

GOVERNMENT ACCOUNTABILITY PROJECT

Institute for Policy Studies
1901 Que Street, N.W., Washington, D.C. 20009

(202) 234-9382

November 26, 1983

Mr. Richard C. DeYoung
Director, Office of Inspection
and Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mr. James G. Keppler
Administrator, Region III
Inspection and Enforcement
799 Roosevelt Road
Glen Ellyn, Illinois 60137

*Bob,
For your information!
--- just misguided! ☹
Belto*

Gentlemen:

Some weeks ago I received a copy of a Memorandum for Region III files regarding a closed meeting held October 25, 1983, in Bethesda, with Mr. J. Selby, President and Chief Executive Officer, and Mr. S. Howell, Executive Vice-President of Consumer Power Company (CPC).

The brief memo raises a number of significant questions which I have listed below. Some of these questions I have already expressed to members of the Region III Office of Special Cases, Midland Team. I would appreciate a response from you as soon as possible to these concerns.

Concerns Regarding October 25, 1983, Meeting

1. The independent management audit discussed at the meeting has, presumably, been left in the hands of CPC. GAP is concerned that, like the Stone and Webster nomination for the Q.A. soils work, the CPC nomination and the scope of the audit will be a fait accompli. The independence criteria (SECY 82-1003) adopted by the NRC at Diablo Canyon for situations such as this, requires public comment be included after the nomination of several companies. Further, since the suggestion was generated by the GAP petition filed June 14, 1983, pursuant to 10 C.F.R. 2.206, it seems minimally reasonable that public comment be permitted about the scope of the management audit.

It is appropriate to note that the NRC position on the case of Midland's problems remains one of bewilderment; see Wall Street Journal article of October 28, 1983, regarding Midland. This has been Region III's response to the cause of Midland's problems since May, 1982.

In light of the NRC's lack of insight and the obvious criticality of pin-pointing the cause of a decade of quality assurance breakdowns and unprecedented construction foul-ups, we renew the request for the NRC approval-phase of CPC's management audit to be conducted with regard for the requirements of SECY 82-1003.

REC-1 1983

Mr. Richard C. DeYoung
Mr. James G. Keppler

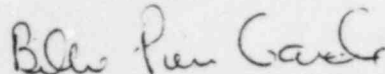
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November 26, 1983

2. The memorandum also makes reference to a "plan of action" which was being prepared for submittal to the NRC. Please explain what this "plan of action" is, and the purpose which it is to serve.

I look forward to your earliest possible response.

Sincerely,



Billie Pirner Garde
Citizens Clinic Director

BPG:me

cc: Distribution List

GOVERNMENT ACCOUNTABILITY PROJECT

Institute for Policy Studies
1901 Que Street, N.W., Washington, D.C. 20009

(202) 234-9382

August 8, 1983

Mr. Darrell G. Eisenhut
Director, Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

PRINCIPAL STAFF	
✓ RA	✓ ENF
D/RA	SCS
A/RA	PAO
DPRP	SLO
DRMA	RC
DRMSF	
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ML	
OL	FILE

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Dear Mr. Eisenhut: ---

It is my understanding that the Division of Nuclear Reactor Regulations (NRR) Division of Engineering has developed a review group composed of four technical members, a group leader, two team members from the structural review staff and a structural consultant to review the concerns of Dr. Ross Landsman over the structural adequacy of the Diesel Generator Building at the Midland Nuclear Power Plant.

Please provide the following information to us as soon as possible:

1. The names, resumes, and nomination process for the members of the review team; 1/
2. The methodology by which the review effort will be completed, and
3. The plans for public participation or oversight, including the input of expert consultants, into the technical report.

We look forward to your immediate response.

Sincerely,

[Handwritten signature]

Billie Pirner Garde

pdc

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In particular we are interested in the selection of the independent consultant.

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

Docket Nos: 50-329
and 50-330

AUG 10 1983

Billie Pirner Garde, Director
Citizens Clinic for Accountable Government
Government Accountability Project
Institute for Policy Studies
1901 Que Street, N.W.
Washington, D. C. 20009

Dear Ms. Garde:

Your letter of August 8, 1983, noted that the Division of Engineering in the Office of Nuclear Reactor Regulations has formed a review group to review the concerns of Dr. Ross Landsman regarding the structural adequacy of the Diesel Generator Building (DGB) at Midland Plant, Units 1 & 2. The concerns of Dr. Landsman and the implementation concept for the review task were described in Board Notification 83-109 which was forwarded to you on July 27, 1983. Your letter requests three items of additional information. These items and our responses follow:

1. Names, resumes, and nomination process for the team members, particularly for selection of the consultant.

The review group is composed of both NRC structural staff and consultants. The review group is headed by Dr. P. T. Kuo, who is a Section Leader in our Structural and Geotechnical Engineering Branch (SGEB). Two team members from the NRC structural staff are assigned - Dr. C. P. Tan and Mr. R. D. Romney. The team members provided by our technical assistance contract with Brookhaven National Laboratories (BNL) are Doctors M. Reich, C. Miller, C. Constantino, P. Wang, and A. Philippopoulos. Enclosure 1 provides the resumes of these individuals.

The NRC and BNL members of the team were selected by the Director of the Division of Engineering on the basis of their qualifications, experience, and availability. The BNL team members were also selected based upon their oversight role in the Diablo Canyon Independent Design Verification Programs.

2. Methodology by which the review effort will be completed.

As described in Enclosure 3 to Board Notification 83-109, the efforts of the review group may include, but will not necessarily be limited to, (1) review of pertinent technical materials, (2) on-site inspections of the DGB, (3) on-site interviews with all inspection personnel that have information to contribute and (4) preparation of a technical report summarizing their activities, considerations and findings. The detailed methodology for the structural evaluation is left to the technical expertise of the review group which will establish its own approach once relevant background information has been reviewed.

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AUG 10 1983

Billie Pirner Garde

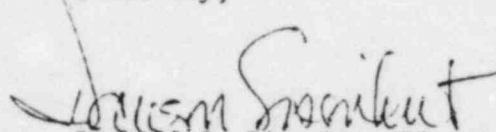
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3. Plans for public participation or oversight, including input of consultants, into the technical report.

To the extent practical, the review will be conducted consistent with "Open Meeting and Statement of NRC Staff Policy" from the 43 Federal Register 28058, June 28, 1978. This Statement and Policy generally provides for meetings between the NRC technical staff and applicants for licenses to be open for interested members of the public, petitioners, intervenors, or other parties to attend as observers. Records of significant information exchanges and correspondence will be maintained by the review group and summarized in their final report as appropriate. The report will reflect the input of the consultants as well as the NRC members of the review group. The consultant's critique of Dr. Landsman's concerns will be incorporated directly into the report. The report will be made publicly available.

I trust this reply is responsive to your requests.

