ATXI Exhibit 17.0

ILLINOIS COMMERCE COMMISSION

DOCKET No. 12-0598

REBUTTAL TESTIMONY

OF

LINDA S. ERDREICH, Ph.D.
EXPONENT, INC.

Submitted On Behalf

Of

AMEREN TRANSMISSION COMPANY OF ILLINOIS

APRIL 26, 2013

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TABLE OF CONTENTS

Page No.

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I. INTRODUCTION

Q. Please introduce yourself.

A. My name is Linda S. Erdreich. I am a Senior Managing Scientist at Exponent, Inc. ("Exponent"), a scientific and engineering consulting firm. My business address is 420 Lexington Avenue, New York, New York 10170.

Q. What are your responsibilities at Exponent?

A. As a Senior Managing Scientist at Exponent, I work in the Health Sciences Practice in the Center for Epidemiology and Computational Biology, where we use scientific methods to examine complex questions about the causes and occurrence of disease in human populations. I manage research projects and assess scientific research, such as epidemiologic research on electric and magnetic fields ("EMF").

Q. Please describe your educational and professional credentials.

A. I earned my B.A. in biological sciences from Temple University, a Masters in Science Education from Temple University, a Masters in Biostatics and Epidemiology from the University of Oklahoma, and a Ph.D. in Epidemiology from the University of Oklahoma. For over 30 years, I have prepared and presented scientific research assessments on a variety of environmental exposures for public health agencies, other scientists, private companies, local government entities such as planning and zoning boards, and the general public. After earning my Ph.D. in Epidemiology, I worked for 7 years in the U.S. Environmental Protection Agency's Office of Research and Development. My work involved health risk assessments and research on methods to determine exposure limits for chemicals in order to protect human health. These methods have been applied to develop standards for water quality in the United States. Since that time, I have been working as an independent scientific researcher, consultant, and teacher. I have published papers in peer-reviewed scientific journals, and I have prepared book chapters and technical reports. I routinely serve as a reviewer for scientific journals that publish research papers in epidemiology and in electromagnetic energy. Additional information on my education, publications, and memberships are described in my resume appended to this testimony (Appendix I).

Q. On whose behalf are you presenting this testimony?

A. I am sponsoring rebuttal testimony on behalf of Ameren Transmission Company of Illinois ("ATXI").

Q. What is the purpose of your rebuttal testimony?

A. I have been asked to render an opinion concerning whether the extremely low frequency ("ELF") EMF that would be produced by the proposed Illinois Rivers Project's (the "Project")

345 kilovolt ("kV") transmission lines (the "Project") would pose a health hazard to the public. As I explain below, health agencies and scientific organizations are in general agreement that the extensive research to date does not demonstrate that exposure to ELF EMF from power lines causes adverse health effects. My failure to address any witnesses' testimony or position should not be construed as an endorsement of same.

Q. In preparing your rebuttal testimony, did you review any direct testimony filed by Intervenors in this proceeding that discussed EMF?

A. Yes. I reviewed specifically the direct testimony of Intervenors that expressed concern about the effect of EMF exposure on human and animal health.

Q. Does your rebuttal testimony address concerns raised by other Intervenors about the effect of EMF exposure on electrical/mechanical equipment?

A. No. My expert testimony is limited to the effect of EMF exposure on human and animal health.

II. THE NATURE AND SOURCES OF ELF EMF

Q. What is EMF?

A. In the context of this discussion, EMF refers specifically to ELF EMF at a frequency of 60 Hertz ("Hz"), commonly called power frequency EMF, which is found wherever electricity is generated, delivered, or used. Power lines are the primary source of EMF outdoors. Sources of EMF indoors include wiring inside buildings, electrical appliances, electronic devices, and workplace equipment.

