

ORIGINAL

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

In the Matter of)	
PACIFIC GAS AND ELECTRIC COMPANY)	Docket Nos. 50-275
(Diablo Canyon Nuclear Power)	50-323
Plant, Units No. 1 and 2))	(Reopened Hearing --
)	Design Quality
)	Assurance)

LICENSEE PACIFIC GAS AND ELECTRIC COMPANY'S
FIRST SUPPLEMENTAL RESPONSE TO
GOVERNOR DEUKMEJIAN'S THIRD SET OF INTERROGATORIES

INTERROGATORY 26

(b) See also PGandE letter to the NRC, dated August 30,
1983 (Enclosure 2, Attachment 13).

INTERROGATORY 46

(b) See also PGandE letter to the NRC, dated August 30,
1983 (Enclosure 2, Attachment 5), and ITR-55, Rev. 0,
Section 4.2.12.

INTERROGATORY 48

(b) The documents pertinent to this matter are identified
in our response to Number 48(a) above. See also PGandE

1 letter to the NRC, dated June 15, 1983 (ref. EOI 8014).

2 See also FSAR Update Change Notices for EOIs 8028,

3 8029, 8030, 8031, 8049, 8051, 8055, and 8059.

4
5 CONTENTION 4(e)

6 Contention 4(e) should be changed as follows: Rev. "D"

7 to Rev. "O".

8
9 INTERROGATORY 56

10 (b)(17)(f) PGandE Audit 83170S; September 14, 1983;
11 signed by G. W. Heggli, A. Ozeroff,
12 C. Kesinger, and S. M. Skidmore; to J. O.
13 Schuyler.

14 INTERROGATORY 61

15 See Attachment A.

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Respectfully submitted,

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Attorneys for
Pacific Gas and Electric Company

By _____
Dan G. Lubbock

DATED: September 28, 1983.

1 UNITED STATES OF AMERICA
2 NUCLEAR REGULATORY COMMISSION
3 BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD
4

5 In the Matter of)
6 PACIFIC GAS AND ELECTRIC COMPANY) Docket Nos. 50-275
7 (Diablo Canyon Nuclear Power) 50-323
8 Plant, Units No. 1 and 2) (Reopened Hearing --
Design Quality
Assurance)

9 CERTIFICATION

10 I, Dan G. Lubbock, hereby certify:

11 1. I am one of the attorneys for Licensee
12 Pacific Gas and Electric Company in the above-entitled
13 matter and, as such, am authorized to execute this
14 certification.

15 2. I have read the foregoing Supplement of
16 Licensee Pacific Gas and Electric Company to Answers to
17 Governor's First and Third Set of Interrogatories, and know
18 the contents thereof.

19 3. I am informed and believe the answers to said
20 interrogatories to be true and correct.

21 I certify under penalty of perjury that the
22 foregoing is true and correct.

23 Executed at San Francisco, California, on
24 September 28, 1983.
25
26

DAN G. LUBBOCK

ATTACHMENT A

ATTACHMENT A IS THE SUPPLEMENTATION
OF ATTACHMENT C
TO PACIFIC GAS AND ELECTRIC COMPANY'S
ANSWERS
TO GOVERNOR DEUKMEJIAN'S
THIRD SET OF INTERROGATORIES

LINCOLN E. MALIK

(f) i) Docket #50-275

Lincoln E. Malik

structural engineering
earthquake engineering
probability analysis
soils engineering

EDUCATION

University of California, Berkeley: Ph.D. Structural Engineering, 1976
Stanford University: Degree of Engineer, 1970
Stanford University: M.S. Civil Engineering, 1969
University of California, Berkeley: B.S. Civil Engineering, 1964

PROFESSIONAL HISTORY

URS/John A. Blume & Associates, Engineers, San Francisco, California, Manager of Structures Department, 1979-present; Project Engineer, 1976-1979
University of California, Berkeley, Department of Civil Engineering, Research Assistant, 1971-1976
Sargent and Lundy Consulting Engineers, Chicago, Illinois, Design Engineer, 1965-1968
Westenhoff and Novak Consulting Engineers, Chicago, Illinois, Design Engineer, 1964

PROFESSIONAL EXPERIENCE

Dr. Malik has had extensive experience in structural engineering, risk analysis, and soils engineering. His experience includes the seismic analysis of nuclear power plants, high-rise buildings, and buried structures; design of reinforced concrete and steel structures; assessment of earthquake damage; risk analysis of nuclear-related equipment and structures; foundation design; and slope-stability analysis. He is also a member of selected professional committees engaged in establishing state-of-the-art procedures for the seismic analysis of nuclear facilities.

Among other major projects, Dr. Malik supervised the seismic reanalysis and design of modifications for the Connecticut Yankee nuclear power plant in response to the Systematic Evaluation Program (SEP) initiated by the Nuclear Regulatory Commission (NRC). He directed the effort to develop the structural criteria and the technical approach to model, analyze, and design the modifications for the entire plant. He also supervised the development of project-specific computer programs and preliminary parametric studies and the preparation of responses to NRC staff questions.

Dr. Malik was also responsible for supervising the analysis, evaluation, and design of modifications of safety-related masonry walls in response to IE Bulletin 80-11. For this project, criteria documents were developed for three nuclear plants, and a full evaluation and design of modifications was completed for the masonry walls at the Connecticut Yankee plant. He also participated in the owners group that developed generic criteria for use in all plants.

PROFESSIONAL EXPERIENCE (Continued)

His supervision of the seismic evaluation and risk analysis of the Purex facility structures at the Hanford reservation in Washington included overseeing the nonlinear analyses of several structures. Also involved, in association with a subcontractor, was a risk analysis to develop fragility curves for the structures at the facility.

In connection with the seismic review of the Diablo Canyon Nuclear Power Plant for a postulated earthquake on the Hosgri fault, Dr. Malik supervised the reevaluation of the containment and auxiliary structures, providing such work as development of seismic criteria, mathematical modeling, soil-structure interaction analysis, dynamic analysis, and assistance in the development of the seismic sections of the PSAR and FSAR documents. In this work, he often met with NRC staff and clients to resolve problems and offered expert testimony at hearings before the Advisory Committee on Reactor Safeguards and the Atomic Safety and Licensing Board. He also coordinated a seismic research program for Pacific Gas and Electric Company involving several engineering and scientific firms.

His nuclear experience has also included structural analyses and design of structures at the Quad Cities Nuclear Power Plant, seismic analysis of buried nuclear waste storage tanks at the Hanford facility, and SEP work for the Dresden 2 and Oyster Creek nuclear power plants.

Dr. Malik's probability analysis experience includes supervision of a project to assess both the reliability of industrial cranes and added reliability resulting from redundancies along the crane's loading path.

Soils engineering, which was one of Dr. Malik's minors in his doctoral studies, is another area of his professional expertise. He was responsible for the analysis and design of the crusher building at the River Rouge Plant in Michigan, which was sunk as a caisson in very soft clay. He also directed projects requiring the design of foundations at several power plants and slope-stability analyses under gravity and seismic loads.

In addition, Dr. Malik has performed static and dynamic analyses to investigate the response of the Olive View Medical Center in Los Angeles to the 1971 San Fernando earthquake. He also investigated the contribution of floor systems to the dynamic characteristics of buildings.

AFFILIATIONS

ASCE Seismic Analysis of Safety Class Structures Standards Committee,
Nuclear Standards Committee

R. C. ANDERSON

- (f) i) Docket # 1. 50-344
2. 50-263
- ii) Case # 1. Trojan
2. Monticello
- (g) i) Date: 1. 1978 - 1980
2. 1971
- ii) Yes
- iii) No
- iv) No

PROFESSIONAL QUALIFICATIONS OF

RICHARD C. ANDERSON

My name is Richard C. Anderson. I am the Engineering Manager in the Diablo Canyon integrated project organization consisting of Pacific Gas and Electric Company and Bechtel Power Corporation employees. I am a Registered Mechanical and Nuclear Engineer in the State of California. I hold a BS degree in Mechanical Engineering from the University of California at Berkeley.

I have been with Bechtel for more than 24 years and for the past five years have been assigned as an Engineering Manager in Bechtel's San Francisco Division, responsible for all engineering work in the Pacific Northwest and Japan. I have been assigned since March, 1982, specifically to the Diablo Canyon Project to act as Project Engineering Manager. Prior to these Engineering Manager assignments, I was the Chief Nuclear/Environmental Engineer for Bechtel's San Francisco Power Division, involved in nuclear power plant design, safety, and operation.

Prior to that, I was assigned as an Assistant Project Engineer on a proposed nuclear power plant project for PGandE and as Mechanical Supervisor and later Project Engineer on another large nuclear power plant project in the United States. These assignments included supervision and coordination of design, specification, procurement, and quality control activities.

I also served as Senior Mechanical Engineer for various other nuclear power facility projects in the United States and abroad, which included work in systems, safety and equipment engineering.

I have been an instructor in Bechtel's power plant courses for over 10 years and have given numerous talks and lectures in California on nuclear power and energy issues.

