

TERA

March 30, 1983

Mr. J. G. Keppeler
Administrator, Region III
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

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

Re: Docket Nos. 50-329 and 50-330
Midland Nuclear Plant - Units 1 and 2
Independent Design and Construction Verification (IDCV) Program
Overview of the Midland Construction Completion Program (CCP)

On March 18, 1983, TERA transmitted under two separate covers information relative to our corporate independence, individual independence and professional qualifications for the Midland Independent Design and Construction Verification (IDCV) Program and the Overview of the Midland Construction Completion Program (CCP). We indicated at the time that supplementary information would be forthcoming. Accordingly, the following additional information is provided for your review:

- Individual Affidavits/Statements of Independence (Attachment 1 - Midland IDCV Program; Attachment 2 - CCP Overview Program)
- Resumes (Attachment 3) - For your convenience, we have included a full set of resumes to eliminate the need to refer to Appendix C of the IDCV project quality assurance program.

Boo!

Dist PER:
D. Hood

Affidavits and resumes have been added for Mr. Robert Felton, Mr. Lawrence Wight, and Dr. Peter Andersen who were not identified in the March 18, 1983 transmittals. Mr. Felton and Mr. Wight are officers of TERA and, in this capacity, will provide a corporate overview of the project. Dr. Andersen has been added to the project team to assist in the areas of heat transfer and fluid dynamics.

Please note that Mr. Patrick Longstreth is currently out of the country, and we are unable to obtain his affidavit. He is expected to be away for several additional weeks. We have, therefore, decided to remove him from the project team. If he is reassigned at a later date, we will transmit an affidavit at that time.

8304010368 830330
PDR ADOCK 05000329
A PDR

TERA CORPORATION
BETHESDA, MARYLAND 20814

301-654-8960

101 WISCONSIN AVENUE

Mr. J. G. Keppler
Mr. D. G. Eisenhut

2

March 30, 1982

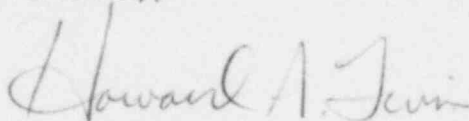
In the process of securing an affidavit from Mr. David Hamel, we have determined that he briefly (approximately a man week) provided consultation services on the Midland project in the area of equipment qualification while employed by Nutech. Mr. Hamel had recently been identified as a potential project participant and has not made any contribution to date. We have no near term plans of using Mr. Hamel; however, if this should change we will resolve the issue and provide you with his affidavit and a complete description of his past activities. Under no circumstances will Mr. Hamel participate in either the IDCV or CCP Overview projects in the equipment qualification area.

On March 24, 1983, Darl Hood, NRC Midland Project Manager, contacted me to request clarification relative to individuals who included additional information on mutual or other funds as an attachment to their individual affidavits. Mr. Hood desired an accounting of which individuals had included these attachments, to assure that in the process of reproduction, attachments had not become separated. This accounting is included as Attachment 4.

Mr. Hood contacted me again on March 30, 1982 to request further clarification relative to individuals who were previously employed by the Nuclear Regulatory Commission. He requested that these individuals submit an affidavit addressing their past involvement with the Midland project while on the NRC staff. Specifically, he was interested in determining whether anyone had provided a safety evaluation on aspects of Consumer Power Company's CP or OL applications which are within the scope of the Midland IDCV program. These affidavits are provided as Attachment 5.

We believe that the information transmitted under this cover completes our submittal on this topic. Should project needs require the assignment of additional personnel or the services of a subcontracted organization, we will obtain the necessary affidavits from these individuals or firms and transmit them to the NRC. Please contact me should you require clarification or further information.

Sincerely,



Howard A. Levin
Project Manager
Midland Independent Design and
Construction Verification Program

cc: J. Cook, CPC
G. Keeley, CPC
D. Hood, NRC

Enclosures
HAL/djb



TERA CORPORATION

TERA

March 30, 1983

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U.S. Nuclear Regulatory Commission
799 Roosevelt Road
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3001

Dist PER:
D. Hood

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PDR ADOCK 05000329
A PDR

TERA CORPORATION
BETHESDA, MARYLAND 20814

301-654-8960

101 WISCONSIN AVENUE

Mr. J. G. Keppler
Mr. D. G. Eisenhut

2

March 30, 1982

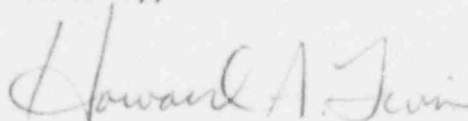
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Sincerely,



Howard A. Levin
Project Manager
Midland Independent Design and
Construction Verification Program

cc: J. Cook, CPC
G. Keeley, CPC
D. Hood, NRC

Enclosures
HAL/djb



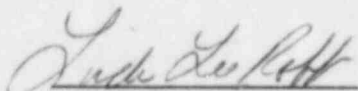
TERA CORPORATION

Mr. J. G. Keppler
Mr. D. G. Eisenhut

3

March 30, 1982

Sworn and Subscribed Before Me This 31ST Day of March 1983


Notary Public

My Commission Expires My Commission Expires July 1, 1986



TERA CORPORATION

Service List for Midland Independent Design
and Construction Verification Program

cc: Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

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

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

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

Michael I. Miller, 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

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

Lee L. Bishop
Harmon & Weiss
1725 I Street, N.W., Suite 506
Washington, D.C. 20006

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

Mr. Wendell Marshall
Route 10
Midland, Michigan 48440

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

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

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

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

ATTACHMENT I

SUPPLEMENTAL INDIVIDUAL AFFIDAVITS
STATEMENTS OF INDEPENDENCE

MIDLAND IDC V PROGRAM

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF S. Fabric

My name is S. FABRIC. I am employed by TERA Corporation
as Assoc. Tech. Reviewer

I am currently assigned to the team which is conducting an independent design and construction verification at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

Stanislav Fabric

Sworn and Subscribed Before Me This 17 Day of March 1983

Karen S. Aisenberg
Notary Public

My Commission Expires 7/1/86

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF John Angelo

My name is John Angelo. I am employed by TERA Corporation.

I am currently assigned to the team which is conducting an independent design and construction verification at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

John Angelo

Sworn and Subscribed Before Me This 25TH Day of March 1983

[Signature]
Notary Public

My Commission Expires

NOTARY PUBLIC STATE OF FLORIDA
BOND AND CAPITAL INS. UND.
COMMISSION EXPIRES SEPT. 26, 1985

March 25, 1983

Fund in which I hold a beneficial interest:

T Rowe Price Tax-Free Income Fund
100 East Pratt Street
Baltimore, MD 21202

John Angelo

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF Susan Sly Burke

My name is Susan Sly Burke. I am employed by TERA Corporation.

I am currently assigned to the team which is conducting an independent design and construction verification at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

Susan Sly Burke

Sworn and Subscribed Before Me This 25 Day of March 1983

Judith Hirsch
Notary Public

My Commission Expires June 30, 1987

JUDITH HIRSCH
Notary Public, State of Ohio
My Commission Expires June 30, 1987

* I was employed by Bechtel Sept, 1978 Through January, 1981. During my employment I was not associated with the Midland project.

