

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
ENERGY FACILITY SITING BOARD**

**IN RE: INVENERGY THERMAL DEVELOPMENT LLC's  
APPLICATION TO CONSTRUCT THE  
CLEAR RIVER ENERGY CENTER IN  
BURRILLVILLE, RHODE ISLAND**

**DOCKET No. SB-2015-06**

**PRE-FILED DIRECT TESTIMONY OF  
WILLIAM BAILEY**

**(JUNE 30, 2017)**

## **SUMMARY**

William Bailey is a principal scientist in the Center for Occupational and Environmental Health Risk Assessment Department at Exponent, Inc. and testifies regarding the electric and magnetic field (“EMF”) analysis conducted for the Clear River Energy Center (“CREC”), as described in the application and in response to data questions. Specifically, he testifies regarding Exponent’s modeling of the EMF associated with the new CREC line. Mr. Bailey, relying on his experience and expertise, the application as supplemented, the relevant literature and national health agency reviews, EMF modeling prepared by Exponent and Invenergy’s responses to relevant data requests and agency opinions, opines that CREC’s levels of electric and magnetic fields will not cause unacceptable harm to the environment or to the public health.

## LIST OF EXHIBITS

WB-1      *Curriculum Vitae*

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**INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED DIRECT  
TESTIMONY OF WILLIAM BAILEY, EXPONENT, INC.**

1 **I. INTRODUCTION**

2 **Q. PLEASE STATE YOUR NAME, BUSINESS TITLE AND BUSINESS ADDRESS.**

3 **A.** My name is William Bailey. I am a Principal Scientist in the Health Science Practice at  
4 Exponent, Inc. ("Exponent"). Exponent is an engineering and scientific firm with 26 offices in  
5 the United States and abroad. My office is located at 17000 Science Drive, Suite 200, Bowie,  
6 MD 20715.

7 **Q. ON WHOSE BEHALF ARE YOU TESTIFYING?**

8 **A.** My testimony is on behalf of the applicant, Invenergy Thermal Development LLC  
9 ("Invenergy"), in support of its application (the "Application") for a license from the Rhode  
10 Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy  
11 Center project in Burrillville, Rhode Island ("Clear River" or "CREC").

12 **Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND**  
13 **PROFESSIONAL EXPERIENCE.**

14 **A.** I received a bachelor's degree from Dartmouth College, an M.B.A. from the University  
15 of Chicago, a Ph.D. in Neuropsychology from the City University of New York, and two years  
16 of postdoctoral training in neurochemistry at The Rockefeller University in New York. Much of  
17 my work over the past 30 years relates to the exposures and potential biological, environmental,  
18 and health effects of electric and magnetic fields ("EMF") associated with electrical facilities,

1 including transmission lines and substations (some of which were attached to power plants),  
2 electrified railroad lines, and home and medical appliances. A detailed description of my  
3 educational background and professional experience is included in my current CV, which is  
4 attached as **Exhibit WB-1**.

5 **Q. PLEASE DESCRIBE YOUR EXPERIENCE PROVIDING TESTIMONY TO**  
6 **REGULATORY COMMISSIONS, BOARDS, AGENCIES OR AS AN EXPERT**  
7 **WITNESS.**

8 **A.** I have testified in regulatory proceedings on behalf of state public utility commissions as  
9 well as project applicants in various states on projections of EMF exposures and the current state  
10 of scientific research on EMF and public health.

11 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?**

12 **A.** My testimony summarizes Exponent’s modeling of: (a) the EMF associated with the new  
13 CREC line and existing lines on the National Grid right-of-way (“ROW”) to the Sherman Road  
14 Substation (Appendix F to the Application to the EFSB) and (b) the interconnection between  
15 CREC and National Grid ROW (Exhibit 7<sup>1</sup> attached to Invenergy’s Response 3-36 to the Rhode  
16 Island Department of Environmental Management’s (“RIDEM”) Third Set of Data Requests). In  
17 addition, Exponent has responded to questions about potential effects on humans and the  
18 environment in DEM requests 3-36 and 3-37, and in response to questions from the Rhode Island  
19 Department of Health, No. 1-1. Further, I can address questions relating to Section 6.11 (Electric  
20 and Magnetic Fields) of the Application prepared by the ESS Group.

21 **Q. PLEASE DESCRIBE YOUR FAMILIARITY WITH CREC.**

22 **A.** CREC has proposed to construct and operate a combined-cycle electric generation station  
23 fueled by natural gas. The electricity generated will be conveyed from the on-site switchyard

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<sup>1</sup> This exhibit contains Exponent’s revised modeling report, which includes both calculations of existing and proposed lines on the National Grid ROW and the proposed interconnection.

1 over an approximately 0.8 mile overhead transmission line interconnection to a National Grid  
2 345-kilovolt (“kV”) ROW (section XS-1). Thence, it will be carried on a new transmission line  
3 about 6 miles northeast to terminate in the Sherman Road Substation. For the first 1.6 miles  
4 from the point of interconnection, the ROW is 300-foot wide, and in this section (section XS-2)  
5 the 341 Line will be removed and replaced by the CREC Line and the 341 Line conductors will  
6 be shifted to new monopole structures in a delta configuration on the opposite side of the  
7 corridor, 57 feet from the western edge of the ROW. In the next 4.4 miles, the width of the  
8 ROW of section XS-3 widens to 500 feet, and here the CREC Line will be constructed 85 feet to  
9 the east of the existing 347 Line on H-frame structures and 200 feet from the eastern edge of the  
10 ROW. Further details describing the transmission line are available in EFSB Docket 2017-01.

11 **Q. WHAT MATERIALS DID YOU REVIEW AND RELY ON WHEN**  
12 **MODELING AND ANALYZING CREC’S ELECTRICAL**  
13 **ENVIRONMENT?**

14  
15 **A.** The ESS Group provided the structural configurations and conductor specifications for  
16 existing and proposed lines, line loadings, and facility maps for our EMF modeling as well as  
17 ROW plans, which were prepared by Power Engineers, with input from National Grid. In  
18 addition, I considered the reviews of EMF research performed by national and international  
19 health and scientific agencies and current research.