W. H. WHITE

(f)	i)	50-344
	ii)	Trojan
(g)	i)	Date: 1978 - 1980
	ii)	No
	iii)	No
	iv)	No

PROFESSIONAL QUALIFICATIONS OF

DR. WILLIAM H. WHITE

My name is William H. White. I am an Assistant Project Engineer in the Diablo Canyon integrated organization consisting of Pacific Gas and Electric Company and Bechtel Power Corporation employees. My responsibilities include supervision and direction of seismic-related engineering analyses for the Diablo Canyon Unit 1 Project Engineering Organization. I am a Registered Professional Engineer and member of the American Society of Civil Engineers.

My educational background includes: BS, Civil Engineering, University of Idaho; MS, Civil Engineering, University of Colorado; PhD, Civil Engineering, University of Colorado.

For the past five years, I have been an engineering specialist with Bechtel's San Francisco Power Division working with the Chief Civil Engineer's staff in the area of seismic analysis for several Bechtel projects.

Earlier, I was a Structural Engineer with the Tennessee Valley Authority where I was responsible for seismic analysis of all Category I structures for a twin-unit nuclear power plant, including seismic input for the design of the nuclear steam supply system.

I was an Assistant Professor at Oregon State University where I taught undergraduate and graduate courses in structural mechanics and analysis and computer applications. I performed a special study for Bechtel on soil-structure interaction for the proposed Mendocino nuclear power plant while teaching at Oregon State University.

While employed at the Bettis Atomic Power Laboratory, I was a Senior Engineer working on shock analysis of nuclear reactors aboard submarines and was involved in programs to assess the shock resistance of reactor internals subjected to long-term irradiation damage.

S. M. SKIDMORE

ii)	No
iii)	No
iv)	No

PROFESSIONAL QUALIFICATIONS OF
STEVEN M. SKIDMORE

My name is Steven M. Skidmore. I have been the Manager of Quality Assurance in the Nuclear Power Generation Department in the Pacific Gas and Electric Company since May, 1983. I am responsible for the quality assurance of Diablo Canyon Power Plant construction and engineering. Prior to that, I was the Assistant Project Manager to the Diablo Canyon Project, between February, 1982 and May, 1983, where I was responsible for management of the Diablo Canyon Construction Quality Assurance Evaluation, as well as other functions.

Between 1972 and 1982, I was employed by Pacific Gas and Electric Company as an engineer in various capacities, including engineer in the Mechanical and Nuclear Engineering Department, Assistant to the Nuclear Projects Engineer, Technical Assistant to the Vice President of Nuclear Power Generation, and Supervising Personnel and Environmental Safety Engineer. In these positions, my responsibilities included analyses of reactor physics and fuel cycle evaluations for Diablo Canyon, and the management and coordination of development of the emergency plans for Diablo Canyon.

Between 1967 and 1971, I was employed as a Research Assistant in the Department of Mechanical Engineering at Stanford University, where I was enrolled as a graduate student of nuclear engineering.

Between 1962 and 1967, I was employed by the General Electric Company, both at the Hanford Atomic Products Operations Office and at the Nuclear Energy Division. My responsibilities included engineering work in pile physics, and the analyses of reactor physics for reactor fuel manufacturers and a plutonium production laboratory.

I am a Registered Professional Nuclear Engineer in the State of California. I have a MS degree in Nuclear Engineering from Stanford University in 1969, and a BS degree in Physics from Oregon State University in 1962.

M. J. JACOBSON

(g) i)

2. 1974

PROFESSIONAL QUALIFICATIONS OF
MICHAEL J. JACOBSON

My name is Michael J. Jacobson. I am the Project Quality Assurance (QA) Engineer for the Diablo Canyon Project consisting of the integrated organization of Bechtel Power Corporation and Pacific Gas and Electric Company. I am a Registered Professional Quality Engineer in the State of California.

My educational background is as follows: BS in Civil Engineering, Sacramento State College, 1970; Business Management Certificate in Management, Golden Gate University, 1979.

I joined Bechtel Power Corporation in 1970 as a Quality Assurance Engineer responsible for various aspects of design phase quality assurance on a nuclear power plant project. I was subsequently responsible for performing structural design and seismic analysis activities on the project. Later, I was assigned as Project Quality Assurance Engineer responsible for supervising project QA activities, including direction of quality audits of construction activities.

Subsequently, I was assigned Project QA Engineer on various other nuclear power plants, where I was responsible for directing project QA programs. I was responsible for ensuring that project construction and site activities, as well as quality control aspects, met applicable QA and regulatory requirements.

I was assigned to the Diablo Canyon project in 1982 to direct and control the QA program for this project.

C. W. DICK

ii)	No
iii)	No
iv)	No

PROFESSIONAL QUALIFICATIONS OF

CHARLES W. DICK

My name is Charles W. Dick. I am a Project Manager and a member of the project management team of the Diablo Canyon Project consisting of the integrated organization of Bechtel Power Corporation and Pacific Gas and Electric Company, and with responsibilities which include quality assurance. I am a Licensed Professional Engineer in the states of California, New York, and Pennsylvania.

My educational background is as follows: BS in Electrical Engineering, California Institute of Technology, 1946; MS in Electrical Engineering, Stanford University, 1948.

I have also had additional training through Advanced Engineering Programs in Business Administration and from various technical and business courses.

Prior to my recent assignment to the Diablo Canyon Project, I was Manager of Division Quality Assurance Division at the Bechtel Power Corporation from 1980 to 1982. My responsibilities included formulating the QA programs for implementing such programs, and training QA personnel for some 14 nuclear projects.

I joined Bechtel Power Corporation in 1965 and worked as a Project Engineer on various nuclear and fossil-fuel projects. I was responsible for project engineering work for a number of different types of power projects and studies, for nuclear standards development and for licensing. Beginning in 1973, I became an Engineering Manager and subsequently Manager of Engineering, with overall management responsibility for the project engineering work on more than 20 power plant projects.

Prior to my employment at Bechtel, I was engaged as an engineer with the General Electric Company beginning in 1948. During that time, I was involved in marketing and application engineering related to nuclear power facilities. Prior to that I was assigned as an electric utility applications engineer and provided consultation services involving heavy electrical apparatus.

I am a senior member of IEEE and a member of the American Society for Quality Control. I was also a member of the industry working group for development of ANSI Standard N45.2.11 (Quality Assurance Standards for Design of Nuclear Power Plants).

G. H. MOORE

(f) None

(g) i) N/A

ii) No

iii) No

iv) No

PROFESSIONAL QUALIFICATIONS OF

GARY H. MOORE

My name is Gary H. Moore. I am the Unit 1 Project Engineer of the Diablo Canyon Project consisting of the integrated organization of Pacific Gas and Electric Company and Bechtel Power Corporation. I have held this position since January, 1982. I am responsible for the project engineering work related to the design and analysis of Diablo Canyon Power Plant Unit 1. I am a Registered Professional Engineer in Mechanical and Control Systems in the State of California.

My educational background is as follows: BS in Mechanical Engineering, San Jose State University, 1968; MS in Mechanical Engineering, San Jose State University, 1969.

I joined PGand E in 1969 as a Mechanical Engineer in the Mechanical and Nuclear Engineering Department, designing instrumentation and control (I&C) systems for conventional fossil plants.

In 1977, I was named a Senior Mechanical Engineer supervising the I&C Group assigned to the Potrero Unit 7 Project.

In 1979, I was named Supervising Mechanical Engineer, supervising the Mechanical and Nuclear Engineering Department's entire I&C Group, including responsibility for the I&C design of the Diablo Canyon Power Plant.

I have completed the following formal training courses: Simulator Training, Westinghouse Nuclear Training Center, Zion, Illinois; Westinghouse PWR Information Course.

DR. S. KAPLAN

- (f) i) Docket # 1) 50-247, 50-286
2) 50-320
3) LA-80-001-AK
4) CP76-96
- ii) Case # 1) Consolidated Edison's Indian
Point Plant, Units 2 and 3
2) Metropolitan Edison Co. - TMI
Unit 2
3) Northern States Power Co. -
Prairie Island
4) USA Fed. Power Comm., Canadian
Arctic Gas Pipeline
- (g) i) Date: 1) January 24, 1983
2) March 20, 1979
3) May 29, 1980
4) August 20, 1976
- ii) Yes
- iii) No
- iv) No

PROFESSIONAL QUALIFICATIONS OF

DR. STANLEY KAPLAN

EDUCATION:

Senior Post-Doctoral Fellowship, University of Southern California, 1967-1969.
Ph.D., Mechanical Engineering and Applied Mathematics, University of Pittsburgh, 1960. Post-doctoral courses in mathematics at the University of Pittsburgh and Carnegie Institute of Technology, 1960-1965.
M.S., Mechanical Engineering, University of Pittsburgh, 1958.
Graduate of the Oak Ridge School of Reactor Technology, 1955.
B.S., Civil Engineering, City College of New York, 1954.