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF LENNY R. LAAKSO

My name is LENNY R. LAAKSO. I am employed by TERA Corporation
as ASSOCIATE TECHNICAL REVIEWER

I am currently assigned to the team which is conducting an independent design and construction verification at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

Lenny R Laakso

Sworn and Subscribed Before Me This 25th Day of March 1983

Mona E. Slaney
Notary Public

My Commission Expires July 16, 1987

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF Sidney Brown

My name is Sidney Brown. I am employed by TERA Corporation

I am currently assigned to the team which is conducting an independent design and construction verification at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

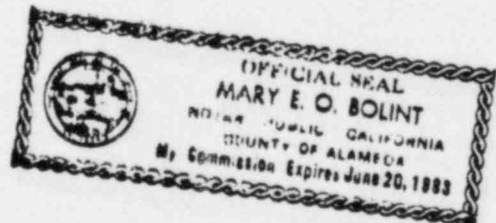
Signed

Sidney Brown

Sworn and Subscribed Before Me This 21 Day of March 1983

Mary E. O. Bolint
Notary Public

My Commission Expires 6/20/83



** EMPLOYED BY BECHTEL 1965 TO 1980. VARIOUS ASSIGNMENT, NEW AT ORISK MIDLAND. DUTIES VARIED, HEAVY INTO PLANNING, SUPPORTS, CONSTRUCTION AND COMPUTER APPLICATIONS. AS CONSTRUCTION SPECIALIST - PLANNING/INSTR.

** RELATIVE: DAUGHTER, MRS. L. BULLOCK WORKS FOR BECHTEL PETROLEUM, SINCE AUG 82, AS A CONST. ASSISTANT.

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF Leonard Stout

My name is Leonard Stout. I am employed by TERA Corporation

I am currently assigned to the team which is conducting an independent design and construction verification at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

Leonard Stout

Sworn and Subscribed Before Me This 30th Day of March 1983

Mary E. O. Bolint
Notary Public

My Commission Expires 6/20/83



- (1) I have previously worked at Bechtel Power Corporation in the San Francisco Office and travelled to the Midland project to consult with the construction project team on the implementation of Bechtel standard Quantity Tracking Systems, computerized progress measurement systems. (1975-1976)

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF Stan W Kaut

My name is STAN W KAUT. I am employed by TERA Corporation.

I am currently assigned to the team which is conducting an independent design and construction verification at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

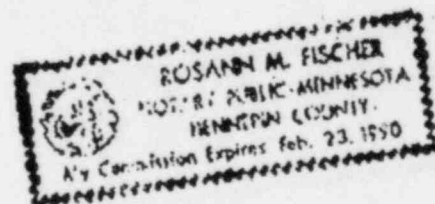
Stan W Kaut



Sworn and Subscribed Before Me This 30 Day of March 1983

Rosann M. Fischer
Notary Public

My Commission Expires 2-23-90



STATEMENT OF INDEPENDENCE

AFFIDAVIT OF Orin W. Kilgore

My name is Orin W. Kilgore. I am employed by TERA Corporation.

I am currently assigned to the team which is conducting an independent design and construction verification at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

Orin W. Kilgore

Sworn and Subscribed Before Me This 25th Day of March 1983

Deane Hesson
Notary Public

My Commission Expires 6-84

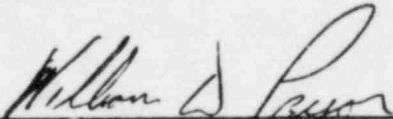
STATEMENT OF INDEPENDENCE

AFFIDAVIT OF WILLIAM D. PRYOR

My name is William D. Pryor. I am employed by TERA Corporation.

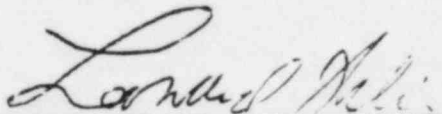
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Signed



William D. Pryor

Sworn and Subscribed Before Me This 23 Day of March 1983



Notary Public Leonard J. Cline

My Commission Expires at death

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF FREDERICK ALLEN PELLERIN

My name is FREDERICK ALLEN PELLERIN. I am employed by TERA Corporation.

I am currently assigned to the team which is conducting an independent design and construction verification at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

Frederick A. Pellerin

Sworn and Subscribed Before Me This 25th Day of March 1983

Andrew M. Culhane
Notary Public

Notary Public, State of Florida

My Commission Expires March 8, 1986

Bonded thru Tony Fain Insurance, Inc.

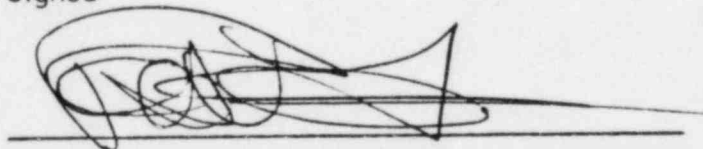
STATEMENT OF INDEPENDENCE

AFFIDAVIT OF Robert W Felton

My name is Robert W Felton. I am employed by TERA Corporation

I am currently assigned to the team which is conducting an independent design and construction verification at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

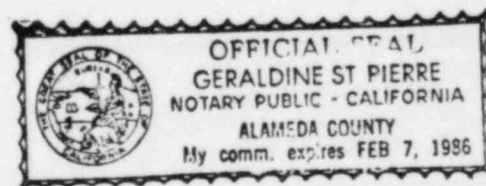
Signed



Sworn and Subscribed Before Me This 24th Day of March 1983

Geraldine St Pierre
Notary Public

My Commission Expires February 7, 1986



STATEMENT OF INDEPENDENCE

AFFIDAVIT OF PETER S. ANDERSEN

My name is Peter S. Andersen. I am employed by TERA Corporation as Technical Reviewer.

I am currently assigned to the team which is conducting an independent design and construction verification at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

Peter S. Andersen

Sworn and Subscribed Before Me This 17 Day of March 1983

Karen S. Aisenberg
Notary Public

My Commission Expires 7/1/86

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF Charles E. Lemon

My name is Charles E. Lemon. I am employed by TERA Corporation

I am currently assigned to the team which is conducting an independent design and construction verification at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

Charles E. Lemon

Sworn and Subscribed Before Me This 22 Day of March 1983

Mary E. O. Bolint
Notary Public

My Commission Expires 6/20/83



* I worked on the Palisades Proj. for Consumers Power while an employee at Bechtel in 1973. I believe I also spent some time, although very little on the Midland Project assisting with the main condenser cooling system design. My efforts on Palisades were the design of the cooling tower system and assist in design of the radwaste system.

ATTACHMENT 2

**SUPPLEMENTAL INDIVIDUAL AFFIDAVITS
STATEMENTS OF INDEPENDENCE**

MIDLAND CCP OVERVIEW PROGRAM



STATEMENT OF INDEPENDENCE

AFFIDAVIT OF S. Fabic

My name is S. FABIC. I am employed by TERA Corporation
as Assoc. Technical Reviewer

I am under consideration for assignment to the team which will conduct an independent overview of the Construction Completion Program at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

Stanley Fabic

Sworn and Subscribed Before Me This 17 Day of March 1983

Karen A. Aisenberg
Notary Public

My Commission Expires 7/1/86

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF John Angelo

My name is John Angelo. I am employed by TERA Corporation.

