EMFRAPID

Electric and Magnetic Fields
Research and Public Information
Dissemination Program

Annual Report for Fiscal Year 1996

June 1997

A joint project of the
U.S. Department of Energy
and the National Institute of
Environmental Health Sciences

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EMF RAPID PROGRAM ANNUAL REPORT FOR FISCAL YEAR (FY) 1996

I. INTRODUCTION AND SUMMARY

The Electric and Magnetic Fields (EMF) Research and Public Information Dissemination (RAPID) Program was authorized by the Energy Policy Act of 1992 as a near-term effort to expand and accelerate the research needed to address the EMF issue. As required by this legislation, the EMF Interagency Committee, the National EMF Advisory Committee (NEMFAC), and the National Academy of Sciences (NAS) are providing valued input and advice for the direction of this program. With this input and advice, the Department of Energy (DOE) and the National Institute of Environmental Health Sciences (NIEHS) have developed and are implementing five-year program plans.

Multi-year health effects research projects and related EMF measurement and exposure assessment projects are underway using funds appropriated in fiscal years 1994, 1995, and 1996 together with voluntary non-Federal contributions. The results of these research projects, along with the results of other EMF research, will be used as input to the hazard evaluation effort, which is the focus of the EMF RAPID Program.

A coordinated interagency program is underway to communicate needed information on the EMF issue in a clear manner to the public and other decision makers.

The RAPID Program's first public information product, a booklet entitled *Questions and Answers About Electric and Magnetic Fields Associated with the Use of Electric Power*, has been followed by a new publication entitled *EMF In The Workplace*. Using a similar question and answer format, this document focuses on issues related to workplace exposures and worker health.

The EMF RAPID Program now has a World Wide Web site at:

<http://www.niehs.nih.gov/emfrapid>

The Web site contains program plans, public

information booklets, research information, and other documents, as well as a link to the RAPID Program *EMF Measurements Database* which can be found at:

<http://www.emf-data.org>

Although signed into law in October 1992, the first year that appropriations were available to the RAPID Program was FY 1994. The Secretary of Energy has requested that the program authorization be extended for one year so that research projects begun during the second year can be completed.

NIEHS has announced that it will hold a series of three science review symposia, the first of which was held in March 1997. These symposia will be used to evaluate the degree to which the scientific evidence can support a causal linkage between EMF exposure and biological/health effects.

II. RESEARCH AND COMMUNICATION ACTIVITIES

Health Effects Research and Hazard Evaluation

Work continued through 1996 on the original multi-year grants awarded by NIEHS in 1994 and in the NIEHS intramural EMF program, with some preliminary results reported at the 1996 Annual Review of Research on the Biological Effects of Electric and Magnetic Fields held in San Antonio (November 17-21, 1996). NIEHS has instituted a program of short-term research grants (R03) intended to augment the existing program of research project grants and to fill gaps in the health effects research. The current budget calls for \$2.25M to be available to the small grants program in 1997 and another \$2.25M in 1998. Annual funding for the small grants will not exceed \$50K per project for direct costs, and the projects are to be completed by January 1999. Twenty-one such small grants were awarded in January 1997 (see the Appendix).

Science Review Symposia and Working Group

At the NEMFAC meeting held April 29-30, 1996, in Washington, D.C., Dan VanderMeer, former co-chairman of the EMF Interagency Committee, presented a draft plan for a series of workshops designed to analyze the results of the health effects research, and in view of those results, see whether a consensus could be reached about the significance or insignificance of EMF as a health hazard. To assist NIEHS in formulating a strategy, Drs. Louis Slesin and Paul Zweigacker of NEMFAC, and members of the Interagency Committee formed an *ad hoc* workshop subcommittee.

In October 1996, Dr. Christopher Portier, Chief of the Laboratory of Computational Biology and Risk Analysis and Chair of the Risk Assessment Research Committee at NIEHS, issued a letter soliciting comments on the resulting plan. The plan calls for a science review symposium to be held in 1997, two in 1998, and a final EMF Science Working Group meeting anticipated for spring 1998. The objective of the symposia is to look at the quality of the scientific evidence supporting EMF effects.