PROFESSIONAL EXPERIENCE:

General Summary

Mathematician and engineer well known for contributions to risk analysis and reliability theory, reactor physics, kinetics, and computational technique. Specializes in probabilistic methodology; decision theory; risk analysis; and, particularly, applications of Bayes' theorem. In this connection, has worked specifically and recently on developing probabilistic and decision theoretic treatments of various phases of the energy business. Included here are PRA analyses of several existing nuclear plants, hazardous material transportation and storage, spent fuel pools, aircraft impact, offshore oil drill (environmental risk), underground oil storage, pipelines, and tarsands projects (business and construction risk). Developer of the DPD method for probabilistic calculations, the two-stage Bayesian technique for data analysis, the "set of triplets," "probability of frequency," "cause table," and "environmental table" concepts in risk analysis. Originator of the Matrix Theory of Event Trees and DPD approach to seismic risk analysis.

Chronological Summary

1977 - Present President, Kaplan & Associates, Inc., a consulting firm specializing in risk analysis and applied decision theory.

Concurrently Adjunct Professor, Department of Chemical, Nuclear and Thermal Engineering, University of California, Los Angeles, and Associate Consultant, Pickard, Lowe and Garrick, Inc.

1975-1977 Private consultant specializing in risk analysis and decision theory.

1972-1975 Holmes & Narver, Inc., Anaheim, California
 Director, Advanced Technology Division;
 Director, Systems Sciences Division
 Technical Director, Nuclear & Systems Science Group

1971-1972 Director of Software Development, COMARC Design Systems, Inc., San Francisco, California.

1969-1971 Product Manager and Senior Staff Member, Computer Sciences Corporation, Los Angeles, California.

1967-1969 Special Research Fellow, U.S. Public Health Service at University of Southern California, Los Angeles.

1955-1967 Westinghouse Bettis Atomic Power Laboratory, West Mifflin, Pennsylvania.
 Experimentalist, Experimentalist in Charge, Scientist,
 Senior Scientist, Fellow Scientist, Advisory Scientist.

1954 Lecturer, Department of Civil Engineering, City College of New York.

1962-1967 Concurrently Adjunct Professor of Mechanical Engineering, University of Pittsburgh; Lecturer, Department of Mathematics, Carnegie Institute of Technology.

MEMBERSHIPS, PAST OR PRESENT:

American Society of Civil Engineers
 American Nuclear Society
 Society of Industrial and Applied Mathematics
 New York Academy of Sciences

LIST OF PUBLICATIONS OF

DR. STANLEY KAPLAN

Kaplan, S., "On a 'Two-Stage' Bayesian Procedure for Determining Failure Rates from Experiential Data," PLG-0191, IEEE Transactions on Power Apparatus and Systems, Vol PAS-102, No. 1, January 1983.

Garrick, B. J., and S. Kaplan, Chapter 2.7, "Electric Power," High Risk Safety Technology, A.E. Green, Editor, John Wiley & Sons, Ltd., 1982.

Kaplan, S., "On Safety Goals and Related Questions," Reliability Engineering, Vol. 3, No. 4, July 1982, 267-277.

Kaplan, S., "A Matrix Theory Formalism for Event Tree Analysis," Risk Analysis, Vol 2, No. 1, March 1982.

Kaplan, S., B.J. Garrick, and P.P. Bieniarz, "On the Use of Bayes' Theorem in Assessing the Frequency of Anticipated Transients," Nuclear Engineering and Design, Vol. 065, ISS., 23-32 (1981).

Kaplan, S., "On the Method of Discrete Probability Distributions in Risk and Reliability Calculations - Application to Seismic Risk Assessment," Risk Analysis, Vol. 1, No. 3, September 1981.

Kaplan, S., and B. J. Garrick, "On the Quantitative Definition of Risk," Risk Analysis, 1, 1, May 1981.

Apostolakis, G., and S. Kaplan, "Pitfalls of Risk Calculations," Reliability Engineering, 2, 2, 135-145, April 1981.

Kaplan, S., B. J. Garrick, and G. Apostolakis, "Advances in Quantitative Risk Assessment - The Maturing of a Discipline," IEEE Transactions on Nuclear Science, NS-28, No. 1, February 1981.

Kaplan, S., and B. J. Garrick, "Some Misconceptions About Misconceptions," Letter to the Editor, Risk Analysis, Vol. 1, No. 4, December 1981.

Apostolakis, G., S. Kaplan, B. J. Garrick, and R. J. Duphily, "Data Specialization for Plant Specific Risk Studies," Nuclear Engineering and Design, Vol. 56, 321-239 (1980).

Kennedy, R. P., A. C. Cornell, R. D. Campbell, S. Kaplan, and H. F. Perla, "Probabilistic Seismic Safety Study of an Existing Nuclear Power Plant," Nuclear Engineering and Design, 59, 2, August 1980.

Kaplan, S., and B. J. Garrick, "Try Probabilistic Thinking to Improve Power Plant Reliability," Power, March 1980.

Kaplan, S., and B. J. Garrick, "On the Use of Bayesian Reasoning in Safety and Reliability Decisions - Three Examples," Nuclear Technology, 44, 231-245 (1979).

Apostolakis, G., S. Kaplan, B. J. Garrick, and W. Dickter, "Assessment of the Frequency of Failure To Scram in Light Water Reactors," Nuclear Safety, Vol. 20, No. 6, November-December 1979.

Kaplan, S., "On a Probabilistic Approach to Project Cost Estimating," Consulting Engineer, February 1976.

Garrick, B. J., and S. Kaplan, "Reliability Technology and Nuclear Power," IEEE Transactions on Reliability, Special Issue on Nuclear Systems Reliability and Safety, Vol. R-25, No. 3, August 1976.

Kaplan, S., "On a Bayesian Type Methodology for Making Accept/Reject Decisions on Offshore Lease Bids," Journal of Petroleum Technology, March 1976.

Kaplan, S., and D. Trujillo, "Numerical Studies of the Partial Differential Equations Governing Nerve Impulse Conduction-I, the Significance of Lieberstein's Inductance Term," Journal of Mathematical Biosciences, 7, 379-404 (1970).

Kaplan, S., "Variational Methods in Nuclear Engineering," Advances in Nuclear Science and Technology, Vol. V, P. R. Greebler, editor, Academic Press (1969).

Kaplan, S., A. J. McNabb, J. K. Siemsen, and D. Trujillo, "The Inverse Problem of Radioisotope Diagnosis - A Computational Model for Determining the Size and Location of Tumors," Journal of Mathematical Biosciences, 5, 29-35 (1969).

Yasinsky, J. B., and S. Kaplan, "On the Use of Dual Variational Principles for the Estimation of Error in Approximate Solutions of Diffusion of Problems," Nuclear Science and Engineering, 31, 80-90 (1968).

Kaplan, S., "Canonical and Involutory Transformations of Variational Problems Involving Higher Derivatives," Journal of Mathematical Analysis and Applications, 22, 1, 45-53 (1968).

Yasinsky, J. B., and S. Kaplan, "Anomalies Arising from the Use of Adjoint Weighting in a Collapsed Group Space Synthesis Model," Nuclear Science and Engineering, 31, 2, 354 (1968).

Kaplan, S., A. J. McNabb, and M. B. Wolf, "Input-Output Relations for a Counter Current Dialyzer by the Method of Invariant Imbedding," Journal of Mathematical Biosciences, 3, 3, 289-293 (1968).

Kaplan, S., "A New Derivation of Discrete Ordinate Approximations," Nuclear Science and Engineering, 34, 1, 76 (1968).

Yasinsky, J. B., and S. Kaplan, "Synthesis of Three-Dimensional Flux Shapes Using Discontinuous Sets of Trail Functions," Nuclear Science and Engineering, 28, 426-437 (1967).

Kaplan, S., and J. A. Davis, "Canonical and Involutory Transformations of the Variational Principles of Transport Theory," Nuclear Science and Engineering, 28, 2, 166-176 (1967).

Kaplan, S., J. A. Davis, and M. Natelson, "Space-Angle Synthesis - An Approach to Transport Approximations," Nuclear Science and Engineering, 28, 364-375, (1967).

Kaplan, S., "Properties of the Relaxation Lengths in P1-Double-P1 and Angle-Space Synthesis Type Approximations," Nuclear Science and Engineering, 28, 450-463 (1967).

Kaplan, S., and J. B. Yasinsky, "Natural Modes of the Xenon Problem with Flow Feedback - An Example," Nuclear Science and Engineering, 25, 430-438 (1966).

Gelbard, E. M., and S. Kaplan, "Reality of Relaxation Lengths in Various Approximate Forms of the Slab Transport Equation," Nuclear Science and Engineering, 26, 4, 569 (1966).

Kaplan, S., "Synthesis Methods in Reactor Theory," Advances in Nuclear Science, Vol. 111, Academic Press, June 1966.

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Kaplan, S., E. M. Gelbard, "Invariant Imbedding and the Integration Techniques of Reactor Theory," Journal of Mathematical Analysis and Applications, 11, No. 1-3, 538-547, (1965).