I am under consideration for assignment to the team which will conduct an independent overview of the Construction Completion Program at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project* or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

John Angelo

Sworn and Subscribed Before Me This 25th Day of March 1983

[Signature]
Notary Public

My Commission Expires _____

* with the exception of the Midland Independent Design and Construction Verification Program

March 25, 1983

Fund in which I hold a beneficial interest:

T Rowe Price Tax-Free Income Fund
100 East Pratt Street
Baltimore, MD 21202

John Angelo

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF Susan Sly Burke

My name is Susan Sly Burke. I am employed by TERA Corporation.

I am under consideration for assignment to the team which will conduct an independent overview of the Construction Completion Program at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project* or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel,** or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

Susan Sly Burke

Sworn and Subscribed Before Me This 25 Day of March 1983

Judith Hirsch
Notary Public

My Commission Expires

June 30, 1987

JUDITH HIRSCH
Notary Public, State of Ohio
My Commission Expires June 30, 1987

* with the exception of the Midland Independent Design and Construction Verification Program

** I was employed by Bechtel September, 1978 through January, 1981. During my employment I was not associated with the Midland Project.

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF LENNY R. LAAKSO

My name is LENNY R. LAAKSO. I am employed by TERA Corporation
as ASSOCIATE TECHNICAL REVIEWER

I am under consideration for assignment to the team which will conduct an independent overview of the Construction Completion Program at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

Lenny R Laakso

Sworn and Subscribed Before Me This 25th Day of March 1983

Mona E. Slaney
Notary Public

My Commission Expires July 16, 1987

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF Sidney Brown

My name is Sidney Brown. I am employed by TERA Corporation.

I am under consideration for assignment to the team which will conduct an independent overview of the Construction Completion Program at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project*, or any job or task for or on behalf of Consumers Power Company, Bechtel,** or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel,** or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel,** or Babcock and Wilcox.

* with the exception of the Midland Independent Design and Construction Verification Program.

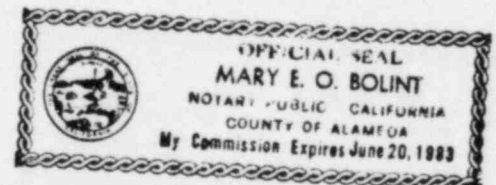
Signed

Sidney Brown

Sworn and Subscribed Before Me This 21 Day of March 1983

Mary E. O. Bolint
Notary Public

My Commission Expires 6/20/83



** EMPLOYED BY BECHTEL 1965 TO 1980; VARIOUS ASSIGNMENTS, NENG FOR N+ MIDLAND.
DUTIES VARIED BY TIME & PROJECT: HEAVY PILING, SURVEYS, COMPUTER APPLICATIONS, CONVT SPECIALIST, SUPERVISOR.

*** RELATIVE: DAUGHTER, MS BULLOCK; WORKS FOR BECHTEL PETROLEUM DIV, SINCE AUG 82,
AS A CONSTRUCTION ASSISTANT.

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF Leonard Stout

My name is Leonard Stout. I am employed by TERA Corporation.

I am under consideration for assignment to the team which will conduct an independent overview of the Construction Completion Program at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project*, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

* with the exception of the
Midland Independent Design
and Construction Verification
Program.

Leonard Stout

Sworn and Subscribed Before Me This 30th Day of March 1983

Mary E. O. Bolint
Notary Public

My Commission Expires 6/20/83



① I have previously worked at Bechtel Power Corporation in the San Francisco office and traveled to the Midland project to consult with the construction project team on the implementation of Bechtel standard QUANTITY TRACKING SYSTEMS, COMPUTERIZED PROGRESS MEASUREMENT SYSTEMS. (1975-1976)

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF STAN W. KAUT

My name is STAN W KAUT. I am employed by TERA Corporation
as ASSOCIATE TECHNICAL REVIEWER

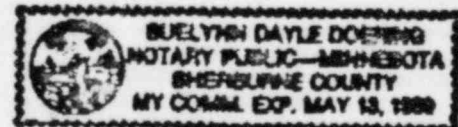
I am under consideration for assignment to the team which will conduct an independent overview of the Construction Completion Program at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

Stan W Kaut

Sworn and Subscribed Before Me This 29 Day of March 1983

Lina Lynn Doyle Doering
Notary Public



My Commission Expires _____

*With the exception of the Midland Independent Design Construction Verification Program.

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF ORIN W. KILGORE

My name is Orin W. Kilgore. I am employed by TERA Corporation.

I am under consideration for assignment to the team which will conduct an independent overview of the Construction Completion Program at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project,* or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

Orin W. Kilgore
Orin W. Kilgore

Sworn and Subscribed Before Me This 23 Day of March 1983

Leonard J. Cline
Notary Public Leonard J. Cline

My Commission Expires at death

*With the exception of the Midland Independent Design and Construction Verification Project.

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF WILLIAM D PRYOR

My name is WILLIAM D PRYOR. I am employed by TERA Corporation.

I am under consideration for assignment to the team which will conduct an independent overview of the Construction Completion Program at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project,* or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

William D Pryor

Sworn and Subscribed Before Me This 25th Day of March 1983

Ernest A. Gauthier
Notary Public

My Commission Expires at my Death

*With the exception of the Midland Independent Design and Construction Verification Project.

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF FREDERICK A. PELLERIN

My name is FREDERICK A. PELLERIN. I am employed by TERA Corporation.

I am under consideration for assignment to the team which will conduct an independent overview of the Construction Completion Program at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project,* or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

Frederick A. Pellerin

Sworn and Subscribed Before Me This 28th Day of March 1983

Sandra M. Cullins
Notary Public

Notary Public, State of Florida

My Commission Expires March 8, 1985
Bonded Thru Troy Fain - Insurance, Inc.

*With the exception of the Midland Independent Design and Construction Verification Project.

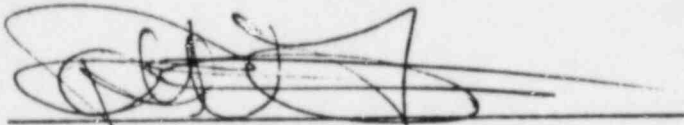
STATEMENT OF INDEPENDENCE

AFFIDAVIT OF Robert W Felton

My name is Robert W Felton. I am employed by TERA Corporation.

I am under consideration for assignment to the team which will conduct an independent overview of the Construction Completion Program at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

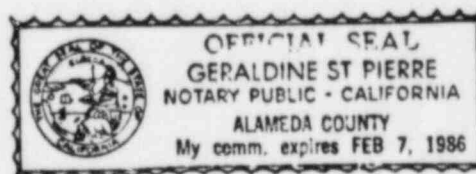


* with the exception of the Midland Independent Design and Construction Verification Program.

Sworn and Subscribed Before Me This 24th Day of March 1983

Geraldine St Pierre
Notary Public

My Commission Expires February 7, 1986



STATEMENT OF INDEPENDENCE

AFFIDAVIT OF PETER S. ANDERSEN

My name is Peter S. Andersen. I am employed by TERA Corporation
as Technical Reviewer.