20 **II. ELECTRIC AND MAGNETIC FIELD ANALYSIS**

21 **Q. PLEASE DESCRIBE ALL RELEVANT STANDARDS AND REGULATIONS**  
22 **THAT YOU REVIEWED FOR COMPARISON TO CALCULATED LEVELS OF**  
23 **EMF.**

24 **A.** Neither Rhode Island nor the federal government has standards for EMF from  
25 transmission lines or other sources. The most relevant standards are health-based standards  
26 developed by two international organizations, the International Commission on Non-ionizing  
27 Radiation Protection (“ICNIRP”), which describes itself as an “official collaborating non-

1 governmental organization”<sup>2</sup> by the World Health Organization (“WHO”) and the International  
2 Committee for Electromagnetic Safety (“ICES”), which operates under the aegis of the Institute  
3 of Electrical and Electronics Engineers (“IEEE”), the world’s largest technical professional  
4 organization.

5         These organizations have performed extensive reviews of research on EMF and have  
6 recommended “basic restrictions”, which are limits on internal electric fields to protect against  
7 acute established effects (i.e., the stimulation of nerves and muscles) that occur at very high EMF  
8 levels – higher than those encountered in normal public and occupational environments. These  
9 limits on internal electric fields are difficult to measure directly, so these organizations have  
10 identified screening levels such that EMF exposures below these screening levels ensure that  
11 limits on internal electric fields are not exceeded. Exposures above these screening levels are  
12 permitted, but need to be checked by dosimetric modeling to ensure that the basic restrictions are  
13 not exceeded. ICNIRP sets screening values of 4.2 kilovolts per meter (“kV/m”) for electric  
14 fields and 2,000 milligauss (“mG”) for magnetic fields to evaluate exposures to the general  
15 public at 60 Hertz (“Hz”) (ICNIRP, 2010). The member countries of the European Union apply  
16 the ICNIRP standards to areas where the general public spends significant time (CEU, 1999).  
17 The IEEE ICES has recommended screening values of 9,040 mG for magnetic-field exposure  
18 and 5 kV/m for electric-field exposure, except on transmission line ROWs where the value  
19 increases to 10 kV/m (ICES, 2002).

20 **Q. PLEASE EXPLAIN YOUR METHODOLOGY.**

21 **A.** The levels of EMF were calculated using methods developed by a division of the U.S.  
22 Department of Energy for modeling EMF from power lines. The models for these calculations  
23 were developed in accordance with IEEE standards applicable to the modeling and measurement

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<sup>2</sup> <http://www.icnirp.org/en/about-icnirp/aim-status-history/index.html>

1 of EMF from transmission lines. The inputs to the model were specified so as to maximize the  
2 calculated levels by assuming an operating voltage 10% higher than normal, assuming that the  
3 CREC Line would carry current equal to the maximum base power output of the generating plant  
4 all the time, and assuming that the entire length of the lines modeled were at the minimum height  
5 of the conductors above ground. Since the magnetic field from the existing lines varies with  
6 current flow, the magnetic fields around the National Grid ROW were calculated at their  
7 expected average loading (the best estimator of the magnetic field on any randomly selected day  
8 of the year) and their expected peak loading (to estimate the highest magnetic field that occurs  
9 for periods where the loading is highest during the year). In addition, analyses of the effect of  
10 different phasing of the CREC line on the National Grid ROW were performed to identify the  
11 phasing at average loading that minimized the magnetic fields at both edges of the ROW. That  
12 phasing was accepted by CREC for its conceptual design of this line for the two segments where  
13 it parallels other transmission lines.

14 **Q. DID YOU MAKE ANY FINDINGS REGARDING THE EFFECT OF THE CREC**  
15 **LINE ON EXISTING EMF LEVELS? IF SO, PLEASE DESCRIBE.**

16 **A.** The addition of the new line to the existing ROW going towards the Sherman Road  
17 Substation will produce electric-field levels on the ROW that are similar to those of the existing  
18 345-kV transmission lines. As might be expected from the addition of a new, heavily loaded  
19 transmission line near to the eastern edge of the existing ROW, the magnetic field will increase  
20 at this edge, particularly in peak loading conditions and where the CREC Line is closest to the  
21 edge of the ROW in section XS-2. The increase in the magnetic field at the western edge of the  
22 ROW will be less. The levels of EMF associated with the interconnection to be constructed  
23 wholly within the CREC property are similar to those of the existing 345-kV lines on the ROW.  
24 All calculated levels of EMF are typical for high voltage transmission lines (Savitz et al., 1989).



1 Both the existing and proposed transmission lines at average and peak loading will produce  
2 levels of EMF at all locations that will comply with limits on exposure of the public (basic  
3 restrictions) recommended by ICNIRP and ICES. The levels also will be below the ICNIRP and  
4 ICES screening values for EMF, except where the calculated electric fields on the ROW exceed  
5 the ICNIRP screening value for this parameter. The WHO recommends these standards and has  
6 stated that compliance with international standards is protective of public health.

7 **Q. DO ANY ASPECTS OF THE PROJECT DESIGN MINIMIZE EXPOSURE OF**  
8 **THE PUBLIC TO EMF?**

9 **A.** Yes. There are several siting and design features that will minimize exposure to EMF.  
10 First, the proposed site of the generating plant is very close to the existing transmission line  
11 ROW, which minimizes the length of the required interconnection line. The large size of the  
12 CREC site in a rural location also means that the interconnection is too far away from the nearest  
13 residences (> 1,000 feet) to have any measureable effect on existing levels of EMF at these  
14 locations. Second, the construction of the CREC Line on an existing ROW avoids creating a  
15 new ROW, and the selection of optimal phasing of the line minimizes the magnetic field at the  
16 edges of the ROW. These low and no-cost options are consistent with recommendations of the  
17 WHO.

18 **Q. WHAT IS THE PERSPECTIVE OF NATIONAL AND INTERNATIONAL**  
19 **HEALTH AND SCIENTIFIC AGENCIES ABOUT EXPOSURES TO EMF?**

20 **A.** The WHO concluded from its comprehensive review of EMF research that:  
21 ... exposure limits are needed [to prevent short-term transient effects  
22 like shocks]. International guidelines exist that have addressed this  
23 issue. Compliance with these guidelines provides adequate protection.  
24 Consistent epidemiological evidence suggests that chronic low-  
25 intensity ELF [extremely low frequency] magnetic field exposure is

1 associated with an increased risk of childhood leukemia. However, the  
2 evidence for a causal relationship is limited, therefore exposure limits  
3 based upon epidemiological evidence are not recommended, but some  
4 precautionary measures are warranted (WHO, 2007, p. 355).

