## PROCEDURAL HISTORY

On February 14, 1989, Public Service filed a motion for a prehearing conference to discuss issues such as discovery, prefiling dates, hearing dates, and related matters. Public Service in its motion, suggested that the prehearing conference be set for approximately ten days following the close of the intervention period. On March 1, 1989, the Commission entered Decision No. C89-296 which set a prehearing conference for March 10, 1989. In the same decision, the Commission granted intervenor party status to the Douglas County Board of County Commissioners, (Douglas County) Dr. John T. Zimmerman, Mr. William E. Myrick, and McArthur Ranch Associates.

On March 10, 1989, a prehearing conference was held before Administrative Law Judge Ken F. Kirkpatrick who had been designated as the Administrative Law Judge to handle preliminary matters in this docket. On March 21, 1989, Judge Kirkpatrick entered Decision No. R89-386-I which set hearing dates in this docket for September 11, 12, 14, 15, and 18, 1989. The decision also provided for the prefiling of testimony of the parties' direct cases (in question and answer format) and exhibits, provided for discovery dates, and granted Meracor Mortgage Corporation intervenor status in this docket. Finally, the decision ordered Public Service to file a motion in limine concerning issues in this docket on or before March 17, 1989, with special attention directed to the issue of property valuation. On March 31, 1989, Administrative Law Judge Kirkpatrick entered Decision No. R89-449-I which granted a motion that had been filed by Meracor Mortgage Corporation to withdraw as an intervenor in this docket.

On March 17, 1989, Public Service filed a "motion in limine concerning property values" which requested the Commission to enter an order limiting the introduction of evidence on property values at the hearing concerning Public Service's application in this docket. On March 31, 1989, William E. Myrick, on behalf of himself and McArthur Ranch Associates, filed a response to Public Service's motion and brief in limine concerning property values. On April 3, 1989, Douglas County filed a request to file out of time its answer brief in opposition to Public Service's motion in limine concerning property values because of difficulty arising out of technical computer problems. On April 3, 1989, Douglas County also filed its answer brief in opposition to Public Service's motion. On April 12, 1989, the Commission entered Decision No. C89-522 which allowed Douglas County to file its brief in opposition out of time and also set Public Service's motion in limine concerning property values for oral argument on April 25, 1989.

On April 19, 1989, the Commission entered Decision No. C89-559 which granted a motion which had been filed by Douglas County to amend a certain portion of its answer brief.

On May 10, 1989, the Commission entered Decision No. C89-665 which denied Public Service's motion in limine concerning property values. That decision acknowledged that this Commission is not a court and is not authorized to award damages as a result of possible diminution of property values which might be occasioned by the upgrade of the transmission line in Douglas County. Nevertheless, that decision also concluded that the Commission does not lack authority to consider the effect of possible property value diminution in making its overall determination of whether or not the proposed facilities are adequate and efficient and will promote the health, comfort, and convenience not only of the public utilities patrons and employees, but also the general public. The Commission, however, in Decision No. C89-665 did limit the manner and extent of testimony relating to possible diminution of property values, if any, which may result from the approval of the application to upgrade the transmission line from 115 KV to 230 KV. The Commission ordered that testimony and exhibits should relate solely to differences, if any, in property values between what properties are worth with a 115 KV line already in place and property values with a proposed 230 KV line. The Commission also limited the amount of hearing time and the number of witnesses related to the property diminution issue.

On April 25, 1989, Commission Counsel John E. Archibold transmitted to Public Service and the intervenors in this docket a Commission request for information setting forth eight questions to be answered by the parties. On June 7, 1989, by Decision No. C89-798, the Commission granted an extension of time to and including July 3, 1989, within which to answer the Commission's information request of April 25, 1989. On June 14, 1989, the Commission entered Decision No. C89-831 which granted, in part, a request by Douglas County for an extension of time within which to conduct discovery. That decision allowed intervenors to conduct discovery through July 3, 1989, and required Public Service to respond to discovery served upon it within 15 days.

