

2/14/83

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	
)	Docket No. 50-142
THE REGENTS OF THE UNIVERSITY)	
OF CALIFORNIA)	
)	(Proposed Renewal of
(UCLA Research Reactor))	Facility License)
)	

TESTIMONY ON BEHALF OF THE COMMITTEE TO BRIDGE THE GAP
AS TO WHETHER THE UCLA NUCLEAR REACTOR IS INHERENTLY SAFE

1. My name is Boyd Norton. From 1960 to 1969 I was employed in reactor safety studies at the National Reactor Testing Station in Idaho, five of the years spent as Group Leader of the Nuclear Test Section of SPERT (Special Power Excursion Reactor Test). I was in charge of operation of both the SPERT I and III reactors, and was at the controls of SPERT I during its final destructive test. A statement of professional qualifications is attached.
2. My name is Dr. Lowell Wayne. I am a chemist and environmental scientist associated with the Southern California Federation of Scientists. I am also Vice President and Director of Scientific Activities for Pacific Environmental Services. Among my previous employment were several years spent as the Occupational Health Engineer at UCLA. Professional qualifications are attached.
3. My name is Dr. Michio Kaku. I am a nuclear physicist at the City College of the City University of New York. A statement of professional qualifications is attached.
4. My name is Dr. Roland Finston. I am Director of Health Physics and the Radiation Safety Officer at Stanford University. A statement of professional qualifications is attached.
5. My name is Dr. Roger Kohn. I am a physicist and systems analyst. I have a B.A. in physics from Haverford College and M.S. and Ph.D. degrees in physics from Stanford. I have completed coursework and employment in both experimental and theoretical nuclear physics, and have had twenty years experience in various applications of physics, mathematics, and computer programming.

My professional resume, giving my credentials prior to entering law school three years ago, is attached.

6. My name is Miguel Pulido. I am a mechanical engineer employed by McCaughey & Smith Energy Consultants. I am also a member of the Executive Committee of the Southern California Federation of Scientists. A statement of professional qualifications is attached.

7. My name is David duPont. I am a chemist associated with the Southern California Federation of Scientists. A statement of professional qualifications is attached.

8. My name is Steven Aftergood. I am a staff engineer and environmental researcher with the Committee to Bridge the Gap, with responsibilities for review of the UCLA application for license renewal of the Argonaut reactor. I am also a member of the Southern California Federation of Scientists. A statement of professional qualifications is attached.

9. My name is Louis Foster. From 1975 through 1979 I was employed by the Nuclear Environmental Services Division of Science Applications, Inc. My duties were primarily in radiation safety and environmental protection in and around nuclear facilities. A statement of professional qualifications is attached.

10. My name is Daniel Hirsch. I am President of the Committee to Bridge the Gap, and a Visiting Lecturer at the University of California. At CBG I am Project Manager for the technical review of the UCLA reactor license renewal application. In that capacity I participate in and oversee the scientific review of the UCLA application, the Staff analyses, and the materials produced through discovery. A statement of professional qualifications is attached.

11. My name is Dr. Sheldon Plotkin. I am President of S.C. Plotkin & Associates, a consulting engineering firm specializing in safety and systems engineering. I serve on the Executive Committee of the Southern California Federation of Scientists and have participated in the activities of the SCFS review group assessing reactor safety matters related to the UCLA reactor. A statement of professional qualifications is attached.

12. We have participated as members of panels reviewing certain aspects of the UCLA reactor related to inherent safety considerations. Relevant portions of the various analyses performed to date and the materials provided in discovery were reviewed, and site visits conducted. The results of these reviews are detailed in the testimony of the panels. The panels and their participants are identified on the following page.

The Panels:

- i. INTRODUCTION; BASIC CONCEPTS RELATED TO INHERENT SAFETY --
Norton, Kaku, Kohn, Hirsch, Plotkin, Aftergood
- I. POWER EXCURSIONS -- Norton, Kaku, Kohn, Hirsch, Aftergood,
Pulido, duPont
- II. CHEMICAL REACTIONS -- Wayne, duPont, Norton, Kaku, Pulido,
Kohn, Hirsch, Plotkin, Aftergood
- III. CORE DISRUPTION AND RELATED ACCIDENTS -- Norton, Kaku, Kohn,
Pulido, Plotkin, Hirsch, Aftergood, duPont
- IV. ACCIDENT CONSEQUENCES -- Wayne, Finston, Aftergood, Foster,
Kaku, Norton, Kohn, Plotkin, Pulido, duPont, Hirsch

Professional Qualifications

BOYD NORTON

My name is Boyd Norton. From 1960 to 1969 I was employed in reactor safety studies at the National Reactor Testing Station in Idaho.

During that period I was in charge of operation of both the SPERT I and SPERT III reactors. The SPERT program (Special Power Excursion Reactor Test) was designed to investigate the vulnerability of certain kinds of reactors to accidents induced by large reactivity insertions and to understand better the behavior of reactors during power excursions.

From 1960 to 1962 I was staff physicist at NRTS, assigned to SPERT I.

From 1963 to 1968 I was Group Leader of the Nuclear Test Section of SPERT. I was in charge of operation of both SPERT III and the rebuilt SPERT I.

In 1968 I became Section Chief, Experiment and Analysis Section, of the Power Burst Facility at NRTS. I was in charge of the Safety Analysis Report for the PBF.