Henry, A. F., and S. Kaplan, "Some Applications of a Multimode Generalization of the Inhour Formula," Nuclear Science and Engineering, 22, 4, 479-486, (1965).

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Kaplan, S., "The Use of the Rayleigh-Ritz Method in Non-Self Adjoint Problems," IEEE Transactions, MIT-12, 2 (1964).

Kaplan, S., Editor and Contributor, Section 5.5, "Space-Time Kinetics," Naval Reactors Handbook, Vol. 1.

Kaplan, S., A. F. Henry, S. G. Margolis, and J. J. Taylor, "Space-Time Reactor Dynamics," Proceedings, Third United Nations International Conference on the Peaceful Uses of Atomic Energy, Geneva (1964).

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Kaplan, S., and S. G. Margolis, "Delayed Neutron Effects During Flux Tilt Transients," Nuclear Science and Engineering, 7, 3, 276 (1960).

Kaplan, S., and G. Sonnemann, "A Generalization of the Finite Integral Transform Technique and Tables of Special Cases," Proceedings of Mid-Western Conference on Solid and Fluid Mechanics, Austin, Texas (1959).

Goldsmith, M., T. T. Jones, T. M. Ryan, S. Kaplan, and A. D. Vorhis, "Theoretical Analysis of Highly Enriched Light Water Moderated Critical Assemblies," Proceedings, Second United Nations International Conference on the Peaceful Uses of Atomic Energy, Paper P/2376 (1958).

REPORTS AND PRESENTATIONS

- Kaplan, S., "Bayesian Methods in PRA," presented at the American Nuclear Society Topical Meeting: Advances in Reactor Computations, PLG-0265, March 28-31, 1983.

"Seabrook Probabilistic Safety Assessment," Public Service Company of New Hampshire, to be published in 1983.

Kaplan, S., M. T. L. Ma, J. C. Wang, and C. P. Purohit, "Probabilistic Risk and Decision Analysis of General Electric Turbine Cracking Problem," PLG-0246, September 1982.

Kaplan, S., H. F. Perla, and D. C. Bley, "A Methodology for Seismic Safety Analysis of Nuclear Power Plants," presented at the International Meeting on Thermal Nuclear Reactor Safety, Chicago, Illinois, August 29-September 2, 1982.

Bley, D. C., S. Kaplan, and B. J. Garrick, "Assembling and Decomposing PRA Results: A Matrix Formalism," presented at the International Meeting on Thermal Nuclear Reactor Safety, Chicago, Illinois, August 29-September 2, 1982.

Fleming, K. N., S. Kaplan, and B. J. Garrick, "Seabrook Probabilistic Safety Assessment Management Plan," PLG-0239, June 1982.

Garrick, B. J., S. Kaplan, D. C. Iden, E. B. Cleveland, H. F. Perla, D. C. Bley, D. W. Stillwell, H. V. Schneider, and G. Apostolakis, "Power Plant Availability Engineering: Methods of Analysis, Program Planning, and Applications," EPRI NP-2168, PLG-0165, May 1982.

"Indian Point 2 and 3 Probabilistic Safety Study," Power Authority of the State of New York and Consolidated Edison Company of New York, Inc., March 1982.

Lin, J. C., and S. Kaplan, "SEIS3: A Computer Program for Seismic and Wind Risk Assessment," PLG-0222, March 1982.

"Zion Probabilistic Safety Study," Commonwealth Edison Company, September 1981.

Kaplan, S., "The Bayesian Approach to Data Reduction in Probabilistic Risk Analysis," PLG-0205 prepared as input to the NRC/ANS Probabilistic Risk Assessment Procedures Guide, September 1981.

Stillwell, D. W., B. J. Garrick, D. R. Buttemer, G. Apostolakis, J. C. Lin, and S. Kaplan, "Analysis of the Pilgrim Nuclear Power Station Reactor Protection System," PLG-0195, July 1981.

Kaplan, S., "Matrix Format for PRA and Its Possible Usefulness in Licensing," presented to the ACRS Subcommittee on Reliability and Probabilistic Risk Assessment, Los Angeles, California, July 28, 1981.

Kaplan, S., G. Apostolakis, B. J. Garrick, D. C. Bley, and K. Woodard, "Methodology for Probabilistic Risk Assessment of Nuclear Power Plants," PLG-0209, June 1981.

Kaplan, S., "Scarce Data Analysis Techniques," ANS 1981 Annual Meeting, Transactions, Miami, Florida, June 7-11, 1981.

Mulvihill, R. J., and B. J. Garrick, R. S. Hanson, S. Kaplan, Y. G. Mody, D. A. Reny, L. H. Reichers, and H. V. Schneider, "Comparative Evaluation of Boiler Availability for Intermountain Power Project," PLG-0169, April 1981.

Garrick, B. J., S. Kaplan, and N. O. Siu, "Definition of Bounding Physical Tests Representative of Transport Accidents - Rail and Truck," PLG-0164, March 1981.

Kaplan, S., L. H. Reichers, and B. J. Garrick, "Histogram Convolution Program (HICOP)," PLG-0157, December 1980.

Hanson, R. S., J. C. Lin, D. M. Wheeler, S. Kaplan, B. J. Garrick, D. C. Iden, W. B. Holder, and L. G. H. Sarmanian, "An Assessment of the Reliability of Turbine-Generators," PLG-0155, November 1980.

Garrick, B. J., S. Kaplan, D. C. Iden, E. B. Cleveland, H. F. Perla, D. C. Bley, and D. W. Stillwell, "Power Plant Availability Engineering, Methods of Analysis - Program Planning - Applications," 2 Vols., PLG-0148, October 1980.

Kaplan, S., R. S. Hanson, B. J. Garrick, and J. W. Stetkar, "A Strategic Plan for a National Data System for Electric Power Plants," PLG-0144, July 1980.

Garrick, B. J., S. Kaplan, G. Apostolakis, D. C. Iden, K. Woodard, and T. E. Potter, "Seminar: Probabilistic Risk Assessment of Nuclear Power Plants," PLG-0141, July 1980.

Garrick, B. J., S. Kaplan, and D. C. Bley, "Seminar: Power Plant Probabilistic Risk Assessment and Reliability," PLG-0127, May 1980.

Garrick, B. J., and S. Kaplan, "A Conceptual Plan for a National Data System for Electric Power Plants," PLG-0131, April 1980.

Garrick, B. J., and S. Kaplan, "Oyster Creek Probabilistic Safety Analysis (OPSA)," presented at the ANS-ENS Topical Meeting on Thermal Reactor Safety, Knoxville, Tennessee, April 8-11, 1980.

Kaplan, S., and B. J. Garrick, "A Strategic Plan for a National Reliability Data System," PLG-0125, March 1980.

Garrick, B. J., S. Kaplan, G. Apostolakis, D. C. Bley, and T. E. Potter, "Seminar: Probabilistic Risk Assessment as Applied to Nuclear Power Plants," PLG-0124, March 1980.

Kaplan, S., B. J. Garrick, and D. C. Bley, "Notes on Risk, Probability, and Decision," PLG-0113, November 1979.

Garrick, B. J., S. Kaplan, and S. Ahmed, "A Reliability Prediction Technique for Selected Thermomechanical Components of Gas Turbine Combined Cycle Plants," PLG-0109, September 1979.

Garrick, B. J., S. Kaplan, P. P. Bieniarz, K. Woodard, D. C. Iden, H. F. Perla, W. Dicter, C. L. Cate, T. E. Potter, R. J. Duphily, T. R. Robbins, D. C. Bley, and S. Ahmed, "OPSA, Oyster Creek Probabilistic Safety Analysis," (Executive Summary, Main Report, Appendixes), PLG-0100 DRAFT, August 1979.

Kaplan, S., and B. J. Garrick, "Notes on Prediction of Reliability," PLG-0117, June 1979.

Kaplan, S., and B. J. Garrick, "Notes for a Workshop on Risk, Reliability, and Decision Under Uncertainty," presented at Battelle Northwest Laboratory, June 1979.

Garrick, B. J., P. P. Bieniarz, and S. Kaplan, "Risk Analysis of Transporting Oconee Spent Nuclear Fuel to the McGuire Nuclear Station," PLG-0102, June 1979.

Garrick, B. J., and S. Kaplan, "Training Engineers to be Reliability Practitioners," Sixth Annual Reliability Engineering Conference for the Electric Power Industry, Proceedings, Miami Beach, Florida, April 19-20, 1979.

Kaplan, S., J. M. Vallance, and C. L. Cate, "Prediction of Frequency of Aircraft Crashes at the Three Mile Island Site," October 1978.

Kaplan, S., "Description of OPTSWU-1, a Program for Computing the Optimum Amounts of Separative Work to be Contracted for," November 1976.

Kaplan, S., "Notes on Pooling, Meaning of, Types of, and Advantages of. Also Notes on a Bookkeeping Concept for Equitable and Visible Management of a Nuclear Pool," September 1976.