Q. How are EMF levels measured?

A. Electric fields are measured in units of kilovolts per meter (kV/m). Magnetic fields are measured in milligauss (mG).

Q. Is EMF something people encounter in everyday life?

A. Yes. Most people encounter magnetic fields over a wide range of values throughout the day, but exposure to high levels are usually shorter, so that the daily average of these exposures is approximately 1 mG (Zaffanella, 1998). For example, a hair dryer may expose the user to a few hundred mG at 6 inches for the time it is used. One foot from a dishwasher, microwave oven, or electric range may measure from a few to 200 mG, depending on the item, and at that distance fields from clocks and lights may be a few milligauss or not detectable. (NIEHS, 2002),

Q. Does the level of exposure to electric or magnetic fields vary with the proximity to the source?

A. Yes. Whatever the source, the strength of both electric fields and magnetic fields diminishes quickly with distance from that source. There are differences between electric and magnetic fields related to potential exposure:

Electric fields are easily blocked by most objects such as buildings, walls, trees, and fences. As a result, the major indoor sources of electric fields are the many appliances and equipment we use within our homes and workplaces.

Magnetic fields, unlike electric fields, are not easily blocked by objects. While higher magnetic-field levels are measured near distribution and transmission lines, the distance of most buildings from a power line's right-of-way ("ROW") reduces the effect of these sources, since the intensity of magnetic fields diminishes quickly with distance from the source. The strongest sources of magnetic fields encountered indoors are from common household electrical appliances and electronic equipment (e.g., refrigerators, vacuum

cleaners, lamps, televisions, computers, hair dryers, etc.), as well as from electrical wiring.

Q. Is it accurate to refer to power frequency EMF as "radiation"?

A. Not really. In the context of power frequency EMF, the term "radiation" is misleading to most people who are not physicists. To most non-scientists, 'radiation' is associated with the radiation produced by x-rays and nuclear material, which is only one part of the electromagnetic spectrum. There are many different forms of electromagnetic energy, each of which has different characteristics based on their frequency and wavelength. The types of electromagnetic energy range from that with low frequencies and long wavelengths (e.g., the static fields of the earth and atmosphere, power frequency EMF, radio waves, and infrared light) to electromagnetic energy with high frequencies and short wavelengths (e.g., ultraviolet light, x-rays, and gamma rays). The frequency and wavelength of electromagnetic energy is a key factor in its interaction with living things.

Electromagnetic energy with high frequencies and short wavelengths is ionizing radiation, and this is the type of electromagnetic energy that many non-scientists generally associate with the term 'radiation.' Ionizing radiation carries enough energy to break chemical bonds and therefore has the potential to cause cellular and DNA damage. Power frequency EMF, along with other energy with low frequencies and long wavelengths, on the other hand, is non-ionizing radiation. Non-ionizing radiation does not carry enough energy to cause cellular or DNA damage (NIEHS, 2002).[1]

[1] This information also is currently provided on the National Institute of Environmental Health Sciences website (http://www.niehs.nih.gov/health/topics/agents/emf/).

Q. Is EMF the same as "stray voltage"?

A. No. While stray voltage occurs due to electricity, it is not related to EMF from transmission lines or from any other source. Stray voltage, also known as "tingle voltage" or "contact current," is defined as a small voltage (less than 10 Volts), measured between two objects that can be simultaneously contacted by an animal in a confinement area. Upon contact, small current flows through the animal, but exposure can only occur if both contact points are touched by the animal at the same time. Stray voltage can arise from a farm's electrical system or the distribution system that is supplying electricity to the farm.

Q. Are electric transmission lines a source of stray voltage?

A. No. A transmission line is not a source of stray voltage, since it only connects to electrical substations at each end of the line, and is not connected directly to customers' electrical systems.

Q. Are there any laws in the United States to limit public exposure to power frequency EMF?

A. There are no federal or state statutes for limiting public exposure to power frequency EMF based on health effects. A numbers of states have enacted limits for magnetic-field levels at the edges of a transmission line's ROW (e.g., 150 mG in Florida and 200 mG in New York), but the basis for these standards is to maintain the *status quo* so that fields from new transmission lines are no higher than those produced by existing transmission lines.

Q. Has the scientific community developed recommendations for acceptable levels of exposure to power frequency EMF?

A. Yes. The International Commission on Non-Ionizing Radiation Protection ("ICNIRP") and the International Committee for Electromagnetic Safety ("ICES"), have provided guideline limits for exposure of both the general public and for occupational exposure. These guidelines for exposure to EMF are based on acute, short-term health effects that can occur at very high field levels, and based on the lack of convincing evidence for long term effects. NIRP recommends screening values for magnetic fields of 2,000 milligauss (mG) for the general public and 4,200 mG for workers (ICNIRP, 2010). The ICES recommends a screening value for magnetic fields of 9,040 mG for the general public and 4,200 mG for workers (ICES, 2002). These organizations also have set screening values for exposure to electric fields—ICNIRP at 4.2 kilovolts per meter (kV/m) for the general public and 8.3 kV/m for workers and ICES at 5 kV/m for the general public and 20 kV/m for workers.