Prior to my arrival at NRTS, I received a Bachelor of Science degree in physics from Michigan College of Mining and Technology. I worked summers during 1954-59 at M&C Nuclear, later a subsidiary of Texas Instruments. M&C Nuclear was a metallurgical laboratory where I did research on fuel elements for nuclear submarines.

In 1969 I was offered, as a result of extensive involvement in conservation work in Idaho, a job with the Wilderness Society, where I remained till 1971. I am now a freelance writer and photographer, mainly on conservation themes but also on nuclear matters.

Statement of Professional Qualifications

PROFESSOR MICHIO KAKU

My name is Michio Kaku. I am Associate Professor of Theoretical Physics at the City University of New York (City College campus).

I did my undergraduate work in physics at Harvard University, from which I graduated in 1968 summa cum laude and phi beta kappa.

I did my graduate work in nuclear physics at the Lawrence Radiation Laboratory of the University of California at Berkeley, from which I received my Ph.D. in 1972.

From 1972-73 I was on the faculty of Princeton University as a lecturer.

From 1973 through the present I have been on the faculty at CCNY.

I have published approximately thirty-five research papers in theoretical physics in such professional journals as Nuclear Physics, Physical Review, and Physics Letters, and have contributed to five books on nuclear and theoretical physics.

My special interests include reactivity calculations for breeder and other reactors, neutron transport theory in reactor physics, the history of accidents at non-power reactors, and metal-water reactions in reactor accident sequences, as well as aspects of theoretical physics such as hadron-hadron interactions, general relativity, supergravity, and unified field theories of the strong and weak interactions.

I am co-editor of the book Nuclear Power: Both Sides, published by Norton in 1982.

Statement of Professional Qualifications

DR. ROLAND FINSTON

My name is Roland Finston. I am Director of Health Physics and Radiation Safety Officer at Stanford University and Stanford Hospital.

I received my A.B. and S.B. degrees (in physics) in 1957 from the University of Chicago. I received an M.S. in Health Physics in 1959 from Vanderbilt University, in conjunction with Oak Ridge National Laboratory. In 1965 I received a Ph.D. in Biophysics from the Cornell University School of Medical Sciences.

From 1965-66 I was Associate Professor of Radiological Physics at Oregon State University in Corvallis.

From 1966-75 I was Health Physicist at Stanford University. In 1975 I became Director of Health Physics at Stanford, a position I hold currently.

From 1970 to the present I have been Lecturer in Radiology (Nuclear Medicine), and since 1975 I have been Radiation Safety Officer at Stanford. In 1983 I also assumed duties as Radiation Safety Officer for the Palo Alto Veterans Administration Hospital.

I am a member of the Health Physics Society, the Society of Nuclear Medicine, and the American Association of Physicists in Medicine.

DR. LOWELL WAYNE

Statement of Professional Qualifications

My name is Lowell Wayne. I am a chemist and environmental scientist associated with the Southern California Federation of Scientists.

I received my Bachelor of Science degree in Chemistry from the University of California at Berkeley in 1937, and my Ph.D. in chemistry from the California Institute of Technology in 1949. In 1942 I received a Certificate in Industrial Hygiene from Harvard University, based on completion of a Joint Program between the Harvard School of Public Health and the Graduate School of Engineering.

From 1937 to 1939 I was employed by Shell Development Co., the research arm of Shell Oil. From 1939 to 1941 I was a teaching assistant in the Department of Chemistry at the University of California at Davis. From 1942 to 1946 I was an Industrial Hygiene Officer in the U.S. Navy.

From 1948 to 1949 I was a post-doctoral fellow in Chemistry at the University of Colorado.

From 1949 to 1953 I was a Fellow at the Mellon Institute of Industrial Research (now part of Carnegie-Mellon University).

From 1953-54 I was a Senior Physical Chemist at the Stanford Research Institute (now SRI, International).

From 1954 to 1956 I was the Occupational Health Engineer at UCLA.

From 1956 to 1962 I was a Research Photochemist with the Los Angeles County Air Pollution Control District.

From 1962 to 1972 I was at the University of Southern California as a Research Associate of the Allan Hancock Foundation, and also part of that time as a Research Associate of the School of Public Health Administration, involved in research on air pollution.

In 1972 I joined Pacific Environmental Services, a company providing environmental services to governmental agencies and industry. I am currently Vice President and Director of Scientific Activities for the firm.

I have published approximately fifty papers in various areas of chemistry and environmental science.

I am a member of AAAS, the New York Academy of Science, the American Chemical Society, Sigma Xi, the American Industrial Hygiene Association, the Air Pollution Control Association (and chair of its committee on chemistry), and was one of the original founders in the early 1950s of what is now the Southern California Federation of Scientists.

LOWELL G. WAYNE, Ph.D.

Vice-President, Senior Research Scientist

EDUCATION

B.S.	1937	Chemistry, University of California, Berkeley
	1942	Certificate in Industrial Hygiene, School of Public Health and Graduate School of Engineering, Harvard University
Ph.D.	1949	Chemistry, California Institute of Technology
	1948-49	Post-doctoral research in Photochemistry, University of Colorado, Boulder

PROFESSIONAL SPECIALTIES

Atmospheric chemistry, industrial hygiene, air quality modeling, statistical analysis of air quality data, computer simulation of photochemical smog.