5 With respect to precautionary measures, the WHO states that, given the weakness of the  
6 evidence and the very limited public health impact, if any, the cost of any measures to reduce  
7 EMF exposure should be very low. The current perspective of the WHO on its website is "...the  
8 WHO concluded that current evidence does not confirm the existence of any health  
9 consequences from exposure to low level electromagnetic fields."<sup>3</sup> Subsequent to the  
10 publication of the WHO report, other national and international agencies have evaluated the  
11 scientific evidence and reached similar conclusions (ICNIRP, 2010; EFHRAN, 2012; MHNZ,  
12 2015; SSM, 2015). In 2015, the Scientific Committee on Emerging and Newly Identified Health  
13 Risks ("SCENIHR") of the European Union issued its opinion report in which the Committee  
14 concluded that research published up to 2014 did not confirm any adverse health effects of EMF  
15 exposure. The SCENIHR review was the most comprehensive of the reviews completed since  
16 the WHO review in 2007. The conclusions of the 2015 SCENIHR review were consistent with  
17 the conclusions expressed in the WHO report. Overall, the SCENIHR report concluded that the  
18 evidence did not confirm the existence of any adverse health effects. With respect to childhood  
19 leukemia, the SCENIHR recognizes the reported epidemiologic associations, but due to the lack  
20 of a known mechanism and the lack of supportive animal data, it does not consider the  
21 association causal. Altogether, while additional research has been published, the main  
22 conclusions of these reviews are quite consistent—the scientific evidence does not establish that

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<sup>3</sup> <http://www.who.int/peh-emf/about/WhatisEMF/en/index1.html>

1 extremely low frequency EMF at levels found in everyday environments pose a public health or  
2 safety threat.

3 **Q. HAVE YOU REVIEWED THE RIDEM ADVISORY OPINION?**

4 **A.** Yes.

5 **Q. DID THE RIDEM'S ANALYSIS OF CREC SUGGEST ANY IMPACT OF THE**  
6 **PROJECT ON THE ENVIRONMENT RELATING TO EMF?**

7  
8 **A.** No.

9 **Q. HAVE YOU REVIEWED THE RHODE ISLAND DEPARTMENT OF HEALTH'S**  
10 **DRAFT AND FINAL ADVISORY OPINIONS?**

11  
12 **A.** Yes. These opinions are consistent with the current scientific assessments of the U.S.  
13 National Cancer Institute, the WHO, and other health and scientific agencies.

14 **III. CONCLUSIONS**

15 **Q. DO YOU HAVE AN OPINION, TO A REASONABLE DEGREE OF SCIENTIFIC**  
16 **CERTAINTY, ABOUT CREC'S IMPACT ON AND FROM EMF?**

17  
18 **A.** Based on my review and evaluation of the research literature, reviews by national and  
19 international health agencies, and the calculated levels of these fields associated with the  
20 operation of the proposed project, the resulting field levels would not cause adverse effects on  
21 public health and the environment.

22 **Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

23 **A.** Yes.

24

25

26

27

28

1 **References**

- 2 Council of the European Union (CEU). Council Recommendation of 12 July 1999 on the limitation of  
3 exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) 1999/519/EC). Official  
4 Journal of the European Communities L199:59-70, 1999.
- 5 European Health Risk Assessment Network on Electromagnetic Fields Exposure (EFHRAN).  
6 Risk Analysis of Human Exposure to Electromagnetic Fields (Revised). Report D2 of the  
7 EFHRAN Project. Milan, Italy: European Health Risk Assessment Network on Electromagnetic  
8 Fields Exposure, 2012.
- 9 International Committee on Electromagnetic Safety (ICES). IEEE Standard for Safety Levels with  
10 Respect to Human Exposure to Electromagnetic Fields 0 to 3 kHz. Piscataway, NJ: IEEE, 2002.
- 11 International Commission on Non-ionizing Radiation Protection (ICNIRP). Guidelines for  
12 limiting exposure to time-varying electric and magnetic fields (1 Hz to 100 kHz). Health Phys  
13 99: 818-836, 2010.
- 14 Ministry of Health of New Zealand (MHNZ). Interagency Committee on the Health Effects of  
15 Non-ionising Fields: Report to Ministers 2015. Wellington, New Zealand: Ministry of Health,  
16 2015.
- 17 Savitz D, Pearce N, Poole C. Methodological issues in the epidemiology of electromagnetic  
18 fields and cancer. Epidemiol Rev 11: 59-78, 1989.
- 19 Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR). Opinion on  
20 Potential Health Effects of Exposure to Electromagnetic Fields (EMF). Brussels, Belgium:  
21 European Commission, 2015.
- 22 Swedish Radiation Safety Authority (SSM). Research 2015:19. Recent Research on EMF and  
23 Health Risk – Tenth report from SSM’s Scientific Council on Electromagnetic Fields.  
24 Stockholm, Sweden: Swedish Radiation Safety Authority, 2015.
- 25 World Health Organization (WHO). Environmental Health Criteria 238: Extremely Low  
26 Frequency (ELF) Fields. Geneva, Switzerland: World Health Organization, 2007.

# **EXHIBIT WB-1**



Engineering & Scientific Consulting

## William H. Bailey, Ph.D.

Principal Scientist | Health Sciences

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### Professional Profile

Dr. Bailey specializes in applying state-of-the-art assessment methods to environmental and occupational health issues. His 30 years of training and experience include laboratory and epidemiologic research, health risk assessment, and comprehensive exposure analysis. Dr. Bailey has investigated exposures to alternating current, direct current, and radiofrequency electromagnetic fields, 'stray voltage', and electrical shock, as well as to a variety of chemical agents and air pollutants. He is particularly well known for his research on potential effects of electromagnetic fields on the environment and health and has served as an advisor to numerous state, federal, and international agencies. Currently, he is involved in research on exposures to marine life from submarine cables and respiratory exposures to ultrafine- and nanoparticles.

Dr. Bailey has been a visiting scientist at the Cornell University Medical College and has lectured at Rutgers University, the University of Texas (San Antonio), and the Harvard School of Public Health. He was formerly Head of the Laboratory of Neuropharmacology and Environmental Toxicology at the New York State Institute for Basic Research, Staten Island, New York, and an Assistant Professor and NIH postdoctoral fellow in Neurochemistry at The Rockefeller University in New York.