The symposia will be divided into three basic categories:

- biophysical mechanisms and *in vitro* findings
- epidemiological studies
- *in vivo* and clinical findings

The first symposium, *Theoretical Mechanisms and In Vitro Research Findings*, was held in Research Triangle Park, North Carolina, March 24-27, 1997. It included researchers in the field as well as specialists from various disciplines other than EMF. The symposium consisted of plenary sessions and focused break-out sessions. All the symposia will be open to the public, and after each breakout session a summary of the discussions will be presented to the plenary session. The reports of the science review symposia are being written by rapporteurs, not by committees, and some may be submitted for publication. All documents and reports resulting from the symposia will be made available for comment prior to the writing of NIEHS' final report. These reports will be available on the

EMF RAPID web site and comments will be solicited. For each symposium and for the final workshop, a steering committee will be established whose role will be to draw up a list of participants and speakers. The *ad hoc* workshop subcommittee will work with the steering committee on this process. The final lists will be presented to the full Interagency and Advisory Committees for approval, and appointments will be made by NIEHS.

A separate exposure assessment symposium will be conducted by DOE. The exposure assessment data obtained from the engineering portion of the RAPID Program will be used to characterize the extent of human exposure to electric and magnetic fields in various occupational and residential settings.

EMF Workshop

The meeting of the final science Working Group will include participants from the science review symposia, as well as other scientists. The task of this working group will be to assess the strength of the evidence for EMF health effects based upon the results of the science symposia. The current plan calls for the working group to meet in Spring 1998 and NIEHS' report to be ready by fall of that year, although this schedule may be adjusted as the nature of a program extension becomes more apparent.

Engineering

The RAPID Program awarded contracts for three new engineering projects (projects 6-8) in 1996. These projects focus on measurement and prediction of personal EMF exposures as well as evaluation of existing technologies for reducing exposures. Project administration for these contracts is handled by Oak Ridge National Laboratory, under the sponsorship of the Department of Energy. The new projects are designed to help meet specific EMF RAPID Program goals as defined by DOE in cooperation with the National EMF Advisory Committee and the EMF Interagency Committee. They will provide information needed for the final stages of the 5-year program, including the development of findings and conclusions about the extent to which EMF exposure affects human health. The projects are described below:

Project 6, *Survey of Personal Magnetic Field Exposures (Phase I)*, is part of a larger effort to estimate personal EMF exposures of the U.S. population. This will be accomplished by performing personal exposure measurements for a statistical sample of the population. During Phase I, survey methodologies will be developed and a small scale survey of about 200 people will be conducted to validate them. It is expected that insight about important factors affecting population exposures will also be gained. Phase II will include a large scale survey using the methodologies developed in Phase I. Ultimately, the project will generate a large data set of personal field exposures for use in risk characterization. The contractor for this project is Enertech, a California-based consulting firm. The principal investigators are Drs. Luciano Zaffanella and Graham Kalton (cost: \$433K).

Project 7, *Development of Field Exposure Models*, is intended to generate methods for predicting human EMF exposure levels based on source measurement data and human activity patterns. The objective of this project is to provide some commonly applicable prediction models for magnetic field exposure assessment. These models will have the potential to save considerable time and expense by eliminating the need for personal exposure measurements in specific environments.

The contractor and principal investigator is Dr. T. Dan Bracken, an Oregon-based EMF consultant (cost: \$138K).

Project 8, *Evaluation of Field Reduction Technologies*, will describe and evaluate existing techniques for reducing EMF fields and/or exposures. The objective of this project is to provide decision makers with information about existing field reduction technologies. The evaluation will include effectiveness, economic costs, and environmental impact and other relevant factors. This project does not include development of new technologies, but is designed to provide a comprehensive list of options and identify their advantages and limitations. The contractor is IIT Research Institute in Chicago. The principal investigator is Mr. Tim R. Johnson, and the project manager is Mr. James R. Gauger (cost: \$124K).

Environmental Field Surveys, an earlier project conducted by Enertech, has been completed, and a report is expected in 1997. Consisting of a series of preliminary surveys of fields in various environments, this project has provided information on major field sources in each environment and cross-environment comparisons of field sources. The *EMF Measurements Database*, another RAPID engineering project, is now accessible on the World Wide Web (<http://www.emf-data.org>). This project is an ongoing effort to make available to investigators original exposure assessment and measurement data, and to set standards for new field measurement data to be included in the database.

Site Visits for Quality Assurance

At the November 21-22, 1996 NEMFAC meeting held in San Antonio, Texas, Dr. Paul Gailey of Oak Ridge National Laboratory reported that 22 of 28 grantee laboratories had been visited thus far. These visits, which are paid for by the DOE EMF Biological Mechanisms Research Program, uncovered specific problems relating to temperature variations, high fields from incubators, and stray fields from computers in about five laboratories. Some of the investigators have consequently decided to redo their experiments from the beginning. Dr. Gailey also reported that the Institute of Electrical and Electronics Engineers (IEEE) had agreed to set up a special panel session at their winter 1997 meeting during which reports by RAPID engineering contractors would be presented. The data will thus be available in advance of eventual publication in technical journals.

