference

Government

Litigation & Policy

Measurement

Medical Applications

Military Systems

Ovens

Power Lines

Satellite Communications

Standards

VDTs

The Microwave News litigation survey for 1982
will appear in our December issue.

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

In the USSR

Research Program Gains, New Standards Set

Four American scientists who visited the Soviet Union this summer say its research program on radiofrequency and microwave (RF/MW) radiation is blossoming. All four report being very impressed with the breadth and depth of the Soviet effort.

"Soviet research in this field is considerably greater, perhaps as much as ten times greater, than ours," said Professor Howard Wachtel of the University of Colorado in Boulder. The Russians are placing special emphasis on non-ionizing radiation compared to other scientific areas, he added. Professor Frank Barnes, Wachtel's colleague and collaborator, agreed with this assessment and explained that a top-level committee of the Soviet Academy of Sciences had ordered greater emphasis on RF/MW radiation research four years ago. "There was too much confusion in the field and they decided to do something about it," Barnes said.

Barnes and Wachtel estimated that there are more than a thousand scientists doing research on RF/MW radiation at about 50 different Soviet institutes. The two Colorado scientists, who are with the university's Department of Electrical Engineering (Barnes was the department chairman until recently), toured several Soviet research laboratories last July as guests of the Institute of Biophysics of the USSR Academy of Sciences.

In September, Drs. Donald McRee and Mays Swicord traveled to the Soviet Union to confer on plans for a joint experiment to be run in both countries. (Rats will be exposed to 10 mW/cm² of 2450 MHz radiation for seven hours (see *MWN*, July/August 1982).) McRee, who is with the National Institute of Environmental Health Sciences (NIEHS) and is the coordinator of the US-

(continued p. 8)

NIOSH Planning Reproductive Study of VDT Workers

Officials at the National Institute for Occupational Safety and Health (NIOSH) have disclosed that they may soon begin to study the impact of video display terminals (VDTs) on pregnant women. Dr. Michael Rosenberg, the chief of reproductive health at NIOSH laboratories in Cincinnati, OH, told *Microwave News* that the agency was in the midst of negotiations with a number of institutions to identify a suitable cohort population. If an agreement is reached, the study could begin in the spring. Present plans are to include 5,000-6,000 pregnancies in a retrospective survey.

Over the last two years, women have grown increasingly concerned about the risks associated with working at VDTs during pregnancy as clusters of miscarriages and birth defects have been discovered among VDT operators. To date, eight confirmed clusters have been reported in the United States and Canada (see *MWN*, July/August 1982 and November 1981). Many VDT

(continued p. 8)

HIGHLIGHTS

Canadian Task Force Recommends VDT Safety Rules

A federal task force in Canada has recommended that VDT operators be given the option of doing alternative work during pregnancy with no loss in pay while national safety standards for office workers are developed.

In a report released to the Minister of Labor on November 3, the Task Force on Micro-Electronics and Employment asks the government to establish office safety regulations and outlines interim rules for VDT work. Along with the right for job transfer during pregnancy, it recommends that employers limit continuous VDT work to at most five hours a day and provide hourly rest breaks. It also advises that employees beginning VDT work should get initial eye examinations followed by annual check-ups and that employers should pay for the special corrective lenses needed by some VDT workers.

Murray Hardie, the task force's executive director, explained that interim rules are needed because no firm research exists to allay worker fears. "As long as we don't know if there is a problem, we must err on the side of caution," he said. The task force report urges the government to continue "to fund medical and other research into health and safety concerns of people working with micro-electronics equipment, especially VDTs, including more research into the adequacy of currently acceptable levels of radiation and the methods of testing for radiation emission..."

According to Julian Reid of the Canadian Ministry of State for Social Development, the report contains "the strongest statement on VDTs yet from North America." Noting that most task force recommendations end up unheeded, Reid said this issue is too important in Canada to be ignored. In fact, an advance story of the report was front page news in the *Globe and Mail*, the country's major national newspaper.

Word of the recommended guidelines drew pleased but cautious responses from union representatives. Robert DeMatteo of the Ontario Public Service Employees Union called the report "a long overdue step in the right direction." He said government regulations for VDTs "are essential" but added that effective rules must include mandatory shielding and testing for radiation emissions for all new machines. Gary Cwitco of the Communications Workers of Canada said the recommendations looked good, but could not comment further "until I see them in the context of the full report, which covers a broad range of office employment issues."

As for the recommended option of alternative work for pregnant women, Reid and the union representatives warned that it is a very short-term, though positive, step. DeMatteo explained that the transfer right "is an important but make-shift measure as long as the units emit radiation that we know so little about."

In the US, David Eisen of the Newspaper Guild also said that transfer is only a temporary solution. "The task force has made a good beginning," he said, "but the radiation issue will only be resolved when research determines whether a problem exists and, if so, what that problem is." Eisen was glad to see that the report recommends more research on other possible office risks, such as PCBs.

The 89-page report, *In the Chips: Opportunities, People, Partnerships*, reviews productivity, job security and training issues as well as health and safety. It is available from Labour Canada, Ottawa, Ontario K1A 0J2. ●

Trial Date Set in Engell Case

Robert Engell's suit against the manufacturers of radar equipment he alleges exposed him to harmful levels of microwave radiation is scheduled to begin this month. After five years of pre-trial discovery, jury selection has been set for November 9 in the US District Court for Connecticut in Hartford. Testimony is due to begin the following day.

Engell was a civilian radar repairman at the Naval Air Station at Quonset Point, RI, from 1964-1973. In his early 30's Engell developed pancreatic cancer and endocrine disorders, which he contends stem from working with TACAN and other radars. (TACAN stands for Tactical Air Navigation.) In March 1977, he filed a \$4.5 million suit against ITT, Raytheon, General Dynamics, Varian Associates and Rockwell International.

Marc Moller of Kreindler & Kreindler in New York City and Matthew Shafner of O'Brien, Shafner, Bartinik, Stuart & Kelly in Groton, CT, are representing Engell.

Attorneys for both the plaintiff and the defendants refused to comment on the suit before the trial.

Two aspects of the case are especially noteworthy. First, one of Engell's co-workers died of pancreatic cancer in the early 1970's. Second, TACAN radars can also emit x-rays, a known cancer-causing agent; this could cloud the microwave-cancer issue.