On June 30, 1989, Douglas County filed a motion for an extension of all procedural dates in this docket. Public Service responded to that motion on July 6, 1989, generally opposing any extensions of time on the basis that it had retained experts to testify who would not be available when Douglas County proposed that the hearing be rescheduled. On July 12, 1989, the Commission entered Decision No. C89-977 which denied the motion for an extension of time filed by Douglas County. That

decision did grant an extension of time through July 17, 1989, within which Douglas County was to respond to Commission Counsel's letter of April 25, 1989. The decision also granted intervenor status to James F. Weber and M. Suzanne Weber with the proviso that they would take the docket as they found it.

On July 14, 1989, Douglas County filed a motion for reconsideration of the Commission's Decision No. C89-977 denying Douglas County's motion for an extension of procedural dates. On July 19, 1989, the Commission entered Decision No. C89-1017 which granted Douglas County's motion for reconsideration in part by adjusting certain discovery and prefiling dates.

On August 16, 1989, the Commission entered Decision No. C89-1145 setting a further prehearing conference for August 28, 1989, before Judge Kirkpatrick and granting two late filed requests filed, respectively, by R. Craig Ewing and Lawrence F. Herbert to intervene in this docket with the proviso that they would take this docket as they found it on the date of intervention.

On August 28, 1989, a second prehearing conference was held before Judge Kirkpatrick who, on August 31, 1989, entered Decision No. R89-1188-I which provided (1) that the hearing would proceed in three distinct phases dealing with (a) the need for the line (Phase I); (b) the non-need aspects of the line such as aesthetics, noise, and property values (Phase II); and (c) the health effects of the line (Phase III), respectively; (2) established an order of witnesses and an order of cross-examination; (3) provided for the identification of witnesses and exhibits, and (4) provided for the filing of summaries of testimony and known exhibits which Public Service might intend to offer in rebuttal in Phases I, II, or III of this docket. All parties stipulated not to challenge the expertise of other parties' expert witnesses.

Hearings in this docket commenced, as originally scheduled, on September 11, 1989, and continued on September 12, 14, 15, and 18, 1989. The witnesses who testified, the parties sponsoring the witness, the identification of the letter corresponding to the witness' direct testimony are set forth in Appendix A-2 to this decision. The exhibits that were introduced into evidence, while a particular witness was on the stand, were identified by the letter corresponding to the witness and a numerical designation in order. For example, Public Service's first witness, William J. Martin, was identified with the letter A, and his exhibits were identified as Exhibits A-1 through A-9 and A-11 through A-17.

At the conclusion of the hearings on September 18, 1989, the Commission orally directed that the parties could file statements of position on or before October 6, 1989, and reply statements of position on or before October 27, 1989. Statements of position were filed on or before October 6, 1989, by the following:

Public Service
Douglas County
Lawrence F. Herbert
James F. Weber

Reply statements of position were filed on or before October 27, 1989, by the following:

Public Service
Douglas County
James F. Weber
M. Suzanne Weber
John Zimmerman

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# EXHIBIT LIST FOR 89A-028E

| Exhibit No | Party and Witness | Description |
|---|---|---|
| A | Public Service Company (William J. Martin) | Direct testimony |
| A (supplemental) | Public Service Company | Supplemental Testimony |
| A-1 | Public Service Company (James A. Ranniger) | Construction requirements data |
| A-2 | Public Service Company (Patrick W. McCarter) | Daniels Park-Greenwood 115,000/ 230,000 Volt Transmission Line Conversion |
| A-3 | | Transcript of hearing 7/26/88 |
| A-4 | Public Service Company | Map of Daniels Park-Greenwood bulk transmission system |
| A-5 | Public Service Company | Map of Metro transmission network |
| A-6 | Public Service Company | Southeast Load Area 576 MW. 1989 Winter Peak |
| A-7 | | Population Estimates for Arapahoe Co., Douglas Co Allocated Load Projection |
| A-8 | | Daniels Park-Greenwood 115/230KV Line Conversion, Alternatives |
| A-9 | | Letter to Kim Hainlen, Planner, from William J. Martin dated 9/30/88 |
| A-11 | | Allocated Coincidental Summer Peak Load Projection and Actual (mW) Fed from S-E Denver Area Transmission Lines |
| A-12 | | 1st page from Public Service Company's response to Douglas Counties First Set of Interrogatories and Request for Production of Documents |