I am under consideration for assignment to the team which will conduct an independent overview of the Construction Completion Program at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Signed

Peter S. Andersen

Sworn and Subscribed Before Me This 17 Day of March 1983

Karen S. Aisenberg
Notary Public

My Commission Expires 7/1/86

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF Charles E. Lemon

My name is Charles E. Lemon. I am employed by TERA Corporation.

I am under consideration for assignment to the team which will conduct an independent overview of the Construction Completion Program at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project*, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company,** Bechtel,** or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

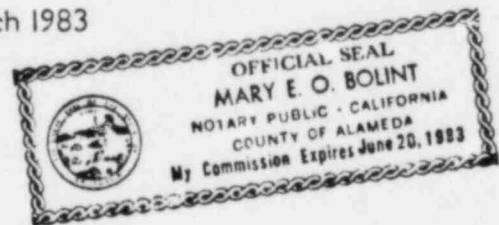
Signed

* with the exception of the
Midland Independent Design
and Construction Verification
Program.

Charles E. Lemon

Sworn and Subscribed Before Me This 22 Day of March 1983

Mary E. O. Bolint
Notary Public



My Commission Expires 6/20/83

**I worked on the Palisades Project for Consumers Power while an employee at Bechtel in 1973. I believe I also spent some time, although very little on the Midland Project assisting with the main condenser cooling system design. My efforts on Palisades were the design of the cooling tower system and assist in design of the radwaste system.

ATTACHMENT 3

RESUMES



JOHN W. BECK
Vice President - Southern/Southwestern Operations

Education

M.S. Mechanical Engineering, Northeastern University
B.S. Engineering Physics, University of Tulsa

Summary of Experience

Mr. Beck has extensive experience in technical and corporate management. He has managed projects and engineering support activities in the areas of fuel management and procurement, power plant licensing, environmental systems, electrical and mechanical engineering, reactor physics and nuclear safety analysis. His corporate management experience was as the Chief Operating Officer of the Vermont Yankee Nuclear Power Corporation which owns and operates a 525 MWe nuclear generating station. He also served as Chairman of the EPRI Nuclear Engineering and Operations Task Force and as a member of the Nuclear Divisional Committee of EPRI.

- 1980 - Present Vice President, TERA Corporation. Responsible for the Southern and Southwestern Operations of the company.
- 1976 - 1980 Executive Vice President, Vermont Yankee Nuclear Power Corporation. Served as the Chief Operating Officer of the company and was responsible for the technical and business management of the corporation. The output of the nuclear plant is sold wholesale to its owners, 10 New England electric utilities.
- 1974 - 1976 Director of Engineering, Yankee Atomic Electric Company. Responsible for the general supervision and management of the Plant, Reactor, and Environmental Engineering Department as well as research and engineering development and computer applications for the company.
- 1973 - 1974 Reactor Engineering Manager, Yankee Atomic Electric Company. Direct responsibility for fuel management, transient and safety analyses for the Yankee Rowe, Vermont Yankee, Maine Yankee, Seabrook and New England Electric System nuclear installations.
- 1967 - 1973 Engineer/Licensing Engineer, Yankee Atomic. Reload core physics design and analysis for operating plants and nuclear design follow for new plants. Licensing engineer for Maine Yankee.
- 1964 - 1967 Scientist, Bettis Atomic Power Laboratory. Experimental reactor physics and analysis for the Shippingport and Light Water Breeder core physics design.

Professional Associations

American Nuclear Society

10/82(1)



TERA CORPORATION

HOWARD A. LEVIN
Project Manager

Education

M.S. Structural Engineering, Massachusetts Institute of Technology
B.E. Civil Engineering, Stevens Institute of Technology

Summary of Experience

Mr. Levin has over nine years of experience in the commercial nuclear field with emphasis in nuclear plant design and construction, operating reactor safety, licensing, project management, and federal regulation.

1981 - Present Project Manager - TERA Corporation. Responsible for the management and implementation of large projects servicing clients in the nuclear services area.

1976 - 1981 Technical Assistant to the Director, Division of Engineering, NRC. Responsible for the development of policies and programs related to the technical review of license applications and operating reactor safety. Administered technical activities in the areas of mechanical, equipment qualification, structural, materials, chemical, hydrological, geotechnical, earthquake and environmental engineering. Represented the Director and provided testimony before the NRC, ACRS, ASLB, public hearings and industry meetings, presenting and justifying technical analyses and evaluations.

Program Manager, Systematic Evaluation Program-NRC. Responsible for the development of program goals, scope, technical criteria and scheduling for the SEP structural, mechanical, and seismic safety review of older operating reactors. Responsibilities included the administration and management of large dollar resources and multi-disciplined engineering professionals. Developed new and innovative procedures for seismic safety assessment.

Senior Engineer, NRC. Responsible for the review of Safety Analysis Report information pertaining to complex structural, mechanical and materials issues related to all operating power and research reactor facilities. Coordination of technical assistance programs; preparation of licensing criteria documents, codes and standards; documentation and presentation of safety analyses and evaluations supporting licensing actions.

1974 - 1976 Structural Engineer, Stone and Webster Engineering Corp. Responsible for the analysis and design of nuclear power plant structures, systems and components for normal and extreme loading conditions. Emphasis on dynamic analysis and computer code development to solve problems related to qualification for seismic and pipe rupture loadings. Developed new design concepts for prestressed concrete containment buildings.



1972 - 1974 Held engineering positions with Slattery Associates and Hercules, Inc. Responsible for design of structural systems used in construction of bridges, subways, sewage plants, and process chemical plants. In charge of field surveying team.

Professional Affiliation

American Society of Civil Engineers

Honors and Publications

Sigma Xi Scientific Honorary
Tau Beta Pi Engineering Honorary
M.I.T. Engineering Resident Fellowship
U.S. Naval Academy Appointment
Moles Heavy Construction Award

Selected Technical papers and Publications:

Prestressed Concrete Containments for Nuclear Power Plants, Operating Experience with Snubbers; Fracture Toughness and Lamellar Tearing of Component Supports; Equipment Response at the El Centro Steam Plant During the October 15, 1979, Imperial Valley Earthquake; Seismic Review of Operating Plants, Systematic Evaluation Program Seismic Review; Evaluation of Existing Nuclear Power Plant Facilities for Postulated Heavy Load Drop Consequences; Seismic Design Guidelines for Existing Nuclear Power Facilities in Light of an Expanding Data Base of Knowledge.



WILLIAM J. HALL
Principal Scientist

Education

Ph.D. Civil Engineering, University of Illinois
M.S. Civil Engineering, University of Illinois
B.S. Civil Engineering, University of Kansas
University of California, Berkeley

Summary of Experience

Dr. Hall has had over 39 years of experience in the fields of structural engineering, structural mechanics and dynamics, soil mechanics, earthquake engineering, plasticity, fatigue, fracture mechanics, nuclear power, and civil defense including 33 years on the faculty of the Civil Engineering Department at the University of Illinois. He is author or co-author of over 115 formal publications (books and professional articles) and over 150 major consulting reports, many of public record and wide distribution. He is editor for a series of texts in civil engineering and engineering mechanics for Prentice-Hall, Inc. On his own and as an associate of the late Nathan M. Newmark, he has carried major consulting engineering responsibility for projects in such areas as development of design criteria for hardened protective structures, physical vulnerability studies, vibration studies of missile test stands, reactor containment structural design and analysis, nuclear field test studies, review of structural criteria and designs for nuclear power plants and equipment for seismic loadings, M-X system development, and the trans-Alaska pipeline design.