Although similar cases have been filed, all have been settled out of court. Some plaintiffs have received substantial settlements, however. Ronald Karras, for example, received \$200,000 from the General Electric Co. and the Western Electric Co. in a case concluded last year. (See *MWN*, July/August 1981.) After the award, neither side would offer any details on the settlement. ●

RCA's Satcom Station Blocked Again in Seattle Area

The Board of Commissioners for Kitsap County, WA, has denied RCA's application to build a satellite communications station on the company's second proposed site. The October 18 ruling is the latest of several setbacks in RCA's long struggle to place a facility in this Seattle-area county. The company is now filing an appeal.

In a unanimous decision, the three-member board cited both inappropriate land use and uncertainty over radiation health effects in rejecting a siting application from RCA Americom (RCA American Communications). The company had proposed putting its station on a tract of forest land in the Indianola-Kingston area. Earlier plans to build on the county's Bainbridge Island were put on hold after unabating local opposition delayed the project's progress. (See *MWN*, July/August and October 1982.)

According to Americom's John Williamson, the company is filing an appeal in a county superior court. It is also keeping open its options to seek approval for the Bainbridge site or to look for another potential location.

Given the board's reasons for rejecting the Indianola-Kingston proposal, county official Richard Kimball doubts that Americom will find a home for its station in Kitsap. In his view, returning to Bainbridge "would be throwing good money after bad" and finding another sufficiently isolated and technically acceptable site "may well be impossible."

The commissioners took a clear stand on the radiation issue

in their decision. In their view, "What is important from a public policy perspective is the degree to which a broad segment of the affected populace perceives that they and their children are at risk." Although RCA "may be willing to take [this risk] based on what they know and based on what they have to gain," the board members concluded that they should not. Pointing to what was learned after the fact about asbestos, atomic radiation and Love Canal, they stated that, "as long as there remain serious questions about microwave radiation the prudent thing for the county to do is err on the side of caution." The board's action followed a community group's appeal of a county hearing examiner's recommendation for permit approval.

Americom's proposed station includes two large dish antennas and a tall relay tower. The site would provide a satellite link for private communications traffic to and from Seattle. ●

Swedish Study Supports Power Line Cancer Link

Swedish researchers have found preliminary evidence to support an association between cancer and electrical wiring. In an attempt to test the results of an American study, the Swedes found that children living in homes near 200-kV power lines had a greater than expected chance of developing tumors. Similarly, children in homes with ambient magnetic fields of 3 milligauss or greater had a higher rate of cancer.

Drs. Lennart Tomenius and Lennart Hellstrom, medical officers with the County of Stockholm, and Dr. Bengt Enander of the Royal Institute of Technology in Stockholm concluded that their work "confirms" the epidemiological study of Dr. Nancy Wertheimer and Ed Leeper, who reported a connection between 60-Hz fields and cancer among children living in Denver, CO. (*American Journal of Epidemiology*, 109, 273, 1979. (Note that power lines in Sweden operate at 50-Hz compared to 60-Hz in the US.) The Swedish results were presented in a paper delivered to the *International Symposium on Occupational Health and Safety in Mining and Tunneling* held in Prague last June.

"It feels good not being out there all alone anymore," said Wertheimer in a telephone interview. She added that she had been in sporadic contact with the Swedish team, but had still only seen the short paper written for the Prague meeting. "I look forward to seeing a more detailed write-up," she said.

Although the paper has not received wide distribution, Dr. Robert Becker had read it and offered the following assessment: "It is an important contribution in light of Wertheimer's original paper and the recent report by Milham [see *MWN*, July/August 1982] in Washington state." He stressed that the exposure levels were not very high, "We are dealing with everyday exposures." Becker was an active researcher on non-ionizing radiation at the VA Medical Center in Syracuse, NY, until his retirement last year.

The Swedish team argues that although their study cannot affirm a causal link between high voltage wires or magnetic fields with the incidence of tumors in children, such a causality cannot be excluded. ●

BRH Issues Report on Controlling RF Sealer Exposures

The Bureau of Radiological Health (BRH) has published a booklet on ways of reducing radiation exposures from radiofrequency (RF) sealers. The report illustrates the types of shielding used on a variety of different sealers and details the efficacy of preventive measures.

RF sealers are used to bond together materials like plastic or rubber. The government has estimated that there are about 20,000 RF heaters and sealers now in use, operated by some 40,000 workers.

One example of shielding cited by BRH is on Solidyne Inc.'s new standard 10-kW RF sealer operating at 27 MHz. With shielding in place, power densities based on measured electric and magnetic fields were 0.01 and 0.27 mW/cm² at a distance of 10 cm from the machine. When the shielding was removed, however, field strengths were too strong for the meter at 10 cm. At a distance of 30 cm, the equivalent power densities for electric and magnetic fields were 130 mW/cm² and 14 mW/cm² respectively. (None of the power levels cited here allow for the duty cycle of the machine: that is the ratio of the time the radiating source is "on" to the total time for one cycle of production.)

A theoretical analysis indicates the power of shielding even more graphically. A 0.001-inch thick sheet of copper reduces a 30 MHz plane-wave field by 115 dB: this is equivalent to reducing the incident power density from 3 trillion mW/cm² to 10 mW/cm². Of course, the leakage from actual machines only roughly approximates the dictates of theoretical models.

Paul Ruggera and Dr. Daniel Schaubert, the authors of the report, issue a number of warnings about shielding techniques: (1) A small gap in the shielding can create significant increases in radiation leakage; (2) While grounding can be effective for reducing RF emissions, electric and magnetic fields must be measured to insure that a reduction and *not* an enhancement, has occurred; (3) Screened rooms that are used to prevent spurious radiation emitted by the sealers from interfering with other electronic devices, in accordance with FCC rules, "can greatly increase the power absorbed by the operators who are inside the rooms."

An alternative method of protecting workers by keeping them away from the radiation source is also reviewed. While such "exposure control" can be effective, it can also hurt the operator's performance, the authors conclude.