Communication

A listing of RAPID Program documents is given in the Appendix.

Brochures:

EMF In the Workplace, a booklet produced by the RAPID Program in conjunction with the National Institute for Occupational Safety and Health (NIOSH), was published in September 1996 and has been widely distributed in the U.S. and abroad. Similar in format to the highly successful *Questions and Answers About Electric*

and Magnetic Fields Associated with the Use of Electric Power, this new publication focuses on issues related to workplace exposures.

Multiple copies of the booklet can be purchased from the:

Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402
(202) 512-1800

Single copies may be obtained without charge by calling the EMF InfoLine at:

1-800-363-2383

The booklet has also been posted on the EMF RAPID Program World Wide Web site:

www.niehs.nih.gov/emfrapid

NIOSH has produced a concise fact sheet entitled *EMFs In the Workplace* which serves as a companion document to the larger booklet. Copies of the NIOSH Fact Sheet on EMF can be obtained by dialing:

1-800-35-NIOSH (1-800-356-4674)

EMF Information Sources:

The Federal government has now set up several sources of information, via telephone and Internet web site for questions about EMF:

EMF InfoLine
1-800-363-2383

The EMF InfoLine is staffed by people trained to respond to public inquiries about power-frequency EMF. The InfoLine is supported by RAPID funds.

ENVIRO-HEALTH Hotline
1-800-643-4794

The National Institute of Environmental Health Sciences operates a hotline to answer questions about a variety of environmental health issues. The ENVIRO-HEALTH Hotline is not supported by RAPID funds.

**Information on
Workplace Hazards Hotline**
1-800-356-4674

The National Institute for Occupational Safety and Health operates a hotline to answer questions about safety and health in the workplace. Although not funded by RAPID, this hotline responds to questions about EMF in the workplace.

EMF RAPID Home Page

The EMF RAPID web site has been a success with approximately 4000 visits per month. The EMF RAPID home page can be found at:

<http://www.niehs.nih.gov/emfrapid/home.htm>

III. FUNDING STATUS

The EMF Research and Public Information Dissemination Program is a cost-shared program in which DOE is required to solicit non-Federal contributions to at least match the Federal annual appropriation. DOE provides public notice of its annual solicitation of non-Federal contributions through the *Federal Register*. Information on annual appropriations and non-Federal contributions is contained in Figure 1 and Table 1.

IV. COMMITTEE ACTIVITIES

The National EMF Advisory Committee (NEMFAC)

The National EMF Advisory Committee (NEMFAC) was constituted in January 1993 in accordance with Section 2118 of the Energy Policy Act of 1992. It is composed of 10 members chosen from among experts in EMF, state regulatory agencies, state health agencies, electric utilities, electric equipment manufacturers, labor unions, and the public. The committee makes recommendations to the EMF Interagency Committee (see below) with respect to the duties of the Committee, and advises the Secretary of Energy and the Director of NIEHS on the design and implementation of the EMF RAPID Program. The NEMFAC has held public meetings since August 1993.

Table 1: Contributions to the EMF RAPID Program

Contributors	FY 94 (in \$K)	FY 95 (in \$K)	FY 96 (in \$K)
<i>Electric Utilities*</i>	3,700	6,300	2,420
<i>National Electrical Manufacturers Association</i>	250	500	250
<i>Others</i>	0	0	5
Total	3,950	6,800	2,675

* Contributions from electric utilities have been collected and forwarded through these organizations:

American Public Power Association
 Edison Electric Institute
 Electric Power Research Institute
 Empire State Electric Energy Corporation
 National Rural Electric Cooperative Association

NEMFAC ACTIVITIES IN FISCAL YEAR 1996**Meeting of November 16-17, 1995**

The National EMF Advisory Committee conducted two meetings in FY 1996. The first meeting was held on November 16-17, 1995 following the Annual Review of EMF Research in Palm Springs, California. Most NIEHS staff were unable to attend due to the shutdown of the Federal government. Of major concern to NEMFAC was the 1995 budget shortfall of \$450K. Mr. Dan VanderMeer of NIEHS, then co-chair of the Interagency Committee, explained that reductions in spending would have to be achieved by reviewing the progress of the research and negotiating a reduction with each grantee. This resulted in what amounted to an average 10% reduction in second year costs for existing grants, although some grants were reduced more than others. The 1995 shortfall was also addressed by not funding proposed add-ons to a study being conducted at IIT Research Institute (\$100K) nor a brain histology add-on (\$30K) to a study originally funded by EPRI.