EXPERIENCE

Pacific Environmental Services, Inc., Santa Monica, CA. 1972-present. Director, Scientific Activities and senior research scientist. Cofounder and vice president of PES. Responsible for quality assurance, occupational health, and computer simulation of photochemical smog. Has prepared theoretical and critical reviews of trends in photochemical oxidant air quality and of atmospheric transport of oxidants and precursors into rural areas from urban areas. Was principal investigator for a major study on the behavioral toxicology of formaldehyde, and served as a professional consultant to the National Academy of Sciences' Committee on Motor Vehicle Emissions. An industrial hygiene chemist of long standing, Dr. Wayne is an acknowledged authority on the chemistry of urban atmospheres, including chemical reaction kinetics and biological effects of photochemical smog. Chairman of the Atmospheric Chemistry Committee (Committee TT2) of the Air Pollution Control Association.

University of Southern California, Los Angeles, CA. 1962-1972. Sector head of the Air Pollution Control Institute and research analyst for the Allan Hancock Foundation. The Air Pollution Control Institute, carried on by the USC School of Public

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Administration between 1965 and 1972, presented a professional-level three-month course to orient students in all aspects of air pollution control; Dr. Wayne was responsible for curriculum development and management of instruction in the scientific aspects of the subject, including chemistry, meteorology, toxicology, epidemiology, and statistics. For the Allan Hancock Foundation, Dr. Wayne coordinated research efforts and managed data analysis for several investigative teams studying various aspects of the biological effects of photochemical smog under an extended program supported by the U.S. Public Health Service (1962-1968).

Air Pollution Control District, Los Angeles County, Los Angeles, CA. 1956-1962. Research photochemist. Participated in various research projects including studies of the photochemical reactions of automobile exhaust gases and the formation of eye irritants on irradiation of synthetic smog mixtures. Prepared the APCD's definitive technical report, "Chemistry of Urban Atmospheres."

University of California at Los Angeles, Los Angeles, CA. 1954-1956. Occupational health engineer for all campuses and field stations of the University in the southern part of the state.

PROFESSIONAL CERTIFICATION

American Academy of Industrial Hygiene, Diplomate. Certified in Chemical Aspects of Industrial Hygiene by the American Board of Industrial Hygiene, 1962

PROFESSIONAL SOCIETIES

Air Pollution Control Association, member and chairman,
Committee TT2, Atmospheric Chemistry, 1973-present
American Chemical Society, member, Environmental Science
Division
American Industrial Hygiene Association, member, Committee on
Criteria for Community Air Quality
Committee on Motor Vehicle Emissions, National Academy of
Sciences, professional consultant, Panel 7, Photochemical
Reactions, 1972-1973
Federation of American Scientists, Los Angeles Chapter,
chairman, 1957, 1963, 1971
New York Academy of Sciences

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HONORS

Pi Mu Epsilon, elected member, 1936
University of California, B.S. cum laude, 1937
California Institute of Technology, Fellowship of Allied
Chemical and Dye Co., 1947-1948
Sigma Xi, The Research Society of North America, elected full
member, 1948
University of Colorado, postdoctoral fellowship, Department of
Chemistry, 1948-1949
American Association for the Advancement of Science, elected
fellow, 1967
American Institute of Chemists, elected fellow, 1969

PUBLISHED WRITINGS

Wayne, L.G., Stredler, J.L., and Braverman, T.F., "Implementation of a Software System for Data Quality Assurance for Point Source Emission Files," paper 81-12.6, presented at the 74th Annual Meeting of the Air Pollution Control Association, Philadelphia, Pennsylvania, June 21-26, 1981, June 1981.

Wayne, L.G., correspondence concerning air quality simulation modeling of ozone in Norfolk, VA, Environ. Sci. Technol., 1981, 5, 600 (Vol. 15), May 1981.

Wilson, K.W., Lowe, G.Y. and Wayne, L.G., "Effects of Increasing VOC Speciation in a Photochemical Oxidant Simulation Model," paper 80-52.3, presented at the 73rd Annual Meeting of the Air Pollution Control Association, Montreal, Quebec, June 22-27, 1980.

Wayne, L.G., Gelinas, G.G. and Wilson, K.W., "Advantages of Trajectory Models over Grid Models in Simulating Photochemical Oxidant for Air Quality Planning," paper presented at APCA Specialty Conference on Ozone/Oxidants: Interactions with the Total Environment, Houston, Texas, October 14-17, 1979. Proceedings, p. 414.

Wayne, L.G. and Weisenberg, I., "Studies of Air Quality in Silver Valley, Idaho: Estimates of Area Source Emissions of Particulate Matter and Lead," prepared for U.S. Environmental Protection Agency under Contract No. 68-02-2536, Task No. 9, April 1979.

Wayne, L.G. and Kochis, P., "Tampa Bay Area Photochemical Oxidant Study AQMA: Assessment of the Anthropogenic Hydrocarbon and Nitrogen Oxide Emissions in the Tampa Bay Area, prepared for U.S. Environmental Protection Agency, Region IV, under Contract No. 68-02-2606, Task No. 2, September 1978.

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Wayne, L.G., Boyd, C. and Gordon, H., "Seasonal Variations in Organic Emissions for Significant Sources of Volatile Organic Compounds," prepared for U.S. Environmental Protection Agency, OAQPS, under Contract No. 68-02-2583, Task No. 6, September 1978.

Drivas, P., Missen, R., Wayne, L.G. and Wilson, K.W., "Procedures for the Preparation of Emissions Inventory Requirements for Volatile Organic Compounds, Volume II: Emissions Inventory Requirements for Photochemical Air Quality Simulation Models," Draft Report prepared for U.S. Environmental Protection Agency under Contract No. 68-02-2583, Tasks No. 5, 13, September 1978 (final report in preparation).