Sincerely,



Darrell G. Eisenhut, Director
Division of Licensing
Office of Nuclear Reactor Regulation

Enclosures:
As stated

MIDLAND

Mr. J. W. Cook
Vice President
Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

cc: Michael I. Miller, Esq.
Ronald G. Zamarin, Esq.
Alan S. Farriell, Esq.
Isham, Lincoln & Beale
Three First National Plaza,
51st floor
Chicago, Illinois 60602

James E. Brunner, Esq.
Consumers Power Company
212 West Michigan Avenue
Jackson, Michigan 49201

Ms. Mary Sinclair
5711 Summerset Drive
Midland, Michigan 48640

Stewart H. Freeman
Assistant Attorney General
State of Michigan Environmental
Protection Division
720 Law Building
Lansing, Michigan 48913

Mr. Wendell Marshall
Route 10
Midland, Michigan 48640

Mr. R. B. Borsum
Nuclear Power Generation Division
Babcock & Wilcox
7910 Woodmont Avenue, Suite 220
Bethesda, Maryland 20814

Cherry & Flynn
Suite 3700
Three First National Plaza
Chicago, Illinois 60602

Mr. Don van Farrowe, Chief
Division of Radiological Health
Department of Public Health
P.O. Box 33035
Lansing, Michigan 48909

Mr. Steve Gadler
2120 Carter Avenue
St. Paul, Minnesota 55108

U.S. Nuclear Regulatory Commission
Resident Inspectors Office
Route 7
Midland, Michigan 48640

Ms. Barbara Stamiris
5795 N. River
Freeland, Michigan 48623

Mr. Paul A. Perry, Secretary
Consumers Power Company
212 W. Michigan Avenue
Jackson, Michigan 49201

Mr. Walt Apley
c/o Mr. Max Clausen
Battelle Pacific North West Labs (PNWL)
Battelle Blvd.
SIGMA IV Building
Richland, Washington 99352

Mr. I. Charak, Manager
NRC Assistance Project
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

James G. Keppler, Regional Administrator
U.S. Nuclear Regulatory Commission,
Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Mr. J. W. Cook

- 2 -

cc: Mr. Ron Callen
Michigan Public Service Commission
6545 Mercantile Way
P.O. Box 30221
Lansing, Michigan 48909

Mr. Paul Rau
Midland Daily News
124 McDonald Street
Midland, Michigan 48640

Billie Pirner Garde
Director, Citizens Clinic
for Accountable Government
Government Accountability Project
Institute for Policy Studies
1901 Que Street, N.W.
Washington, D. C. 20009

Mr. Howard Levin, Project Manager
TERA Corporation
7101 Wisconsin Avenue
Bethesda, Maryland 20814

Ms. Lynne Bernabei
Government Accountability Project
1901 Q Street, N.W.
Washington, D. C. 20009

Supplemental page to the Midland OM, OL Service List

Mr. J. W. Cook

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cc: Commander, Naval Surface Weapons Center
ATTN: P. C. Huang
White Oak
Silver Spring, Maryland 20910

Mr. L. J. Auge, Manager
Facility Design Engineering
Energy Technology Engineering Center
P.O. Box 1449
Canoga Park, California 91304

Mr. Neil Gehring
U.S. Corps of Engineers
NCEED - T
7th Floor
477 Michigan Avenue
Detroit, Michigan 48226

Charles Bechhoefer, Esq.
Atomic Safety & Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dr. Frederick P. Cowan
Apt. B-125
6125 N. Verde Trail
Boca Raton, Florida 33433

Jerry Harbour, Esq.
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Geotechnical Engineers, Inc.
ATTN: Dr. Steve J. Poulos
1017 Main Street
Winchester, Massachusetts 01890

ENCLOSURE 1

RESUMES

RESUME

(NAME

KUO, PAO-TSIN

.ADDRESS

11405 Rambling Road
Gaithersburg, Maryland 20760

EDUCATION

Diploma, Taipei Institute of Technology
MSCE, North Dakota State University
PhD, Rice University

SUMMARY

- 5 Years Section Leader, Structural Engineering Section B
(1979 to Present) Supervises review staff in the assessment and approval of the adequacy of seismic and structural aspects of license applications for nuclear power plant licensing.
- 3½ Years Structural Engineer on the review staff for
(1975 to 1979) assessment and approval of the adequacy of seismic and structural aspects of license applications for nuclear power plant design
- 4½ Years Engineering Specialist in seismic analyses,
(1971 to 1975) earthquake resistant design, and other structural analyses for nuclear power plant facilities
- 1 Year Senior Design Engineer in engineering analysis
(1966 to 1967) and structural design of nuclear power plant facilities
- 5 Years Structural engineer in design and construction
(1961-1965) of harbor structures and high-rise buildings
- 1 Year Civil engineer in embankment line layout
(1960-1961)

EXPERIENCE

As a staff member in U.S. Nuclear Regulatory Commission (USNRC), the applicant currently serves as a technical reviewer for evaluating the adequacy of seismic analysis and structural design for proposed and existing nuclear power plants. He performs technical review and evaluation of safety analysis reports. He also provides specialized technical assistance to various offices, monitors USNRC sponsored research contracts, confers with technical and management representatives of organizations applying for licenses, and participates as a representative of the Regulatory staff on USNRC and national committees relating to the development of standards, codes, and criteria for nuclear applications.

Before joining USNRC, the applicant was employed by Bechtel Power Corporation for 4½ years. He served as a staff specialist responsible for reviewing and establishing criteria for seismic analyses of structures, performing investigative studies in the seismic analysis area, and advising Chief Engineer concerning problems related to seismic analyses and design. He also served as a member of the Bechtel Seismic Task Force Committee establishing the corporate standards related to seismic analyses and design. In addition to seismic analyses for

structures, he was also responsible for reviewing and approving the seismic qualifications of mechanical and electrical equipment by either analytical means or laboratory testing. Between the years of 1971 to 1973, he was also engaged in impact analysis for cask drop and aircraft impact and in developing design criteria and methods for pipe whip restraint design.

Prior to joining Bechtel, the applicant was associated with Cushing & Nevell Technical Design Corporation on contract to Ebasco Services, Inc.. He was primarily concerned with the engineering analysis and design for a 700 MW nuclear power plant. He was also employed by John A. Mackel and Associates responsible for design and analysis of high-rise buildings.

From July 1961 to March 1965, he joined Keelung Harbor Bureau in Taiwan, China. He served as a field structural engineer responsible for construction of a number of harbor structures including both steel and reinforced concrete structures.

Between the years of 1960 to 1961, he was employed by Taiwan Water Conservancy Bureau as a civil engineer involved in embankment line layout.

PROFESSIONAL
MEMBERSHIP

American Society of Civil Engineers
Earthquake Engineering Research Institute

PROFESSIONAL
ACTIVITIES

Speaker at the 1975 Seminar on Geotechnical and Structural Aspects of Earthquake Engineering sponsored by National Capital Section, ASCE, February, 1975

Lecturer on "Earthquake Resistance of Nuclear Containment Structures", a short course for continuing education sponsored by George Washington University, July, 1975

PUBLICATIONS

"Response of Structures to Propagating Ground Motions", paper coauthored and presented at 5th European Conference on Earthquake Engineering, Turkey, September, 1975

"Torsional Effects in Structures Subjected to Dynamic Excitations of the Ground", PhD Thesis submitted to Rice University, March, 1974

"Coupled Lateral and Torsional Response of Nuclear Power Plants under Earthquake Excitations", paper presented at 2nd International Conference on Structural Mechanics in Reactor Technology, Berlin, West Germany, September, 1973

"Survey of Aseismic Design Data for Nuclear Power Plants", paper co-authored and presented at the Fifth World Conference on Earthquake Engineering, Italy, June, 1973

"Seismic Analyses of Structures and Equipment for Nuclear Power Plants". Bechtel Topical Report, EC-TOP-4, coauthored and published in August, 1974

CHEN P. TAN
PROFESSIONAL QUALIFICATIONS
STRUCTURAL ENGINEERING BRANCH

I am a Structural Engineer in the Structural Engineering Branch of Nuclear Regulatory Commission. I am responsible for the review and evaluation of adequacy of criteria used in the structural design and analysis of Seismic Category I structures, systems and components of nuclear power plants assigned to the branch.