NEMFAC also received an update on the progress of the Loescher DMBA study replication. Dr. Boorman of NIEHS had visited Dr. Loescher's laboratory at the Hannover School of Veterinary Medicine (Germany) in 1994 and had stayed in contact with him. A Request for Proposals (RFP) was issued after May 1995. Best and final contract negotiations were in progress with an expected award date of March 15, 1996. The committee also discussed what protocol should be used in the replication, Dr. Loescher's or a standard protocol that had been recommended by scientists at NIEHS. Many committee members felt that the original experimental protocol should be adhered to as closely as possible.

Dr. Gregory Lotz of NIOSH and Dr. Imre Gyuk of DOE reported that the regional exposure facilities were operational at NIOSH, FDA, and ORNL. The facility located at Pacific Northwest National Laboratory (PNNL) would be operational later in the fiscal year. Funding responsibilities for the facilities are shared by DOE and NIEHS. The DOE EMF Biological Mechanisms Research Program supports the facilities, system development, quality assurance, and research projects at Battelle/PNNL and ORNL. RAPID

The National EMF Advisory Committee

Shirley Linde (Committee Chair)
*Founding Member of Citizens for Safer
EMF*

J. Peter Bingham, Ph.D.
*President
Philips Laboratories*

Joe Garcia
*Commissioner
Florida Public Service Commission*

Kate Maracas
*Director, Utility Services
Econergy International Corporation*

James Melius, M.D., Dr.P.H.
*Director
NYS Laborers' Health and Safety Fund*

Thomas Rozzell, Ph.D.
*Director, Fellowship Programs
National Academy of Sciences, National
Research Council*

Robert Schell, P.E.
*Manager, Radiation Control Program
Maine Department of Human Services*

Margaret Seminario
*Director, Occupational Safety and Health
AFL-CIO*

Louis Slesin, Ph.D.
*Publisher
Microwave News*

Paul Zweifelacker, Ph.D.
*Manager, Environmental Permitting
Texas Utility Services*

funds, via NIEHS, support research at NIOSH and FDA. The host agencies also supply indirect resources, especially manpower.

Mr. Richard Loughery of the Edison Electric Institute reiterated his organization's commitment to support the RAPID Program, however, Mr. Loughery expressed his concerns about the uncertainties of Federal funding and program timing. The utility industry, he said, was in transition and having to operate in an increasingly competitive environment. Consequently, it was becoming more and more difficult to solicit contributions from member utilities, especially when faced with the uncertainty of whether RAPID would truly be a five-year program as Congress had originally intended.

Lynne Gillette, DOE, reported on engineering and communication projects:

- Five projects begun in May 1995 would have final reports in the coming months;
- Interagency agreements were in place to examine various exposure environments; NIOSH was identifying occupations that might experience higher than normal exposures and the Department of Transportation was examining EMF exposures from typical modes of transportation.
- Distribution of the *Questions and Answers About EMF* brochure had exceeded 100,000 with about half going to utilities for customers and the rest going to state and local governments or individuals who called the EMF InfoLine.
- The EMF InfoLine administered by EPA was receiving about 250 calls per month; an estimated 1,000 calls per month were coming in for all three EMF hotlines at NIOSH, NIEHS, and EPA.

The committee also discussed its request for an extension of the RAPID Program in order to complete the research now under way and to write the final report. It was agreed that the committee would recommend a two-year extension which would take the program through 1999.

Meeting of April 29-30, 1996

The spring NEMFAC meeting was conducted jointly with the EMF Interagency Committee and held in Washington, DC. Lynne Gillette provided an overview of the new management structure at DOE's Office of Energy Efficiency and Renewable Energy. EMF programs, while remaining in the Office of Utility Technologies (OUT) were now being managed through the Office of Energy Outreach within OUT.

Dr. Gary Boorman presented an update of the current status of the RAPID Program:

- Twenty seven grants had been awarded with the initial focus being on replication of earlier experiments and the major research focus on

cancer.