Q. How do the EMF levels associated with the Project compare to these levels?

A. Ameren's engineers have predicted that the magnetic-field level at the edge of the ROW will be 18 mG, which is less than 1% of the ICNIRP recommended exposure limit for the general public. The electric field at the edge of the ROW will be 1 kV/m, which is less that 25% of the ICNIRP's recommended limits for electric-field levels. Because both types of fields decrease with distance from the source, levels further from the right of way will be even lower.

III. EMF RESEARCH AND FINDINGS

Q. Are you familiar with the scientific research of ELF EMF exposure?

A. Yes. Considerable scientific research has been conducted over the past thirty years to understand the potential health effects associated with exposure to ELF EMF. Generally, studies of EMF and health outcomes have focused on magnetic fields. This research has been evaluated in weight-of-evidence reviews by numerous national and international health and scientific agencies. The types of studies considered in weight-of-evidence reviews falls into three categories—epidemiology research, laboratory research of whole animals (*in vivo*), and laboratory research of cells and tissues (*in vitro*). The differences in these studies may be explained as follows:

- Epidemiology research is observational. Data is collected by scientists about human populations observed in their day-to-day environments to determine if there are patterns between a particular exposure and biological indicators of disease. Epidemiology studies measure statistical associations to evaluate whether an exposure and disease occurs together more often than would be expected by chance.
- Laboratory studies of animals (*in vivo*) are conducted by scientists to expose an animal to the substance in question under controlled conditions, usually at levels significantly greater than the levels at which people would be exposed, and generally for the entire lifetime of the animal.
- Laboratory studies in cellular systems (*in vitro*) are conducted by scientist to understand biological processes that might be affected by an exposure.

As I discuss in more detail below, various national and international health organizations have convened multidisciplinary scientific expert panels to conduct weight-of-evidence

assessments of the available research. Is it possible to draw broad conclusions about EMF based on a single study?

A. No. To understand the potential health effects of ELF EMF, one cannot consider the results of a single study in isolation because different studies provide different information, depending on the type of study and its design. Rather, the results of all this research must be evaluated together in a weight-of-evidence assessment, taking into consideration the strengths and weaknesses of the different studies, their results, and whether the findings are replicated in multiple studies and in multiple laboratories (for *in vivo* and *in vitro studies*) and that results are consistent across the different types of research available.

Q. Are you familiar with a 1999 report by the National Institute of Environmental Health Services, which is part of the National Institutes of Health, concerning EMF?

A. Yes. The National Institute of Environmental Health Services ("NIEHS") produced a report in 1999 entitled *Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields.* The remainder of my testimony will refer to this report as the 1999 NIEHS Report.

Q. What did the 1999 NIEHS report conclude?

A. The *NIEHS Report* was based on a comprehensive review of the research studies prepared by a Working Group of 30 international scientists who used standard scientific methods for evaluating research about the health impacts of EMF (NIEHS, 1998). Their work reflects the review of nearly 1000 research studies. The NIEHS "Recommended Actions" based on the ***entire body*** of research evaluated in their weight of evidence review was as follows:

> The NIEHS suggests that the level and strength of evidence supporting ELF-EMF exposure as a human health hazard are insufficient to warrant aggressive regulatory actions; thus, we do not recommend actions such as stringent standards on electric appliances and a national program to bury all transmission and distribution lines (NIEHS 1999, p 37).

Q. The NIEHS Report was issued 14 years ago. Are the conclusions and recommendations of that report still relevant today?

A. Yes. The scientific review conducted by the NIEHS is widely respected for its scientific methodology and the depth and breadth of the Working Panel's expertise. Scientific research, however, is a process that builds and develops information over time, so an evaluation of recent research is particularly important for reducing the uncertainty as to whether there are or are not effects from the exposure of interest. So, the only limitation of the NIEHS review is that the review is not the "last word," simply because a large body of research since its publication has provided additional relevant information. The considerable amount of research conducted over the past 15 years about long-term health risks should be considered to ascertain whether health risks have been documented, or that earlier uncertainties have been clarified.