The National Institute for Occupational Safety and Health (NIOSH) is working on another booklet on control technology for regulating radiation exposures from RF sealers. NIOSH's David West said that the report was still in rough draft form and he could not predict when it would be ready for publication. "All our energies are directed at completing the criteria document on RF/microwave radiation," he explained. Work on RF sealers has been suspended until a draft of the document is out for external review, he said. According to recent estimates, the criteria document will not be ready for circulation until early next year.

The BRH report, *Concepts and Approaches for Minimizing Excessive Exposure to Electromagnetic Radiation from RF Sealers*, (Publication No. FDA 82-8192) is available from the National Technical Information Service (NTIS), Springfield, VA 22161. At press time, the NTIS order number had not yet been assigned. ●

More Siting Problems for Microwave Sources

Vernon, NJ, has joined a growing number of communities where public concern over radiation hazards has created problems for siting radiofrequency/microwave (RF/MW) sources. Some residents of this small town across the Hudson River from New York City are fighting to stop RCA Americom from building an additional microwave relay link for its satellite communications center in Vernon.

Plans for an imposing but low-power point-to-point tower

have mobilized residents in Vernon. They fear the antenna might create health hazards and are convinced that its approval will open the way for a flood of other towers. Citizens have successfully pressured the town planning board into hiring a consulting engineer to evaluate the antenna's effect on ambient radiation levels and into asking Americom for an environmental impact study. At an October 27 board meeting, RCA agreed to perform the study which should take four to six weeks to complete.

The proposed tower would be Americom's third relay link between New York City and its Vernon satellite communications station. It already has a point-to-point near the station and in Glenwood, NJ. Many other companies also have radiation sources in the area because it is the closest radio quiet zone to New York City and, therefore, a choice spot for communications links. Federal Communications Commission (FCC) records show there are over 50 microwave (4-12 GHz)

point-to-point and satellite communications sources within five miles of Vernon. Along with Americom, the American Satellite Co. and Western Union each have a major satcom station there.

Americom maintains its new tower would meet the strictest exposure standards in the world and that it poses no danger. A company spokesman said, "We will continue to do our best to allay fears, then we will just have to see what happens."

The skepticism of many residents toward assurances from industry and the absence of federal RF/MW standards may make Americom's job difficult. People in Vernon have found the thousand-fold difference between the Soviet Union's standard (0.005 mW/cm²) and the new American National Standards Institute guideline (5 mW/cm² above 1.5 GHz) unsettling. Elise Kreindler, one leader in the fight against the tower, has explained, "all we are sure of is that there is no proof as to what is safe." ●

UPDATES

Biological Effects. . . EPA's Office of Research and Development is sponsoring an experiment that will test some of Professor H. Frohlich's theories. Frohlich, a physicist at the University of Liverpool in the UK, has long maintained that there are coherent emissions from cellular systems at millimeter wave frequencies. Now Professor Karl Illinger of the Department of Chemistry at Tufts University in Medford, MA, has devised a sensitive experiment to see if he can detect such signals. Under a \$50,000 EPA contract, Illinger will investigate emissions in the 40-60 GHz band during his first year of research. EPA plans to award him another \$50,000 for a second year of work if it has the funds. . . . Dr. Joseph Lary and co-workers at NIOSH labs in Cincinnati, OH, have been studying the teratological effects of 27.12 MHz radiation. In a paper due to appear in the December issue of *Teratology*, the team presents the results of exposing rats to magnetic fields of 55 A/m and electric fields of 300 V/m—an SAR averaging between 11.1 to 12.5 W/Kg—at various times during the gestation period. They found significant increases in fetal malformations among the irradiated animals compared to the controls. With respect to possible mechanisms, they note: "Though most of the teratogenic and embryotoxic effects of RF radiation are probably due to temperature elevation caused by RF absorption in tissues, effects caused by 'nonthermal' interactions with the electromagnetic field cannot be ruled out." The authors conclude that "care should be taken to insure that pregnant women are not exposed to levels which exceed the current US occupational standard." Lary cites NIOSH's own surveys of RF sealer plants indicating that young women are routinely exposed to fields which are greater than the equivalent of 100 mW/cm². The old OSHA occupational standard was 10 mW/cm² and the new ANSI standard is 1 mW/cm² at 30 MHz. . . . ONR is continuing to support Dr. James Bond's efforts to develop a model to explain Drs. Ross Adey and Carl Blackman's experimental findings on calcium efflux in brain tissue. Under a new \$100,000 contract, Bond will devise some experiments to test his thermodynamic model, which he described at last June's BEMS meeting in Los Angeles. Bond and Carol Jordon recently left Jaycor of Alexandria, VA, to join Science Applications Inc. in McLean, VA. . . . Dr. Clay Easterly of the Oak Ridge National Laboratory, TN, has published a paper on "Cardiovascular Risk from Exposure to Static Magnetic Fields" in the July issue of the *Journal of the American Industrial Hygiene Association*. . . . BRH's Division of Biological Effects recently issued its annual report for FY80. A copy is available for \$10.50 from the National Technical Information Service, Springfield, VA 22161. Order No. PB82-215500. . . . Dr. Hans Selye died on October 16 in Montreal, Canada. Selye was well known for his studies on the physiological effects of stress.

Communications. . . Five sets of reply comments on the FCC's proposed RF/MW safety radiation rules were filed: they largely underscored earlier recommendations. (See *MWN*, September 1982.) The

American Radio Relay League, GTE Service Corp., Motorola Inc., and the National Association of Broadcasters (NAB), all of whom had already submitted comments, supported FCC adoption of the ANSI standard until federal rules are set. The NAB also asked that broadcasters only be held responsible for their own transmitters rather than ambient levels at any given site. Commenting for the first time, Aeronautical Radio Inc. urged that, "based on criteria of intermittency and low power," the aeronautical mobile service be excluded from the proposed rules. . . . The FCC's Office of Science and Technology has issued *A Comparison of Alternative Spectrum Regulatory Approaches*. Copies can be purchased from the Downtown Copy Center in Washington, DC, (202) 452-1422. . . . A notice summarizing FCC licensing policies for low-power microwave systems operating in the 22.0-23.6 GHz band was released by the commission October 15. . . . Comments submitted to the FCC on its plans to deregulate the use of FM subcarrier channels were overwhelmingly supportive. *Broadcasting* presents an overview in its October 25 issue. . . . More car telephones are on the way. Last month AT&T became the first company to win FCC approval for cellular mobile phone service. Its AMPS subsidiary will now build a cellular system for the metropolitan Chicago market.