- Grantees were starting to put more time into cellular and animal studies, and basic research.
- Four regional exposure facilities were being used to perform replication experiments, to provide an opportunity for scientists to have access to calibrated and quantified exposure units, and to conduct basic research. In addition to quality assurance visits by DOE and NIST, visits by NIEHS staff were conducted to gather information from the investigators and to see how experiments were progressing.
- Gene expression studies were underway for a year at the FDA's exposure facility located in Rockville, Maryland. The FDA facility was also doing work to a lesser extent on ornithine decarboxylase (ODC) in combination with Catholic University (Washington, DC). The NIOSH replication facility was addressing the work of Lindstrom in cell signalling and calcium flux, as well as the West (National Center for Toxicological Research) cellular transformation studies. The Oak Ridge site was working with Dr. Carl Blackman (EPA) on neurite outgrowth. Dr. Anderson's group at PNNL was attempting to replicate Dr. Liburdy's melatonin experiments.
- Whole animal studies were also being supported by RAPID. A study of melatonin in mice had been completed and would be submitted for publication. A series of immunotoxicity studies had been completed, as had two six-month leukemia studies using transgenic mice. Also, NIEHS had funded intramural melatonin experiments in which no EMF exposures were employed. It had been shown that five 60-second periods of light during the animals' dark period resulted in a 30% decrease in melatonin. RAPID had contributed a small amount of funds (1-1.5 \$K) to this work. NIEHS would now try to relate melatonin levels to breast cancer rates in an attempt to establish a model for breast cancer.
- The contract to replicate the Loeschner DMBA

EMF RAPID Program

Questions and Answers About EMF

- ▶ General information booklet
- ▶ Available in English and Spanish
- ▶ Available through the EMF InfoLine (1-800-363-2383)

EMF RAPID Program Homepage and Measurements Database

- ▶ Provides program information and booklets to the public
<http://www.niehs.nih.gov/emfrapid>
- ▶ Linked to the EMF RAPID Program Measurements Database: a collection of data sets of electric or magnetic field measurements
<http://www.emf-data.org>
- ▶ Homepage and Database are linked

Science Review Symposia

- ▶ A series of three conferences plus a final working group designed to review the results of the RAPID Program health effects research:
 - biophysical mechanisms and in vitro findings
 - in vivo and clinical findings
 - epidemiological studies

EMF in the Workplace

- ▶ Booklet and associated fact sheet produced in cooperation with the National Institute for Occupational Safety and Health (NIOSH)
- ▶ Focuses on health issues and EMF exposures in occupational settings

EMF Handbook

- ▶ A comprehensive EMF guide containing research summaries, study abstracts, and resource information

Note: Science Review Symposia and EMF Sci

Electric and Magnetic Fields Research and Public Information Dissemination

Activities and Products

Working Group dates are tentative.

study was awarded to Battelle Pacific Northwest National Laboratory and would actually consist of two studies. One study would run 13 weeks and use Dr. Loesch's experimental protocol, while another study, using a standard DMBA breast cancer protocol, would run for 26 weeks. Each group would contain 100 animals to increase the statistical sensitivity of the experiments. These studies would run concurrently in order to save money, and exposures were scheduled to begin in July 1996. The final report is expected in July 1997. Battelle, not RAPID, would pay travel expenses for the PNNL team to visit Loesch's laboratory in Germany.

Dr. Boorman also reported that \$2.25M was being set aside to fund approximately 25 small innovative projects (see Appendix). These projects would be limited to \$50K per year in direct costs for a maximum duration of two years, and could be handled at the NIEHS level rather than going through the entire NIH review process. Applicants would be encouraged to use the regional exposure facilities to conduct their experiments.

THE EMF INTERAGENCY COMMITTEE

The EMF Interagency Committee delivered its *Progress Report on the Electric and Magnetic Fields Research and Public Information Dissemination Program* (DOE/EE 0088) to Congress in December 1995, and continued to meet regularly throughout fiscal 1996. Dr. Gary Boorman, Associate Director for Special Programs in the Environmental Toxicology Program at NIEHS, and Dr. Imre Gyuk, DOE EMF Program Manager, have replaced Dan VanderMeer (NIEHS) and Robert Brewer (DOE) as Committee co-chairmen. Lynne Gillette, DOE's EMF RAPID Program Manager, was named the Designated Federal Official to NEMFAC.

The meetings of the committee mainly covered programmatic issues such as the status of funding and the request for an extension, status of the NIEHS small grants program, and progress of the science review symposia and hazard evaluation. Representatives from EPA and DOE have volunteered to serve on the *ad hoc* workshop subcommittee which is assisting NIEHS in planning the science review symposia.