| Exhibit No | Party and Witness | Description |
|---|---|---|
| A-13 | | Map of S-E Denver |
| A-14 | | 1st page of Public Service Company's response to Douglas County's Second Set of Interrogatories and Requests for Production of Documents. |
| A-15 | | Article entitled "Controlling Exposure to Transmission Line Electromagnetic Fields: A Regulatory Approach that is compatible with Available Science |
| A-16 | | Public Service Company Plan |
| A-17 | | Case Summary: Daniels Park-Greenwood 115 to 230 KV Uprate 1 |
| B | Public Service Company (Richard A. Keyser) | Prefiled Direct Testimony |
| B-1 | Public Service Company (Richard A. Keyser) | Public Service Company Line Length and Construction Cost Estimate, Overground v. Underground |
| B-2 | Public Service Company (Richard A. Keyser) | Public Service Company Line Length and Construction Cost Estimate of All 115 to 230 KV Upgrades Planned from 1989 through 1993 |
| B-3 | Public Service Company (Richard A. Keyser) | Public Service Company Line Length and Construction Cost Estimate for Conversion of all Denver Metro Area 230 KV Overhead Transmission Lines to Underground |
| B-4 | Public Service Company | Public Service Company Line Length and Construction Cost Estimate for Conversion of all Denver Metro Area 115 KV and 230 KV Overhead Transmission Lines to Underground |

| Exhibit No | Party and Witness | Description |
|---|---|---|
| D | Douglas County (James M. Summers) | Direct Testimony |
| D-1 | Douglas County (James M. Summers) | Allocated Coicident Summer Peak Load Projection |
| D-2 | Douglas County (James M. Summers) | Tables on Electric Energy Requirements in Gigawatts) |
| D-3 | Douglas County (James M. Summers) | Audible Noise Profile Ornamental Braced Pole |
| E | Public Service Company (Timothy P Dreese) | Direct Testimony |
| F | Public Service Company (David L. Adams) | Direct Testimony |
| F-1 | Public Service Company (David L. Adams) | Typical Activities-Sound Levels Reference and Community Responses |
| F-2 | Public Service Company (David L. Adams) | Adding dB Sources Logrithmically |
| F-3 | Public Service Company (David L. Adams) | Typical Human Reaction to Increases or Decreases in Sound Level |
| F-4 | Public Service Company (David L. Adams) | Transmission Line Sound Level Measurements (in dB) |
| F-5 | Public Service Company (David L. Adams) | Comparison of Octave Band Sound Pressure Levels (SPL) at Site No. 1 |
| F-6 | Public Service Company (David L. Adams) | Article entitled "IEEE Standard for the Measurement of Audible Noise from Overhead Transmission Lines" |
| F-7 | | Standard Handbook for Electrical |
| F-8 | | Public Service Company's Barr Lake Test Line Corona Noise Analysis |

| Exhibit No | Party and Witness | Engineers Description |
|---|---|---|
| F-9 | | Average Sound Levels |
| F-10 | | Standard Handbook for Electrical Engineers, P. 14-14 |
| F-11 | | Audible Noise Data Sheet |
| F-12 | | Energized v. Ambient Sound Levels |
| F-13 | | American National Standard, Methods for the Measurement o Sound Pressure Levels |
| G | Public Service Company (William T. Vancourt) | Direct Testimony |
| H | Douglas County (Jacqueline w. Davis) | Direct Fling |
| I | Douglas County (Peter D. Bowes) | Direct Testimony |
| J | Douglas County (Steven D. Wilson) | Direct Testimony |
| J-1 | Douglas County (Steven D. Wilson) | Douglas County Zoning Resolution Adopted 11/15/82 |
| J-2 | | Map |
| J-3 | | Memo from Kim Nainlen to Douglas County Board of Commissioners re update and overview of Daniels Park upgrade |
| J-4 | | Letter from Kim Hainlen to Douglas County Board of Commissioners dates 7/26/88 |
| J-5 | | Memo from Kim Hainlen to Douglas County Board of Commissioners dated 7/6/88 |
| K | Public Service Company (James Michael Silva) | Direct Testimony |