Wayne, L.G., Wilson, K.W. and Drivas, P., "Case Study Evaluation of Ozone Isopleth Methodology," prepared for U.S. Environmental Protection Agency under Contract No. 68-02-2606, Task No. 5, February 1978.

Wayne, L.G., "Five-Year Plan to Assure the Availability of Credible and Acceptable Source-Receptor Relationships for Photochemical Oxidants," Draft Report prepared for U.S. Environmental Protection Agency, OAQPS, under Contract No. 68-02-2606, Task No. 6, January 1978.

Drivas, P.J., Wilson, K.W., and Wayne, L.G., "Emission Inventory Requirements for Photochemical Air Quality Simulation Models," paper presented at APCA Specialty Conference on Emission Factors and Inventories, Anaheim, CA, November 1978.

Drivas, P.J. and Wayne, L.G., "Sensitivity Studies of a Lagrangian Photochemical Air Quality Simulation Model," paper No. 78-10.3, presented at 71st Annual Meeting of the Air Pollution Control Association, Houston, TX, June 1978.

Wayne, L.G. and Drivas, P.J., "Sensitivity of the Empirical Kinetic Modeling Approach to Input Data and Local Conditions," Paper No. 78-72.2, presented at 71st Annual Meeting of the Air Pollution Control Association, Houston, TX, June 1978.

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Wayne, L.G., Wilson, K.W. and Boyd, C., "Detection and Interpretation of Trends in Oxidant Air Quality," presented at ASTM Conference on Air Quality Meteorology and Atmospheric Ozone, Boulder, CO, August 1977.

Drivas, P. and Wayne, L.G., "Validation of an Improved Photochemical Air Quality Simulation Model," PES Document TP-04, March 1977.

Haagen-Smit, A.J., and Wayne, L.G., "Atmospheric Reactions and Scavenging Processes," chapter 6 in Air Pollution, Vol. I, 3rd ed., ed. Arthur C. Stern, Academic Press, New York, 1976.

Wayne, L.G., Wilson, K.W. and Boyd, C., "Detection and Interpretation of Trends in Oxidant Air Quality," prepared for U.S. Environmental Protection Agency under Contract No. 68-02-1890, Task No. 1, September 1976.

Wayne, L.G. and Yamada, M.M., "Oxidant Strategy Error Analysis," prepared for U.S. Environmental Protection Agency under Contract No. 68-02-1890, Task No. 2, July 1976.

Wayne, L.G., "Eye Irritation, A Literature Review," in Behavioral Toxicology: Early Detection of Occupational Hazards, ed. Xintaras et al., U.S. Department of Health, Education and Welfare, NIOSH 74-126, 1974, pp. 329-332.

Wayne, L.G., Kokin, A. and Weisburd, M.I., "Controlled Evaluation of the Reactive Environmental Simulation Model (REM), Volume I: Final Report (EPA Document R4-73-013a); Volume II: User's Guide (EPA Document R4-73-013b)," NTIS numbers PB 220 456/8; PB 220 457/6, February 1973.

Wayne, L.G., Kokin, A. and Weisburd, M.I., "Model (REM) Vol. I," prepared for U.S. EPA Meteorology Lab, NERC, Research Triangle Park, NC, under Contract No. 68-02-0345, February 1973.

Wayne, L.G. and Weisburd, M.I., "Computing the Effects of Chemical Reactions on Air Quality of the Urban Atmosphere," paper presented at the International Congress on Chemical Engineering in the Service of Mankind, Paris, France, 2-9 September 1972. Abstract in Chimie et Industrie, genie chimique 105, 15:C54.

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Wayne, L.G., Weisburd, M.I., Danchick, R. and Kokin, A., "Final Report: Development of a Simulation Model for Estimating Ground Level Concentrations of Photochemical Pollutants," technical memorandum TM-(L)-4673/000/00, System Development Corporation, Santa Monica, CA, January 1971.

Wayne, L.G., "Simulation: The Road to Co-existence," Datamation 17, 8:26, April 15, 1971.

Wayne, L.G., Danchick, R., Weisburd, M.I., Kokin, A. and Stein, A., "Modeling Photochemical Smog on a Computer for Decision-Making," J. Air Pol. Contr. Assoc., Vol. 21, No. 6, June 1971.

Danchick, R. and Wayne, L.G., "Modeling of the Photochemical Smog Reaction in the Los Angeles Basin," paper presented at the Pacific Conference on Chemistry and Spectroscopy, San Francisco, CA, October 1970.

Wayne, L.G., "Technology Assessment, 1970," statement at hearings before the Subcommittee on Science, Research and Development of the Committee on Science and Astronautics, U.S. House of Representatives, Ninety-First Congress, Second Session on H.R. 17046. Part II (No. 21), pp. 521-525, 1970.

Wayne, L.G., discussion of paper, "Mathematical Models of Air Quality Control Regions," by John H. Seinfeld, in Development of Air Quality Standards, ed. Atkisson and Gaines, Columbus, Ohio, 1970, pp. 196-199.

Wayne, L.G., "The Environmental Crisis," in Agenda for the Los Angeles Area in 1970, eds. W.Z. Hirsch and S. Hale, Institute of Government and Public Affairs, University of California, Los Angeles, 1969, p. 32.

Wayne, L.G. and Ernest, T.E., "Photochemical Smog, Simulated by Computer," Paper No. 69-15, presented at the 62nd Annual Meeting of the Air Pollution Control Association, New York, 1969.