Kaplan, S., "Notes on the Concept of Inventory as it Relates to Uranium Procurement Planning," September 1976.

Kaplan, S., "UPLAN, A Decision Theoretic Tool for Uranium Procurement Planning," May 1976.

Kaplan, S., and J. M. Vallance, "Notes on a Model for Evaluation and Optimization of Uranium Procurement Strategies for the CAPCO Companies," January 1976.

Garrick, B. J., and S. Kaplan, "Reliability Technology and Nuclear Power," 1975.

Garrick, B. J., S. Kaplan, "A Method for Evaluating Nuclear Plant Siting Concepts," presented before the Joint Committee on Atomic Development and Space, California Legislature, Sacramento, May 19, 1972.

Garrick, B. J., S. Kaplan, and D. C. Baldonado, "On a Decision Theory Formalism for Nuclear Power Plant Siting," presented to the Conference on Unique Siting Concepts for Nuclear Power Plants, Joint Committee on Atomic Development and Space, Sacramento, California, May 9, 1972.

L. E. SHIPLEY

RESPONSE TO INT. 61:

- (a) Yes
- (b) Seismic
- (c) See attached qualifications of L. E. Shipley.
- (d) None
- (e) To be provided during testimony.
- (f)
 - 1.
 - i) Docket # 50-344
 - ii) Case #: Trojan Seismic Reevaluation
 - 2.
 - i) Docket # 50-352
 - ii) Case #: Limerick Construction License
Hearing
 - 3. ACRS - Bechtel Presentation on Industrial Problem
- (g)
 - i) Date:
 - 1. 1978-1979
 - 2. 1972
 - 3. 1975-1976
 - ii) No
 - iii) No
 - iv) No

Name: L.E. SHIPLEY

Position: Assistant Chief Engineer (Plant Design)
Technical Consultant to Diablo Canyon

Education: BS, Mechanical Engineering, US Merchant Marine Academy,
Kings Point, NY

Professional Data:

- o Registered Professional Mechanical Engineer in California
- o Member of ASME
- o Member of ASME/ANSI Task Force to Define Vibration Monitoring Requirements for Piping (Past)
- o Member ANS Committee for Protection Against Postulated Effects of Pipe Rupture.
- o Member of Industry Advisory Committee to a DOE program for Structural Energy Absorbing Restrainers.
- o Chairman on several ASME Technical Sessions at the ASME Piping and Pressure Vessel Conferences.

Summary:

- o Present - Assistant Chief Engineer
- o 1 year Technical Consultant to Diablo Canyon
- o 1½ years Assistant Project Engineer (Nuclear Plant)
- o 4 years Supervisor of Piping Stress Analysis for San Francisco Power Division.
- o 9 years various positions of increasing responsibility in Engineering
- o 2 years Engineering Officer, US Merchant Marines.

Experience: Mr. Shipley has recently assumed the position of Assistant Chief Engineer for Plant Design in the San Francisco Power Division. The scope of responsibility of the Chief's office requires technical direction of over 900 professional engineers and draftsmen working on 15 projects worldwide. Scope of services includes equipment location, piping layout, piping stress analysis, pipe support design, material specification, welding and NDE. Projects include nuclear, fossil and co-generation power plants. He is the chairman of an interdivisional technical steering committee for computer program applications. In addition, he is the corporate sponsor for over 10 computer programs including the most widely used piping program.

Experience
(continued):

For over a year, Mr. Shipley has been assigned to the Diablo Canyon Nuclear Power Plant in San Luis Obispo, Ca. as a Technical Consultant to the piping program. He was instrumental in the development and review of the Corrective Action Program whose intent was to review all piping systems to licensing commitments and newly developed seismic criteria. During the course of the assignment, constant communication was required with the independent verification team and the construction forces at the jobsite.

Previously, he was Assistant Project Engineer on the Susquehanna Steam Electric Station in Berwick, Pennsylvania for 1½ yrs. He was responsible for engineering in the civil-structural, architectural and piping/plant design areas. He directed the efforts of 350 engineers and draftsmen in a variety of engineering tasks including:

- o structural analysis review of all seismic category 1 buildings.
- o Preparation of as-built response spectra curves.
- o Piping/Stress analysis and pipe support design.
- o Valve Qualification
- o Material Specification
- o Welding and NDE

The final 2 months before fuel-load were spent at the jobsite coordinating the final as-built reconciliation for pipe hangers. This phase of the work required extensive construction/engineering interface for which he was the focal point. The job responsibilities also included budget, schedule and manpower planning aspects.

Technical direction was given in the areas of stress analysis, pipe support design, materials selection and qualification, valve qualification, welding and NDE.

Previously, Mr. Shipley worked in the field of piping stress analysis for 13½ years and was responsible for technical direction and personnel administration of 150 engineers and technicians. Projects under his supervision include nuclear and fossil power plants, as well as liquid-metal fast breeder plants.

Experience
(continued):

He has been directly involved in the design of the following nuclear plants: Monticello, Pilgrim 1, Peach Bottom, and Duane Arnold. He has had supervisory responsibilities for Arkansas Units 1 and 2, and Trojan, Limerick, 1 & 2, Susquehanna, 1 & 2, Pilgrim 2, Skagit. Fossil plants include: Jim Bridger and Colstrip. FFTF was the breeder plant.

Mr. Shipley was responsible for the dynamic analysis of piping as it relates to abnormal events, such as pipe rupture and building response to dynamic loads. Analysis includes both linear and non-linear, as well as elasto-plastic evaluations using time history and direct integration computer codes. Mr. Shipley was also responsible for ASME - required stress reports including life cycle evaluation of thermal transients as well as other cyclic phenomenon. He was responsible for the analysis of piping on fossil projects, including cold springing of the major piping systems. Corporate Standards and Guides were written under his supervision.

Mr. Shipley has visited all of the jobsites mentioned above, primarily in a trouble-shooting capacity, and has conducted the pipe support field review on Monticello.

He was responsible for the Bechtel Topical report, "Seismic Analysis of Piping Systems." He has served on ASME Annual Meetings for Pressure Vessels and Piping as a session chairman for seismic analysis of piping and equipment.

He has testified at several hearings on various piping issues.

DR. H. BOLTON SEED

- (a) Yes
- (b) Soils and Seismic
- (c) See attached Professional Qualifications
- (d) Will supplement
- (e) To be provided during testimony
- (f) 1. 50-275, 50-323
2. Diablo Canyon Seismic Safety Hearings
- (g) (i) 1. 12/16/78
2. 12/20/78
3. 12/21/78
(ii) Yes
(iii) Yes
(iv) No

1 UNITED STATES OF AMERICA
2 NUCLEAR REGULATORY COMMISSION

3 BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

4 In the Matter of) Docket Nos. 50-275
5) 50-323
6 PACIFIC GAS AND ELECTRIC COMPANY)
7) Applicants Ex. No. 7
8 (Diablo Canyon Nuclear Power)
9 Plant, Units No. 1 and 2) December 1978
10

11 PROFESSIONAL QUALIFICATIONS
12 OF WITNESSES FOR
13 PACIFIC GAS AND ELECTRIC COMPANY
14

15 Name: \ Dr. H. Bolton Seed

16 Title or Position: Professor of Civil Engineering, Geo-
17 technical Engineering, Department of Civil
18 Engineering, University of California, Berkeley

19 Degrees: B.S. Kings College, London University 1944;
20 S.M. Harvard University 1947; Ph.D Kings College,
21 London University 1948

22 Professional Experience: Dr. H. Bolton Seed is a member of
23 the faculty of the Department of Civil Engineering,
24 University of California, Berkeley, since 1950 and
25 has been engaged in research and instruction in
26 soil mechanics, seismic ground motion, soil lique-
faction under seismic excitation, soil-structure
interaction analyses for seismic response, seismic
design of large civil engineering structures, etc.

1 Dr. Seed was Chairman of the Department of
2 Civil Engineering, U.C. Berkeley, 1965-1971.

3 Foundation Engineer, Thomas Worcester Inc.,
4 Consulting Engineers, Boston, 1949-50.

5 Since 1953, Consultant on soil mechanics
6 problems and seismic design problems to:

7 U.S. Army Corp of Engineers

8 U.S. Bureau of Reclamation

9 U.S. Geological Survey

10 U.S. Nuclear Regulatory Commission

11 U.S. Navy

12 U.S. Veterans Administration

13 National Aeronautics and Space Administration

14 Oakridge National Laboratory

15 State of California Department of Water Resources

16 San Francisco Bay Conservation and Development

17 Commission

18 Bechtel Corporation, Consulting Engineers

19 Kaiser Engineers, Consulting Engineers

20 Stone and Webster, Consulting Engineers

21 Asphalt Institute

22 Shell Development Company

23 J. H. Simons Company, Consulting Civil Engineers

24 John A. Blume and Associates, Consulting Structural

25 Engineers
26

1 H. J. Sexton and Associates, Consulting Structural
2 Engineers

3 Agbalian-Jacobsen and Associates

4 R. E. Davis, Consulting Civil Engineer

5 Woodward-Clyde Consultants, Consulting Soil
6 Engineers

7 Dames and Moore, Consulting Soil Engineers

8 Shannon and Wilson, Consulting Soil Engineers

9 Law Engineering Co., Consulting Soil Engineers

10 Abbot A. Hanks, Consulting Soil Engineers

11 Compania Shell de Venezuela

12 etc.