Compatibility & Interference. . . The FCC is stepping up its enforcement of RFI violations. On October 7, the commission fined Coleco Industries Inc. \$2,000 for failing to certify a computer game before marketing. According to an FCC staffer, one of Coleco's competitors reported the incident to the commission. After testing the unit, the FCC discovered that the games had a "somewhat higher than normal potential for interfering with television receivers." Coleco has since modified the game (model 2400) and won FCC authorization for its sale. The company will repair or exchange any units that still cause RFI. . . . A day earlier, the FCC had fined Sonic Cable TV in California \$6,000 for excessive signal leakage and failure to correct harmful interference to amateur radio communications. Last January, engineers from the commission's field office in Long Beach, CA, inspected Sonic's equipment and found it radiating in excess of the 20 microvolts/meter limit (at 10 feet) set by the FCC. Over the last two years, amateur radio operators had complained to the FCC that Sonic was disrupting signals in the two-meter band, 144-148 MHz. . . . In our March issue, we featured a story on an RFI incident at the Three Mile Island nuclear reactor in Middletown, PA. Two-way radios used by workmen had interfered with a gas measuring meter, falsely indicating the buildup of combustible gases inside the reactor building. At that time, spokesmen for General Public Utilities, the owner of the plant, refused to disclose the type of meter involved. Now we have learned that the meter in question was made by GasTech of Mountain View, CA. David West, the company's engineering manager admitted that the meter is not completely RF proof. He said that to upgrade it would require redesigning the unit, which does not

make sense since 99 percent of his customers are happy with it. . . . The FCC has received more than 7,000 applications for low power television (LPTV) licenses. The commission is reviewing them to see if they might interfere with existing stations or with others whose proposals are still pending. Anyone applying to use LPTV directional antenna systems must submit radiation patterns to the FCC. . . . On October 19-21, the FAA Technical Center and the FAA Ames Research Center sponsored a workshop on EMI effects on aircraft at the Boeing Aircraft Co. in Seattle, WA. The 100 attendees from the US and Europe heard 20 papers on the problem of aircraft-generated noise and its coupling with avionics systems, followed by solutions and validation techniques. A transcript of the presentations and open discussions is being prepared and should be ready early next year. For a copy, send a request on company letterhead to: Nickolus Rasch, ACT-340, FAA Technical Center, Atlantic City Airport, NJ 08405, (609) 641-8200. . . . As for cars, W.B. Ribbens of the University of Michigan in Ann Arbor has published "Measurements of Electromagnetic Radiation from Automotive Ignition Systems" in the August issue of the *IEEE Transactions on Electromagnetic Compatibility*. . . . The Senate Foreign Relations Committee has released its report *Radio Broadcasting to Cuba Act* (Report No. 97-544) on H.R. 5427, which would authorize Radio Marti. . . . Marcel Dekker, the New York City publishing company, has issued the second edition of *Electromagnetic Compatibility: Applied Principles of Cost-Effective Control of Electromagnetic Interference and Hazards* by Heinz Schlicke (\$45.00). . . . In contract news, the Bureau of Mines has awarded A.R.F. Products Inc. of Raton, NM, \$117,000 to study the interaction of radio transmissions with mine monitoring and control systems. And officials at the army's White Sands Missile Range, NM, are negotiating with GTE Products Corp. of Mountain View, CA, to investigate the vulnerability of selected army weapons systems to "special" EMI phenomena. . . . Is RFI making it more and more difficult for E.T. to talk to us? So claims Dr. Carl Sagan and a galaxy of some of the world's most famous scientists. In a letter to *Science* (October 29) they ask for a coordinated search for signals from extraterrestrial civilizations: "Because of the growing problem of [RFI] by civilian and military transmitters, the search program will become more difficult the longer we wait."

Government. . . . Work on a statement to reassure a wary public that there is no reason to fear very low levels of RF/MW radiation is still stalled at the National Telecommunications and Information Administration (NTIA). Two of the agency's advisory committees, the Electromagnetic Radiation Management Advisory Council (ERMAC) and the Frequency Management Advisory Council (FMAC) have been struggling over the right wording for nearly a year (see *MWN*, January/February 1982) and now it appears that the statement may never be finished. Though the committee members have nearly resolved their differences, there is not enough money to bring everyone back to Washington to iron out the remaining problems. In fact, ERMAC may soon become an advisory committee without an agency to advise: NTIA allocated no funds for ERMAC in FY83, which began on October 1, and no other part of the federal government has stepped forward to adopt it. (Some had hoped that the Office of Science and Technology Policy would come to ERMAC's rescue, but there have been no welcoming signs from the White House.) ERMAC's role in coordinating federal bioeffects research, a job it has had for the last ten years, is now slated to end on December 31. ERMAC member Dr. Sam Koslov called the situation "a shambles." If another agency is going to adopt and take over ERMAC and its coordinating function, there must be a lot of behind the scenes negotiations, but this is not happening, he said. NTIA is "absolutely insensitive" to the problems industry is having siting their communications stations, Koslov added on a note of exasperation. There is one encouraging sign on the horizon, however. Reliable sources indicate that a federal agency will soon pick up NTIA's contract for assembling digests of the RF/MW biological effects literature. Work on the digests was suspended earlier this year due to budget cuts (see *MWN*, July/August 1982). . . . It is official: the Bureau of Radiological Health (BRH) and the Bureau of Medical Devices (BMD) have been joined together to become the National Center for Devices and Radiological Health. The staffs of both bureaus remain largely intact in the center's Office of Radiological Health (ORH) and Office of