Professional Affiliations

American Society of Civil Engineers, Fellow, officer of local section and numerous committees
American Association for the Advancement of Science, Fellow
Earthquake Engineering Research Institute - past Director
American Concrete Institute
American Society of Engineering Educators
International Institute of Welding
Seismological Society of America
American Society for Testing and Materials
Society for Experimental Stress Analysis
International Association for Bridge and Structural Engineering
Illinois Society of Professional Engineers
National Society of Professional Engineers
Structural Engineers Association of Illinois
Applied Technology Council
National Science Foundation Advisory Committee on Earthquake Engineering

Honors

Who's Who in America
Who's Who in Engineering
Who's Who in the Midwest
Who's Who in Metals



Personalities of the West and Midwest
American Men of Science
Engineers of Distinction
A. Epstein Memorial Award
Walter L. Huber ASCE Research Award
Adams Memorial Award of the AWS
Halliburton Engineering Education Leadership Award of the University of Illinois College
of Engineering
National Academy of Engineering
U.S. Delegation on Earthquake Engineering and Hazards Reduction to People's Republic of
China, National Academy of Sciences
Tau Beta Pi
Sigma Tau
Phi Kappa Phi
Sigma Xi
Chi Epsilon



DONALD K. DAVIS
Manager - Nuclear Safety and Licensing

Education

B.S. Nuclear Engineering, North Carolina State University
Graduate Numerical Sciences, The Johns Hopkins University
Studies

Summary of Experience

Mr. Davis has 15 years of nuclear engineering experience. He has managed licensing programs for the NRC and has performed safety analyses for commercial power plants. He has directed multiple discipline engineering groups evaluating the design aspects of commercial power plants including potential site hazards such as earthquakes and floods, structural and mechanical design, electrical engineering, system performance and reactor core accident analysis. He is an expert in nuclear licensing issues from a policy and engineering viewpoint. At TERA Mr. Davis has been the Project Manager for two key projects related to the Diablo Canyon nuclear plant; the performance of Seismic Design Studies to verify the safety design basis of the plant and the development of an Earthquake Emergency Plan to address the potential effects of an earthquake on emergency planning activities.

1979 - Present Manager - Nuclear Safety and Licensing, TERA Corporation.

1972 - 1979 Chief, Systematic Evaluation Program Branch, NRC. Responsible for the safety evaluation of 11 older power plants in over 130 technical issues from seismic design to accident analyses.

Chief, Operating Reactor Project Branch, NRC. Responsible for the licensing activities associated with 15 power reactors.

Technical Assistant, Division of Operating Reactors, NRC. Provided technical direction to the licensing staff evaluating operating reactors.

Technical Support Section Leader, Office of Nuclear Reactor Regulation. Provided technical assistance and advice on policy issues to the Director and Deputy Director of Nuclear Reactor Regulation.

Project Manager, Light Water Reactors, AEC. Responsible for the licensing of nuclear power reactors for construction and operation.

1967 - 1972 Reactor Engineer, Hittman Associates. Responsible for the design and safety analyses of several nuclear power plants and spent fuel shipping containers. Conducted analyses of primary and secondary system transients and loss-of-coolant accident analyses for several power reactor designs.

1964 - 1967 Research Assistant, North Carolina State University. Responsible for dosimetry research associated with 10 kilowatt research reactor and 30,000 Curie Cobalt-60 irradiator.



Professional Affiliations and Honors

American Society of Mechanical Engineers
Tau Beta Pi, Engineering Honorary
Sigma Pi Sigma, Physics Honorary
Phi Kappa Phi, Academic Honorary



ROBERT L. WILSON
Senior Vice President

Education

M.S. Nuclear Engineering, Purdue University
B.S. Aeronautical Engineering, Purdue University

Summary of Experience

Mr. Wilson has extensive experience in management of engineering, environmental and licensing activities for power plants, mining projects and chemical industry projects. He has managed numerous projects involving the design of various power plant systems and studies of environmental impacts as a result of plant or mine operations. He has directed numerous management consulting projects for TERA ranging from development of Project Control Systems to Corporate Organizational Planning and Development projects.

- 1979 - Present Senior Vice President, TERA Corporation. Responsible for three divisions of the firm providing environmental engineering, seismic analysis and management consulting services.
- 1974 - 1979 Vice President and Division Manager, TERA Corporation. Responsible for managing multi-disciplined projects including lignite mining studies, environmental assessments, project management services, waste handling evaluation, nuclear radiological assessments, emergency/contingency planning, facilities licensing services, and computer applications projects.
- 1969 - 1974 Sacramento Municipal Utility District (SMUD), Supervisor of Nuclear Engineering. Full responsibility for nuclear engineering, environmental assessment, and federal, state, and local licensing activities for the Rancho Seco Nuclear Project. Responsibility for administration of the NSSS contract for Rancho Seco Unit.
- 1966 - 1969 Plant Engineer, Knolls Atomic Power Laboratory (KAPL). Responsible for management of operation and testing activities for a nuclear power plant facility.

Professional Affiliations

Professional Engineer, Nuclear Engineering, State of California
Member, American Nuclear Society; member of Executive Committee of Reactor Operations Division
Member, Northern California Section, American Nuclear Society; past Chairman and member of the Executive Committee
Co-founder and Chairman of the Utilities Nuclear Coatings Work Committee, a national organization with membership from all segments of the nuclear industry, currently representing over 80 countries.



CURT M. STALEY
Principal Engineer - Project Engineering

Education

M.S. Structural Engineering, University of California, Berkeley
B.S. Structural Engineering, University of California, Berkeley

Summary of Experience

Mr. Staley specializes in the development and application of management methods and systems to large engineering and construction projects. His responsibilities have included supervision and management of engineering design, field construction and project management activities. His extensive experience has been applied to major petrochemical and power plant projects in the United States and abroad.

- 1977 - Present Principal Engineer - Project Engineering, TERA Corporation. Responsible for directing management services, including the design and implementation of management systems for large industrial projects.
- 1976 - 1977 Engineering Supervisor and Deputy Project Engineer, Bechtel Power Corporation. Responsible for all phases of the civil design for the water treatment and particulate control addition to a coal-fired power plant. As Deputy Project Engineer, he managed the project team and was responsible for coordinating client, vendor, and construction management activities.
- 1974 - 1976 Project Civil Engineer, Chemico (Africa), Inc. Responsible for all field engineering activities, including document control, engineer/constructor coordination, quality control, contract administration, and client interface for one of the world's largest LNG plants.
- 1968 - 1974 Senior Engineer and Group Leader, Bechtel Power Corporation. Leader in the analysis and design evolution for the Mark II containment, reactor building and associated facilities for a 2200-MW nuclear power plant project. Other assignments included design and analysis of refining and petrochemical plant components and systems.
- 1967 - 1968 Dynamics Engineer, General Dynamics Corporation. Developed mathematical models, conducted analyses, and directed laboratory testing related to the structural dynamics of airframes.