The EMF Interagency Committee

Imre Gyuk, Ph.D., Co-Chair
Office of Utility Technologies
Department of Energy (DOE)

Gary Boorman, D.V.M., Ph.D., Co-Chair
Environmental Toxicology Program
National Institute of Environmental Health Sciences (NIEHS)

Alex Cockey
Electric Program
Rural Utilities Service (RUS)

John Conway
Senior Counsel to the Chair
Federal Energy Regulatory Commission (FERC)

Robert Curtis
Health Response Team
Occupational Safety and Health Administration (OSHA)

Alan Cookson, Ph.D.
Electronics and Electrical Engineering Laboratory
National Institute of Standards and Technology (NIST)

Michael Marron, Ph.D.
Office of Naval Research
Department of Defense (DOD)

Arnold Konheim
Office of Environment, Energy and Safety
Department of Transportation (DOT)

Mary Smith
Indoor Environments Division
Environmental Protection Agency (EPA)

NATIONAL ACADEMY OF SCIENCES/NATIONAL RESEARCH COUNCIL COMMITTEE ON THE POSSIBLE EFFECTS OF ELECTROMAGNETIC FIELDS ON BIOLOGIC SYSTEMS

The Committee on the Possible Effects of Electromagnetic Fields on Biologic Systems of the National Research Council (NRC) reviewed over 500 EMF studies over a three-year period. The committee published its findings at the end of October 1996. In its report the committee concluded that "...the current body of evidence does not show that exposure to these fields presents a human health hazard. Specifically, no conclusive and consistent evidence shows that

exposures to residential electric and magnetic fields produce cancer, adverse neurobehavioral effects, or reproductive and developmental effects." The report also states that there is a statistically reliable and robust association between residence near power transmission and distribution systems and childhood cancer, although this association cannot be clearly ascribed to magnetic field exposure. Areas outlined by the NRC report for possible further studies are substantially among those pursued by the DOE research program on biological effects of EMF and by NIEHS. In response to the NRC report, the National EMF Advisory Committee and the EMF Interagency Committee have issued statements which can be found in the Appendix of this report.

V. A LOOK FORWARD TO FISCAL YEAR 1997

Health Effects Research and Science Review Symposia

Health effects research begun in 1995 will continue throughout 1997. In addition to the full research project grants (RO1), NIEHS has awarded 21 short-term grants (R03) that are intended to fill gaps in the knowledge of how EMF may affect health. The small grants program is scheduled to run through January 1999. Topics and principal investigator information are presented in the Appendix. Abstracts for these studies may be found at the EMF RAPID web site:

<http://www.niehs.nih.gov/emfrapid>

The 13-week replication of the Loeschler DMBA study was completed late in 1996. The replication resulted in a much higher rate of tumor formation for all groups (exposed and unexposed) than the original experiment, making it difficult to distinguish any promotional effects of EMF. A 26-week study which followed an NIEHS protocol has also been completed, and the pathology report is due in July 1997. A study conducted simultaneously by DOE has identified the correct dosage corresponding to that of the Loeschler experiment. A second 13-week study in which such a lower dose of DMBA tumor initiator is used is underway, and a final report is due in September 1997.

The first science review symposium, entitled *Theoretical Mechanisms and In Vitro Findings*, was held March 24-27, 1997 in Research Triangle Park, N.C. The second symposium, which will review epidemiological results, is tentatively scheduled to be held in fall 1997. The third symposium, on *in vivo*/clinical laboratory findings, is tentatively scheduled for March 1998. At each symposium, the participants will consider the quality and reproducibility of the research findings for evaluating the degree to which scientific evidence can support a causal linkage between EMF exposure and biological/health effects. The symposia will be open to the public.

Engineering

EMF measurement guidelines, which have been nearly completed, will be published in 1997. Guidelines for environmental exposures, personal exposures, and source-specific exposures will be published in one volume. Data will be added to the *EMF Measurements Database* as it becomes available, and work will continue on the evaluation of field reduction technologies.

Communication

The next major public information product will be an *EMF Handbook*, a comprehensive guide that will contain research abstracts, available results, public information materials, and a guide to other informational resources on EMF. The EMF InfoLine will continue operations under the direct management of the RAPID Program.

Funding and Extension of the EMF RAPID Program

The Secretary of Energy had requested that the funding authorization for the EMF RAPID Program be extended through FY 1998. RAPID's non-Federal sponsors are supporting this request. The extension is necessary to provide a full five years of funding and to complete the research begun in the second year of the program. The extension will also allow other EMF studies taking place outside of the RAPID Program to be completed so that their results may be considered during the later science review symposia. Due to a government-wide recision,

the program received only \$3.3 million in FY 1996 instead of the requested \$3.9 million. Some funding was restored in 1997, and the appropriation currently stands at \$3.7 million for FY 1997. As in previous years, the planned implementation of the program and completion of the research is dependent upon matching non-Federal contributions.