### Academic Credentials & Professional Honors

Ph.D., Neuropsychology, City University of New York, 1975

M.B.A., University of Chicago, 1969

B.A., Dartmouth College, 1966

Sigma Xi

The Institute of Electrical and Electronics Engineers/International Committee on Electromagnetic Safety (Subcommittee 3, Safety Levels with Respect to Human Exposure to Fields (0 to -3 kHz) and Subcommittee 4, Safety Levels with Respect to Human Exposure to Radiofrequency Fields (3 kHz to 3 GHz)

Elected member of the Committee on Man and Radiation (COMAR) of the IEEE Engineering in Medicine and Biology Society, 1998-2001

## Academic Appointments

Visiting Scientist, Department of Pharmacology, Cornell University Medical College, New York, NY, 1986-2012

Visiting Scientist, The Jackson Laboratory, Bar Harbor, ME, 1984-1985

Head, Laboratory of Neuropharmacology and Environmental Toxicology, NYS Institute for Basic Research in Developmental Disabilities, Staten Island, NY, 1983-1987

Assistant Professor, The Rockefeller University, New York, NY, 1976-1983

Postdoctoral Fellow, Neurochemistry, The Rockefeller University, New York, NY, 1974-1976

Dissertation Research, The Rockefeller University, New York, NY, 1972-1974

CUNY Research Fellow, Dept. of Psychology, Queens College, City University of New York, Flushing, NY, 1969-1971

Clinical Research Assistant, Department of Psychiatry, University of Chicago; Psychiatric Psychosomatic Inst., Michael Reese Hospital, and Illinois State Psychiatric Inst, Chicago, IL, 1968-1969

## Teaching Appointments

Lecturer, University of Texas Health Science Center, Center for Environmental Radiation Toxicology, San Antonio, TX, 1998

Lecturer, Harvard School of Public Health, Office of Continuing Education, Boston, MA, 1995, 1997

Lecturer, Rutgers University, Office of Continuing Education, New Brunswick, NJ, 1991-1995

Adjunct Assistant Professor, Queens College, CUNY, Flushing, NY, 1978

Lecturer, Queens College, CUNY, Flushing, NY, 1969-1974

## Prior Experience

President, Bailey Research Associates, Inc., 1991-2000

Vice President, Environmental Research Information, Inc., 1987-1990

Head of Laboratory of Environmental Toxicology and Neuropharmacology, New York State Institute for Basic Research, 1983-1987

Assistant Professor, The Rockefeller University, 1976-1983

## Professional Affiliations

The Health Physics Society (Affiliate of the International Radiation Protection Society)

Society for Risk Analysis

International Society of Exposure Analysis

New York Academy of Sciences

William Bailey, Ph.D.

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American Association for the Advancement of Science

Air and Waste Management Association

Society for Neuroscience/International Brain Research Organization

Bioelectromagnetics Society

The Institute of Electrical and Electronics Engineers/Engineering in Medicine and Biology Society

Conseil International des Grands Réseaux Électriques

## Publications

Petri AK, Schmiedchen K, Stunder D, Dechent D, Kraus T, Bailey WH, Driessen S. Biological effects of exposure to static electric fields in humans and vertebrates: A systematic review. *Environ Health* 2017 Apr 17; 16(1):41. doi: 10.1186/s12940-017-0248-y.

Bailey WH. Review of epidemiology of electromagnetic fields, Martin Röösli, Editor. *Health Physics* 2015; 109:606-607.

Chang ET, Adami H-O, Bailey WH, Boffetta P, Krieger RI, Moolgavkar SH, Mandel JS. Validity of geographically modeled environmental exposure estimates. *Crit Rev Toxicol* 2014 May; 44:450-466. doi: 10.3109/10408444.2014.902029.

Alexander DD, Bailey WH, Perez V, Mitchell ME, Su S. Air ions and respiratory function outcomes: A comprehensive review. *J Negat Results Biomed* 2013 Sep 9; 12(1):14. doi: 10.1186/1477-5751-12-14.

Perez V, Alexander DD, Bailey WH. Air ions and mood outcomes: A review and meta-analysis. *BMC Psychiatry* 2013 Jan 15; 13(1):29. doi: 10.1186/1471-244X-13-29.

Bailey WH, Johnson GB, Bishop J, Hetrick T, Su S. Measurements of charged aerosols near &plusmn;500 kV DC transmission lines and in other environments. *IEEE Transactions on Power Delivery* 2012; 27:371-379.

Shkolnikov YP, Bailey WH. Electromagnetic interference and exposure from household wireless networks. 2011 IEEE Symposium on Product Compliance Engineering (PSES), October 1-5, 2011.

Kavet R, Bailey WH, Bracken TD, Patterson RM. Recent advances in research relevant to electric and magnetic field exposure guidelines. *Bioelectromagnetics* 2008; 29:499-526.

Bailey WH, Wagner M. IARC evaluation of ELF magnetic fields: Public understanding of the 0.4µT exposure metric. *Journal of Exposure Science and Environmental Epidemiology* 2008; 18:233-235.

Bailey WH, Erdreich L. Accounting for human variability and sensitivity in setting standards for electromagnetic fields. *Health Physics* 2007; 92:649-657.

Bailey WH, Nyenhuis JA. Thresholds for 60-Hz magnetic field stimulation of peripheral nerves in human subjects. *Bioelectromagnetics* 2005; 26:462-468.

Bracken TD, Senior RS, Bailey WH. DC electric fields from corona-generated space charge near AC transmission lines. *IEEE Transactions on Power Delivery* 2005; 20:1692-1702.

Bailey WH. Dealing with uncertainty in formulating occupational and public exposure limits. *Health*



Physics 2002; 83:402-408.

Bailey WH. Health effects relevant to the setting of EMF exposure limits. Health Physics 2002; 83:376-386.

Kavet R, Stuchly MA, Bailey WH, Bracken TD. Evaluation of biological effects, dosimetric models, and exposure assessment related to ELF electric- and magnetic-field guidelines. Applied Occupational and Environmental Hygiene 2001; 16:1118-1138.

Bailey WH. ICNIRP recommendation for limiting public exposure to 4 Hz-1 kHz electric and magnetic fields. Health Physics 1999; 77:97-98.

Bailey WH. Principles of risk assessment with application to current EMF risk communication issues. In: EMF Risk Perception and Communication. Repacholi MH, Muc AM (eds), World Health Organization, Geneva, 1999.