Registrations

Registered Professional Engineer - California, Maryland and Texas

Associations

American Society of Civil Engineers
Tau Beta Pi, National Engineering Honor Society

Awards

Awarded a National Defense Education Act Fellowship in Civil Engineering



FRANK A. DOUGHERTY
Project Manager

Education

M.B.A. University of Chicago
M.S. Nuclear Engineering, Georgia Institute of Technology
B.S. Chemistry, Illinois Institute of Technology

Summary of Experience

Mr. Dougherty has more than 14 years of experience in the nuclear power industry. He has managed numerous projects for utility and architect-engineer clients including licensing, quality assurance, design review, and design engineering tasks. The plants for which these services were provided include both BWRs and PWRs ranging from the pre-PSAR stage through backfit modification for operating plants. Among his more recent projects have been the evaluation of the QA program and implementing procedures for a utility, the performance of a design evaluation for an architect-engineer, and the management of a project involving backfit modifications during an outage.

1982 - Present Project Manager, TERA Corporation.

1973 - 1982 Manager, Project Management Division, EDS Nuclear. Responsible for all major projects in the western region including engineering design and analysis, QA, licensing, and design reviews. Directed a staff of project managers who were responsible for specific projects.

Manager, Utility Services, EDS Nuclear. Directed non-nuclear work in the areas of project management, environmental services, and management consulting. Projects included pipelines and fossil-fired power plants.

Manager, Nuclear Systems Division, EDS Nuclear. Directed plant safety evaluations, prepared system design criteria, managed design review projects, and developed QA programs.

Supervising Engineer, Nuclear Systems Division, EDS Nuclear. Wrote and reviewed PSARs, FSARs, and ERs, performed safety analyses, wrote QA procedures, developed licensing strategies, evaluated NSSS bids.

1968 - 1973 Mechanical Engineer, Sargent & Lundy. Responsible for A-E interface with NSSS vendor, developed system designs, wrote PSARs, wrote specifications, evaluated bids.

Nuclear Analyst, Sargent & Lundy. Performed safety evaluations and dose calculations, performed numerous economics studies, analyzed fuel supply options, developed computer programs for economic analysis.



Professional Affiliations and Honors

American Management Association
American Nuclear Society
ANS 3 Committee (Operations)
ANS 59 Subcommittee (Diesel-generators)
American Chemical Society, Midwestern Section,
Undergraduate Research Award

Professional Licenses

Professional Engineer, California, NU-0021



RICHARD P. SNAIDER
Senior Systems Engineer

Education

B.S. Systems Engineering, U.S. Naval Academy
M.B.A. Wharton School, University of Pennsylvania

Summary Of Experience

Mr. Snider has fifteen years of experience in nuclear power, nine years of which have been in the commercial nuclear field with emphasis on operation, maintenance, and design, particularly as applied to operating reactor safety and licensing.

1982 - Present Senior Systems Engineer - TERA Corporation. Has participated in several projects related to key technical issues, such as fire protection, the control of heavy loads, and commitment tracking. Particular emphasis has been in the area of nuclear plant system design and operation.

1975 - 1981 Senior Project Manager, Operating Reactors, Division of Licensing, NRC. Responsible for managing and performing review of licensing issues for operating nuclear power plants. Assisted in developing Commission policy regarding relaxation of licensing requirements on older and smaller power reactors.

Task Manager, Unresolved Safety Issues Program, NRC. Assigned responsibility for developing and managing programs for resolution of two safety issues, related to BWR Nozzle Cracking and Fracture Toughness of Component Supports in PWRs.

Senior Mechanical Systems Engineer, Systematic Evaluation Program, NRC. Responsible for safe shutdown reviews on the three Mk. I BWRs included in the program. Also assisted in reviews regarding the qualification of equipment to withstand post-accident harsh environments, as well as materials and mechanical topics.

1973 - 1975 Project Engineer, Generation Engineering Department - Jersey Central Power & Light Company. Served as JCP&L coordinator, with General Public Utilities Service Corporation and Burns & Roe, Inc., on large facility modification involving design and construction of new liquid, solid, and gaseous radwaste treatment facilities for the Oyster Creek Nuclear Generating Plant. Responsible for selection, purchase, and installation of a system to treat chromated wastewater from the Oyster Creek torus. Served as an assistant to the Oyster Creek Maintenance Engineer during refueling outages, supervising seven crews of personnel in the accomplishment of assigned tasks on plant safety systems, auxiliary systems, and turbine systems.

1966 - 1973 Officer, U.S. Navy Served aboard three submarines in positions of increasing responsibility, including two department head tours. Awarded Navy Commendation Medal and Navy Achievement Medal, among others.

Professional Affiliation

American Nuclear Society

10/20/82



TERA CORPORATION

LIONEL D. BATES, P.E.
Principal Associate Engineer

EDUCATION

Graduate Westinghouse Nuclear Plant Engineering School
M.S. Mechanical Engineering, Brigham Young University
B.S. Mechanical Engineering, Brigham Young University

SUMMARY OF EXPERIENCE

Mr. Bates has extensive experience in the design, manufacture and test of instrumentation and control systems for nuclear power plants.

1981 - Present Principal Engineer. Provides expertise in reviews involving nuclear plant electrical, instrumentation and control systems.

1977-1981 System Design Group Manager - NUTECH. Directed the activities of electrical, instrumentation and control engineers in the design of safety-related systems for nuclear power plants. These systems included safety relief valve monitoring, containment temperature monitoring, post-accident sampling, emergency power systems, hydrogen recombiner control and other similar plant electrical, instrumentation and control (I&C) systems. Mr. Bates also directed activities in the area of equipment qualification including the development of "Q" lists, evaluation of qualification status and the development of qualification programs for Class 1E equipment.

As a Senior Engineer at Nutech, Mr. Bates has lead technical responsibility for modifications to I&C systems for Susquehanna I, Laguna Verde, Fermi 2 and LaSalle I. These modifications were made to the NSSS systems and included testability, safety relief valve control and over thirty (30) others of varying scope and complexity.

1973-1977 Westinghouse Electric Corporation, Idaho National Engineering Lab

While employed by Westinghouse Electric at the Naval Reactor Facility (NRF), Mr. Bates qualified as Engineering Officer of the Watch (EOOW) at the AIW Prototype. He also qualified and functioned as Nuclear Plant Engineer (NPE), and Emergency Director. His responsibilities at NRF were at the management level for the operation and maintenance of the reactor plant, and for the training of nuclear navy personnel. While at NRF, Mr. Bates participated in numerous plant start-ups, shutdowns, abnormal events/transients, and site emergencies (actual and training drills).

1972-1973 Associate Engineer - San Diego Gas & Electric Company. Responsible for the forecasting of gas supply and demand, and for the economic justification of projects involving gas transmission and storage.



MARTIN B. JONES, JR.
Senior Project Manager

Education

B.S.E.E. The Citadel, Charleston, South Carolina

Summary of Experience

During Mr Jones' twenty-two years of responsible experience in the electric utility industry, he has directed and participated in a number of major plant construction projects built by both union and non-union contractors. He has also had direct responsibility for the development and implementation of quality control, warehousing and records management programs and systems.