Medical Devices (OMD). John Villforth, who had been the director of BRH, will now serve as the director of the center with James Benson as his deputy. Benson is also the acting director of ORH. The reorganization plan, published in the *Federal Register* on October 8 (47 FR 44614), is an interim one, with a final merger due in about six months. For the time being both offices will operate independently as the staff considers new ways of streamlining the center's management. One FDA official predicted that the two Offices of Compliances in ORH and OMD would be folded into one. The two-stage reorganization process will allow the center to operate with only minimum disruption, he said. . . . One internal and anticipated change took effect at the same time: BRH's Division of Biological Effects has turned into ORH's Division of Risk Assessment. . . . BRH's (now ORH's) Technical Electronic Product Radiation Safety Standards Committee (TEPRSSC) has decided not to hold a meeting in 1982, one is planned for next year, though no date has been set. Dr. Zory Glaser is stepping down as executive secretary of the committee to join the new risk assessment group; Dr. Melvyn Altman will fill in for the time being. . . . Other personnel changes include: Dr. Wordie Parr, the chief of NIOSH's Physical Agents Effects Branch in Cincinnati, OH, has announced that he will retire on December 29. No replacement has been named. Mark Cowan, deputy director of OSHA, has gone to work for Labor Secretary Raymond Donovan as chief of staff. Dr. Stephen Lukasik has resigned as FCC's chief scientist to join the Northrop Corp. And Dr. Robert Kamper has been appointed the director of NBS' Boulder, CO, laboratories. Kamper, a physicist, had been chief of the Electromagnetic Technology Division at NBS since 1978. . . . *Broadcasting* magazine discloses in its October 25 issue that the General Accounting Office (GAO) is investigating charges of malfeasance at high levels of NTIA. The GAO will look into the use of travel money, among other items.

Litigation & Policy. . . . New York Telephone lost its final bid to appeal Mrs. Nettie Yannon's workers' compensation award this September when the NY State Court of Appeals refused to consider the case. Yannon's compensation claim alleged her husband's illness and eventual death were the result of microwave radiation exposure he received while working on TV relay equipment for the phone company. Commenting on the case, New York Telephone attorney Saul Schier said any future suits "will have to be judged individually; this is just not a precedent-setting case." Angello Gucciardo, Yannon's lawyer, called the case "a landmark decision," adding that "it clearly demonstrates that constant exposure to microwave radiation can be harmful and should be avoided." Mrs. Yannon is appealing the dismissal of her suit against RCA, the manufacturer of microwave equipment her husband worked with. Her attorneys, Jerome Ellis and David Paulty, filed the appeal in the NY State Supreme Court Appellate Division after a state supreme court judge in Richmond County ruled that the statute of limitations had expired before Yannon filed her \$3.5 million negligence and breach of warranty suit. The judge dismissed the case in a pre-trial hearing in July. (See *MWN*, July/August 1982). . . . Raytheon's John Osepchuk reports that the legal and policy seminar on RF/MW radiation he organized was "very productive." About 100 representatives from the communications, electronics and appliances industry attended the meeting at the Homestead in Hot Springs, VA, October 27-29, and agreed on the concept of an alliance to respond to the public's "irrational" fear of RF/MW radiation (see *MWN*, October 1982). "The organizing committee will now explore various possibilities for the alliance," he said.

Measurement. . . . Litton Microwave has asked NBS to set up a program to improve the accuracy of meters used to measure leakage from microwave ovens. Litton representatives had raised the possibility of accrediting laboratories that market power density meters at last July's National Voluntary Laboratory Accreditation Program (NVLAP) workshop on electromagnetic calibration. The proposal was supported by BRH. There are at least two approaches NBS could now take: set up a new LAP for survey meters operating at 2450 MHz or set up a Measurement Assurance Program (MAP). A MAP is much less formal than a LAP and is therefore the more likely option at the moment. A spokesman for Litton Microwave in Sioux Falls, SD, refused to comment on the proposal saying that doing so would

divulge confidential business information. NBS has not responded to the request . . . NBS engineers have successfully tested a small-scale model of a microwave horn, which, when full-sized, will serve as a transfer standard for satellite communication antennas operating in the 240-400 MHz frequency range. With this new horn and a newly developed extrapolation technique, NBS has found a way to overcome the calibration problem associated with broadbeam signals, *characteristic of this frequency range, and their ground reflections.* The NBS standard will be used to calibrate antennas in the military's satellite communications systems as well as private sector VHF/UHF antennas . . . A team from the Bioacoustics Research Laboratory at the University of Illinois, Urbana, has developed an automated Crawford cell exposure system for irradiating experimental animals in the 225-500 MHz band for incident power densities of 2.5-50 mW/cm². Writing in the September issue of the *IEEE Transactions on Instrumentation and Measurement*, they describe how the system can compute instantaneous values of the whole-body average specific absorption rate (SAR).

Medical Applications . . . The National Cancer Institute (NCI) has issued its request for proposals on "Comparative Clinical NMR Imaging Studies." The institute's new Diagnostic Imaging Research Branch wants to develop criteria, guidelines and protocols to evaluate the potential of NMR imaging systems in diagnostic applications as well as run clinical trials on at least 200 patients with various types of pathologies. One of the study's objectives is to compare NMR with other diagnostic techniques. Proposals are due on December 17, and NCI expects to make awards to a number of institutions next June. . . . The October issue of *Diagnostic Imaging* features a report on the *First Annual Meeting of the Society of Magnetic Resonance in Medicine*, held in Boston last August. . . . The first issue (dated July) of the *IEEE Transactions on Medical Imaging* is out. Subscriptions cost \$8.00 for IEEE members and \$50.00 for others. Contact: IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854 . . . Universal NMR Inc. intends to buy Fonar Corp.'s NMR whole body scanners for mobile uses and become their exclusive distributor. The agreement, which is contingent on Fonar receiving FDA approval for its units, could be worth up to \$31 million if Universal buys 25 scanners. Investors in Fonar stock, who no doubt thought the shares would shoot up, must have been disappointed by an October 15 column in the *New York Times*. Robert Metz quoted a Wall Street analyst as saying that Fonar shares are "substantially overvalued." The analyst saw little advantage in being the first to develop a new technology: for example, the original producers of CAT scanners are now out of business. Nevertheless, the bulls seem to have had the upper hand. The price of Fonar shares rose nearly 20 percent in the last two weeks of October. . . . Electrobiolgy Inc. may be one of tomorrow's blue chip companies, according to a recent appraisal by Morgan Stanley & Co. The upbeat outlook for the still small company that uses pulsed electromagnetic fields to heal fractures is in the October 13 *Wall Street Journal*. . . . Those unable to attend the *Second Annual Meeting of the Bioelectrical Repair and Growth Society*, held in Oxford, UK, September 20-22, can order a copy of the meeting's transactions for \$17.50 from H. Schnitzer, BRAGS, 425 Medical Education Building, 36th and Hamilton Walk, Philadelphia, PA 19104. The booklet contains abstracts of the 95 papers presented at the conference. . . . NCI is in the process of reviewing proposals for its hyperthermia quality assurance program. It expects to announce contract winners in early February. . . . Meanwhile, the institute has made some additional awards to those hospitals participating in NCI's hyperthermia evaluation program: University of Arizona Medical Center, \$37,550; M.D. Anderson Hospital, \$46,185; MIT-New England Deaconess Hospital, \$57,385; Stanford University Medical Center, \$64,385; and University of Utah Medical Center, \$54,385. An NCI staffer said that the objective is to ensure consistency in gathering data and calibrating the various systems used by the participating hospitals. (See *MWN*, April 1982.) . . . F. Kristian Storm and co-workers at the UCLA School of Medicine have published a paper, "Clinical RF Hyperthermia by Magnetic-Loop Induction: A New Approach to Human Cancer Therapy," in the *IEEE Transactions on Microwave Theory and Techniques*, August 1982. . . . Professor Padmakar Lele of MIT described his work on hyperthermia, especially his computer focused ultrasound system, at an October 21 meeting of the New York Academy of Sciences.