De Santo RS, Bailey WH. Environmental justice tools and assessment practices. Proceedings, American Public Transit Association, 1999.

Bailey WH, Su SH, Bracken TD. Probabilistic approach to ranking sources of uncertainty in ELF magnetic field exposure limits. Health Physics 1999; 77:282-290.

Bailey WH. Field parameters. Proceedings, EMF Engineering Review Symposium, Status and Summary of EMF Engineering Research. Bracken TD and Montgomery JH (eds), Oak Ridge National Laboratory, Oak Ridge, TN, April 28-29, 1998.

Bailey WH. Policy implications. Proceedings, EMF Engineering Review Symposium, Status and Summary of EMF Engineering Research. Bracken TD and Montgomery JH (eds), Oak Ridge National Laboratory, Oak Ridge, TN, April 28-29, 1998.

Bailey WH. Probabilistic approaches to deriving risk-based exposure guidelines: Application to extremely low frequency magnetic fields. In: Non-Ionising Radiation. Dennis JA and Stather JW (eds), Special Issue of Radiation Protection Dosimetry 1997; 72:327-336.

Bailey WH, Su SH, Bracken TD, Kavet R. Summary and evaluation of guidelines for occupational exposure to power frequency electric and magnetic fields. Health Physics 1997; 73:433-453.

Bracken TD, Senior RS, Rankin RF, Bailey WH, Kavet R. Magnetic field exposures in the electric utility industry relevant to occupational guideline levels. Applied Occupational and Environmental Hygiene 1997; 12:756-768.

Blondin J-P, Nguyen D-H, Sbeghen J, Goulet D, Cardinal C, Maruvada P-S, Plante M, and Bailey WH. Human perception of electric fields and ion currents associated with high voltage DC transmission lines. Bioelectromagnetics 1996; 17:230-241.

Bailey WH, Charry JM. Acute exposure of rats to air ions: Effects on the regional concentration and utilization of serotonin in brain. Bioelectromagnetics 1987; 8:173-181.

Bailey WH, Charry JM. Measurement of neurotransmitter release and utilization in selected brain regions of rats exposed to dc electric fields and atmospheric space charge. Proceedings, 23rd Hanford Life Sciences Symposium, Interaction of Biological Systems with Static and ELF Electric and Magnetic Fields, 1987.

Pavildes C, Aoki C, Chen J-S, Bailey WH, Winson J. Differential glucose utilization in the parafascicular region during slow-wave sleep, the still-alert state and locomotion. Brain Research 1987; 423:399-402.

Bailey WH, Charry JM. Behavioral monitoring of rats during exposure to air ions and DC electric fields. *Bioelectromagnetics* 1986; 7:329-339.

Charry JM, Shapiro MH, Bailey WH, Weiss JM. Ion-exposure chambers for small animals. *Bioelectromagnetics* 1986; 7:1-11.

Charry JM, Bailey WH. Regional turnover of norepinephrine and dopamine in rat brain following acute exposure to air ions. *Bioelectromagnetics* 1985; 6:415-425.

Bracken TD, Bailey WH, Charry JM. Evaluation of the DC electrical environment in proximity to VDTs. *Journal of Environmental Science and Health Part A* 1985; 20:745-780.

Gross SS, Levi R, Bailey WH, Chenouda AA. Histamine modulation of cardiac sympathetic responses: A physiological role. *Federation Proceedings* 1984; 43:458.

Gross SS, Guo ZG, Levi R, Bailey WH, Chenouda AA. 1984. Release of histamine by sympathetic nerve stimulation in the guinea pig heart and modulation of adrenergic responses. *Circulation Research* 1984; 54:516-526.

Dahl D, Bailey WH, Winson J. Effect of norepinephrine depletion of hippocampus on neuronal transmission from perforant pathway through dentate gyrus. *Journal of Neurophysiology* 1983; 49:123-135.

Guo ZG, Gross SS, Levi R, Bailey WH. Histamine: Modulation of norepinephrine release from sympathetic nerves in guinea pig heart. *Federation Proceedings* 1983; 42:907.

Bailey WH. Biological effects of air ions on serotonin metabolism: Fact and fancy. pp. 90-120. In: *Conference on Environmental Ions and Related Biological Effects*. Charry JM (ed), American Institute of Medical Climatology, Philadelphia, PA, 1982.

Weiss JM, Goodman PA, Losito BG, Corrigan S, Charry JM, Bailey WH. Behavioral depression produced by an uncontrollable stressor: Relationship to norepinephrine, dopamine, and serotonin levels in various regions of rat brain. *Brain Research Reviews* 1981; 3:167-205.

Bailey WH. Ion-exchange chromatography of creatine kinase isoenzymes: A method with improved specificity and sensitivity. *Biochemical Medicine* 1980; 24:300-313.

Bailey WH, Weiss JM. Evaluation of a 'memory deficit' in vasopressin-deficient rats. *Brain Research* 1979; 162:174-178.

Bailey WH, Weiss JM. Effect of ACTH 4-10 on passive avoidance of rats lacking vasopressin (Brattleboro strain). *Hormones and Behavior* 1978; 10:22-29.

Pohorecky LA, Newman B, Sun J, Bailey WH. Acute and chronic ethanol injection and serotonin metabolism in rat brain. *Journal of Pharmacology and Experimental Therapeutics* 1978; 204:424-432.

Koh SD, Vernon M, Bailey WH. Free-recall learning of word lists by prelingual deaf subjects. *Journal of Verbal Learning and Verbal Behavior* 1971; 10:542-574.

## **Book Chapters**

Cotts B, Graf K, Bailey WH, Murphy P. Electromagnetic interference considerations for electrical power systems. In *The Power Grid: Smart, Secure, Green and Reliable*. D'Andrade B (ed), Academic Press, New York, NY 2017 (in press).

Bailey WH. Principles of risk assessment and their limitations. In: Risk Perception, Risk Communication and its Application to EMF Exposure. Matthes R, Bernhardt JH, Repacholi MH (eds), International Commission on Non-Ionizing Radiation Protection, Oberschleisheim, Germany, 1998.

Bailey WH. Biological responses to air ions: Is there a role for serotonin? pp. 151-160. In: Air Ions: Physical and Biological Aspects. Charry JM and Kavet R (eds). CRC Press, Boca Raton, FL, 1987.