1980	Senior Project Manager, TERA Corporation.
1975 - 1980	Manager of Construction, South Carolina Electric & Gas Co. Mr. Jones was responsible for all major company construction activities. Among his primary responsibilities with S.C.E.&G.CO. were the \$200 million Fairfield Pumped Storage Facility (8 60MW units; completed in 1978) and the \$800 million Summer Station (scheduled for completion in 1981).
1973 - 1975	Quality Control Manager, S.C.E.&G.CO. Mr. Jones established and organized a quality control group within the Construction Department for the construction of V.C. Summer Unit 1 (960MW PWR). He was responsible for hiring and training inspectors, warehousemen and records personnel. He developed and implemented the initial quality control, warehousing and records management systems for the Summer Project.
1969 - 1973	Senior Construction Supervisor, S.C.E.&G.CO. Mr. Jones organized a Construction Department electrical startup group. He directed the check-out and startup of Wateree Units 1 & 2 (350 MW-coal) and Williams I (650MW-heavy oil). He was also responsible for check-out of Saluda Hydro Unit 5, a 75MW expansion of an existing plant.
1963 - 1969	I&E Engineer, Project Engineer, Carolinas Virginia Nuclear Power Association, Inc. Mr. Jones was engaged in a federally funded R&D program during operation of the prototype plant (CVTR). He was also in charge of an 18-month program on containment leakage and simulated steam-break accidents following shut-down. Mr. Jones was engaged in a responsible role in decommissioning this plant.
1963	South Carolina Industries. Mr. Jones participated in the startup of a Kraft Paper Mill in Florence, South Carolina.
1959 - 1963	Staff Electrical Engineer, Plant Instrument Supervisor, Carolinas Virginia Nuclear Power Association. Mr. Jones was involved in designing, building and operating a prototype nuclear power plant at Parr, South Carolina.
1958 - 1959	Assistant Electrical Superintendent, South Carolina Electric & Gas Company. Mr. Jones participated in the construction of two 125MW coal fired units.



TERA CORPORATION

CHARLES E. LEMON
Manager - Quality Assurance

Education

B.S. Mechanical Engineering, University of Idaho

Summary of Experience

Mr. Lemon has over eight years of supervisory and technical experience in nuclear and fossil fueled power plant engineering, quality assurance, licensing, environmental studies and computer systems application. At present, he performs quality assurance functions for TERA nuclear safety functions, including review of project QA plans and performance of audits. In addition, he is responsible for the system design of the NRC Document Control System Project. He has assisted in the design and implementation of Automated Records Management Systems for three nuclear power plant projects, including computer software for document indexing and micrographics systems.

- 1976 - Present Manager - Quality Assurance. Implementation of TERA quality assurance program, development of QA procedures, review of project QA plans, and auditing of QA activities. In addition, responsible for the design and implementation of user oriented records and information management systems for nuclear projects. Special emphasis in computer indexing systems for nuclear power plant QA/QC records and documentation.
- 1974 - 1976 Project Manager - Power Engineering, TERA Corporation. Responsible for the preparation of capital cost and capability models for fossil and nuclear fueled power plants. Performed technical and economic evaluations of the impact of thermal effluent limitations on steam electric power plants for the National Commission on Water Quality.
- 1973 - 1974 Mechanical Group Quality Engineering Coordinator, Bechtel. Responsible for review and approval of vendor QA/QC manuals, and preparation and implementation of group QA/QC effort with project and corporate QA/QC program.
- 1970 - 1973 Engineer, Bechtel. Responsible for the design and procurement of mechanical draft cooling tower system for conversion of existing open cycle circulating water system to closed cycle circulating water system for an 800 MWe PWR. System design and equipment procurement for Balance of Plant thermal cycle systems for two unit 1100 MWe BWR. System design and equipment procurement for gaseous radwaste system, fuel pool cooling and cleanup systems and containment atmospheric control systems.

Registrations

Registered Professional Engineer - Nuclear Engineering, California
Registered Professional Engineer - Mechanical Engineering, California

Professional Associations

American Society of Mechanical Engineers
National Society of Professional Engineers
California Society of Professional Engineers
National Micrographics Association



MARK W. FOLIT
Quality Assurance Engineer

Education

B.A. Philosophy, Rockford College, Rockford, Ill
 Post graduate study in Organizational Group Dynamics at
 Rimfaxe, Copenhagen, Denmark

Summary of Experience

Mr. Polit has managed the QA of major projects and assisted in the design and implementation of corporate Quality Assurance plans and procedures at TERA. He further reviews project QA plans and audits quality assured activities. For the Engineering Analysis of TERA, he has designed and implemented programs which control the quality and flow of work related to the seismic design of nuclear power plants, as well as assisting in the organization and supervision of complex tasks. Mr. Polit has given technical and supervisory support to many projects involving earthquake hazard and strong motion studies for nuclear facilities.

1979 - Present Supervisor Quality Assured Activities, Engineering Analysis, TERA Corporation. Design and implement the Division's organizational concepts relating to Quality Control. Responsible for the implementation of project QA plans involving the management and surveillance of quality assured activities.

As a quality assurance engineer, assist in the development and implementation of corporate QA procedures. Review project QA plans and auditing of QA activities. Responsibilities also include the organization and supervision of major tasks and projects relating to the seismic hazard at many nuclear facilities.

Supervise the collection, organization and documentation of a large seismic data base used as the design basis for nuclear plants. Responsible for QA/QC of data.



ROBERT L. CUDLIN
Principal Nuclear Systems Engineer

Education

J.D. Georgetown University Law Center
M.S. Nuclear Engineering, The Catholic University
B.S. Mechanical Engineering, Cornell University

Summary of Experience

Mr. Cudlin has over nine years of experience in the nuclear energy field. He had direct involvement at the Congressional level with the policy oversight and budget authorization for the NRC and development of nuclear energy legislation. At the NRC he managed the containment research program and was Chairman of the Containment Research Review Group. He also directed multi-disciplinary engineering groups in assessing methods for combining dynamic responses, the analysis of hydrodynamic forces in pressure-suppression containments, the development of a reactor safeguards program, and the environmental qualification of safety related equipment. Most recently he was part of the NRC's TMI recovery team and a member of the Lessons Learned Task Force.

1980 - Present Principal Nuclear Systems Engineer, Systems Engineering Operations, TERA Corporation.

1979 - 1980 Principal Technical Staff Member, Subcommittee on Nuclear Regulation, U.S. Senate. Provided technical analysis and advice on nuclear energy policy issues and legislation to the members of the Subcommittee.

1972 - 1979 Program Manager, Office of Nuclear Regulatory Research, NRC. Responsible for managing NRC's containment safety research program. This included major experimental studies and analytical model development for pressure-suppression containment dynamic loads. Also responsible for interfacing with international containment research programs such as Marviken 1 and 2, Battelle C and D, GKSS and JAERI.

Technical Assistant, Division of Operating Reactors, NRC. Assisted in the direction of the technical staff for the evaluation of operating reactors.

Technical Assistant, Office of Nuclear Reactor Regulation, NRC. Provided technical assistance and advice on policy issues to the Director of Nuclear Reactor Regulation.

Systems Analyst, Containment Systems Branch, NRC. Responsible for technical licensing reviews of nuclear power plant containments. Was lead reviewer on BWR Mark I, II and III type containments including assessment of suppression pool dynamic loads. Also lead staff person for development and promulgation of 10 CFR 50.44, Standards for Combustible Gas Control Systems in Light Water Cooled Power Reactors.