Military Systems . . . The IIT Research Institute has scheduled a technical symposium, *Ecological Monitoring Program: ELF Communications System*, to be held at the Telemark Lodge in Cable, WI, on November 9. The purpose of the meeting is to determine "if low-level, long-term electromagnetic fields produced by an ELF communications system affect plant and/or animal populations, or otherwise result in community or ecosystem level changes of importance." According to present plans, pre- and post-construction studies will be done. There will be a meeting of the subcontractors the following day. For more information contact: Dr. J.E. Zapotosky, IITRI, 10 West 35th Street, Chicago, IL 60616, (312) 567-4000. . . . On September 24, the navy awarded GTE Sylvania \$5.25 million for a full-scale development model of the ELF system. Last April, the navy paid GTE \$6.85 million for preliminary development work on the project . . . The navy and DARPA blue-green laser program, an alternative submarine communication system, is also moving ahead. According to the October 18 *Aviation Week & Space Technology*, Rockwell International's Defense Electronics Operations will design, build and test a submarine receiver under a \$3 million contract. The same issue reports that RCA Missile & Surface Radar in Moorestown, NJ, received a \$370.4 million contract to provide and support the Aegis weapon system for the navy's fifth, sixth and seventh Ticonderoga-class guided-missile cruisers.

Ovens . . . The Federal Trade Commission (FTC) has accused Amana Refrigeration Inc. of marketing its microwave ovens with "false, misleading and unfair" advertising. The commission complained that Amana had claimed that its oven was the only one of six to pass four tests conducted by an independent laboratory at the Illinois Institute of Technology Research Institute. In fact, the FTC said that seven ovens had been tested and that the Panasonic model had also passed. The commission also charged that Amana had misled consumers when it claimed that a survey of microwave oven owners had rated Amana "best quality." The FTC said that, on the contrary, the survey indicated that "the vast majority of owners of other brands did not rate Amana 'best quality.'" A spokesman for Amana in Amana, IA, responded: "Our ads are true: we did not mislead the public." He maintained that the Amana Radarange is the only oven to earn an exemption from BRH's rules requiring a warning label. In any case, he added, the ads stopped running two years ago and Amana believes the FTC is wasting its resources by pursuing this case. The FTC has scheduled a hearing before an administrative law judge for November 29 in Washington, DC. . . . On another front, the FTC has released an amended order against Litton Industries Inc. for falsely advertising its ovens. The company had run ads claiming that independent service technicians preferred Litton's microwave ovens, when it had only interviewed authorized Litton service agents (see *MWN*, February 1981). Litton had appealed an earlier FTC order that prohibited the misrepresentation of survey and test data to the US Court of Appeals for the Ninth Circuit. The revised order, which appears in the September 28 *Federal Register* p. 42551, bans Litton from misrepresenting survey data only. If it does, the company faces a possible \$10,000 fine. . . . Do microwave ovens "abuse" food? So claims George Claytor Jr., the president of Amtrak. According to the October 7 *New York Times*, Claytor is ordering the removal of all microwave ovens from Amtrak trains; sandwiches will be heated with toaster ovens in the future. . . . Cober Electronics Inc. of Stamford, CT, has won a \$106,000 contract from the US Army Natick R&D Labs, MA, for a drying system using microwaves and radiated heat sources. . . . Factory shipments of microwave ovens are still lagging behind last year. The Association of Home Appliance Manufacturers reports that 2,841,000 units were shipped through the end of September, down nearly 11 percent from the first nine months of 1981.

Power Lines . . . The New York State Overhead Power Lines Project has suspended work on the one epidemiological study it funded last spring. The project had provisionally approved Dr. Samuel Kaplan's \$281,000 project on "Historical Cohort Mortality Study of Electrical Utility Workers Exposed to Strong Electromagnetic Fields," and had awarded him \$40,000 to look for potential study populations. According to Greg Alvord, the project's scientific research coordinator, the decision to start a new epidemiological study was reached after questions were raised over the way the cohorts had been defined. He said that a new request for proposals (RfP) would be issued. Reached

at his office at SRI International in Palo Alto, CA, Kaplan said that he would reapply if he thought he could satisfy the project's new specifications. Alvord added that he was completing negotiations with a consultant to see if it is still possible to reanalyze Dr. Nancy Wertheimer's data on childhood cancer and power line radiation (the paper was published in 1979). On the basis of the consultant's report, the project's scientific advisors will decide whether to sponsor another analysis or to issue an RFP for a completely new replication study. . . . About 80 people came to Philadelphia, PA, on October 30 to attend the American Institute of Medical Climatology's conference on high voltage direct current (HVDC) power lines and the biological effects of air ions. NBS's Dr. Ronald McKnight and GE's Dr. Gary Johnson described how to take measurements near HVDC lines, especially for electric field strengths and space charge densities. Johnson has been running experiments at GE's HV Transmission Research Facility in Lenox, MA. In an appraisal of the research on the bioeffects of air ions, Dr. William Bailey of Rockefeller University in New York City said the data relating changes in serotonin levels to air ion concentrations were "fairly fanciful." He recommended that future ion research adopt new approaches. In response to a question from the audience, he said that he knew of no evidence indicating that VDTs depleted environmental ions. The proceedings of the meeting will be prepared and should be ready by the end of the year. Contact: AIMC, 1023 Welsh Road, Philadelphia, PA 19115.