| Exhibit No | Party and Witness | Engineers Description |
|---|---|---|
| K-1 | Public Service Company (James Michael Silva) | Electromagnetic Spectrum |
| K-2 | Public Service Company (James Michael Silva) | Magnetic Field Environment |
| K-3A | Public Service Company (James Michael Silva) | Untitled |
| K-3B | Public Service Company (James Michael Silva) | Untitled |
| K-4A | Public Service Company (James Michael Silva) | Public Service Summary of Midspan Electric and Magnetic Field Calculations for the Daniels Park-Greenwood Conversion (Table 1) |
| K-4B | Public Service Company (James Michael Silva) | Public Service Company Summary of Midspan Electric and Magnetic Filed Calculations for the Daniels Park-Greenwood Conversion (Table 2) |
| K-5 | Public Service Company (James M. Silva) | Master List for Mr. Silva |
| K-6 | | Pamphlet entitled "Electric and Magnetic Fields from 60 Hertz Electric Power: What Do We Know About Possible Health Risks?" |
| K-7 | | Paper entitled "Biological Effects of Power Frequency Electric and Magnetic Fields |
| L | Public Service Company (Darwin R. Labarthe) | Direct Testimony |
| L-1 | | Risk of Lung Cancer Relative to Cigarettes Smoked/Day |
| L-2 | | Cancer Risk in Relation to Electric and Magnetic Fields |
| L-3 | | Master List for Dr. Larbarthe |

| Exhibit No | Party and Witness | Description |
|---|---|---|
| M | Public Service Company (Edward Paul Gelmann) | Direct Testimony |
| N | Public Service Company (Richard S. Bockman) | Direct Testimony |
| N-1 | Public Service Company (Richard S. Bockman) | Master List for Dr. Bockman |
| O | Public Service Company (Daniel A. Goldstein) | Direct Testimony |
| O-2 | Douglas County (Robert H. Sarikas) | Douglas County's Responses to Public Service Company's Second Set of Interrogatories and Requests for Production |
| P | Douglas County (James P. Kornberg) | Direct Testimony |
| P-1 | Douglas County | Bibliography of James B. Kornberg, M.D. |
| P-2 | Douglas County | Interrogatories and Requests for Production to James R. Kornberg, M.D. |
| Q | Douglas County (Lawrence F. Herbert) | Prefiled Testimony |
| Q-1 | Douglas County (Lawrence F. Herbert) | Oversight Hearing 10/87--House of Representatives--Health Effects of Transmission Lines |
| Q-3 | | Book entitled "Interaction of Biological Systems and Static and ELF Electric and Magnetic Fields |
| Q-4 | | Article entitled "IBM Device uses Superconductors to Diagnose Epilepsy, Stroke |
| Q-5 | | Book entitled "The Electric Wilderness |

DR. LABARTHE

Dr. Labarthe serves as a professor of epidemiology and adjunct professor of medicine, Director of the Epidemiology Research Center, Director of the Southwest Center for Prevention Research, and is Associate Director of the Institute of Environmental Health. Dr. Labarthe is also Director of the Design and Analysis Unit at the Baylor College of Medicine. Reflective of Dr. Labarthe's expertise in the field of epidemiology, he is a Fellow of the American College of Preventive Medicine, a member and past chairman of the Council on Epidemiology of the American Heart Association, a member and past president of the Society for Epidemiological Research, and a member and past chairman of the Epidemiology Section of the American Public Health Association. As Director of Research Groups at the University of Texas, Dr. Labarthe evaluates epidemiologic research proposals, manages epidemiologic research projects and conducts independent research in the area of epidemiology. In particular, Dr. Labarthe researches environmental factors and other issues which are potential areas of concern for human health. He has conducted pediatric studies relating to the general health status of children, participated in the design and analysis of a prospective epidemiologic study of junior high and high school children, and has collaborated on epidemiologic studies on various health in points in approximately 14 different countries. Most of his work in epidemiologic studies have included cohort studies, population surveys, case-control studies, clinical/community trials, and community surveillance studies. Most of Dr. Labarthe's work has concerned chronic diseases, such as cancer as distinguished from infectious diseases.

Dr. Labarthe has published over 50 articles on epidemiology and co-authored more than 15 book chapters and monographs and has published his epidemiologic research in 6 scientific journals, including American Journal of Epidemiology, Annals of Clinical Research, Journal of the American Medical Association, Journal of Chronic Disease, Journal of Clinical Epidemiology, and Cancer. This is a "case-control" study.