Wayne, L.G. and Chambers, L.A., "Biological Effects of Urban Air Pollution: A Study of Effects of Los Angeles Atmosphere on Laboratory Rodents," Arch. Envir. Health 16:871, 1968.

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Wayne, L.G., "Health Effects of Photo-Oxidant Smog from Motor Vehicle Emissions," prepared for World Health Organization, Division of Environmental Health, May 1968.

Haagen-Smit, A.J. and Wayne, L.G., "Atmospheric Reactions and Scavenging Processes," chapter 6 in Air Pollution, Vol. I, 2nd ed., ed. Arthur C. Stern, Academic Press, New York, 1968.

Wayne, L.G., "Air Conservation," book review in Quart. Rev. Biol., 42:49. 1969.

Knudson, Jr., A.G., Wayne, L.G. and Hallett, W.Y., "On the Selective Advantage of Cystic Fibrosis Heterozygotes," Am. J. Human Genetics 19:338, 1967.

Wayne, L.G., "Eye Irritation as a Biological Indicator of Photochemical Reactions in the Atmosphere," Atmospheric Environment 1:97, 1967.

Swann, Jr., H.E., Brunol, D., Wayne, L.G. and Balchum, O.J., "Biological Effects of Urban Air Pollution II. Chronic Exposure of Guinea Pigs," Arch. Envir. Health 11:765, 1965.

Wayne, L.G., "Smog: Los Angeles and Other Cities," Scientist and Citizen 7, 4:1-9, March 1965.

Wayne, L.G., "Implementation of an Air Pollution Program," in Proceedings, 4th Annual Bio-Environmental Engineering Symposium: Water and Air Pollution Control, 29 September - 1 October 1964, USAF School of Aerospace Medicine, Brooks Air Force Base, San Antonio, TX.

Wayne, L.G., "Ozone: Protection of the Plants from Injury," letter in Science 142:447, October 1963.

Wayne, L.G., "On the Mechanism of Photo-Oxidation in Smog," Arch. Envir. Health 7:229, 1963.

Wayne, L.G., "Photo-Oxidation Systems with Added Iodine," letter in Science 139:251, 1963.

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Wayne, L.G., "The Chemistry of Urban Atmospheres," Technical Progress Report, Vol. III, Los Angeles County Air Pollution Control District, December 1962.

Hamming, W.J., Mader, P.P., Nicksic, S.W., Romanovsky, J.C. and Wayne, L.G., "Gasoline Composition and the Control of Smog," joint report, Air Pollution Control District, County of Los Angeles and Western Oil and Gas Association, September 1961.

Wayne, L.G. and Romanovsky, J.C., "Rates of Reaction of the Oxides of Nitrogen in Photo-oxidation of Diluted Automobile Exhaust Gases," in Chemical Reactions in the Lower and Upper Atmosphere, pp. 71-81, New York, 1961.

Wayne, L.G. and Orcutt, J.A., "Relative Potentials of Common Organic Solvents as Precursors of Eye Irritation of Urban Atmospheres," J. Occupational Medicine 2:383, 1960.

Broadwell, S.J., Heath, A.E. and Wayne, L.G., "Possible Kinetic Interaction of Ethylene and Other Olefins in Photo-oxidation Systems," paper presented at 4th Conference, Methods in Air Pollution Studies, California State Department of Health, 5-6 December 1960.

Heath, A.E., Broadwell, S.J., Wayne, L.G. and Mader, P.P., "Transitory Products in the Gas Phase Reaction of Ethylene with Ozone," J. Phys. Chem. 64:9, 1960.

Broadwell, S.J., Heath, A.E. and Wayne, L.G., "Infrared Spectra of Samples of Los Angeles Atmosphere," paper presented at Conference Workshop on Techniques in Air Pollution, University of California, Riverside, 15 May 1959.

Wayne, L.G., "Relation of Reactive Components of Gasoline to the Production of 'Photochemical Smog'," prepared for Air Pollution Control District, County of Los Angeles, CA, 8 April 1959.

Wayne, L.G., "A Method for Obtaining Approximate Pore-Size Distribution Curves from Nitrogen Desorption Isotherms," J. Am. Chem. Soc. 73:5498, 1951.

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Wayne, L.G. and Yost, D.M., "Rate of the Rapid Gas Phase Reaction between NO, NO₂ and H₂O," J. Chem. Physics, 19:41, 1951.

Wayne, L.G. and Yost, D.M., *ibid.*, 18:767, 1950.

DR. SHELDON C. PLOTKIN

PROFESSIONAL QUALIFICATIONS

My name is Sheldon C. Plotkin. I am President of S.C. Plotkin & Associates, a consulting engineering firm specializing in accident analysis. I am also a member of several review panels established by the Southern California Federation of Scientists to assess fundamental safety aspects of the UCLA nuclear reactor.

I have over thirty years experience in analysis and design of electronic, electro-mechanical, mechanical, human factors, chemical and computer systems, as well as combinations thereof. My previous employers include:

Los Alamos Scientific Laboratory, Los Alamos, New Mexico -- 1946-7,
design and construction of electronic equipment

U.S. Naval Air Missile Test Center, Point Mugu, California -- 1949-50.
conducted and evaluated missile flight tests

University of California, Berkeley--1950-56
1950-54, teaching assistant in Engineering Department
1954-56, Project Engineer, in charge of operation of the
Cosmic Ray Laboratory

Energy Systems (formerly Levinthal Electronics), Palo Alto, California -- 1956-68
Senior Project Engineer for design and safety of high voltage,
high power pulse modulators.