APPENDIX

EMF RAPID SHORT-TERM RESEARCH GRANTS

Principal Investigator	Title
R. Dean Astumian University of Chicago	Nonlinear Mechanisms for EMF Effects on Cells
Elizabeth K. Balcer-Kubiczek University of Maryland	Molecular Effects of ELF Fields with Harmonic Content
Martin Blank Columbia University, New York City	Cytochrome Oxidase in Electric and Magnetic Fields
Lucio G. Costa University of Washington, Seattle	Exposure to EMF and Astrocytomas: <i>in Vitro Studies</i>
Gale Louise Craviso University of Nevada	Effects of EMFs on Calcium Levels in Excitable Cells
Reba Goodman Columbia University, New York City	EM Fields and Co-Promotion of Cancer
Guy David Griffin Oak Ridge National Laboratory Oak Ridge, Tennessee	Evaluation of Reported EMF Effects on Cell Communication
Buell Grissom University of Utah, Salt Lake City	Magnetic Field Dependence of Human Enzymes at Weak Fields
Theodore J. Hahn Veterans Affairs Medical Center, W. Los Angeles, California	Brain Tumors in Mice Exposed to 60-Hz Magnetic Fields
Tom K. Hei Columbia University, New York City	EMF Environmental Carcinogenesis and Co-Mutagenicity
Daniel F. Kripe University of California, San Diego	EMF Effects on Melatonin Among Aging Volunteers
Henry C. Lai University of Washington, Seattle	60-Hz Magnetic Field Induced DNA Damage
Howard B. Lieberman Columbia University, New York City	ELF Magnetic Fields, Gene Expression and the Cell Cycle
Lisa I. Loberg IIT Research Institute, Chicago	EMF Effects on Cell Regulation in A-T Cells
Lee James McDonald ITT Research Institute, Chicago	60-Hz Magnetic Fields and Cellular Stress Response
David L. McCormick ITT Research Institute, Chicago	<i>In vivo</i> Responses to Complex EMF Exposure Metrics
Russell J. Reiter University of Texas, San Antonio	Magnetic Field and <i>in vivo</i> DNA Damage
Bernadette M. Ryan IIT Research Institute, Chicago	Developmental Toxicity of EMF Exposure in Rats
Jesse E. Siskin University of Kentucky, Lexington	Effects of 60-Hz EMF on Capacitative Calcium Entry
Asher R. Sheppard Loma Linda University, Loma Linda, California	Attributable Fraction Estimates for EMF Exposures
Michael G. Yost University of Washington, Seattle	Extended Analysis of EMF Exposure Metrics and Melatonin Levels in Utility Workers

EMF RAPID PROGRAM DOCUMENTS CURRENTLY AVAILABLE

1. *Electric and Magnetic Fields Research and Public Information Dissemination (EMF RAPID) Program Research Agenda and Communication Plan*, (DOE/EE-0021), by the Federal EMF Interagency Committee, May 1994.
2. *EMF RAPID Program: Implementation Plan for Health Effects Research and Risk Communications*, (DOE/EE-0088) by the National Institute of Environmental Health Sciences (NIEHS), October 1994.
3. *EMF RAPID Program: Implementation Plan for Engineering Research, Development and Demonstration*, (DOE/EE-0036) by the U.S. Department of Energy (DOE), October 1994.
4. *EMF RAPID Program: Implementation Plan for Communication*, (DOE/EE-0037), by DOE and NIEHS, October 1994.
5. *Questions and Answers About Electric and Magnetic Fields Associated with the Use of Electric Power*, (DOE/EE-0040), by DOE and NIEHS, January 1995. A Spanish version of this document is also available, (DOE/EE-0050), March 1995.
6. *EMF RAPID Program: Annual Report for Fiscal Year 1994* (DOE/EE-0042), by DOE and NIEHS, December 1994.
7. *EMF RAPID Program: Annual Report for Fiscal Year 1995*, (DOE/EE-0076), by DOE and NIEHS, December 1995.
8. *Progress Report on the Electric and Magnetic Fields Research and Public Information Dissemination Program*, (DOE/EE-0088), by the EMF Interagency Committee, December 1995.
9. *EMF in the Workplace*, (DOE/GO-10095-218) by the EMF RAPID Program, September 1996.

Single copies of *EMF in the Workplace* may be obtained for free from the EMF InfoLine by calling 1-800-363-2383.