Epidemiology is the study of disease in human populations, and epidemiologic studies are undertaken to describe the occurrence of disease in populations and to identify the causes of disease. When the purpose of a study is to understand causation, several approaches are possible. One approach in epidemiology is to compare rates of disease in populations with different exposures. These studies are called "cohort" studies. Another approach is to compare exposures in individuals who have developed a particular disease - the "cases" - with exposures in a comparable group that have not developed a disease - the "controls." This is a case control study.

It is important to consider the epidemiologic research as a whole and look for consistency both within and amongst studies to determine whether statistical correlations are biologically meaningful. Public Service witness, Dr. Labarthe, considered over 35 epidemiological studies in addition to the one by Wertheimer and Savitz which was cited by Douglas County. Douglas County opines that Dr. Labarthe discounted the findings of Wertheimer and Savitz whereas Dr. Labarthe actually said that the Savitz study supports his conclusion. Dr. Labarthe also testified that, considered in proper context with all of the epidemiologic research, the Wertheimer and Savitz studies do not provide a scientific basis for concern about health effects from powerline fields.

DR. GELMANN

Dr. Gelmann has been associated with the National Cancer Institute which is an organization chartered by the United States Congress and is the nation's largest biomedical center involved with cancer research. The National Cancer Institute is a part of the National Institutes of Health (NIH). Dr. Gelmann reviews grant proposals for NIH projects and he serves on a study section for the National Institutes of Allergy and Infectious Diseases, namely the Micro-Biology and Virology Research Committee. He also regularly reviews articles that are being considered for publication in scientific journals such as Cancer Research, International Journal of Cancer, Journal of the National Cancer Institute, Proceedings of the National Academy of Science, Journal of the Clinical Oncology, The New England Journal of Medicine, and others. Dr. Gelmann has spoken on cancer and cellular biology at numerous national and international scientific conferences, and has received a decoration and citation from the United States Public Health Service for his work in cancer research. He serves as liaison between the American Society of Clinical Oncology and the National Cancer Advisory Board, the latter being a committee of sciences, physicians, and lay people who oversee cancer research policy in the United States which committee is appointed by the President of the United States.

Dr. Gelmann described the basic structure and function of the cell which is the basic building block of the human body. Cells make up all the systems of the body, including the muscular, skeletal, nervous, and circulatory systems. Within the cell is the nucleus, and the chromosomes reside within the nucleus. The chromosomes are composed of molecules of DNA. DNA contains the genetic information which provides a blueprint for all inherited characteristics. This genetic information is contained in discrete subunits of the DNA known as the genes. For this reason, DNA is known as the genetic material. DNA is necessary for the cell to perform its functions. Because DNA contains the essential information for all cell functions, change to the DNA molecule, that i.e., genetic change, can have serious effects on cell processes and therefore on tissues and organisms. Subtle changes in the DNA molecule can be responsible for making a normal cell become a cancer cell, but most change that occurs in DNA does not result in cancer, or for that matter in any demonstrable effect. The cell has repair mechanisms that can correct change, in some degree, to DNA. Change in the DNA molecule or other molecules within the cell can also cause other adverse effects in the human body such as problems with reproduction, growth, metabolism, and development.

Dr. Gelmann stated that it is important to realize that cancer is a generic term to describe many different types of diseases. Each cancer type has unique characteristics, including where it occurs and its causes. For example, ultra-violet light from the sun changes the DNA of skin cells and causes melanomas and other skin cancers but does not cause lung cancer. Cigarette smoking, on the other hand, can deposit substances in the cells of the lung which can change their DNA and thus lead to lung cancer, but smoking does not cause skin cancer. To determine whether some agent causes cancer, scientists conduct laboratory studies on isolated cells and tissues under controlled laboratory conditions as well as laboratory and field studies on intact animals. Dr. Gelmann described the various types of studies that have been conducted with electric and magnetic fields, including studies which he categorized in four areas: mutational analyses studies, chromosome studies, animal studies, and tumor growth studies.