Hoffman Electronics Corporation -- 1959 to 1961
Consultant in the Communications Systems Department

University of Southern California -- 1958 to 1961
Assistant Professor of Engineering

Hughes Aircraft Company, Culver City, California -- 1961 to 1967
Staff Engineer for G&C Advanced Systems Laboratory

TRW Systems, Redondo Beach, California -- 1967 to 1969
Senior Staff Engineer, ESD Systems Engineering Laboratory

RAND Corporation, Santa Monica, California -- 1969 to 1971
Senior Engineer in the Engineering Sciences Department.

From 1971 to the present I have run a consulting engineering firm which specializes in safety engineering and systems approaches to accident analysis.

I have published several hundred papers, reports, and intra-company documents. Accident and Product Failure Analyses. (book). "Introduction to Accident, Safety, and Forensic Engineering" (seminar).

I am a Registered Professional Safety Engineer, and a member of I.E.E.E., Pi Mu Epsilon, Eta Kappa Nu, Sigma Xi, and the Executive Board of the Southern California Federation of Scientists.

Education: B.S.E.E. (University of Colorado, 1946); B.S. Aero.E. (University of Colorado, 1949);
Ph.D. E.E. (University of California at Berkeley, 1956)

Statement of Professional Qualifications

LOUIS FOSTER

My name is Louis Foster. From 1975 to 1980 I was employed at the Nuclear Environmental Services Division of Science Applications, Inc., involved primarily in radiation safety and environmental protection in and around nuclear facilities.

My duties at SAI included implementation of radiation monitoring systems to determine levels of gamma and beta emitting nuclides in effluent streams and in environmental samples.

I was assigned through SAI to implement radiation monitoring systems at the nuclear power plants at Calvert Cliffs, Oyster Creek, Salem, Peach Bottom, Three Mile Island, Ginna, Indian Point, Vermont Yankee, Main Yankee, Quad Cities, Dresden, Zion, and others.

I have extensive experience in field and lab radiation measurements and quality analysis/quality assurance testing.

When I left SAI I was the Technical Supervisor for the SAI field research team involved with radiation safety monitoring as well as experimental research on radioiodine differentiation and concentration as part of the Three Mile Island Unit 2 cleanup.

I received my Associate of Arts degree in Environmental Science and Technology in 1977 from Montgomery College in Maryland, and thereafter completed numerous courses at the University of Maryland relating to my radiation protection work at SAI.

Professional Qualifications

DAVID R. DUPONT

My name is David R. Dupont. I am a chemist associated with the Southern California Federation of Scientists (SCFS).

I worked, in cooperation with Professor James Warf, a colleague at SCFS, on an assessment of chemical reactions that might affect reactor safety at UCLA. This included assessment of the potential for combustion of the reactor's graphite, magnesium, and/or uranium constituents; the potential for explosive reactions with steam, water, or carbon dioxide should such a fire occur or elevated temperatures otherwise result; Wigner energy storage and other effects of radiation upon the chemical and physical properties of the reactor materials; and the chemistry of fission product release at temperatures above and below the melting point of the fuel meat.

I received a Bachelor of Science Degree in Chemistry from the State University of New York at Albany in 1977. From 1980-1982 I was a Research Associate in the Biological Chemistry Department at the University of California at Los Angeles.

Statement of Professional Qualifications

MIGUEL A. PULIDO

My name is Miguel A. Pulido. I am an engineer employed by McCaughey and Smith Energy Associates, Consulting Engineers, Inc. My work at McCaughey and Smith entails work with energy systems; heating, ventilating, and air conditioning systems; estimating leak rates from buildings and other structures; air flow matters generally; and other related aspects of mechanical engineering.

I received my Bachelor of Science degree in Engineering, with a specialty in Mechanical Engineering and a subspecialty in Energy Engineering, from California State University at Fullerton in 1980.

I am an Associate Member of the American Society of Heating, Refrigeration, and Airconditioning Engineers (ASHRAE) and of the American Society of Mechanical Engineers (ASME). I am a Member of the Association of Energy Engineers.

I am also a member of the Executive Board of the Southern California Federation of Scientists.

ROGER L. KOHN

524 Eleventh Street, Manhattan Beach, CA 90266
(213) 379-3956

Education:

Ph.D.	Applied Physics	1968	Stanford University	1963-1968
M.S.	Applied Physics	1965	Stanford, California	
B.A.	Physics (Honors)	1963	Haverford College	1959-1963
			Haverford, Pennsylvania	

Professional experience:

- Research and development
 - Laboratory experiments
 - Computer simulation
- Systems and mission analysis
 - Performance analysis
 - Test design and evaluation

Fields of specialization:

- Laser and optical systems and applications
 - Communication
 - Atmospheric propagation
 - Object detection, tracking, and ranging
 - Atmospheric pollution measurement
 - Image transmission and display
- Lasers and optical devices
 - Solid-state, gas, and vapor-phase lasers
 - Dye lasers and fluorescence spectroscopy
 - Short optical pulses, modulation, and mode-locking
 - Photodetectors
 - Deflectors and scanners
 - Retroreflectors
 - Frequency doublers and nonlinear effects
 - Xerography and electrophotography
- Electronic devices
 - Gaseous discharges
 - Nuclear-particle detectors

Roger L. Kohn (cont'd)

Employment:

Pacific-Sierra Research Corporation	Senior Scientist
1456 Cloverfield Boulevard	1978 - 1980
Santa Monica, California 90404	

Responsible for performance analysis, and design, supervision, and evaluation of tests of optical systems and components. Specifically, laser rangefinders and trackers have been modeled, the effects of atmospheric turbulence and aerosol scatter analyzed, and interesting targets characterized. The utility of various lasers-- tunable dye, neodymium, and carbon dioxide-- for use in such applications as air to ground, air to sea, and ground to ground has been investigated. Key individual components have been studied and, in some cases, characterized through laboratory measurements. These optical elements include heterodyne detectors, wide-field optical filters, visible and infrared lasers, and retro-reflective devices. Changes in device or system designs or test procedures are recommended through agency or contractor personnel briefings and reports.