Weiss JM, Bailey WH, Goodman PA, Hoffman LJ, Ambrose MJ, Salman S, Charry JM. A model for neurochemical study of depression. pp. 195-223. In: Behavioral Models and the Analysis of Drug Action. Spiegelstein MY, Levy A (eds), Elsevier Scientific, Amsterdam, 1982.

Bailey WH. Mnemonic significance of neurohypophyseal peptides. pp. 787-804. In: Changing Concepts of the Nervous System. Morrison AR, Strick PL (eds), Academic Press, New York, NY, 1981.

Bailey WH, Weiss, JM. Avoidance conditioning and endocrine function in Brattleboro rats. pp 371-395. In: Endogenous Peptides and Learning and Memory Process. Martinez JL, Jensen RA, Messing RB, Rigter H, McGaugh JL (eds), Academic Press, New York, NY, 1981.

Weiss JM, Glazer H, Pohorecky LA, Bailey WH, Schneider L. Coping behavior and stress-induced behavioral depression: Studies of the role of brain catecholamines. pp. 125-160. In: The Psychobiology of the Depressive Disorders: Implications for the Effects of Stress. Depue R (ed), Academic Press, New York, NY, 1979.

## **Technical Reports**

Normandeau, Exponent, Tricas T, Gill A. Effects of EMFs from undersea power cables on elasmobranchs and other marine species. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Regulation, and Enforcement, Pacific OCS Region, Camarillo, CA. OCS Study BOEMRE 2011-09, May 2011.

Jardini JA, et al. Electric field and ion current environment of HVDC overhead transmission lines. Report of Joint Working Group B4/C3/B2.50, CIGRÉ, August 2011.

Johnson GB, Bracken TD, Bailey WH. Charging and transport of aerosols near AC transmission lines: A literature review. EPRI, Palo Alto, CA, 2003.

Bailey WH. Probabilistic approach to ranking sources of uncertainty in ELF magnetic-field exposure limits. In: Evaluation of Occupational Magnetic Exposure Guidelines, Interim Report, EPRI Report TR-111501, 1998.

Bracken TD, Bailey WH, Su SH, Senior RS, Rankin RF. Evaluation of occupational magnetic-field exposure guidelines; Interim Report. EPRI Report TR-108113, 1997.

Bailey WH, Weil DE, Stewart JR. HVDC Power Transmission Environmental Issues Review. Oak Ridge National Laboratory, Oak Ridge, TN, 1996.

Bailey WH. Melatonin responses to EMF. Proceedings, Health Implications of EMF Neural Effects Workshop, Report TR-104327s, EPRI, 1994.

Bailey WH. Recent neurobiological and behavioral research: Overview of the New York State powerlines project. In: Power-Frequency Electric and Magnetic Field Research, EPRI, 1989.

Bailey WH, Bissell M, Dorn CR, Hoppel WA, Sheppard AR, Stebbings, JH. Comments of the MEQB Science Advisors on Electrical Environment Outside the Right of Way of CU-TR-1, Report 5. Science Advisor Reports to the Minnesota Environmental Quality Board, 1986.

Bailey WH, Bissell M, Brambl RM, Dorn CR, Hoppel WA, Sheppard AR, Stebbings JH. A health and safety evaluation of the +/- 400 KV powerline. Science Advisor's Report to the Minnesota Environmental Quality Board, 1982.

Charry JM, Bailey WH, Weiss JM. Critical annotated bibliographical review of air ion effects on biology and behavior. Rockefeller University, New York, NY, 1982.

Bailey WH. Avoidance behavior in rats with hereditary hypothalamic diabetes insipidus. Dissertation, City University of New York, 1975.

### **Invited Presentations**

Bailey WH. Thresholds for peripheral nerve stimulation by ELF magnetic fields in humans. Presentation at Bundesamt für Strahlenschutz Workshop on Action and Perception Thresholds of Static and ELF Magnetic and Electric Fields and Contact Currents in Humans, Munich, Germany, October 26-27, 2016.

Bailey WH. Update on scientific developments regarding extremely low frequency and radiofrequency fields and health. Committee on Man and Radiation (COMAR) of the IEEE Engineering in Medicine and Biology Society, January 11, 2016.

Bailey WH. Measurements of charged aerosols around DC transmission lines and other locations. International Committee on Electromagnetic Safety TC95/ Subcommittee 3: Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0 - 3 kHz, December 2011.

Bailey WH, Erdreich LS. Human sensitivity and variability in response to electromagnetic fields: Implications for standard setting. International Workshop on EMF Dosimetry and Biophysical Aspects Relevant to Setting Exposure Guidelines. International Commission on Non-Ionizing Radiation Protection, Berlin, March 2006.

Bailey WH. Research-based approach to setting electric and magnetic field exposure guidelines (0-3000 Hz). IEEE Committee on Electromagnetic Safety, December 2005.

Bailey WH. Conference Keynote Presentation. Research supporting 50/60 Hz electric and magnetic field exposure guidelines. Canadian Radiation Protection Association, Annual Conference, Winnipeg, June 2005.

Bailey WH. Scientific methodology for assessing public health issues: A case study of EMF. Canadian Radiation Protection Association, Annual Conference, Public Information for Teachers, Winnipeg, June 2005.

Bailey WH. Assessment of potential environmental effects of electromagnetic fields from submarine cables. Connecticut Academy of Science and Engineering, Long Island Sound Bottomlands Symposium: Study of Benthic Habitats, July 2004.

De Santo RS, Coe M, Bailey WH. Environmental justice assessment and the use of GIS tools and methods. National Association of Environmental Professionals, 27th Annual Conference, Dearborn, MI, June 2002.

Bailey WH. Applications to enhance safety: Research to understand and control potential risks. Human Factors and Safety Research, Volpe National Transportation Systems Center/Dutch Ministry of Transport, Cambridge, MA, November 2000.

Bailey WH. EMF health effects review. EMF Exposure Guideline Workshop, Brussels Belgium, June 2000.

Bailey WH. Dealing with uncertainty when formulating guidelines. EMF Exposure Guideline Workshop, Brussels Belgium, June 2000.

Bailey WH. Field parameters: Policy implications. EMF Engineering Review Symposium, Status and Summary of EMF Engineering Research, Charleston, SC, April 1998.