Satellite Communications . . . A tentative timetable for Téléport, a massive satellite communications complex planned for Staten Island, NY, expects a City Planning Commission hearing on February 15, 1983, and a final decision from the Board of Estimate on April 21. Meanwhile, Téléport's environmental impact statement is overdue and is not expected out for public review before December. . . . NASA has received an added \$20 million for 20/30 GHz communications satellites in its final FY83 budget, according to the October 11 *Aviation Week & Space Technology*. . . . Comsat's Satellite Television Corp. (STC) has ordered two direct business satellites (DBS) from RCA. The \$113 contract is one step in STC's plan to begin DBS service in 1986. . . . STC and United States Television are wrangling before the FCC over who will be the first to offer DBS service. For a rundown on the fight, see the October 25 *Broadcasting*. . . . The private satellite service market is expected to climb from \$146 million last year to \$2.9 billion by 1991 according to a Frost & Sullivan report. For more information on private satellite networks (Report No. 1063), contact F&S Inc., 106 Fulton Street, New York, NY 10038, (212) 233-1080. Frost & Sullivan has also prepared reports on communications satellite systems markets in developing countries (No. W565), in North America (No. A954) and in Europe (No. E564).

Standards. . . A second public hearing on Massachusetts' revised draft standard for general population on RF/MW exposures is scheduled for December 2 in Holyoke. The first hearing will be held in Boston on November 29. For information, contact the Radiation Control Program, 600 Washington Street, Room 770, Boston, MA, 02111, (617) 727-6214. Written comments on the draft are due December 13.

VDTs . . . Dr. Hari Sharma of the University of Waterloo in Ontario, Canada, has recommended shielding the fly-back transformers in VDTs and not allowing pregnant women to work at unshielded machines. In a May 29 report, Sharma states he found "very high" power densities of 17 kHz (very-low-frequency) radiation and its harmonics were emitted by VDTs at the Ontario legislative library in Toronto. Sharma noted that, "our observations on a large number of VDTs have indicated that a fly-back transformer emits 14-17 kHz radiation along with its harmonics up to 1 MHz." The measured X-ray levels were below 0.02 mR/hr, which Sharma noted provided a "large safety factor." The RF/MW readings were taken with a RAHAM 4 broadband meter, which measures 200 kHz to 26 GHz radiation. Sharma explained that at 15 kHz he multiplied the meter reading by 25 to get the "true reading" because the meter "detects low frequency radiation with reduced [4 percent] efficiency." He also took one of the library's GEAC terminals back to his laboratory for further testing and determined that "there is a very high level of leakage of radiation (800 mW/cm²)." The library's director requested the tests this spring out of general concern for two pregnant employees. The women were given alternate work and have since had healthy babies.

. . . At the request of the British Columbia Hospital Employees' Union, Sharma has also tested VDTs at Surrey Memorial Hospital in Vancouver where six out of seven pregnancies among VDT workers in the accounts department had adverse outcomes. (See *MWN*, July/August 1982.) According to the union's Jean Greatbatch, Sharma measured high levels of low frequency radiation coming from the department's plastic bodied VDTs. Sharma visited the hospital in October and has taken one of the units back to his lab for further testing. He found no detectable emissions from newer VDTs of a different model in the hospital's medical records department. A final report is due in late November. Meanwhile, hospital administrators have hired Professor Bill Guy of the University of Washington, Seattle, to test another of the machines. . . . The Connecticut Legislature's Labor and Public Employees Committee is investigating the health effects of VDTs. The committee held a hearing on October 13 and is now considering further action. Among those testifying were Vico Henriques, the President of the Computer and Business Equipment Manufacturers Association in Washington, DC, and Betty Tianti, representing the Connecticut AFL-CIO. Henriques stated that "there is no danger from radiation from [VDTs]." Tianti asked that the legislature require the collection and reporting of data on pregnancies of women using VDTs. Women should be offered the option of doing non-VDT work while pregnant, she advised. According to committee staff member Joan Lennon, Senator Mike Skelley (D-35th District) instigated the investigation. It is not clear at this time what action, if any, the committee might take next. . . . M.J. Lewis, the director of the South Australian Health Commission's Occupational Health and Radiation Control Branch, has published a survey of general health problems and spontaneous abortion rates among VDT operators. (*Community Health Studies*, VI, 130, 1982) Lewis and co-workers collected questionnaires from 279 VDT users and 110 current non-users in 1978 and found "no convincing evidence of an association between the use of VDTs and general health disturbances," though "there is the suggestion of an association with poor sleep and dizziness." An analysis of reported miscarriages among VDT users indicated "no statistically significant relationship" between the machines and the pregnancy problems. They did note, however, that the sample size was small and "the statistical test therefore not powerful." . . . Australia's National Health and Medical Research Council has issued an *Occupational Health Guide: Visual Display Units*, (VDU-82-93), June 1982. The guide, which covers ergonomic issues, states that there "is no scientifically acceptable evidence that the use of VDTs damages the eyes or eyesight or imposes any risk from radiation." . . . Working Women's International Conference on Office Work & New Technology drew an overflow crowd in Boston October 28-29. Over 350 people from business, labor and universities met to exchange information, listen to panels and attend special issue workshops. At the low-level radiation workshop, as elsewhere, people shared a general concern for worker safety while taking different tacks on solving problems. Workshop leaders Robert DeMatteo from the Ontario Public Service Employees Union and Mary Sue Henifin from the Women's Occupational Health Resource Center at Columbia University agreed that transferring pregnant women from the sets is a good idea for the time being. DeMatteo stressed the need for shielding, Henifin said solutions to VDT radiation questions will have to be political rather than scientific. Proceedings of the conference will be available next year. . . . Trade union representatives from the US and Canada took advantage of the gathering and held a caucus on office work policy issues the day after the conference. About 100 people joined the general discussions on the effects of new technology in the work place and on worker health and safety, according to one attendee. ☉

MICROWAVE NEWS is published monthly, except in January and July • ISSN 0275-6595 • PO Box 1799, Grand Central Station • New York, NY 10163 • (212) 794-9633 • Editor: Louis Slesin, Ph.D., Associate Editor: Martha Zybko • Subscription: \$165 per year (overseas \$200) • Copyright © 1982 by Louis Slesin • Reproduction in any form is forbidden without written permission.