I received a B.S. degree in Civil Engineering from National Tang Shan College of Engineering in ^{CHINA IN} 1948. I received the degree of Master of Science in Structural Engineering from Oklahoma State University, Stillwater, Oklahoma in 1957 and the degree of Ph.D. (Structural Engineering) from the University of Pennsylvania in 1966.

From 1948 to 1955 I worked as an assistant engineer on the design, analysis and supervision of construction of highway bridges in Taiwan Highway Bureau, Taiwan, China. During the years 1957 to 1961 when under employment at the consulting engineer firm of Yule, Sticklen, Jordan and McNee in Philadelphia, Pennsylvania I worked as a senior Structural Engineer on the design of highway bridges for the states of Pennsylvania, Ohio and Connecticut.

From May 1965 to March 1966, I worked as a senior Structural Engineer in Catalytic Construction Company on the structural design and analysis of buildings in a polymerization plant for a major chemical company and also on the structural design of a V/Stol wind tunnel.

Since 1966 I have served in the structural engineering area including research, design and analysis for the construction and power industries. During the years (1966-1970) of my association with the

Franklin Institute Research Laboratories as a senior staff engineer, I was responsible for a research program to study the state of the art of the technology of prestressed concrete reactor pressure vessels and to review the design and construction practices of prestressed and reinforced concrete containment vessels. I also performed stress analysis of concrete containments for nuclear power plants as well the study of the effect of an airplane crash on liquified natural gas tanks.

From December 1970 to April 1972 I worked as an engineering specialist and as a staff member of the civil group in the Gaithersburg, Md. division of the Bechtel Power Corporation. My assignments related to the structural design and analysis of concrete containments for various nuclear power plants. I also reviewed drafts of PSAR and FSAR for nuclear power plants and assisted in drafting responses to questions from Regulatory agencies.

As a member of the Structural Engineering Branch, I have participated in developing criteria for structural design and analysis of Seismic Category I structures in nuclear power plants, performed evaluations of technical reports concerning structural behavior under accident loading conditions and reviewed the safety analysis reports of nuclear power plants of Fulton, Summit, McGuire, Washington Nuclear Power Projects Nos. 1 and 4, Blue Hills, Wisconsin Utilities Project, Palo Verde, etc. in the areas relating to the design and analysis of Seismic Category I structures.

I am a member of the American Society of Civil Engineers, the American Concrete Institute and the Society of Sigma XI. I am a member

- 5 -

. ACI-ASME 359 technical committee on concrete pressure components for nuclear service. I WAS A MEMBER OF ACI COMMITTEE 224 ON CRACKING

I am a registered professional engineer in the state of Pennsylvania. I have published technical papers and discussions in the Journal of American Concrete Institute and the Journal of the Structural Engineering Division of the American Society of Civil Engineers.

NORMAN D'EDWARD ROMNEY
1211 Fairmont Street, N. W.
Washington, D. C. 20009

PERSONAL: Married, U. S. Citizen, Date of Birth: 3/5/51

EDUCATION: B.S.C.E. May, 1974, Howard University

"CPM: Reliable Planning and Control of Projects", The George Washington University, Continuing Engineering Education Program, 2.1 CEU, 1977.

"ASME Boiler Pressure Vessel Code - ACI 359/349 Code Requirement for Nuclear Safety Related Concrete Structures", Bechtel In-House Training Program, 24 hours 1979.

"Concrete Technology and Codes", Portland Cement Association, 6.2 CEU, 1980.

REGISTRATION: Professional Engineer, January, 1980, Virginia

PROFESSIONAL ACTIVITIES: Member, National Society of Professional Engineers

EXPERIENCE:

May 1980
to
Present U.S. Nuclear Regulatory Commission, Bethesda, Maryland
Engineer, Structural Engineering Branch, Division of Engineering. Review and evaluate the structural and earthquake engineering aspects of structures needed for safe plant operation and safe shutdown during normal, transient, accident, and environmental conditions in reactor facilities licensed for power operation.

March 1978
to
May 1980 Bechtel Power Corporation, Gaithersburg, Maryland
Engineer, Davis-Besse Nuclear Power Station, Units 1, 2, and 3. Design of structural steel floors, columns and platforms for Unit 2 and 3 auxiliary building; design pipe anchors for additions to Unit 1 fire protection system; check Unit 1 pipe support design for adequacy of expansion anchor bolts.

March 1977
to
March 1978 De LEUW, Cather and Company, Washington, D. C.
Scheduling Engineer, Metro Project Program Control. Review construction schedules and specifications developed by Metro section design consultants for implementation into the system-wide "Design and Construction Schedule". Develop CPM networks for Metro project sections designed by De LEUW Cather and Company.

June 1974
to
March 1977
Bechtel Power Corporation, Gaithersburg, Maryland

(June 1974
to
November 1975)
Engineer, Civil-Structural Design Group, Grand Gulf Nuclear Power Station. Design of reinforced concrete and steel structures for Turbine and Control Buildings.

(November 1975
to
February 1976)
Engineer, Civil-Structural Design Group, Joseph M. Farley Nuclear Power Station. Design of pipe supports and pipe whip restraints for main steam and main feedwater pipes in auxiliary building.

(August 1976
to
March 1977)
Technical Representative, College Relations. Assisted Personnel Department with the development of a college relations program and recruiting efforts at minority colleges.

(February 1976
to
March 1977)
Engineer, Coordinator Civil/Pipe Hanger Engineering Groups, Grand Gulf Nuclear Power Station. Provide liaison between Civil Structural Groups and Pipe Hanger Design Group; resolve design problems resulting from interface between pipe hanger designs and structural design of Plant buildings. Review pipe hanger designs for structural effects on building steel and attachments to concrete structures.

SUMMER
EMPLOYMENT: _

1973
Engineering-Science, Inc., McLean, Virginia
Engineering Aide, Drafting and detailing of sewage treatment facilities.

1971
District of Columbia, Department of highways and Traffic, Washington, D. C.
Engineering Aide, Traffic Operations Division. Assisted in the layout, phasing, timing, and coordination of existing and planned traffic signal installations.

1969
Lovell Belcher, Inc. City Surveyors, New York, New York
Trainee. Assisted in field surveys, as chairman and rodman. Also did some drafting of surveys from field notes.

Name: Carl J. Costantino, Senior Consultant Structural Analysis Division, BNL.

Title: Professor, Department of Civil Engineering, CCNY.

Experience:

Teaching:

The City College of the City University of New York 1967 to present.