The Aerospace Corporation	Member of Technical Staff
Electronics Research Laboratory	1973 - 1978
El Segundo, California	
(P.O. Box 92957, Los Angeles, CA 90009)	

Involved in laser research, development, and the application of optics and lasers to mission-oriented programs. Responsibilities included development of new concepts and devices, conducting of laboratory projects, maintenance of expertise on present and future lasers, systems, and applications, and briefing of agency personnel.

Laser research included study of new dye and vapor-phase lasers with emphasis on small-scale, visible devices, and the investigation of laser noise sources. Applications of optics included the measurement of atmospheric pollutants, transmission spectrum of the atmosphere, and the analysis of precision rangefinders for satellite positioning (e.g. for proposed solar-power stations). Laser lifetime tests were designed for the USAF communication satellite program. Novel concepts were pursued: small particles were levitated by radiation pressure with the aim of rotating the suspended beads for numerous research and device purposes.

Bell Laboratories	Member of Technical Staff
Active Optical Device Department	1968 - 1972
Murray Hill, New Jersey 07974	
and	
Coherent Optics Research Department	
Holmdel, New Jersey 07733	

Roger L. Kohn (cont'd)

Conducted research into fluorescence and lasing properties of dyes and their interactions, excitation, and decay. Computerized data processing and automated spectroscopic equipment were developed to assure reliable results.

Proposed and developed a unique continuously-operating dye laser, independently of other groups previously equipped and working toward this goal, and introduced fundamental design now incorporated in all commercial and most experimental cw dye lasers.

Involved in the development of a high-resolution facsimile recording system, including research and development in gas-discharge and laser image recording, optics and deflection devices, and laser image scanners (the proprietary nature of this work precluded publication).

Microwave Laboratory	Research Assistant
W.W. Hansen Laboratories of Physics	1963 - 1968
Stanford University	
Stanford, California 94305	

Conducted research into the mechanism and applications of mode-locking of ruby lasers. A model for phase- and amplitude-modulated transient mode-coupling of lasers was developed and computer calculations compared with experimental results. Mode-locking was proposed and shown to increase nonlinearly-generated power, and second-harmonic enhancement was used to study locking.

Experimental Reactor Division	Research Assistant
Los Alamos Scientific Laboratory	1963 (summer)
Los Alamos, New Mexico	

Research involved the study of gamma-ray noise mechanisms in nuclear-particle detectors in the vicinity of nuclear reactors.

Bell Telephone Laboratories	Technical Aide
Murray Hill, New Jersey	1961 (summer)

Continued the development and testing of a newly-devised nuclear-particle detector.

Radiation Laboratory	Laboratory Assistant
Johns Hopkins University	1959, 1960 (summer)
Baltimore, Maryland	

Modified, calibrated, and operated an infrared spectrometer.

Roger L. Kohn (cont'd)

Publications:

- "Internal Modulation of Ruby Lasers and Second-Harmonic Generation,"
1966 International Quantum Electronics Conference, Phoenix,
April, 1966. (with R.H. Pantell).
- "Second-Harmonic Enhancement with an Internally-Modulated Ruby Laser,"
Appl. Phys. Letters 8, 231 (1 May 1966) (with R.H. Pantell).
- "Mode Coupling in an External Raman Resonator," Appl. Phys. Letters 9,
104 (1 August 1966) (with R.H. Pantell, B.G. Huth, H.E. Puthoff).
- "Mode Coupling in a Ruby Laser," IEEE J. Quantum Electr. QE-1, 306
(August 1966) (with R.H. Pantell).
- "Mode-Coupling Effects with Ruby Lasers," Ph.D. Dissertation, Stan-
ford University, May 1968; Microwave Laboratory Report 1636.
- "An Intracavity-Pumped CW Dye Laser," Opt. Commun. 3, 177 (May 1971)
(with C.V. Shank, E.P. Ippen, A. Dienes).
- "Observation of Inhomogeneity in the Gain Spectrum of a Coumarin Laser
Dye," Opt. Commun. 7, 309 (April 1973) (with C.V. Shank, A. Dienes).
- "Characteristics of the 4-Methylumbelliferone Laser Dye," IEEE J.
Quantum Electr. QE-9, 833 (August 1973) (with A. Dienes, C.V. Shank).
- "Automated System for Measuring Gains in Organic Dyes," Appl. Opt. 12,
2939 (December 1973) (with C.D. Lingel, C.V. Shank, A. Dienes).

Aerospace Corporation technical reports

- "Laser Transmitter for NASA Satellite Rangefinder," 8 May 1974.
- "Laser Trimming of Precision Resistors for Aerospace Applications," 17
October 1974.
- "Angular Acceleration of Neutral Particles with Laser Radiation," 15
October 1975 (with M. Birnbaum).
- "Low Frequency Pulsation Noise in Continuous Argon-Ion Lasers," 24
October 1975.
- "Short-Range Satellite-to-Satellite Lidar: Cooperative vs. Uncooperative
Targets." 3 February 1976.