Q. Have other agencies that have looked at EMF since 1999 reached the same conclusions as NIEHS?

A. Yes. Considerable research has been published since 1999. Some of the organizations that have prepared reviews of the research include: the International Agency for Research on Cancer ("IARC") in 2002, the National Radiological Protection Board ("NRPB") of Great Britain in 2004,[2] the World Health Organization ("WHO") in 2007, the European Union's

[2] In 2005, the NRPB was merged into the Health Protection Agency of the United Kingdom.

Scientific Committee on Emerging and Newly Identified Health Risks ("SCENIHR") and the Health Council of the Netherlands ("HCN"), and the International Commission on Non-Ionizing Radiation Protection ("ICNIRP"), the European Health Risk Assessment Network on Electromagnetic Field Exposure ("EFHRAN"), and the Swedish Radiation Safety Authority ("SSM) in 2010. The most comprehensive and detailed of these reviews was that conducted by the WHO in 2007.

Q. What did WHO conclude based on its 2007 review?

A. The WHO review provided the following recommendation similar to the recommendation of the NIEHS noted previously:

> Given the weakness of the evidence for a link between exposure to ELF magnetic fields and childhood leukaemia and the limited potential impact on public health, the benefits of exposure reduction on health are unclear and thus the cost of reducing exposure should be very low (WHO, 2007, p. 372).

Q. Is there a consensus among the organizations you just identified concerning the health effects of power frequency EMF?

A. Yes. The scientific consensus among these various expert panels is that the available evidence does not support the conclusion that exposure to ELF EMF is a cause of any adverse health effects in adults or children at the levels found in the ordinary public environment. These reviews are readily available at the websites for these organizations. In addition, many of these organizations have published short summaries of their research for the general public (Appendix II).

Q. Has EMF research shown that exposure can cause cancer?

A. No. The NIEHS Working Group concluded from their evaluation of epidemiology studies, experimental animal studies (*in vivo*) and cellular studies of mechanism that the epidemiology studies provided weak support (i.e., limited evidence) for an association between childhood leukemia and average residential magnetic field intensities of less than 4 milligauss ("mG").

Subsequent reviews by the IARC and the WHO evaluated additional published research and also judged the epidemiologic research as limited. These groups also concluded that the *in vivo* data were "inadequate" to support a risk of cancer (IARC, 2002; WHO, 2007). Overall, the IARC and the WHO categorized ELF magnetic fields as "possibly carcinogenic to humans" based on the statistical association of higher than average residential magnetic fields (i.e., $\geq$ 3-4 mG) and childhood leukemia, and based on the lack of laboratory support for cancer.

No organization that has evaluated the research using a scientifically validated weight of evidence process, however, has determined that EMF is a "probable carcinogen" or "known carcinogen." Scientific organizations and health agencies that have conducted comprehensive reviews of the research have not concluded that either electric fields or magnetic fields from transmission lines (or other sources) pose long term health risks, cause cancer, or have adverse reproductive effects. None of these scientific organizations or health agencies has recommended routing lines away from homes based on minimizing potential long-term health exposure (NRPB, 2004; WHO, 2007; SCENIHR, 2009; EFHRAN, 2010; ICNIRP 2010).

The largest and most recent study of adult cancer in relation to transmission lines did not report an association between any types of cancer that had been suggested as related to EMF exposure in the NIEHS 1999 review. Based on comparisons of thousands of cases (for example,

7823 cases of leukemia and 6781 cases of brain cancer) with controls, no statistical associations were found with distance from power lines or estimated magnetic fields (Elliott et al., 2013).

Q. What is the difference between a "possible," "probable" and "known" carcinogen?

A. To help put the classification into perspective, it is helpful to understand the IARC's classification scheme. A rating of "limited evidence" for epidemiology studies requires that the IARC categorize a particular exposure as a "possible carcinogen," even without evidence from laboratory studies that the exposure might pose a cancer risk, as is the case for EMF. Classification as a "possible carcinogen" is below classification of "probable carcinogen" and of course below the group of "known carcinogens." For perspective, the classification as a "possible carcinogen" puts ELF magnetic field exposure in the same cancer classification category as coffee, gasoline engine exhaust, and pickled vegetables.