Research:

From June 1959 to August 1967, at IIT Research Institute, Chicago, Illinois, conducting research studies for both government and industry. From Assistant Research Engineer to Manager of Nuclear Weapons Effects and Structural Dynamics Section of the Mechanics Research Division.

Project Engineer on programs involving site hardening for missile guidance systems. Principal investigator in theoretical and experimental investigations of soil-structure interaction problems for use in hardening analyses.

Principal investigator in the development of large computer programs to study two-dimensional stress wave propagation problems in general nonlinear media. Application of the finite element methods to stress wave problems.

Major participant in studies involving investigations of structural response to shock loadings and analysis of reactor containment shell structures to large plastic deformations.

From September 1967 to date, at The City College, Department of Civil Engineering.

Conducting research studies in stress-wave propagation; finite strain and medium-structure interaction effects. Development of three-dimensional finite element programs to study stress wave problems.

Other:

Summers of 1956, and 1957 and 1958, with Tippetts, Abbott, McCarthy and Stratton, Consultant Engineers, as Soils Engineer.

Resident engineer on earth moving program involving soil stabilization and compaction for foundation of a large industrial site.

Field supervision of soils exploration programs for large earth dams, flood control projects and river erosion problems. 3

Education:

B.C.E., City College of New York, 1956
M.S. in Civil Engineering, Columbia University,
Major in Soil Mechanics and Foundation Engineering,
1958
Ph.D. in Civil Engineering at Illinois Institute of
Technology, 1960

Societies:

American Society of Civil Engineers
American Society of Mechanical Engineers
Chi Epsilon
Sigma A
Tau Beta
Chairman, Applied Mechanics Division, Chicago Section,
ASME (1964-1965)
Reviewer, Applied Mechanics Reviews, ASME
Reviewer, Structures Division, ASCE
Reviewer, Pressure Vessel and Piping Division, ASME

Publications:

1. "Representative Triaxial Testing", Thesis, Department of Civil Engineering, Columbia University, 1958.
2. "Stresses in the Vicinity of Deep Underground Shelters", Proceedings, 32nd Symposium on Shock, Vibration and Associated Environments, Part II, Bulletin No. 32, Off. of the Director of Defense Research and Engineering.
3. "Approximate Burst Strength of Thin-Walled Cylinders with Hemispherical Caps", with N.A. Weil, M.A. Salmon, Journal AIAA, Vol. 1, No. 9, pp. 2088, September 1963.
4. "Comparison of Approximate Theories for the Burst Strength of Finite Cylinders", with N.A. Weil, Transactions, American Nuclear Society, Vol. 6, No. 1, pp. 115, June 1963.
5. "The effect of End Conditions on the Burst Strength of Finite Cylinders", with N.A. Weil, M.A. Salmon, Journal of Applied Mechanics, Vol. 3, No. 1, pp. 97, March 1964.

- 4
6. "The Strength of Thin-Walled Cylinders Subjected to Dynamics Internal Pressures", Journal of Applied Mechanics, Vol. 32, No. 1, pp. 104, March 1965.
 7. "A Simplified Soil-Structure Interaction Model to Investigate the Response of Buried Silos and Cylinders", with R. R. Robinson, M. A. Salmon, Proceedings, Symposium on Soil-Structure Interaction, pp. 303, University of Arizona, September 1964.
 8. "Experiments on Circular Cylinders with Flexible Roof Plates Buried in Sand", with A. Longinow, Proceedings, Symposium on Soil-Structure Interaction, pp. 423, University of Arizona, September 1964.
 9. "The Theory of Limiting Equilibrium for Axisymmetric Problems: A Comparison with Experiment on Silo Skin Friction", with A. Longinow, Proceedings, Symposium on Soil-Structure Interaction, pp. 583, University of Arizona, September 1964.
 10. "Crushable Materials for Structural Blast Shields", Journal, Structure Division, ASCE, Vol. 91, pp. 229, June 1965.
 11. "Response of Buried Silos and Internal Systems to Ground Shock", with A. Wachowski, Proceedings, International Symposium on the Use of Electronic Digital Computers in Structural Engineering. University of Newcastle upon Tyne, 1966.
 12. "Response of Crushable Foam Encased Buried Cylinders", Thesis, Illinois Institute of Technology, June 1966.
 13. "Finite Element Approach to Stress Wave Problems", Journal, Engineering Mechanics Division, ASCE, April 1967.
 14. "Finite Element Solution for Wave Propagation in Layered Media Caused by a Nuclear Detonation", with A. Wachowski, and U. L. Barnwell, presented at the International Symposium on Wave Propagation and Dynamic Properties of Earth Materials, Albuquerque, New Mexico, 1967.
 15. "Response of Crushable Foam Encased Buried Cylinders", with E. Vey, Journal, Soil Mechanics Division, Vol. 95, No. SM5, September 1969.
 16. "Two-Dimensional Wave Propagation Through Nonlinear Media", Journal of Computational Physics, Vol. 4, No. 2, August 1969.

- 5
17. "Structure-Foundation Interaction of a Nuclear Power Plant with a Seismic Disturbance", with C. A. Miller, Nuclear Eng. & Design, December, 1970.
 18. "Analysis of Soil-Structure Interaction Effects Under Seismic Excitation", First Inter. Conf. on Structural Mechanics in Reactor Technology, Berlin, September 1971.
 19. "Dynamic Response of Nonlinear Media at Large Strains", with J. Heifitz, Journal, Eng. Mechanics Division, ASCE, pp 1511-1528, Vol. 98, EM6, December 1972.
 20. "Seismic Analysis of Liquid Sodium Storage Tanks", with C. A. Miller, Proceedings, 5th World Conference on Earthquake Engineering, Rome, June 1973.
 21. "Rocking Effects in a Nuclear Power Plant Subjected to a Seismic Disturbance", with C. A. Miller, Proceedings, 5th World Conference on Earthquake Engineering, Rome, June 1973.
 22. "Influence of Soil-Structure Interaction Parameters on Floor Response Spectra", with C. A. Miller, Proceedings, 2nd Inter. Conf. on Struct. Mechanics in Reactor Technology, Berlin, September 1973.
 23. "Finite Element Analysis for Soil Amplification Studies", with L. A. Lufvano, Proceedings, ASCE Specialty Conference on Structural Design at Nuclear Plant Facilities, Vol. II, Chicago, December 1973.
 24. "Mesh Size Criteria for Soil Amplification Studies", C.J. Costantino, C.A. Miller, and L. Lufrano, Proceedings 3rd Structural Mechanics in Reactor Technology Symposium, September 1975.
 25. "Facility Design Constraints for Combined Seismic and Thermal Loading", C.A. Miller and C.J. Costantino, Technology Symposium, September 1975.
 26. "Soil-Structure Interaction Parameters from Finite Element Analysis", C.J. Costantino, C.A. Miller and L. Lufrano, Proceedings Conference on Extreme Load Conditions and Finite Analysis Procedure, September 1975.
 27. "Seismic Analysis", C.A. Miller and C.J. Costantino, Shock and Vibration Computer Programs, Reviews and Summaries, edited by W. & B. Pilkey, The Shock and Vibration Information Center, United States Department of Defense, 1975.

Name: Charles A. Miller, Senior Consultant, Structural Analysis Division, SNI.

Title: Professor, Department of Civil Engineering, CUNY.