Bailey WH. Principles of risk assessment: Application to current issues. Symposium on EMF Risk Perception and Communication, World Health Organization, Ottawa, Canada, August 1998.

Bailey WH. Current guidelines for occupational exposure to power frequency magnetic fields. EPRI EMF Seminar, New Research Horizons, March 1997.

Bailey WH. Methods to assess potential health risks of cell telephone electromagnetic fields. IBC Conference — Cell Telephones: Is there a Health Risk? Washington, DC, June 1997.

Bailey WH. Principles of risk assessment and their limitations. Symposium on Risk Perception, Risk Communication and its Application to EMF Exposure, International Commission on Non-Ionizing Radiation Protection, Vienna, Austria, October 1997.

Bailey WH. Probabilistic approach for setting guidelines to limit induction effects. IEEE Standards Coordinating Committee 28: Non-Ionizing Radiation, Subcommittee 3 (0-3 kHz), June 1997.

Bailey WH. Power frequency field exposure guidelines. IEEE Standards Coordinating Committee 28: Non-Ionizing Radiation, Subcommittee 3 (0-3 kHz), June 1996.

Bailey WH. Epidemiology and experimental studies. American Industrial Hygiene Conference, Washington, DC, May 1996.

Bailey WH. Review of 60 Hz epidemiology studies. EMF Workshop, Canadian Radiation Protection Association, Ontario, Canada, June 1993.

Bailey WH. Biological and health research on electric and magnetic fields. American Industrial Hygiene Association, Fredrickton, New Brunswick, Canada, October 1992.

Bailey WH. Electromagnetic fields and health. Institute of Electrical and Electronics Engineers, Bethlehem, PA, January 1992.

Bailey WH, Weiss JM. Psychological factors in experimental heart pathology. Visiting Scholar Presentation, National Heart Lung and Blood Institute, Bethesda, MD, March 1977.

## **Presentations**

Williams AI, Bailey WH. Toxicologic assessment of air ion exposures in laboratory animals. Poster presentation at 53rd Annual Meeting of the Society of Toxicology, Phoenix, AZ, March 26, 2014.

Perez V, Alexander DD, Bailey WH. Air ions and mood outcomes: A review and meta-analysis. Poster presentation at the American College of Epidemiology, Chicago, IL, September 8-11, 2012.

Shkolnikov Y, Bailey WH. Electromagnetic interference and exposure from household wireless networks. Product Safety Engineering Society Meeting, San Diego, CA, October 2011.

Nestler E, Trichas T, Pembroke A, Bailey W. Will undersea power cables from offshore wind projects affect sharks? North American Offshore Wind Conference & Exhibition, Atlantic City, NJ, October 2010.

Nestler E, Pembroke A, Bailey W. Effects of EMFs from undersea power lines on marine species. Energy Ocean International, Ft. Lauderdale, FL, June 2010.

Pembroke A, Bailey W. Effects of EMFs from undersea power cables on elasmobranchs and other marine species. Windpower 2010 Conference and Exhibition, Dallas, TX, 2010.

Bailey WH. Clarifying the neurological basis for ELF guidelines. Workshop on Practical Implementation of ELF and RF Guidelines. The Bioelectromagnetics Society 29th Annual Meeting, Kanazawa, Japan, June 2007.

Sun B, Urban B, Bailey W. AERMOD simulation of near-field dispersion of natural gas plume from accidental pipeline rupture. Air and Waste Management Association: Health Environments: Rebirth and Renewal, New Orleans, LA, June 2006.

Bailey WH, Johnson G, Bracken TD. Method for measuring charge on aerosol particles near AC transmission lines. Joint Meeting of The Bioelectromagnetics Society and The European BioElectromagnetics Association, Dublin Ireland, June 2005.

Bailey WH, Bracken TD, Senior RS. Long-term monitoring of static electric field and space charge near AC transmission Lines. The Bioelectromagnetics Society, 26th Annual Meeting, Washington, DC, June 2004.

Bailey WH, Erdreich L, Waller L, Mariano K. Childhood leukemia in relation to 25-Hz and 60-Hz magnetic fields along the Washington DC — Boston rail line. Society for Epidemiologic Research, 35th Annual Meeting, Palm Desert CA, June 2002. American Journal of Epidemiology 2002; 155:S38.

Erdreich L, Klauenberg BJ, Bailey WH, Murphy MR. Comparing radiofrequency standards around the world. Health Physics Society 43rd Annual Meeting, Minneapolis, MN, July 1998.

Bracken TD, Senior RS, Rankin RF, Bailey WH, Kavet R. Relevance of occupational guidelines to utility worker magnetic-field exposures. Second World Congress for Electricity and Magnetism in Biology and Medicine, Bologna, Italy, June 1997.

Weil DE, Erdreich LS, Bailey WH. Are 60-Hz magnetic fields cancer causing agents? Mechanisms and Prevention of Environmentally Caused Cancers, The Lovelace Institutes 1995 Annual Symposium, La Fonda, Santa Fe, NM, October 1995.

Bailey WH. Neurobiological research on extremely-low-frequency electric and magnetic fields: A review to guide future research. Sixteenth Annual Meeting of the Bioelectromagnetics Society, Copenhagen, Denmark, June 1994.

Blondin J-P, Nguyen D-H, Sbeghen J, Maruvada PS, Plante M, Bailey WH, Goulet D. The perception of DC electric fields and ion currents in human observers. Annual Meeting of the Canadian Psychological Association, Penticton, British Columbia, Canada, June 1994.

Erdreich LS, Bailey WH, Weil DE. Science, standards and public policy challenges for ELF fields. American Public Health Association 122nd Annual Meeting, Washington, DC, October 1994.

Bailey WH, Charry JM. Particle deposition on simulated VDT operators: Influence of DC electric fields. 10th Annual Meeting of the Bioelectromagnetics Society, June 1988.

Charry JM, Bailey WH. Contribution of charge on VDTs and simulated VDT operators to DC electric fields at facial surfaces. 10th Annual Meeting of the Bioelectromagnetics Society, June 1988.

Bailey WH, Charry, JM. Dosimetric response of rats to small air ions: Importance of relative humidity.

EPRI/DOE Contractors Review, November 1986. Charry JM, Bailey WH, Bracken TD (eds). DC electric fields, air ions and respirable particulate levels in proximity to VDTs. International Conference on VDTs and Health, Stockholm, Sweden, June 12-15 1986.