Single copies of the RAPID Program documents (give exact title and publication number) are available free of charge by writing to:

DOE Public Inquiries Center
1000 Independence Ave., SW (PA-5)
Washington, DC 20585

All of the documents are available on the EMF RAPID web site: <http://www.niehs.nih.gov/emfrapid>.

THE NATIONAL ELECTRIC AND MAGNETIC FIELDS ADVISORY COMMITTEE

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FOR IMMEDIATE RELEASE

Date: December 12, 1996

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National EMF Advisory Committee calls for continued research on electric and magnetic field health effects

Los Angeles, California—

The Congressionally-mandated National Electric and Magnetic Fields Advisory Committee (NEMFAC) calls for continued research on electric and magnetic fields because a recent report from the National Academy of Sciences/National Research Council (NAS/NRC) **does not state that extremely low frequency magnetic fields are safe**. Rather, the report concludes that there is an **unexplained** but statistically reliable and robust association between residence near power transmission and distribution systems and childhood cancer, and **continued research is necessary**.

The NEMFAC also concluded that:

- The NAS/NRC report, entitled *Possible Health Effects of Exposure to Residential Electric and Magnetic Fields*, received widespread national press coverage, much of which was misleading. This could adversely impact funding decisions for all EMF research programs in the future.
- Neither the NAS/NRC press release nor the Executive Summary of the report adequately reflects the conclusions to be found in the body of the report.

NEMFAC comments were contained in a letter sent to Ms. Christine Ervin, Assistant Secretary for Energy Efficiency and Renewable Energy at the U.S. Department of Energy, from Ms. Shirley Linde, Chairperson, NEMFAC. The letter reflects decisions made by NEMFAC at its semiannual meeting, held November 21, 1996, in San Antonio, Texas. The Committee believes continued research with adequate funding is essential to resolve uncertainties about EMF health effects.

The NEMFAC was established by Congress, in the Energy Policy Act of 1992, to provide advice to the Secretary of Energy and to the Director of the National Institute of Environmental Health Sciences on the Electric and Magnetic Fields Research and Public Information Dissemination (EMF RAPID) Program, also established by that law. The 10 Committee members represent all constituent groups concerned with electric and magnetic field effects--the general public, labor, government, industry, and the scientific community.

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THE ELECTRIC AND MAGNETIC FIELDS INTERAGENCY COMMITTEE
The EMF Research and Public Information Dissemination (RAPID) Program

May 23, 1997

Dr. John H. Gibbons
Assistant to the President for Science and Technology
Office of Science and Technology Policy
Executive Office of the President
Washington, D.C. 20502

Dear Dr. Gibbons:

As you are aware, the National Research Council has recently issued a report entitled, *Possible Health Effects of Exposure to Residential Electric and Magnetic Fields*. That study confirms there is evidence to warrant continued, serious research on the effects of EMF. The research currently sponsored by the Department of Energy and the National Institute of Environmental Health Sciences under the Congressionally-mandated EMF RAPID Program is in line with the Report's recommendations.

The Federal EMF Interagency Committee, however, is concerned about characterizations of the NRC Report in the media as definitely finding that further research is not required and that the EMF issue is now resolved. The NRC Report says no such thing.

The widely reported finding of the Report was that "no conclusive and consistent evidence shows that exposures to residential electric and magnetic fields produce cancer, adverse neurobehavioral effects, or reproduction and developmental effects." To be sure, this will allay some concerns regarding major hazards from field exposure to EMF. However, this finding must be considered in its proper context. It is essential to take into account the limitations and restrictive focus of the NRC Report.

Of necessity, the NRC Report was limited in its scope. The Report deals mainly with low level *residential* exposure, not occupational exposure. Analysis of the experimental evidence focuses on the few studies with correspondingly low field intensities where results are difficult to isolate. The Report concentrates mainly on direct rather than indirect genotoxic effects, although many environmental agents are known to act by non-genotoxic mechanisms. And, significantly, the Report is essentially confined to studies published only through 1994. Important research in epidemiology, tumor promotion, and cellular systems has been reported since then. The report concludes that "continued research is important, however, because the possibility that some characteristic of the electric or magnetic field is biologically active at environmental strengths cannot be totally discounted".

The limitations of the NRC Report underscore the importance of a more complete evaluation of possible health effects of electric and magnetic field exposure which will be conducted as a part of the RAPID Program through a series of public meetings. To that end, the Report, with the results of more recent research, will provide useful input for these meetings.

cc: Dr. Bruce Alberts, President, National Academy of Sciences
Membership, National Electric and Magnetic Fields Advisory Committee

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