13 Consultant during past year on seismic design
14 problems to:

15 World Bank

16 U. S. Nuclear Regulatory Commission

17 Atomic Energy Organization of Iran

18 U. S. Army Corp of Engineers

19 State Rivers & Water Supply Commission, Victoria,
20 Australia

21 State of California Department of Water Resources

22 State of California, Division of Highways

23 State of California, Division of Mines & Geology

24 Bechtel Corporation

25 Woodward-Clyde Consultants

26 Los Angeles Department of Water and Power

1 Hazza Engineering Company, Chicago
2 Tippetts-Abbot-McCarthy-Stratton, New York
3 Ministry of Planning, Nicaragua
4 East Bay Municipal Utility District
5 Motor Columbus, Switzerland
6 Tehran-Berkeley/Pandam, Iran
7 United Engineers and Constructors
8 Metropolitan Water District of Los Angeles
9 Fugro, Long Beach
10 Pacific Gas and Electric Company, San Francisco
11 Westinghouse-Hanford Company
12 Department of Interior - Panel to Investigate
13 Failure of Teton Dam

J. K. McCALL

RESPONSE TO INT. 61:

- (a) Yes
- (b) Seismic
- (c) See attached qualifications of J. K. McCall.
- (d) None
- (e) To be provided during testimony.
- (f) None
- (g)

i)	N/A
ii)	N/A
iii)	N/A
iv)	N/A

PROFESSIONAL QUALIFICATIONS OF

JOHN K. McCALL

My name is John K. McCall. My work experience is described in the "Work History" summary attached.

PROFESSIONAL LICENSES AND SOCIETIES:

Registered Civil Engineer, California

Registered Professional Engineer, Florida

EDUCATION AND PERSONNEL DEVELOPMENT PROGRAMS:

B.S., University of California, Berkeley, Civil Engineer, 1966.

M.S., University of California, Berkeley, Structural Engineer, 1968.

NAME John K. McCall

WORK HISTORY			
DATES		COMPANY, DIVISION OR DEPARTMENT, LOCATION AND SUPERIOR	POSITION HELD, SUMMARY OF RESPONSIBILITIES AND SIGNIFICANT ACCOMPLISHMENTS
FROM	TO		
3/1968	6/1971	Kaiser Engineers, Civil/Structural Oakland, CA <u>Superior:</u> Mr. D. Mauser	<u>Engineer -</u> Preparing structural drawings, calculations, and specifications for commercial and industrial buildings.
6/1971	12/1971	Self-employed	Design and construct single family residence.
12/1971	7/1973	Bechtel Corporation Civil Structural-SFHO San Francisco, CA <u>Superior:</u> Mr. H. Wahl	<u>Senior Engineer -</u> On Chief Engineer's staff, responsible for planning, executing, and reporting post-tensioning tendon surveillance program for 5 PWR containments; assisted in preparing division civil/structural criteria.
1/1974	11/1977	Bechtel Corporation Civil Structural-SFPD San Francisco, CA <u>Superior:</u> Mr. G. Katanics	<u>Senior Engineer -</u> Assigned to Hope Creek project, prepared project civil/structural design criteria; participated in conceptual and final design of all buildings; responsible for coordination execution and review of seismic analysis and design; performed confirmatory seismic analysis; assistant to project engineer as engineering planner.
11/1977	6/1979	Bechtel Corporation Civil Structural-SFPD San Francisco, CA <u>Superior:</u> Mr. G. Katanics	<u>Engineering Supervisor -</u> Assigned to Hope Creek project field as Lead Resident Engineer; approved changes and deviations from plans and specifications; interpreted design requirements; participated in constructibility improvement program; initiated numerous design changes to simplify construction; eliminated construction delays due to documentation interface.

NAME John K. McCall

WORK HISTORY			
DATES		COMPANY, DIVISION OR DEPARTMENT, LOCATION AND SUPERIOR	POSITION HELD, SUMMARY OF RESPONSIBILITIES AND SIGNIFICANT ACCOMPLISHMENTS
FROM	TO		
6/1979	2/1981	Bechtel Corporation Civil Structural-SFPD San Francisco, CA <u>Superior:</u> Mr. K. Buchert	<u>Engineering Supervisor -</u> Assigned to Hope Creek project as Group Leader; direct supervision of 20 to 25 engineers and designers responsible for generating design and contract documents, and related coordination, for Reactor Building (2 units), natural draft cooling towers, and service water intake structure; resolved technical problems and initiated construction of intake structure and cooling towers; continued finalization of Reactor Building design and supported construction activities.
2/1981	3/1982	Bechtel Corporation Civil Structural-SFPD San Francisco, CA <u>Superiors:</u> Mr. K. Buchert and Mr. B. Pusheck	<u>Engineering Specialist -</u> Assigned to Hope Creek as Deputy Civil Group Supervisor; technical supervision of 70 to 80 engineers and designers responsible for generating design and contract documents, and related coordination, for all civil and structural work on project; continued finalization of design and support of construction activities, prepared draft sections of FSAR.
3/1982	5/1982	Bechtel Corporation Civil Structural-SFPD San Francisco, CA <u>Superior:</u> Mr. B. Pusheck	<u>Engineering Specialist -</u> Assigned to PSE&G General Service Agreement as project engineer for remodeling existing warehouse to a combined office building and warehouse; supervision of approximately 10 engineers and designers of all disciplines, generating design and construction documents, supervision of consultant activities, assisting in generation of project schedules and budgets, coordination with client personnel at project manager level; initiated project, including engineering staffing and procedure, led negotiations with both client and vendors for both consultant and general contractor agreements, supported start of erection of structural steel and pile driving in field approximately 5 weeks after client direction to start project.

NAME

John K. McCall

WORK HISTORY

DATES		COMPANY, DIVISION OR DEPARTMENT; LOCATION AND SUPERIOR	POSITION HELD, SUMMARY OF RESPONSIBILITIES AND SIGNIFICANT ACCOMPLISHMENTS
FROM	TO		
5/1982	Present	Bechtel Corporation Civil Structural-SFPD San Francisco, CA <u>Superior:</u> Mr. B. Pusheck	<u>Engineering Supervisor -</u> Assigned to Diablo Canyon Project as Unit #1 Civil Group Supervisor; supervision of 350 engineers and designers responsible for verifying, evaluating, and designing civil/structural items, coordination, planning and scoping group efforts, controlling associated consultant efforts, initiated group and developed organization and procedures, developed various sources, working with chief engineer, to staff group, performed review, analysis and design for plant structures and raceways/HVAC supports, supported field construction of modifications required, designed major revision of water supply and sanitary systems, prepared required licensing documents, interfaced with independent verification program consultants.

E. R. KAHLER

RESPONSE TO INT. 61:

- (a) Yes
- (b) QA
- (c) See attached professional qualifications of E. R. Kahler.
- (d) None
- (e) To be provided during testimony.
- (f) Previous testimony: None
- (g)
 - i) Not Applicable
 - ii) Not Applicable
 - iii) Not Applicable
 - iv) Not Applicable

Edwin Roy Kahler
RESUME

WORK EXPERIENCE:

MAY 1982 - PRESENT

Project Quality Engineer - Unit 1, Diablo Canyon Project (PG&E - Bechtel) - Supervisor, responsible for quality engineering function for the project. Duties include monitoring the quality of engineering design, resolution of engineering concerns and problems in the area of procedures and quality assurance, developing quality assurance requirements for contracts and purchasing with the engineer, preparing responses for and interfacing with the NRC and various independent verifications consultants in the area of quality and quality assurance.

OCTOBER 1980 - MAY 1982

Senior Engineer supervising the Program Section of Engineering Quality Control - Responsibilities included directing EQC auditing of power generation projects for compliance with the Engineering Manual, including the general responsibilities listed above.

JUNE 1977 - OCTOBER 1980

Engineer, Electrical Engineering Department - Responsible engineer for electrical desing on Los Medanos Gas Storage Project, Geysers H₂S abatement systems Units 1-8 including DER systems and the pilot project at Unit 8, conceptual design for Montezuma Coal Project switchyard system, switchyard modifications at Martinez Power Plant, providing interface design for matching a Toshiba generator to 1950 design GE turbine, excitation and switchyard system.

JUNE 1972 - JULY 1977

Field Engineer on loan to Electrical Engineering Department - Responsible engineer for the seismic and regulatory requirement upgrade for Humbolt Bay Nuclear Unit 3. Responsibilities included redesign of old systems, design of new systems to meet regulatory requirements, seismic qualification of old equipment or purchase of qualified new equipment.