Experience:

Teaching:

The City College of the
City University of New York

1968 to Present

Research:

From December 1957 to August 1968, at IIT Research Institute conducting research studies for both industry and government. From Assistant Engineer to Assistant Director of the Engineering Mechanics Division responsible for a group of twenty-five engineers engaged in solid mechanics research.

Project engineer on studies dealing with the vulnerability of military and industrial facilities to the effects of nuclear weapons; the design of hardened radar antennas; and the conceptual design and cost trade off of alternate approaches for superhard missile launch facilities.

Principal investigator on studies related to the: mathematical modeling of the dynamic response of structural/mechanical systems; the development of minimum cost designs for prestressed concrete structures; the creep behavior of reinforced concrete structures; and the application of large scale structural computer codes to analyze the response of complex structures to both static and dynamic loading.

Other:

From June 1953 to May 1954, at M. W. Kellogg Co. involved in the hydraulic design of petrochemical plants.

Registration:


Registered professional engineer in New York State.

Education:

- B.S. in Civil Engineering, Manhattan College. (1953)
M.S. in Civil Engineering, Illinois Institute of Technology. (1960)
Ph.D. in Civil Engineering, Illinois Institute of Technology. (1966)

Publications:

1. "Dynamic Analysis of Two Hinged Arches", M.S. Thesis, Illinois Institute of Technology, January 1960.
2. "Response of Electronic Equipment to Nuclear Blast", C. A. Miller and J. A. Granath, Proceedings, 29th Symposium on Shock, Vibration and Associated Environments.
3. "Influence Coefficients for Two-Hinged Arches", C. A. Miller and S. A. Guralnick, Proceedings, ASCE, Journal of the Structural Division, August 1962.
4. "Dynamic Response of Slab Structure Exhibiting Coulomb Friction to Combined Air and Shock Loading", E. Sevin, C. A. Miller and R. R. Robinson, Proceedings, Symposium on Use of Computers in Civil Engineering, September 1962.
5. "Computers in Structural Engineering", Frontier, Autumn, 1965.
6. "An Investigation of the Behavior of Reinforced Concrete Beams Subjected to Repeated Cycles of Loadings", Ph.D. Thesis, Illinois Institute of Technology, January 1966.
7. "Educational Problems of New Computer Users", Presented at Civil Engineering Program Application Group (CEPA) March, 1966.
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9. "The Dynamic Analysis of Non-Orthogonal Grid Systems", C. A. Miller and R. E. Kramm, International Conference on Space Structures, London, September 1966.

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10. "Opportunities in Continuing Education in Computer Sciences", presented at ASCE sponsored Symposium on Computer Applications for Civil Engineers at Illinois Institute of Technology, November 1966.
 11. "A Reinforced Concrete Beams Subjected to Repeated Loads", Proceedings ASCE, Journal of the Structural Division, October 1967.
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 13. "Interior Structure Motion Environment", Presented at DASA Long Range Planning Meeting, Albuquerque, N.M., January 1968.
 14. "Creep of Reinforced Concrete Beams", Presented at ASCE Joint Specialty Conference on Optimization and Non Linear Problems, Chicago, Illinois, April 1968.
 15. "Creep Effects in Continuous Reinforced Concrete Beams", C. A. Miller, Proceedings IABSE Symposium on Design of Concrete Structures for Creep, Shrinkage and Temperature Changes, September 1970.
 16. "Creep Deflection of Reinforced Concrete Beams", C.A. Miller and S. A. Guralnick, Proceedings ASCE, Journal of the Structural Division, December 1970.
 17. "Structure-Foundation Interaction of a Nuclear Power Plant with a Seismic Disturbance", C. A. Miller and C. J. Costantino, Nuclear Engineering and Design, December 1970.
 18. "Redistribution of Internal Forces in Concrete Beams as a Result of Creep", Presented at ACI annual meeting, March 1971.
 19. "Seismic Analysis of Liquid Sodium Storage Tanks", C. A. Miller and C. J. Costantino, Proceedings 5th World Conference on Earthquake Engineering, June 1973.
 20. "Rocking Effects in a Nuclear Power Plant Subjected to a Seismic Disturbance", C. A. Miller and C. J. Costantino, Proceedings 5th World Conference on Earthquake Engineering, June 1973.
 21. "Influence of Soil-Structure Interaction Parameters on Floor Response Spectra", C. J. Costantino and C. A. Miller, Proceedings 2nd Structural Mechanics in Reactor Technology Symposium, September 1973.

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22. "Mesh Size Criteria for Soil Amplification Studies", C.J. Costantino, C.A. Miller, and L. Lufrano, Proceedings 3rd Structural Mechanics in Reactor Technology Symposium, September 1975.
 23. "Facility Design Constraints for Combined Seismic and Thermal Loading", C.A. Miller and C.J. Costantino, Proceedings 3rd Structural Mechanics in Reactor Technology Symposium, September 1975.
 24. "Soil-Structure Interaction Parameters from Finite Element Analysis", C.J. Costantino, C.A. Miller and L. Lufrano, Proceedings Conference on Extreme Load Conditions and Finite Analysis Procedure, September 1975.
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Societies:

American Concrete Institute
American Society of Civil Engineers
Chi Epsilon
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Biographical Information

WANG, PING-CHUN, Senior Engineer, Structural Analysis Group, Department of Nuclear Energy, Brookhaven National Laboratory, Upton, NY.
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College Degrees: B.S., National Central University of China, 1943; M.S., University of Illinois, 1946; Ph. D., University of Illinois, 1951.

Major Fields of Interest: Structural Mechanics.

Courses Taught 1981-82 Academic Year: CE 331 Steel Structures; CE 609 Matrix Analysis of Structures I; CE 610 Matrix Analysis of Structures II; CE 616 Finite Elements Method.

Professional Activities, Societies and Honors

Professional Society Memberships: American Society of Civil Engineers--Fellow; American Concrete Institute--Member; Chinese Institute of Engineers--Member; Seismological Society of America--Member; Earthquake Engineering Research Institute--Member.

Honorary Society Memberships: Sigma Xi, Chi Epsilon.

Positions Held: 1943-1947, Junior Engineer, China Bridge Company; 1950-51, Designer, Ammann and Whitney, New York; 1951-1960, Supervising Engineer, Seelye, Stevenson, Vail & Knecht, New York; 1960-1963, Associate Professor, Stevens Institute, Hoboken, New Jersey; 1963-Present, Professor, Polytechnic Institute of New York.

Consulting:

The office of Irving Cantor, Consulting Engineers

Publications:

"Composite Action of Concrete Slab and Open Web Joists," by D. J. Kaley and P. C. Wang. Engineering Journal, A.I.S.C., January 1967.

"Elastic-Plastic Analysis and Design of Flexible Arches," by G. Granik, P.C. Wang and S.F. Borg, Trans., New York Academy of Science, March 1967.

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"Critical Seismic Response of Nuclear Reactors," R.F. Drenick, P.C. Wang, C.B. Yun and A.J. Philippopoulos. Transaction of the 5th International Conference on Structural Mechanics in Reactor Technology, Vol. K8/4, August 1979.

"Critical Response Spectra for Linear and Non-linear Structures," by P.C. Wang and A.J. Philippopoulos. Proceedings of the International Conference of Engineering for Protection from Natural Disasters, Bangkok, Thailand, January 1980.