Mutational analyses are in vitro tests that show whether a heritable change has occurred in the chemical structure of the DNA molecule as a result of exposure to an agent.

The chromosome level studies, which are in vitro studies, evaluate whether there are breaks or other damage to the chromosome as a result of exposure to an agent. Because chromosomes are made of DNA and change to DNA is necessary for cancer to occur, these studies are important in addressing an agent's potential to cause cancer or other adverse health effects. A number of diseases, including chronic myelogenous leukemia and downs syndrome have been shown to be linked to abnormalities in chromosomes.

Dr. Gelmann addressed the subject of cancer promotion as well as the issues concerning immune response and calcium efflux. He examined studies on cell proliferation, RNA synthesis, RNA transcription, and ornithine decarboxylase which, contrary to Douglas County's assertion, deal directly with functions at the cellular level other than as related to cancer initiation. The list of studies which Dr. Gelmann reviewed and relied upon include every cancer promotion study referenced in the OTA Report as well as studies not considered in the report. Dr. Gelmann concluded that there was no persuasive scientific data showing that power frequency electric and magnetic fields in any way cause or promote cancer.

DR. BOCKMAN

Dr. Bockman holds a Ph D. in Bio-Chemistry from the Rockefeller University and while at that university he was awarded an NIH Fellowship to perform graduate studies in biological chemistry. That research involved the use of magnetic resonance to study the effects of very high intensity magnetic fields (10,000,000-15,000,000 milligauss) on molecules in solution. This research tool has been adapted for medical imaging of the human body. Dr. Bockman's early training was in immunology which is the medical discipline that studies the network of cells and tissues that protects the body from disease. He is a board certified specialist in internal medicine and has as his medical subspecialty endocrinology. Endocrinology is a subspecialty of internal medicine in which one studies and treats hormonal and metabolic balances and how those balances may be altered by external and internal factors.

The endocrine system refers to those biological systems whose functions can be modulated or altered by hormones. These include the neuroendocrine, adrenal, and reproductive systems. These systems exhibit a variety of responses as to the result of our reactions to everyday stimulae. Stimulae constitute biologic effects, but that does not necessarily mean that they are harmful. For example, the every day environment is filled with sights, sounds, smells, and other stimulae that generate measurable biological responses or biological effects. An exchange stimulus may result in a bodily reaction which is known as "stress." In a normal response, there are brief and temporary changes in neuroendocrine's responses such as neural responses, heart rate, and adrenalin levels, but these quickly return to base line levels. By way of contrast, a stressful stimulus causes a continual outpouring of neuroendocrine substances that are maintained in a high level. The failure to return to the base line level is what is known as a "stress response."

Dr. Bockman considered relevant studies in the areas of immunology, endocrinology and neuroendocrinology which included every study in the OTA Report and a great many more dealing with calcium efflux, hormones and enzymes, neuro-transmitters, immune response, learning behavior, circadian rhythms, and central nervous function. As we read the testimony, it does seem evident that the Public Service medical experts were not persuaded by the few "positive" studies which suggest a relationship between overhead transmission lines and certain adverse health effects. Scientists, however, do not consider studies in isolation nor are they guilty of "discounting" studies when they examine all the research to look for replication, consistency, biologic plausibility, or the biologic significance of experimental results. In epidemiology, one must exercise caution in drawing any conclusion from one or two studies.

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DR. DANIEL A. GOLDSTEIN

Dr. Goldstein practices medicine in Denver, Colorado. His background includes an undergraduate degree cum laude in molecular biology from the University of Wisconsin. After receiving an undergraduate degree, Dr. Goldstein did a year of graduate work in the Department of Genetics which included detailed course-work in the field of genetics as well as research in the area of immunology. He subsequently obtained a Doctorate of Medicine from the Johns Hopkins University and completed a three-year residency in pediatrics at the same institution. This was followed by a two-year fellowship in pharmacology and toxicology at the University of Toronto which fellowship included extensive training in the edpidemiology and biostatistics. Dr. Goldstein has been engaged in the practice of general toxicology, with extensive patient care responsibilities, for the past two years.

Dr. Goldstein is currently certified by the American Board of Medical Toxology, the American Board of Pediatrics, and the Royal College of Physicians and Surgeons of Canada (Pediatrics).