DECEMBER 1974 - JUNE 1976

Field Engineer, Superintendent's Office, Diablo Canyon - Responsible for liaison between construction and engineering, vendor representative contracts, and part-time as a start-up engineer at the plant.

JULY 1974 - DECEMBER 1974

Field Engineer - Responsible for electrical construction and start-up of Geysers Units 9, 10 and 11. Responsibilities included writing and performing start-up tests from loop tests through commercial operation of the plant.

PROFESSIONAL CREDENTIALS:

Washington State University - June, 1973

Registered Professional Electrical Engineer (California) No. E10110

BIMAL SARKAR

RESPONSE TO INT. 61:

- (a) Yes
- (b) Seismic
- (c) See attached qualifications of Bimal Sarkar.
- (d) None
- (e) To be provided during testimony.
- (f) i) Docket No. 50-344
 - ii) Case No. Trojan ASLB Hearing
- (g) i) Date: 1978-1980
 - ii) No
 - iii) No
 - iv) No

PROFESSIONAL QUALIFICATIONS
OF BIMAL SARKAR

PRESENT POSITION:

Engineering Supervisor, Bechtel Power Corporation

EDUCATION:

B.Sc.(Eng.), Civil Engineering, University of Bihar, India

M.E., Civil Engineering, University of Calcutta, India

M.S., Civil Engineering, University of California, Berkeley

PROFESSIONAL DATA:

Registered Professional Engineer, California •

SUMMARY:

5 years: Engineering Supervisor
3 years: Senior Engineer
2 years: Engineer
2 years: Structural Analyst
4 years: Civil Engineering Specialist
3 years: Design Engineer
2 years: Lecturer in Civil Engineering

EXPERIENCE:

Mr. Sarkar is the Engineering Supervisor in Bechtel's San Francisco Power Division. Presently, he is the deputy group supervisor in the Civil/Structural group of the Diablo Canyon Project. In his present position, he controls the group's licensing activities as well as coordination with the IDVP. Earlier, he performed design, analysis and supervisory work in the design of Nuclear Power Plants.

Prior to joining Bechtel, Mr. Sarkar worked as a Structural Analyst with URS/John Blume and Associates, where he was involved primarily with evaluation of multi-story buildings which were affected by the 1971 San Fernando Earthquake.

From 1966 to 1970, Mr. Sarkar was a Civil Engineering Specialist with the Ministry of Planning and Ministry of Industry, Government of Libya. In this capacity, Mr. Sarkar was responsible for review of the engineering design of major civil engineering projects in Libya which were being designed by consulting engineering firms of Europe and the United States.

Mr. Sarkar worked as a Design Engineer with M/S Ballardie, Thompson & Matthews, a structural engineering firm in Calcutta, India, for two years. Mr. Sarkar designed multi-story buildings, auditoriums, and other structures both of reinforced concrete and structural steel.

From 1961 to 1963, Mr. Sarkar was a lecturer in Civil Engineering at the Calcutta University in India, where he taught undergraduate courses in structural mechanics and analysis.

G. V. CRANSTON

RESPONSE TO INT. 61:

- (a) Yes
- (b) General
- (c) See attached qualifications of G. V. Cranston.
- (d) Publications:

Author of Bechtel Nuclear Topical Report, NB-TOP-1, "Testing Criteria for Integrated Leakage Rate Testing of Primary Containment Structures for Nuclear Power Plant, November, 1972, which has been approved by the Nuclear Regulatory Commission.

Participated in writing the ANSI/ANS-56.6 - 1978 (N277) Standard, "American National Standard on PWR Containment Ventilation System," November 8, 1978.

Participated in writing the ANSI/ANS-56.8 - 1981 (N274) Standard, "Containment System Leakage Testing Requirement," February 19, 1981.

(e) To be provided during testimony.

(f) i) None

ii) None

(g) i) N/A

ii) N/A

iii) N/A

iv) N/A

PROFESSIONAL QUALIFICATIONS OF
GREGORY V. CRANSTON

My name is Gregory V. Cranston. I am the Unit 2 Project Engineer of the Diablo Canyon Project, consisting of the integrated organization of Pacific Gas and Electric Company and Bechtel Power Corporation personnel. I have held this position since May, 1982. I am responsible for the project engineering work related to the design and analysis of the Diablo Canyon Power Plant Unit 2. I am a Registered Professional Engineer in Mechanical and Nuclear in the State of California. I hold a BS degree from the United States Naval Academy at Annapolis, Maryland, with a major in Nuclear Science. I also attended and graduated from the U. S. Navy Nuclear Power Program, which included six months education on Nuclear Power Plant Theory and Operations at the U. S. Navy Nuclear Power School, Mare Island, California, and six months of practical training and qualifications as an Engineering Officer of the Watch on a nuclear reactor prototype at the U. S. Naval Nuclear Power Training Unit, located at the National Reactor Testing Facility in Idaho.

I have been with Bechtel for more than 13 years. Prior to my assignment on Diablo Canyon, I was assigned as the Resident Engineer on a two-unit nuclear power plant in Pennsylvania. Prior to that, I was assigned as an Assistant Resident Project Engineer and Mechanical Group Supervisor. These assignments included supervision and coordination of design, specification and quality control activities. I also served as Senior Mechanical Engineer for various other nuclear power plant projects in the United States and abroad.

From 1972 to 1979, I served as Test Director for all Bechtel offices for Primary Reactor Integrated Leakage Rate Testing, supervising test preparation and testing at various nuclear power plant projects in the United States and abroad.

Prior to working for Bechtel, I was a Lieutenant in the U. S. Navy and a qualified Engineering Officer of the Watch on a nuclear-powered submarine that went through new construction, initial startup and criticality, and sea trials.

MICHAEL R. TRESLER

RESPONSE TO INT. 61:

- (a) Yes
- (b) Seismic
- (c) See attached qualifications of Michael R. Tresler.
- (d) None
- (e) To be provided during testimony.
- (f) i) Docket No. 50-275, 50-323
 - ii) Case No. Diablo Canyon Seismic Reevaluation Hearing
- (g) i) Date: 1978-1979
 - ii) No
 - iii) No
 - iv) No

PROFESSIONAL QUALIFICATIONS OF
MICHAEL R. TRESLER

My name is Michael R. Tresler. From 1981 to the present, I have been employed as a Piping Design Coordinator at PGandE. My responsibilities include supervision, coordination, and direction of the piping and pipe support analysis and design for Diablo Canyon Power Plant.

From 1980 to 1981, I was employed as a Supervising Project Control Engineer in PGandE's Nuclear Projects Department with responsibility to develop, implement, and maintain a project control system for Diablo Canyon Power Plant.

From 1964 to 1980, I was employed in various positions as an engineer and superintendent in PGandE's Engineering Department and General Construction Department. During that time, I held the positions of Engineer, Resident Mechanical Engineer, Project Superintendent, and Assistant Station Construction Superintendent. My responsibilities included engineering, analysis, design, field engineering services, and supervision and management activities related to large fossil-fired units and the Diablo Canyon Power Plant. In particular, from 1966 to 1970, I prepared startup procedures and supervised startup activities related to fossil and nuclear power plants.

My educational background includes a BS degree in Mechanical Engineering from the California Polytechnic State University, 1964.

I have completed the following formal training courses:

Westinghouse Reactor Operator Training School, 1969.

Westinghouse Design Lecture Series specific to Diablo Canyon, system and components design, 1971.

Stat-A-Matrix course covering the establishment of a QA program and personnel training, 1973.

Westinghouse PWR Information Course, 1980.

4248a Westinghouse Simulator Training, 1980.

N. J. TUHOLSKI

RESPONSE TO INT. 61:

- (a) Yes
- (b) Seismic
- (c) See attached qualifications of N. J. Tuholski.
- (d) Publications:
 - i) SIT Reports
 - ii) Tendon Surveillance Reports
- (e) To be provided during testimony.
- (f) None
- (g)

i)	N/A
ii)	N/A
iii)	N/A
iv)	N/A

PROFESSIONAL QUALIFICATIONS OF
N. J. TUHOLSKI

My name is Neil J. Tuholski. My work experience is described in the "Work History" summary attached.

PROFESSIONAL ACHIEVEMENTS:

1. Participation in ASME Code Committee.
2. Participation in the Subgroup on Testing and Protection Against Overpressure (SC-3C)
3. Past Member of the Working Group on Concrete Pressure Components (SC-XI)

PROFESSIONAL LICENSES AND SOCIETIES:

Licenses: Civil Registration California C-022053
Structural Registration California S-2260

Societies: Tau Beta PI
ASME
SESA SNAME (Inactive)

EDUCATION AND PERSONNEL DEVELOPMENT PROGRAMS:

BSCE, University of California, Berkeley, 1963. Major: Civil Engineering

MSCE, University of California, Berkeley, 1972. Major: SESM (Structural Engineering).

United States Navy, Airborne Crew (Officer Training Avionics Navigation, etc.)

University of Maryland, Graduate Courses in Plates/Shells/Torsion

4248a Bechtel, BOC, Materials Engineering.