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"Review of Methods and Criteria for Dynamic Combination in Piping Systems," by M. Reich, P.C. Wang, J. Curreri, S. Hou and H. Goradia. Report prepared for U.S. Nuclear Regulatory Commission, March 1980.

"Prediction of Earthquake Resistance of Structures," by P.C. Wang. Final Report to NSF under Grant No. PER 76-14893, January 1980.

Textbooks:

"Numerical and Matrix Methods in Structural Mechanics," with Application to Digital Computers," John Wiley and Sons, 1966.

Registrations:

P.E., New York and New Jersey.

Honors:

Who's Who in America.

RESUME
PERSONAL DATA

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Name : A.J. Philippopoulos
Home Address : 11 Vernon St., Farmingdale, NY 11735
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EDUCATION

Doctor of Philosophy in Civil Engineering, Polytechnic Institute of New York, May 1980. Major for doctorate: Civil Engineering. Minor for doctorate: Applied Mechanics, Mathematics.

Master of Science in Civil Engineering, Polytechnic Institute of Brooklyn, June 1976.

Bachelor of Science in Civil Engineering, Aristotelion University of Thessaloniki, School of Engineering, June 1975.

AWARDS

Research Fellowship, Senior Grade. Received during graduate studies at Polytechnic Institute of New York. Research grants sponsored by the National Science Foundation.

MEMBERSHIPS

Sigma Xi, The Scientific Research Society of North America, Associate Member, May 1977.

American Society of Civil Engineers, Associate Member, November 1976.

Technical Chamber of Greece, Member, June 1975.

PRESENT EMPLOYMENT

Brookhaven National Laboratory, Department of Nuclear Energy, Structural Analysis Division, Upton, NY 11973. Position: Assoc. Scientist.

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PUBLICATIONS

1. "An Assessment of Soil-Structure Interaction Effects Based on Simple Models", Philippacopoulos, A.J. and Miller, C.M., 7th International Conference on Structural Mechanics in Reactor Technology, Chicago, IL. Paper K10/3.
2. "Site-Structure Dependent Excitations", Philippacopoulos, A.J., accepted for publication in the Journal of Nuclear Engineering and Design, February 1983.
3. "Critical Seismic Assessment of Life Line Structures", Wang, P.C. and Philippacopoulos, A.J., Proceedings of the 7th World Conference on Earthquake Engineering, Istanbul, Turkey 1980, pp. 257-264.
4. "Application of Reduction Methods to Nuclear Power Plant Structures", Miller, C.M. and Philippacopoulos, A.J., Report NUREG/CR-3074, prepared for the U.S. Nuclear Regulatory Commission, October 1982.
5. "Evaluation of Simultaneous Action of Earthquake, LOCA and SRV on Mark III Containment and Drywall Structures", Philippacopoulos, A.J. and Reich, M., 6th International Conference on Structural Mechanics in Reactor Technology, Paris, France, 1981, Paper J 7/2.
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7. "Behavior of Basic Soil-Structure Interaction Parameters", Philippacopoulos, A.J., submitted to the American Society of Civil Engineers for review and possible publication in the Journal of the Engineering Mechanics Division, December 1982.
8. "Evaluation of Concured Peak Responses", Wang, P.C., Curreri, J., Shooman, M., Wang, Y-K., Philippacopoulos, A.J., Reich, M. and Subudhi, M., Report NUREG/CR-2685, prepared for the U.S. Nuclear Regulatory Commission, May 1982.

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10. "Critical Response Spectra for Linear and Nonlinear Structures", Wang, P.C. and Philippacopoulos, A.J., International Conference for Protection from Natural Disasters, Asia Institute of Technology, Bangkok, 1980, pp. 427-435.
11. "ABS, SRS and CDF Response Combination Evaluations for Mark III Containment and Drywell Structures", Philippacopoulos, A.J., Report NUREG/CR-1980, prepared for the Nuclear Regulatory Commission, June 1982.
12. "Errors Resulting from Reduction Methods", Miller, C.M. and Philippacopoulos, A.J., 7th International Conference on Structural Mechanics in Reactor Technology, Chicago, IL, Paper K 3/4.
13. "Large Scale Polymer Concrete Vessels for the Direct Utilization of Geothermal Processes", Philippacopoulos, A.J., Koplík, B., and Reich, M., Report BNL-29027, August 1980.
14. "Probability Based Load Criteria for the Design of Nuclear Structures: A Critical Review of the State-of-the-Art", Shinosuka, M., Ellingwood, B.R., Wang, P.C., Meyer, C., Wen, Y.K., Kao, S., Shooman, M.L. and Philippacopoulos, A.J., Report NUREG/CR-1979, prepared for the U.S. Nuclear Regulatory Commission, April 1981.
15. "High Soil-Structure Damping Combined with Low Structural Damping", Miller, C.M., Costantino, C.J., and Philippacopoulos, A.J., 7th International Conference on Structural Mechanics in Reactor Technology, Chicago, IL.
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18. "Upper Bound Floor Response Spectra", Philippopoulos, A.J., Wang, P.C., Miller, C.M. and Reich, M., submitted for the 8th World Conference on Earthquake Engineering, San Francisco, California.
19. "Independent Seismic Evaluation of the Diablo Canyon Unit 1 Containment Annulus Structure and Selected Piping Systems", Philippopoulos, A.J., Reich, M., Berler, P., Miller, C.M., Wang, Y.K., Subudhi, M., Shteyngart, S. and Brown, P., Report NUREG/CR-2834, prepared for the U.S. Nuclear Regulatory Commission, August 1982.
20. "Prediction of Earthquake Resistance of Structures", Wang, P.C. with contributions from Philippopoulos, A.J., Polytechnic Institute of New York, Final Report to NSF, Grant No. FFR 76-14893, January 1980.
21. "Dynamic Combinations for Mark II Containment Structures", Philippopoulos, A.J. and Reich, M., Report NUREG/CR-2039, prepared for the U.S. Nuclear Regulatory Commission, June 1982.
22. "Statistically Evaluated Critical Response Spectra", Wang, P.C., and Philippopoulos, A.J., submitted for the 8th World Conference on Earthquake Engineering, San Francisco, California.

Morris Reich

Position:

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Special Fields:

Over twenty years of extensive management experience in the utilization and development of nuclear energy systems and related technology. Some of the items worked on includes; structural design and safety evaluations of fission, advanced fission, fusion reactors, geothermal and conventional power plants, coal mine tunnels, underground support systems, complex radar support systems, and bridge and highway structures; extensive work in the development of structural finite element techniques, fracture mechanics techniques, and dynamic response methods; recent work includes development of risk and reliability analysis methods for design of engineering structures and systems.

Member - Editorial Board of Journal of Nuclear Engineering and Design. North Holland Publishing Company.

Consultant - Advisory Committee on Reactor Safeguards (ACRS) of the United States Nuclear Regulatory Commission, 1977 - 79.

Board Member of the International Association for Structural Mechanics in Reactor Technology.

Division/Session Chairman
and/or Invited Speaker

Chairman and Invited Speaker - Session - M5, Structural Systems/Component Reliability, 7th International Conference on Structural Mechanics in Reactor Technology, Chicago, IL, 1983.