Charry JM, Bailey WH. Air ion and DC field strengths at 104 ions/cm<sup>3</sup> in the Rockefeller University Small Animal Exposure Chambers. EPRI/DOE Contractors Review, November 1985.

Charry JM, Bailey WH. DC Electrical environment in proximity to VDTs. 7th Annual Meeting of the Bioelectromagnetics Society, June 1985.

Bailey WH, Collins RL, Lahita RG. Cerebral lateralization: Association with serum antibodies to DNA in selected bred mouse lines. Society for Neuroscience, 1985.

Kavet R, Bailey WH, Charry JM. Respiratory neuroendocrine cells: A plausible site for air ion effects. Seventh Annual Meeting of The Bioelectromagnetics Society, June 1985.

Bailey WH, Charry JM. Measurement of neurotransmitter release and utilization in selected brain regions of rats exposed to DC electric fields and atmospheric space charge. 23rd Hanford Life Sciences Symposium, Richland, WA, October 1984.

Bailey WH, Charry JM, Weiss JM, Cardle K, Shapiro M. Regional analysis of biogenic amine turnover in rat brain after exposure to electrically charged air molecules (air ions). Society for Neuroscience, 1983.

Bailey WH. Biological effects of air ions: Fact and fancy. American Institute of Medical Climatology Conference on Environmental Ions and Related Biological Effects, October 1982.

Goodman PA, Weiss JM, Hoffman LJ, Ambrose MJ, Bailey WH, Charry, JM. Reversal of behavioral depression by infusion of an A2 adrenergic agonist into the locus coeruleus. Society for Neuroscience, November 1982.

Charry JM, Bailey WH. Biochemical and behavioral effects of small air ions. Electric Power Research Institute Workshop, April 1981.

Bailey WH, Alonson DR, Weiss JM, Chin S. Predictability: A psychologic/ behavioral variable affecting stress-induced myocardial pathology in the rat. Society for Neuroscience, November 1980.

Salman SL, Weiss JM, Bailey WH, Joh TH. Relationship between endogenous brain tyrosine hydroxylase and social behavior of rats. Society of Neuroscience, November 1980.

Bailey WH, Maclusky S. Appearance of creatine kinase isoenzymes in rat plasma following myocardial injury produced by isoproterenol. Fed Assoc Soc Exp Biol, April 1978.

Bailey WH, Maclusky S. Appearance of creatine kinase isoenzymes in rat plasma following myocardial injury by isoproterenol. Fed Proc 1978; 37:889.

Bailey WH, Weiss JM. Effect of ACTH 4-10 on passive avoidance of rats lacking vasopressin (Brattleboro strain). Eastern Psychological Association, April 1976.

## Advisory Appointments

National Institute of Environmental Health Sciences, National Toxicology Program, Participation in research study to update Level of Concern categories to better integrate evidence for toxicity and extent of human exposure, 2017

Bundesamt für Strahlenschutz - Federal Office for Radiation Protection. Summarize recent research and

recommend research direction on magnetic field stimulation of peripheral nerves, 2016

Federal Office for Radiation Protection - Germany, Technical input to assessment of static and ELF exposures to public from updating national transmission network, 2016

RWTH Aachen University. Workshop on human perception thresholds in static electric fields from high-voltage direct current (HVDC) transmission lines, 2015

ZonMw - Netherlands Organization for Health Research and Development, 2012; 2007-2008, reviewer for National Programme on EMF and Health

US Bureau of Ocean Energy Management, Regulation and Enforcement, 2009-2010

Canadian National Collaborating Centre for Environmental Health, reviewer of Centre reports, 2008

Island Regulatory and Appeals Commission, province of Prince Edward Island, Canada, 2008

National Institute of Environmental Health Sciences/ National Institutes of Health, Review Committee, Neurotoxicology, Superfund Hazardous Substances Basic Research and Training Program, 2004

National Institute of Environmental Health Sciences, Review Committee Role of Air Pollutants in Cardiovascular Disease, 2004

Working Group on Non-Ionizing Radiation, Static and Extremely Low-Frequency Electromagnetic Fields, International Agency for Research on Cancer, 2000-2002

Working Group, EMF Risk Perception and Communication, World Health Organization, 1998-2005

Member, International Committee on Electromagnetic Safety, Subcommittee 3 - Safety Levels with Respect to Human Exposure to Fields (0 to 3 kHz) and Subcommittee 4 - Safety Levels with Respect to Human Exposure (3kHz to 3GHz), Institute of Electrical and Electronics Engineers (IEEE), 1996-present

Invited participant, National Institute of Environmental Health Sciences, EMF Science Review Symposium: Clinical and In Vivo Laboratory Findings, 1998

Working Group, EMF Risk Perception and Communication, International Commission on Non-Ionizing Radiation Protection, 1997

U.S. Department of Energy, RAPID EMF Engineering Review, 1997

Oak Ridge National Laboratory, 1996

American Arbitration Association International Center for Dispute Resolution, 1995-1996

U.S. Department of Energy, 1995

National Institute for Occupational Safety and Health, 1994-1995

Federal Rail Administration, 1993-1996

U.S. Forest Service, 1993

New York State Department of Environmental Conservation, 1993

National Science Foundation



National Institutes of Health, Special Study Section — Electromagnetics, 1991-1993

Maryland Public Service Commission and Maryland Department of Natural Resources, Scientific Advisor on health issues pertaining to HVAC Transmission Lines, 1988-1989

Scientific advisor on biological aspects of electromagnetic fields, Electric Power Research Institute, Palo Alto, CA, 1985-1989

U.S. Public Health Service, NIMH: Psychopharmacology and Neuropsychology Review Committee, 1984

Consultant on biochemical analysis, Colgan Institute of Nutritional Science, Carlsbad, CA, 1982-1983

Behavioral Medicine Abstracts, Editor, animal behavior and physiology, 1981-1983

Consultant on biological and behavioral effects of high-voltage DC transmission lines, Vermont Department of Public Service, Montpelier, VT, 1981-1982

Scientific advisory committee on health and safety effects of a high-voltage DC transmission line, Minnesota Environmental Quality Board, St. Paul, MN, 1981-1982

Consultant on biochemical diagnostics, Biokinetix Corp., Stamford, CT, 1978-1980

### Editorships & Editorial Review Boards

Associate Editor, Non-Ionizing Radiation, Health Physics, 1996-present