Q. Does it seem likely that the public along either the Proposed or Alternate Routes would have prolonged exposure to ELF EMF at levels above that commonly encountered in homes, schools, and offices?

A. No, it is unlikely that the public located along either the Proposed or Alternate Routes would have prolonged exposure to ELF EMF at levels above those that are commonly encountered in residential settings. In general, ELF EMF levels would be highest directly under the conductors, and would decrease exponentially with distance from the line. No home or other structures may be built within the ROW of the Project, where fields would be highest. Therefore, exposures to these ELF EMF levels would be of limited duration and intermittent; for example, when walking or driving near the ROW or when crossing the ROW. Further, the magnetic field levels at the edges of the ROW and beyond would be similar to those experienced

at or near other ELF EMF sources, such as the distribution lines that feed into our homes and the electrical appliances and electronics that we use daily.

IV. CONCLUSION

Q. Do you have an opinion, within a reasonable degree of scientific certainty, whether the levels of ELF EMF produced by the Project pose a health hazard to the public?

A. It is my opinion that the reviews of research about ELF EMF that have been published by national and international health and scientific agencies are in general agreement that exposures in the community do not cause adverse health effects. These reviews provide a sufficient and reliable basis to a reasonable degree of scientific certainty upon which to conclude that the ELF EMF levels associated with the Project would not pose a health hazard to the general public.

Q. Does this conclude your rebuttal testimony?

A. Yes, it does.

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Professional Profile

Dr. Linda S. Erdreich is a Senior Managing Scientist in Exponent's Health Sciences Center for Epidemiology, Biostatistics, and Computational Biology. Ms. Erdreich is an epidemiologist with 32 years of experience in environmental epidemiology and health risk assessment. She specializes in assessing epidemiological research and integrating this information with that from other disciplines for qualitative and quantitative risk assessments. She has prepared risk assessments for environmental and occupational chemicals, radiofrequency energy, electric and magnetic fields (EMF), and stray voltage. Dr. Erdreich has also prepared analyses of complex epidemiological evidence suitable for communication with interested parties of various backgrounds, including other scientists, executives, elected officials, and the general public. She has been particularly active in updating standards regarding non-ionizing radiation, both low frequencies (EMF) and radio frequencies. Dr. Erdreich has provided support to government agencies and private clients in health risk assessment and epidemiology.

Prior to joining Exponent, Dr. Erdreich was a Principal Scientist with Bailey Research Associates, where she specialized in epidemiologic research and analysis. Before that, Dr. Erdreich managed a research program in risk assessment at the U.S. Environmental Protection Agency and contributed to the development of risk assessment methods and guidelines. Dr. Erdreich has served on advisory committees to government, regulatory organizations, and industry regarding health risk assessments of chemicals and electromagnetic fields. Dr. Erdreich served as an adjunct associate professor at the Robert Wood Johnson Medical School in New Jersey.

Academic Credentials and Professional Honors

Ph.D., Epidemiology, University of Oklahoma, 1979
M.S., Biostatistics and Epidemiology, University of Oklahoma, 1977
M.Ed., Science Education, Temple University, 1968
B.A., Biological Sciences, Temple University, 1964

Fellow, American College of Epidemiology

U.S. Environmental Protection Agency: Special Achievement Award for Development of EPA's Proposed Risk Assessment Guidelines, 1984; Certificate of Achievement, Mentor: Research Apprenticeship Program, 1983; Special Achievement Award for Development of Methodologic Approaches to Risk Assessment Essential to the Agency, 1982

U.S. Public Health Service Traineeship, 1975–1979; Graduate Dean's Research Prize, University of Oklahoma, 1978

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Erdreich, L. Epidemiology: What it can tell you and what it can't? Short Course on Electromagnetic Energy. RF Safety: Science, Compliance and Communications. Co-sponsored by the Electromagnetic Energy Association and the Center for Environmental Radiation Toxicology of the University of Texas Health Sciences Center at San Antonio, San Antonio, TX, January 2000.

Erdreich L. What are the policy issues? Short Course on Electromagnetic Energy. RF Safety: Science, Compliance and Communications. Co-sponsored by the Electromagnetic Energy Association and the Center for Environmental Radiation Toxicology of the University of Texas Health Sciences Center at San Antonio, San Antonio, TX, January 2000.