USSR (continued from p. 1)

USSR RF/MW cooperation program, said that both countries should be in a position to turn the power on by the beginning of the year.

Occupational Exposure Standards

In telephone interviews, all four said that Soviet scientists had told them that a new occupational health standard for RF/MW radiation had been adopted. Barnes and Wachtel reported that the new standard specifies a maximum energy dose as a function of exposure time. The maximum exposure level in the 300-3000 MHz band is governed by the formula:

$$\text{Maximum Exposure (uW/cm}^2\text{)} \times \text{Exposure Time (hr)} = 200 \text{ uW-hr/cm}^2$$

The equation only applies for exposures of more than 12 minutes. Therefore, the standard is 25 uW/cm² for 8 hours, 50 uW/cm² for 4 hours, 100 uW/cm² for 2 hours, and an absolute maximum of 1 mW/cm² for shorter periods. In contrast, the new ANSI standard allows 1 mW/cm² exposures to 30-300 MHz radiation for unlimited amounts of time and 5 mW/cm² above 1500 MHz.

From 50-300 MHz, Swicord added, the exposure of Soviet workers must not exceed 5 V/m and 0.15 A/m for electric and magnetic fields respectively, and for 30-50 MHz the limits are 10 V/m and 0.3 A/m. Swicord is the chief of the electromagnetic radiation branch in the Bureau of Radiological Health's (BRH) Division of Risk Assessment.

Future Soviet exposure standards for the general population will not be limited to continuous wave radiation. Barnes said that one member of Professor Mikhael Shandala's group at the Institute of General and Communal Hygiene in Kiev told him that they were in the process of introducing modulation characteristics into the exposure limits for the general public.

Barnes and Wachtel explained the current approach to standard setting in Kiev: they are specifying a different exposure standard for each class of electronic device. Thus, there is one standard for landing radar on aircraft and another for microwave ovens. Barnes noted that the oven standard, though specified in a different form from BRH's, is essentially the same as the US leakage limit. He added that the Kiev group was developing a standard for the communications industry and had initiated a five-year project to set exposure standards for civil aviation radar.

The American visitors were struck with the Soviet commitment to coordinating RF/MW research. That responsibility lies with Professor Inal Akoev, the deputy director of the Institute of Biophysics in Pushchino, a scientific research center south of Moscow. Wachtel found that there was cooperation between the Ministry of Health and the Academy of Sciences, a rare event because the two units usually work independently.

(The Soviet effort stands in contrast to current US moves to reduce funding for RF/MW bioeffects research (see *MWN*, July/August 1982) and to dismantle its coordination; see Updates: Government, p.5.)

US-USSR Cooperation

The joint US-USSR experiment is developing into a truly cooperative venture. Researchers in each country will use American rats and food, and the rats will live in Soviet plexiglass cages. BRH's Howard Bassen is scheduled to go to Kiev early next year to help Shandala's group with their dosimetry. In the US, the experiment will be carried out at both NIEHS and BRH. NIEHS will run behavioral, physiological and neu-

rochemical tests, while BRH will only look at behavioral effects.

A meeting between the participating Soviet and American scientists has been scheduled for next June, according to McRee. That way, he said, the Russians can attend the Bioelectromagnetics Society's annual meeting on June 12 in Boulder, CO.

When asked what research most impressed him during his trip, Swicord cited the work of Professor Y.A. Kolodov of the Institute of Higher Nervous Activity in Moscow and Professor K.V. Sudakov, chief of the P.K. Anokhin Institute of Normal Physiology in Moscow. Kolodov is investigating the ability of humans to emit and sense magnetic fields. Sudakov is working on ways to better withstand stress by exposing experimental animals to electric fields. This latter project is especially interesting, Swicord said, given some scientists' belief that electromagnetic fields can cause stress.

In response to the same question, Barnes and Wachtel referred to work on artificial membranes, isolated frog nerves and computer modelling. Barnes made special mention of investigations of the impact of magnetic fields on photosynthesis and the effects of long-term exposures to non-ionizing radiation on leukocyte mobility. ●

NIOSH (continued from p. 1)

workers, especially in Canada, have already won the right to do alternative work during pregnancy.

Jay Bainbridge, the assistant director of NIOSH's Division of Surveillance, Hazard Evaluation and Field Studies, confirmed that the study would go forward if the negotiations were successful. While noting that there is no evidence of any radiation hazard from VDTs, he said, "We would like to resolve this issue once and for all." Bainbridge and Rosenberg are in the same division at NIOSH.

Rosenberg said that the study population would be large enough to be statistically reliable. He added that one advantage of the proposed cohorts is that all the pregnancies would be monitored by one health care agency, which would ensure consistency in the study.

Meanwhile, a representative from another part of NIOSH has been assuring VDT operators that the machines do not cause miscarriages. According to a story in the October 21 *Toronto Star*, Dr. Michael Smith told members of the International Information/Word Processing Association that while the sets can cause a number of physical and psychological ailments, radiation hazards were not among them. Smith listed eye and muscle strain and stress as the most serious complaints. Smith, who works in NIOSH's Division of Biomedical and Behavioral Sciences, was out of the country and unavailable for comment.

Word of NIOSH's plans coincided with calls for an epidemiological study of pregnant operators from the Newspaper Guild in Washington, DC. The guild is already sponsoring a study at the Mount Sinai School of Medicine in New York City: VDT users at seven guild locals have been asked to complete a questionnaire on potential health impacts. Dr. Arthur Frank, the study's director at Mount Sinai, said that as far as pregnancy problems are concerned, the responses to his study could only generate hypotheses but not test them. "It will give us clues, but not answer any questions," he said.

In a related development, a Canadian task force on computer technology recommended that VDT operators should be allowed to do alternative work during pregnancy without any loss in pay (see story on p.2). ●