NAME Neil J. Tuholski

WORK HISTORY			
DATES		COMPANY, DIVISION OR DEPARTMENT; LOCATION AND SUPERIOR	POSITION HELD, SUMMARY OF RESPONSIBILITIES AND SIGNIFICANT ACCOMPLISHMENTS
FROM	TO		
Summers	1960-62	Calif. Division of Highways - District II	Surveying on Interstate System. Soils testing in field (compaction, gradation, clay equivalents, etc.)
10/63	4/64	Shasta County	Junior Civil Engineer. Bridge Inspection. Design of 225' R.C. Box Girder Bridge. Some highway design.
4/64	8/68	U.S. Navy	Commissioned Officer (Ensign - Lt.) - Airborne Tactical Coordinator - Several duties including: 1. Sqd. Air Intelligence Officer - Briefing & De- briefing air-crews; 2. Tactical Coordina- tor in C.O.'s air-crew; 3. Air Frames Branch Officer. (Two tours in Viet Nam).
3/69	10/73	U.S. Naval Ship Research & Development Center Carderock, MD	Research Structural Engineer, engaged in structural analysis in support of Trident program. Principal role in tasks which involved structural analysis, scale steel model design & instrumentation, stability analysis, parametric studies of struc- tural configurations, & writing reports on the results of comparisons of analysis & model tests. Member of Submarine Deep Dive Group.
10/73	4/75	Ann Arbor Power Division Office - Bechtel	Senior Engineer on the Midland Nuclear Power Project at the Ann Arbor office of Bechtel Power. Responsible for finite element analysis & design of the contain- ment structure & steam generator supports. Additional assignments included safety analysis report preparation, liner plate design & piping penetration design & analysis.
4/75	10/77	Bechtel Mining & Metals - San Francisco	Facility Engineer for the Mining & Metals Division. Responsible for the steel & concrete design & analysis of major struc- tures for large concentration plants. <u>Duties:</u> Coordinating, checking, & issuing extensive structural drawings & calculations. <u>Projects:</u> 1. Hurricane Creek 2. Tilden Mine 3. Pala Bora

NAME Neil J. Tuholski

WORK HISTORY			
DATES		COMPANY, DIVISION OR DEPARTMENT; LOCATION AND SUPERIOR	POSITION HELD, SUMMARY OF RESPONSIBILITIES AND SIGNIFICANT ACCOMPLISHMENTS
FROM	TO		
10/77	12/79	Bechtel Research & Engineering	<p>Testing activity leader with Bechtel's Research & Engineering Operation in the Applications Engineering Group. Engaged in the planning, field implementation, & report writing of structural integrity tests, tendon surveillance programs, and other tests for nuclear containments.</p> <p><u>Projects:</u> 1. Arkansas Nuclear One 2. Point Beach 3. Palisades 4. Farley 5. Trojan 6. SONGS 7. ASCO 8. Lemonitz 9. Kousheng</p> <p>Also development of designs and studies in support of Photovoltaic Power Stations</p>
12/79	9/82	Bechtel - San Francisco Power Division	<p>Group Leader on Limerick Plant for Containment & Adjacent Structure Analysis & Assessment of Mark II Hydrodynamic Loads.</p> <p>Group Leader of Civil Equipment Qualification Group.</p>
9/82	PRESENT	Bechtel - SFPD	<p>Civil Deputy Group Supervisor - Supervisor for Containment Group and Field Coordination Activities.</p>

PAT CHANG-LO

RESPONSE TO INT. 61:

- (a) Yes
- (b) Seismic
- (c) See attached qualifications of Pat Chang-Lo.
- (d) Publications:

SMIRT-4 Conference, "Containment Line Plate Anchors and Steel Embedment Test Results, 1977."

ASCE, "Design of Nuclear Power Plant Structures."

Bechtel Topical Report, BC-TOP-5, "Prestressed Concrete Nuclear Reactor Containment Structures."

- (e) To be provided during testimony.

- (f) i) Docket No. 50-344
- ii) Case No. Trojan ASLB Hearing
- (g) i) Date: 1978-1980
- ii) No
- iii) No
- iv) No

PROFESSIONAL QUALIFICATIONS OF
PATRICK L.C. CHANG-LO

POSITION:

Project Engineer

EDUCATION:

BSCE, Civil Engineering, Virginia Military Institute

MSCE, Civil Engineering, San Jose State College

PROFESSIONAL DATA:

Registered Civil Engineer in California

SUMMARY:

5 years: Project Engineer

3 years: Group Supervisor

3 years: Group Leader

1 year: Senior Engineer

3 years: Engineer

2 years: Intermediate Engineer

EXPERIENCE:

Mr. Chang-Lo is presently a consultant to the civil/structural group supervisor and the sponsor, responsible for management of the Diablo Canyon project turbine building structural verification program.

Mr. Chang-Lo is also the Project Engineering Manager on the Bechtel/MHI Technology and Services Contract. In this capacity, he has overall responsibility for the transfer of engineering technology relating to the design of FWR nuclear power plants and associated engineering services.

Mr. Chang-Lo was the Project Engineer on the Trojan Nuclear Project. In this capacity, he had overall responsibility for the civil/structural design and analysis of the proposed modifications to the Trojan Control Building.

Previously, Mr. Chang-Lo was the Project Engineer on the Tsuruga No. 2 Power Station. In this capacity, he had overall responsibility for the project, which included the civil/structural design of the reactor building and review and comment services relating to plant and equipment arrangement in the reactor and the auxiliary buildings.

Mr. Chang-Lo was the civil/structural supervisor on the TEPCO turbine plant reference design project and the Kashiwazaki design review. He was also the civil and structural group supervisor on the Japan Atomic Power Company BWR feasibility study. He was responsible for the seismic and structural analysis and design of the reactor building consisting of the auxiliary, fuel, diesel generator, and control buildings.

Previously, Mr. Chang-Lo was group leader for the Puget Sound Power & Light reactor building. In this capacity, he was responsible for all civil and structural activities pertaining to the reactor building. As group leader in the special structures group, he was responsible for the development of design guides, topical reports, and structural analyses of the concrete nuclear containment structures.

Previously, Mr. Chang-Lo worked as senior engineer for the Arkansas Nuclear One, Units 1 and 2 reactor building. As lead engineer he was responsible for design, analysis, and preparation of specifications and engineering drawings. He also participated in the design of the Northern States Power Company's Monticello reactor building and was responsible for the design and analysis of equipment supports, structural steel, and concrete walls and slabs.

J. B. HOCH

RESPONSE TO INT. 61:

- (a) Yes
- (b) General
- (c) See attached qualifications of J. B. Hoch.
- (d) None
- (e) To be provided during testimony.
- (f) i) Docket # 50-323, 50-275
 - ii) Case: Diablo Canyon Project
- (g) i) Date: _____
 - ii) No
 - iii) No
 - iv) No

PROFESSIONAL QUALIFICATIONS OF

JOHN B. HOCH

My name is John B. Hoch. Since January, 1982, I have been employed as Project Manager of the Diablo Canyon Project organization at PGandE. My responsibilities include managerial and supervisory duties, and providing coordination and direction of the Diablo Canyon Project organization.

From 1980 to 1982, I was employed as Manager of the Nuclear Projects Department at PGandE. My responsibilities include managerial and supervisory duties, and providing coordination and direction of the Nuclear Projects Department in matters related to PGandE's nuclear power plants.

From 1959 to 1980, I was employed as an Engineer in various disciplines in PGandE's Engineering Department. My responsibilities included engineering, design, analysis work, activities related to NRC licensing, and engineering management for PGandE's Diablo Canyon Power Plant.

My educational background includes a BS degree in Mechanical Engineering from the University of Idaho, 1959, and graduate studies in Engineering, University of California, Berkeley, 1961 to 1962.

I am a Registered Professional Engineer (Mechanical and Nuclear) in the State of California.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)
)
PACIFIC GAS AND ELECTRIC COMPANY)
)
Diablo Canyon Nuclear Power Plant,)
Units 1 and 2)
_____)

Docket No. 50-275
Docket No. 50-323

'83 OCT -3 PM 2:31

CERTIFICATE OF SERVICE

The foregoing document(s) of Pacific Gas and Electric Company has (have) been served today on the following by deposit in the United States mail, properly stamped and addressed:

Judge John F. Wolf
Chairman
Atomic Safety and Licensing Board
US Nuclear Regulatory Commission
Washington DC 20555

Judge Glenn O. Bright
Atomic Safety and Licensing Board
US Nuclear Regulatory Commission
Washington DC 20555

Judge Jerry R. Kline
Atomic Safety and Licensing Board
US Nuclear Regulatory Commission
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Atomic Safety and Licensing
Board Panel
US Nuclear Regulatory Commission
Washington DC 20555

Chairman
Atomic Safety and Licensing
Appeal Panel
US Nuclear Regulatory Commission
Washington DC 20555

Secretary
US Nuclear Regulatory Commission
Washington DC 20555

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Judge W. Reed Johnson
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Date: September 23, 1983

Dan G. Lubbock