Erdreich LS, Moulder JE. Cell phones and cancer: An update on the evidence for a connection. 1st International Medical Scientific Congress "Non-Ionizing High-Frequency EM Radiations: Researching the Epidemiological and Clinical Evidences" Sponsored by the University of L'Aquila and the Italian Society of Medical Statistics, Rome, Italy, November 1999.

Erdreich J, Erdreich LS. Human vibration standards: do we ask the right questions? 133rd Meeting of the Acoustical Society of America, Pennsylvania State University, State College, PA, June 1997.

Erdreich L. Epidemiologic studies of EMF. The EMF Regulation and Litigation Institute: Anticipating, Avoiding and Managing EMF Claims, Business Development Associates, Inc., Washington, DC, April 1996.

Erdreich L. Health issues and radiofrequency devices. Defining the role of local government: antennas, towers, and satellite dishes. Pace University School of Law, White Plains, NY, March 1996.

Erdreich L, Klauenberg BJ. Recent developments in non-cancer risk assessment and optimal use of radiofrequency data. Michaelson Research Conference, Colorado Springs, CO, August 1996.

Erdreich L. Overview of EMF epidemiological research; update. Electric and Magnetic Fields: Science and Policy Update, Sponsored by Northwestern University, University of Illinois, IIT Research Institute and Commonwealth Edison. Chicago, IL, October 1995.

Erdreich L. EMF and residential and occupational health risks. Conference on Electromagnetic Fields—Legal and Technical Update of the Bar of the City of New York and Society for Risk Analysis, September 1995.

Erdreich LS. The two newest studies: what questions should we ask? EMF Seminar: Focus on Research, Electric Power Research Institute, March 1994.

Erdreich LS. Epidemiology in developing exposure standards: science and policy roles. Electromagnetic Energy Association Annual Meeting and Symposium, May 1994.

Erdreich LS. Research: answers or more questions? 9th Annual Meeting and Symposium of the Electromagnetic Energy Policy Alliance, Alexandria, VA, May 1993.

Erdreich LS. EMF research: Summarizing the evidence. Symposium on Possible Health Effects of EMFs Associated with Electric Power Generation and Distribution. Iowa Academy of Science, Des Moines, IA, February 1992.

Erdreich LS. EMF health issues briefing. Residential and Small Commercial Services Seminar, Electric Council of New England, Manchester, NH, May 1991.

Erdreich LS. State policy options for managing extremely low frequency electromagnetic fields. Conference on Health Effects of High Voltage Power Lines, Center for Environmental Health, University of Connecticut, West Hartford, CT, June 1990.

Erdreich LS. Current public health issues in EMF. University of Oklahoma College of Public Health Alumni Day, Oklahoma City, OK, October 1989.

Thorslund T, Erdreich LS, Hegner R. Testing hypotheses of mechanism using epidemiologic data. Presented at the International Symposium on Chemical Mixtures: Risk Assessment and Management, Cincinnati, OH, June 1988.

Erdreich LS, Sonich C. Hypersusceptible subgroups of the population: determining numbers at risk. Presented at Satellite Meeting of the Environmental Mutagen Society, March 1983.

Prior Experience

Bailey Research Associates, Principal Scientist, 1991–1999
Environmental Research Information (ERI), Senior Research Associate, 1989–1991
Clement Associates, Senior Associate, 1987–1989
U.S. Environmental Protection Agency, Office of Research and Development, Methods Evaluation and Development Staff, Group Leader, 1984–1987
U.S. Environmental Protection Agency, Office of Research and Development, Environmental Criteria and Assessment Office, Senior Epidemiologist, 1980–1984

Current Academic Appointments

- Adjunct Associate Professor, Department of Environmental and Community Medicine, Robert Wood Johnson Medical School, University of Medicine & Dentistry of New Jersey, 1993–present

Teaching Appointments

- Lecturer, Short Course on Electromagnetic Energy: University of Texas Health Science Center, Center for Environmental Radiation Toxicology, San Antonio, Texas (1998, 2000
- Adjunct Assistant Professor, Institute of Environmental Health, University of Cincinnati Medical Center, 1982–1987
- Teaching Assistant, Department of Biostatistics and Epidemiology, University of Oklahoma School of Public Health, 1975–1979
- Teacher of Biology and Chemistry, Ann Arbor, MI; Philadelphia, PA; Montgomery County, MD, 1964–1972