Roger L. Kohn (cont'd)

"Retroreflectors for Precision Optical Ranging," 17 February 1976.

"Laser Rangefinder for Use with Satellite Elements of Adaptive Station-kept Array," 30 July 1976.

"Aerospace 405B Laser Communications Laboratory," 13 October 1976.

"Measurement of Off-Axis Beam Intensity of 405-B Downlink," 7 January 1977.

"Dye Laser for KrF-Pumped Formaldehyde Isotope-Separation Applications," 15 August 1977.

"Cerenkov Radiation in Optical Systems," 22 August 1977.

Pacific-Sierra Research Corporation technical reports

"Considerations for a Narrowband Optical Filter for ODCS," July 1978.

"Initial Assessment of OCCULT Performance," July 1978 (with R. Lutomirski).

"Compass Hammer Parametric Tests. Part I," September 1978.

"Application of an OCCULT-Type Laser System to an Electro-Optical Countermeasure," April 1979.

"Geometric Considerations when Using an Optical Scintillometer," January 1979.

"Measurement of Plastic Retroreflector Arrays for Some Radiometric Applications," March 1979.

Patents:

"Dye Laser with Pump Cavity Mode Matched to Laser Resonator"
Inventor: R.L. Kohn. #3 766 488, October 16, 1973.

Others submitted to employers for further action.

Roger L. Kohn (cont'd)

Professional affiliations:

American Physical Society, IEEE, AAAS, Sigma Xi.

Personal data:

Born - 1 December 1941, Baltimore, Maryland.

Citizenship - U.S.A.

Statement of Professional Qualifications

STEVEN AFTERGOOD

My name is Steven Aftergood. I am an environmental researcher on the staff of the Committee to Bridge the Gap. I am also a member of the Southern California Federation of Scientists.

I received my Bachelor of Science degree, cum laude, from the School of Engineering at the University of California at Los Angeles in 1977. In 1977 I was also elected to Tau Beta Pi.

In 1978 I was employed by Meret Opto-Electronics, a fiber optics firm, as an applications engineer. In 1980 I was employed as a research physicist at the Technion, in Haifa, Israel, working on the development of photovoltaics from amorphous silicon. In early 1981 I joined the staff of the Committee to Bridge the Gap.

My responsibilities at the Committee to Bridge the Gap include research into local environmental issues and, in particular, coordination of the technical review of the UCLA reactor license application.

Statement of Professional Qualifications

DANIEL O. HIRSCH

My name is Daniel O. Hirsch. I am President of the Committee to Bridge the Gap and a Visiting Lecturer at the University of California at Los Angeles.

At CBG I am Project Manager for the technical review of the UCLA reactor license renewal application. In that capacity I participate in and oversee the scientific review of the UCLA application, the Staff analyses, and the materials produced through discovery.

I helped found CBG in 1970 and have been associated with it since that time. In addition to the UCLA application, I have been Project Manager of the environmental assessment of the radioactive waste dump in Brentwood being considered by the City of Los Angeles as the site of a proposed park; review of past accidents at the Atomics International facility in Santa Susana, in particular the Sodium Reactor Experiment (SRE) partial meltdown and subsequent assessment of consequences attendant thereto; review of the potential for criticality accidents at the Atomics International fuel fabrication facility in Canoga Park; review of past ocean disposal of radioactive waste and potential environmental impacts of proposed renewal of the practice by the United States, particularly with regards submarine reactor vessels.

I am a member of the Ad Hoc Scientific Advisory Committee to the Joint Committee on Fisheries and Aquaculture of the California Legislature, assessing the impacts of past and proposed ocean radwaste disposal off the California coast; the Hazardous Materials Task Force Advisory Committee of the City of Los Angeles, assessing local zoning and other regulation of radioactive materials; and the Executive Board of the Southern California Federation of Scientists. I have provided technical review of SCFS studies on conversion of partially-completed nuclear power plants, emergency planning at California nuclear power plants, and initiators of accidental nuclear war.

I chaired one of the two panels on public health impacts of the nuclear fuel cycle at the first "science court" conducted by the American Public Health Association, at its annual convention in 1981. I am co-author, with Professor Jackson Davis, Professor John Van Dyck and colleagues of his at the University of Hawaii, of "Ocean Disposal of Radioactive Wastes: An Assessment," the technical background documents submitted by several Pacific island nations to the upcoming London Dumping Convention.

I received my B.A. from Harvard University in 1972, magna cum laude, in Special Studies, an interdisciplinary program. Since spring 1975 I have been a Lecturer at the University of California at Los Angeles, in an interdisciplinary program called the Council on Educational Development, a program of the UCLA Academic Senate. I am currently teaching "Energy Alternatives and Public Policy," which crosses technical and policy lines on nuclear and related issues.

In August, 1981, I was approved by the Atomic Safety and Licensing Board in the UCLA reactor proceeding as an "expert interrogator" under 10 CFR 2.733 (LEP-81-29, 14 NRC 353). I have presented invited testimony on nuclear matters before the U.S. Radiation Policy Council, the Subcommittee on Energy, Environment, and Natural Resources of the Government Operations Committee of the U.S. House of Representatives, the Joint Committee on Fisheries and Aquaculture of the California Legislature, and numerous other governmental bodies.