Invited Speaker - Session - M7, Probabilistic Risk Assessment, 7th International Conference on Structural Mechanics in Reactor Technology, Chicago, IL, 1983.

Division Chairman - 5th International Conference on Structural Mechanics in Reactor Technology, Berlin, Germany, 1979.

Chairman Session - (M3) Structural Analysis of Pre-Stressed Concrete Reactor Vessels II, 4th International Conference on Structural Mechanics in Reactor Technology, San Francisco, CA, August, 1977.

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**Division/Session Chairman
and/or Invited Speaker (Cont'd)**

Co-Chairman - Structural Dynamics II, International Meeting on Fast Reactor Safety and Related Physics, American Nuclear Society and European Society, Chicago, IL, October 1976.

Invited Speaker - Structural Problems of Fusion Power Session NP. 4th International Conference on Structural Mechanics in Reactor Technology, San Francisco, CA, August 1977.

Invited Speaker - Safety Considerations of PCRV's American Nuclear Society Meeting, San Francisco, CA, November 1975.

Edited; Special Issue on Fusion, Vol. 58, (1980), Nuclear Engineering and Design, North Holland Publishing Company, Amsterdam, Netherlands.

Edited; Structural Analysis Needs for Magnetic Fusion Energy Superconducting Magnets, published by ERDA, CONF-760984-1976.

Education:

City College of New York, B.S.M.E., June 1961

City College of New York, M.S.M.E., June 1963

Polytechnic Institute of Brooklyn, Mechanical Engineering, June 1972

Polytechnic Institute of Brooklyn, Mechanical Engineering, Ph.D., Summer 1974

Dr. Reich joined Brookhaven National Laboratory in 1962 as a member of the Mechanical Engineering Division. His early assignments included project work at the newly designed High Flux Beam Reactor (HFBR). Later, he was appointed Chief Mechanical Engineer of the Pulsed Fast Reactor Project.

Since forming the Structural Analysis Group (about seven years ago), he has participated and directed a host of activities for the Nuclear Regulatory Commission (NRC), the Department of Energy (DOE - formerly ERDA), the Federal Highway Administration, the U.S. Bureau of Mines, the Office of Saline Water and the Department of Defense. As Head of the Structural Analysis Group, he supervises Senior Engineers and scientists in the development of complex structural analysis and probabilistic methods and their application to evaluations of structural components and systems used in water-cooled reactors (LWR's and BWR's), Liquid Metal Fast Breeder Reactors (LMFBR's), High Temperature Gas-Cooled Reactors (HTGR's), and Controlled Thermonuclear Reactors (CTR's). His activities involving evaluations of static, dynamic, elastic, elastic-plastic small and large deformations, as well as large strains, linear and ductile

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fracture mechanics, creep, fatigue, creep-fatigue interaction, linear and nonlinear seismic response, soil structure interaction, and combined structural-probabilistic analysis, etc. for reactor vessels, steam generators, piping systems, core and core components, prestressed concrete reactor vessels (PCRV's), containment structures, fusion magnet structures and systems, blanket, and other general power plant components are well documented in literature.

Similarly, he has participated and directed research for the Bureau of Mines, dealing with the design and evaluation of coal mine underground support systems, and development methods and the structural response evaluation of anisotropic layered media; has worked on various schemes for new types of desalination plants for the Office of Saline Water; has participated in structural evaluations and designs involving new highway bridge-decks airport runways, and general bridge designs utilizing prestressed and/or post-tensioned polymer concrete for the Federal Highway Administration; developed and designed equipment for geothermal power plant use for Department of Energy; evaluated various sophisticated equipment for Department of Defense.

Journal Publications

1. "Analysis of Bridge Decks Using Poly-Impregnated Concrete", M. Reich and B. Koplík, Pub. SP. 40, American Concrete Inst. (ACI) 1973.
2. "Finite-Element Analysis of Structural Response of Superconducting Magnets for a Fusion Reactor", M. Reich, T.Y. Chang, S. Prachuktam and J. Powell, Paper M 2/9, presented at the 3rd International Conference on Structural Mechanics in Reactor Technology, London, England, Sept. 1975.
3. "Determination of Burst Pressures for Cracked Steam Generator Tubes", M. Reich and T.Y. Chang, ASME Paper 77 PVP-31, presented at the ASME Energy Tech. Conf., Houston, TX, Sept. 1977.
4. "Inelastic Analysis of Finite Length and Depth Cracked Tubes Paper", M. Reich, S. Prachuktam and D. Gardner, Paper F 7/4, presented at the 4th Intl. Conf. of Structural Mechanics in Reactor Technology, San Francisco, CA, Aug. 1977.
5. "Three-Dimensional Nonlinear Failure Analysis for PCRV's and Containment Structures", M. Reich and J.J. Connor, Paper B 2/1, presented at the 4th International Conf. on Structural Mechanics in Reactor Technology, San Francisco, CA, Aug. 1977.
6. "Effect of Clearance and Distribution of Mass on the Dynamic Response of an NTR Core", M. Reich and B. Koplík, Paper K 1/3, presented at the 4th International Conf. on Structural Mechanics in Reactor Technology, San Francisco, CA, Aug. 1977.
7. "Structural Aspects of Superconductivity Fusion Magnets", M. Reich, J. Lehner and J. Powell, Paper 1.55, presented at the World Electrotechnical Congress, Moscow, USSR, June 1977.
8. "Cyclic Behavior of Seized Steam Generator Tubes", M. Reich and S. Prachuktam, ASME/CSME Vessel and Piping Conference, Montreal, Canada, June 1978.
9. "Failure Analysis of Steam Generator Tubes in Dented and Wastage Configuration", M. Reich, S. Prachuktam and T.Y. Chang, Journal of Pressure Vessel Technology Trans. ASME, Vol. 100, No. 4, 1978.
10. "Compilation of References, Data Sources and Analysis Methods for LMFBR Primary Piping System Components", M. Reich and E.F. Esztergar, Nuclear Engineering and Design, Vol. 50, No. 2, Oct. 1978.
11. "Application of Fracture Mechanics Methods in Safety Analysis of Piping Components in Subcreep and Creep Regions", M. Reich, E.F. Esztergar, E.G. Ellison, R. Erdogan, T.F.C. Spence and C. Wells, Nuclear Engineering and Design, Vol. 51, No. 2, Jan. 1979.