Advisory Positions

- Institute of Electrical and Electronics Engineers (IEEE), 1992–present
  - Chair, Epidemiology Workgroup of Subcommittee 4 Safety Level with Respect to Human Exposure to Radiofrequency Fields (3 kHz–33 GHz), for the Standards Coordinating Committee 28 Non-Ionizing Radiation, 1992–2000
  - Member, Standards Coordinating Committee 28 Non-Ionizing Radiation, and Subcommittee 3 Safety Levels with Respect to Human Exposure (0-3 kHz), Institute of Electrical and Electronics Engineers (IEEE)
- Member of the Committee on Man and Radiation (COMAR) of the Engineering in Medicine and Biology Society, 1995–2000; 2002–2007; 2009-2012

- Chair of the Expert Panel to advise the Massachusetts Department of Public Health, Bureau of Environmental Health Assessment regarding radio-frequency exposure from the Air Force Space Command's PAVE PAWS radar system on Cape Cod, 1998–1999
- Member of a panel convened by Health Canada to review a toxicity assessment of a priority substance under the Canadian Environmental Protection Act (1,3-butadiene), 1998
- Served on peer review panels for risk assessments for chromium, cadmium, acrylamide, and for methylmercury, convened by Toxicology Excellence for Risk Assessment, a non-profit, 501(c)(3) corporation, 1997–1998
- Contributor to NATO Standardization Agreement: Evaluation and Control of Personnel Exposure to Radio-Frequency Fields - 3 kHz to 300 GHz, 1995
- At EPA, managed and co-authored the agency's first draft Interim Methods for Development of Inhalation Reference Doses, 1987–1988
- Member of U.S. EPA's work group to develop Oral Reference Doses for non-carcinogens, available on Integrated Risk Information System (IRIS), 1986–1987
- Member of EPA's Risk Assessment Forum's Technical Panel: Developing a Scientific Policy for Thyroid Neoplasia, 1986–1987
- Panel member for an EPA workshop in weight of evidence/hazard identification for non-cancer health endpoints, 1986–1987
- Co-Chair of EPA's agency-wide committee to write Risk Assessment Guidelines for Chemical Mixtures, 1985–1986
- Program Committee to plan a national symposium Epidemiology and Health Risk Assessment, sponsored by private, governmental and academic institutions, 1984–1985
- Member, Environmental Advisory Council to the City of Cincinnati. Appointed to the Executive Committee, 1986, 1984–1987
- Planned and managed an international symposium on "Advances in Risk Assessment of Systematic Toxicants and Chemical Mixtures," held October 1984; co-edited the proceedings, 1983–1984
- Chairperson for two international symposia: "Risk Assessment for Multiple Chemical Exposures," sponsored by EPA, 1981–1983

Appendix II

Fact sheets and brief summaries on Internet

Australian Radiation Protection and Nuclear Safety Agency
Electricity and Health Fact Sheet 19
http://www.arpansa.gov.au/pubs/factsheets/019is_electricity.pdf

Health Canada
It's Your Health – Electric and Magnetic Fields from Power Lines and Electric Appliances
http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/environ/magnet-eng.php

International Commission on Non-Ionizing Radiation Protection
Fact Sheet on the Guidelines for Limiting Exposure to Time-Varying Electric and Magnetic Fields (1 Hz – 100 kHz)
http://www.icnirp.de/documents/FactSheetLF.pdf

National Cancer Institute at the National Institutes of Health
Magnetic Field Exposure and Cancer: Questions and Answers
http://www.cancer.gov/cancertopics/factsheet/Risk/magnetic-fields

National Institute of Environmental Health Services
EMF – Electric and Magnetic Fields Associated with the Use of Electric Power Questions & Answers
http://www.niehs.nih.gov/health/docs/emf-02.pdf

US Environmental Protection Agency
Electric and Magnetic Fields (EMF) Radiation from Power Lines
http://www.epa.gov/radtown/power-lines.html

World Health Organization
Electromagnetic Fields and Public Health – Exposure to Extremely Low Frequency Fields, Fact Sheet No. 322, June 2007
http://www.who.int/mediacentre/factsheets/fs322/en/index.html