DR. JAMES P. KORNBERG

Dr. James Phillip Kornberg is a physician and environmental engineer from Boulder, Colorado. He received a Bachelor of Science Master of Degree in Aeronautical and Astronautical Engineering at the Massachusetts Institute of Technology. He also earned a Doctor of Science and Environmental Health Sciences and Engineering at Harvard University and was awarded a Doctor of Medicine Degree from Dartmouth Medical School. He completed an internship at Columbia University teaching hospital in Cooperstown, New York and them completed residency training and occupational medicine at Harvard University. In 1980 he completed all examinations necessary to become Board certified as a specialist in occupational medicine. Dr. Kornberg is engaged in the full-time clinical and consoling practice of occupational and environmental medicine. Occupational medicine is primarily directed toward the management of risk and reduction of morbidity and mortality among individuals employed within the work force.

On a daily basis, Dr. Kornberg's practice consists primarily of the following activities:

- The design and implementation of health maintenance and health surveillance medical programs for a variety of industries, businesses, and governmental agencies. These programs include the design and administration of pre-placement (pre-employment) physical examinations, interim, fitness and, on occasion, termination of employment evaluations.

- Treatment and evaluation of injured workers.

- Specialty, referral evaluation of individual workers who present with medical or psychological conditions which are possibly caused or aggravated by workplace conditions.

- Development of occupational medical risk management strategies for employers directed at reducing injuries and illnesses in the workplace. As a corollary to this effort, I am involved on a regular basis with the development of regulatory compliance and preventive medicine educational programs for workers. One good example of such program development is the design and implementation of a Medical Respirator Certification

Program for employers who must comply with OSHA Standard 1910.134 before they can issue respirators to their employees. Another example is the design of a comprehensive medical evaluation program for asbestos removal workers, whose medical surveillance program must be in compliance with the Federal Asbestos Standard (29 CFR Parts 1910.1001 and 1926). Finally, I am involved on a regular basis with occupational medical programs for workers who are at risk from environmental exposure, for example, during the cleanup of hazardous waste sites. (Superfund Amendments and Reauthorization Act (SARA) - 1986, Section 126 (b); OSHA 29 CFR 1910.120).

Dr. Kornberg's work in the field of environmental medicine includes:

- Participation in the performance of public health risk assessments, as part of the EPA, requirements for remediation of hazardous waste sites. (SARA, Title III, Subtitle C, Section 323[c][2]). Regulatory imperatives for this type of work include, among other tasks, assessing exposure of persons living in a local community to the hazards of specific chemicals and conducting studies to determine the health effects of exposure. In this regard, as a primary medical investigator for one client which owns and operates a uranium mill south of Denver, I prepared a comprehensive Environmental Health Risk Survey Document outlining the environmental impact of 11 potentially toxic metals (9/86). This document examined the potential impact of each metal upon eleven environmental target categories, ranging from human health and plant life to soil, sediments, and insects.

- Advising municipal and/or governmental agencies on policies which may directly impact public health and safety; for example, the development of appropriate programs for spraying public lands with

herbicides or pesticides, with particular emphasis upon the type of material which can be used, the manner in which they should be used, the appropriate warnings which should be given to the public, and the time duration beyond which public access can be safely permitted.

- The conceptualization of possible environmental impact and public safety problems, associated with airborne, waterborne, and solid waste from client company facilities.

- The evaluation of possible adverse health effects of new technology programs both upon the public and upon the individual workers present at the job site. In 1978, for example, I was director of a Federal NIOSH program (Energy Industries Medical Protocol: Contract 210-78-0100) to study the overall health effects of a variety of coal gasification and coal liquefaction (synthetic fuels) methodologies. I have also served as consulting medical director to one company which has developed a unique technology for disposal of municipal wastes through deep well injection, combined with oxygenation under pressure.

Dr. Kornberg performs off-site industrial plant walk-through evaluations and is able to perform initial work site hazard evaluations and to offer advice for hazard elimination or mitigation. On the environmental side, Dr. Kornberg's background training as an environmental engineer allows him to deal directly with problems of environmental pollution and, as an occupational physician, to interpret the significance of that pollution upon individuals or groups of individuals within the population.