Journal Publications (Cont'd)

12. "Concepts for Benchmark Problem Development for Fracture Mechanics Application in Safety Evaluation of Nuclear Piping in Sub-Creep Service", M. Reich and E.F. Esztergar, Nuclear Engineering and Design, Vol. 51, No. 2, January 1979.
13. "Nonlinear Response to Multiple Decaying Sine Waves", B. Koplik, M. Reich and J. Curreri, Paper M10/7, presented at the 5th International Conference on Structural Mechanics in Reactor Technology, Berlin, August 1979.
14. "Existing and Future Structural Analysis Techniques and Their Application to Superconducting Magnets", M. Reich, N2/1-1, presented at the 5th International Conference on Structural Mechanics in Reactor Technology, Berlin, August 1979.
15. "Generic Structural Mechanics Aspects of Fusion Magnet Systems", M. Reich and J.R. Powell, Nuclear Engineering and Design, Vol. 58, No. 2, 1980.
16. "Non-linear Dynamic Response of a Multi-Mass System with Gaps", M. Reich, and B. Koplik, presented paper at the 47th Shock and Vibration Symposium, Albuquerque, N.M., October 1976.
17. "Reliability Assessment of Nuclear Structural Systems", M. Reich, and H. Hwang, Paper M/5/1, presented at the 7th International Conference on Structural Mechanics in Reactor Technology Chicago, IL, August 1983.
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19. "Assessment of Nonlinear Structural Finite Element Program: NONSAP for Inelastic Analysis", T.Y. Cheng, S. Prachuktam and M. Reich, ASME paper 77-PVP-10, ASME Energy Conference, Houston, Texas, September 1977.
20. "Three-Dimensional Inelastic Evaluation of Controlled Magnetic Fusion Energy Reactor Magnet", J. Lehner, M. Reich and J. Powell, Paper L5/4, presented at the 4th International Conference on Structural Mechanics in Reactor Technology, San Francisco, CA, August 1977.
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22. "Safety and Reliability Aspects of Superconducting Magnets for Thermonuclear Power Reactors", J. Powell, S.T. Hsieh and M. Reich, Paper 1.54 presented at the World Electrotechnical Congress, Moscow, USSR, June 1977.

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23. "Failure Analysis of Tubes with Wastages", S. Prachuktam, M. Reich and J. Ragan, ASCE Paper 79-PVP-113, presented at the Pressure Vessel and Piping Conference, San Francisco, CA, June 1979.
24. "A Finite Element Model for Elastic and Slip Responses of Fusion Magnets", T.Y. Chang and M. Reich, Journal of Pressure Vessel Technology, Vol. 102, May 1980.
25. "A Three Dimensional Peak Program for Nonlinear Behavior of an HTGR Core", J. Curreri, M. Reich, E. Kopylik, P. Bexler and M. Subudhi, Paper K12/1, presented at the 5th International Conference on Structural Mechanics in Reactor Technology, Berlin, August 1979.
26. "A Review of Structural Mechanics Aspects of Fusion Blankets", J.R. Powell and M. Reich, Nuclear Engineering and Design, Vol. 58, No. 2, 1980.
27. "Finite Element Based Random Vibration Analysis of Nuclear Structures Under Seismic Loading", T. Kako, M. Shinozuka, H. Hwang, and M. Reich, Paper M 7/2, presented at the 7th International Conference on Structural Mechanics in Reactor Technology, Chicago, IL, August 1983.
28. "Development of a Reliability Analysis Method for Category I Structures", M. Shinozuka, T. Kako, H. Hwang and M. Reich, Paper M5/3, presented at the 7th International Conference on Structural Mechanics in Reactor Technology, Chicago, IL, August 1983.
29. "Estimation of Structural Reliability Under Combined Loads", M. Shinozuka, T. Kako, H. Hwang, P. Brown and M. Reich, Paper M 2/3, presented at the 7th International Conference on Structural Mechanics in Reactor Technology, Chicago, IL, 1983.
30. "Computer Technology in Fusion Reactor Research", T.Y. Chang, H. Suzuki and M. Reich, ASCE Publication, PVP-78-031, 1978.
31. "Thermal and Structural Design Aspects of Heat Temperature Blankets for Fusion SIV Fuel Production", J.R. Powell, J.A. Fillo and M. Reich, Paper B 2/4, presented at the 6th International Conference on Structural Mechanics in Reactor Technology, Paris, France, August 1981.
32. "Evaluation of Concurrent Peak Responses", P.C. Wang, J. Curreri, and M. Reich, Paper M 2/4, presented at the 7th International Conference on Structural Mechanics in Reactor Technology, Chicago, IL, August 1983.

Selected NRC and DOE Reports

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1. "Integrity of LMFBR Primary Piping: A Preliminary Evaluation", Part I: J.G.Y. Chow, Part II. M. Reich, September 1974, Report No. ENL/FRS-74-2.
2. "Elastic and Inelastic Methods of Piping Systems Analysis: A Primary Review", M. Reich and E. Esxtergar, February 1975, Report No. BNL-19768.
3. "Proceedings of the Workshop on Structural Analysis Needs for Magnetic Fusion Energy Superconducting Magnets - A Technical Assessment", M. Reich, J. Lehner, J. Powell and P. Berler, Eds., held at BNL, September 1976; Report No. CONF-760984.
4. "Piping Benchmark Problems, Dynamic Analysis Uniform Support Motion Response Spectrum Method", P. Berler, M. Hartzman and M. Reich, August 1980, Report No. NUREG/CR-1677.
5. "Seismic Review Table", M. Subudhi, M. Reich, B. Koplak and J. Lane, April 1980, Report No. NUREG/CR-1429.
6. "Probability Based Load Criteria for Design of Nuclear Structures: A Critical Review of the State of the Art", M. Reich, H. Hwang, Eds., Major Contributors, M. Shinozuka, B. Ellingwood, Contributors, P.C. Wang, C. Meyer, Y.K. Wen, S. Kao, M.L. Shoeman and A.J. Philippacopoulos, February 1981, Report No. NUREG/CR-1979.
7. "Dynamic Combinations for Mark II Containment Structures", A.J. Philippacopoulos and M. Reich, February 1981, Report No. NUREG/CR-2039.
8. "Evaluation of Concurrent Peak Response", P.C. Wang, J. Curreri, M. Shoeman, Y.K. Wang, A.J. Philippacopoulos, M. Reich and M. Subudhi, May 1982, Report No. NUREG/CR-2685.
9. "Review of Load Combinations for NSSS and BOP Piping and Equipment of Mark III Plants", A.J. Philippacopoulos, M. Reich and P.C. Wang, May 1982, Report No. NUREG/CR-2686.
10. "Independent Seismic Evaluation of the Diablo Canyon Unit 1 Containment Annulus Structure and Selected Piping Systems", A.J. Philippacopoulos, M. Reich, P. Berler, C. Miller, Y.K. Wang, M. Subudhi, S. Shteyngart and P. Brown, June 1982, Report No. NUREG/CR-2834.
11. "Failure Evaluation of a Reinforced Concrete Mark III Containment Structure Under Uniform Pressure", S. Sharma, M. Reich, T.Y. Chang and S. Shteyngart, September 1982, Report No. NUREG/CR-1967.
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13. "Probabilistic Models for Materials Used in a Reinforced Concrete Containment", H. Kwang, S. Kau and M. Reich, September 1982, Report No. NUREG/CR-3041.
14. "Seismic and Dynamic Qualification of Safety Related Electrical and Mechanical Equipment in Operating Nuclear Power Plants". J. Curreri, C. Costantino, M. Reich and A.J. Philippopoulos, April 1983, Report No. NUREG/CR-3266.
15. "Review of Current Analysis Methodology for Reinforced Concrete Structural Evaluations", S. Sharma, M. Reich and T.Y. Chang. April 1983. will be published as a NUREG Report.
16. "Probabilistic Models for Operational and Accidental Loads on Seismic Category I Structures", H. Kwang, P.C. Wang and M. Reich, April 1983, will be published as a NUREG Report.