Honors

Tau Beta Pi Engineering Honorary

Publications

"Recent Considerations of Pool Dynamic Loads in Pressure-Suppression Containments," presented at IAEA Conference in Cologne, West Germany, December 1976.

TERA CORPORATION

HENRY J. GEORGE
Senior Mechanical Engineer

Education

Graduate Study Nuclear Engineering, Catholic University
M.A.S. Administrative Science, University of Alabama
B.S. Mechanical Engineering, The Johns Hopkins University

Summary of Experience

Mr. George has eight years experience in the licensing and evaluation of nuclear power plants and three years experience in general mechanical engineering on defense projects. At TERA he has managed and performed technical work on various engineering analyses and design verifications. At the NRC, he directed a multidisciplinary engineering group which established adequate measures for the control of heavy loads throughout the plant; served as group leader for a review team that evaluated the adequacy of protection from fires at a large number of operating facilities, and evaluated the adequacy of available systems and equipment to achieve safe shutdown under various conditions. His defense-related work involved experience in reliability engineering, system test plans, sampling plans, failure analysis, and component qualification testing. He has extensive training in nuclear plant systems and reliability engineering.

1981 - Present	Senior Mechanical Engineer - TERA Corporation
1979 - 1981	Senior Engineering Systems Analyst, NRC. Served as Task Manager on a major unresolved generic issue managing the efforts of a multidisciplinary engineering group to analyze the radiological and system operational consequences of various postulated events.
1974 - 1979	Engineering Systems Analyst, NRC. Served as group leader of a multidisciplinary review team in evaluating the effects of fires at nuclear power facilities. These reviews included detailed site visits, reviews of facility drawings, and analysis of plant system responses to the effects of fires. Performed quality assurance tasks, including review of utility and vendor quality assurance programs, equipment and system test programs, procedures to implement the test program, and technical specification surveillance requirements.
1971 - 1974	Mechanical Engineer, U.S. Army Missile Command. Responsible for providing engineering support during the development and production phases of various missile systems. In this capacity, he developed reliability models, established programs for system acceptance and qualification testing and reliability assessment, and evaluated test and operational failures.



CHRISTIAN P. MORTGAT
Project Manager

Education

Ph.D.	Civil Engineering, Stanford University
Engineer's Degree	Geotechnical Engineering, Stanford University
M.S.	Structural Engineering, Stanford University
B.S.	Civil Engineering, Tennessee Technological University

Summary of Experience

Dr. Mortgat has a broad background in probabilistic earthquake engineering that ranges from structural analysis for buildings and earth dams to the development of seismic hazard maps. Dr. Mortgat has developed a unique Bayesian risk analysis methodology and has studied earthquake response spectrum shapes and their attenuation. He has directed or participated in major seismic risk analysis projects for Costa Rica, Nicaragua, Alaska, and Algeria. He has published numerous articles and reports in these areas and has served as an independent seismic risk consultant to several companies. Developed a methodology based on expert opinion solicitation for computation of seismic hazard in the Eastern United States. The procedure was applied in the NRC Systematic Evaluation Program aimed at evaluating the seismic design margin of nine older nuclear power plants in the Central and Eastern U.S. Developed a Monte Carlo approach to define the seismic hazard at a site on an event specific basis. The approach was used to determine the seismic input in the NRC Seismic Safety Margin Research Program.

1977 - Present	Project Manager, Earthquake Engineering, TERA Corporation. Responsible for several major seismic risk analyses, including one directed at all the Department of Energy (DOE) facilities.
1976 - 1977	Earthquake Engineer, Woodward-Clyde Consultants. Participated in a seismic risk analysis of the Gulf of Alaska for offshore drilling platforms.
1973 - 1977	Research Affiliate, Stanford University, J. A. Blume Earthquake Engineering Center. Developed new techniques to characterize the frequency content of postulated earthquake motions and developed unique approaches to calculating seismic exposure.

Professional Associations

American Society of Civil Engineers
Earthquake Engineering Research Institute



PublicationsJournal Papers

Mortgat, C. P., "Seismic Risk Analysis, a General Approach," Pan American Institute of Geography and History, Reviste Geofisica, December, 1976.

Mortgat, C. P., and Shah, H. C., "A Bayesian Model for Seismic Hazard Mapping." Bulletin of Seismological Society of America. (in publication).

Papers Presented at Conferences

Kiremidjian, A., and Mortgat, C., "A Probabilistic Approach for Seismic Load Determination," ASCE-EM Specialty Conference on Probabilistic Methods in Civil Engineering, Stanford, California, July, 1974.

Mortgat, C. P., and Shah, H. C., "An Intensity Scale for Earthquakes," The Fifth European Conference on Earthquake Engineering, Istanbul, Turkey, September, 1975.

Shah, H. C., Mortgat, C. P., Kiremidjian, A., and Zsutty, T., "A Study of Seismic Risk for Nicaragua," The Sixth World Conference on Earthquake Engineering, New Delhi, India, January, 1977.

Mortgat, C. P., and Shah, H. C., "A Study of Stable Earthquake Parameters," The Sixth World Conference on Earthquake Engineering, New Delhi, India, January, 1977.

Mortgat, C. P., and Shah, H. C., "Stable Seismic Design Parameters," ASCE/EMD Specialty Conference at North Carolina State University, May, 1977.

Mortgat, C. P., Patwardhan, A. S., and Idriss, I. M., "Influence of Seismicity Modeling on Seismic Exposure Evaluation." Seventy-Third Annual Meeting of the Seismological Society of America, April 6-8, 1978.

Mortgat, C. P., and Shah, H. C., "A Bayesian Model for Seismic Hazard Mapping--A Case for Algeria." Sixth European Conference on Earthquake Engineering, Dubrovnik, Yugoslavia, September, 1978.

Other Publications

Shah, H. C., Mortgat, C. P., Kiremidjian, A., and Zsutty, T. C., "A Study of Seismic Risk for Nicaragua, Part I," Technical Report No. 11, The John A. Blume Earthquake Engineering Center, Department of Civil Engineering, Stanford University, January, 1975.

Shah, H. C., Zsutty, T. C., Krawinkler, H., Mortgat, C. P., Kiremidjian, A., and Dixon, J. O., "A Study of Seismic Risk for Nicaragua, Part II," In two volumes, Technical Report No. 12A and No. 12B, the John A. Blume Earthquake Engineering Center, Department of Civil Engineering, Stanford University, March, 1976.

Mortgat, C. P., "Finite Element Analysis of Embankments on Weak Clay Foundations," Engineer's Thesis, Stanford University, California, June, 1976.



Mortgat, C. P., "A Bayesian Approach to Seismic Hazard Mapping; Development of Stable Parameters," Ph.D. Dissertation, Stanford University, California, December, 1976.

Mortgat, C. P., Zsutty, T. C., Shah, H. C., and Lubetkin, L., "A Study of Seismic Risk for Costa Rica." Technical Report No. 25, The John A. Blume Earthquake Engineering Center, Department of Civil Engineering, Stanford University, April, 1977.

• Mortgat, C. P., and Shah, H. C., "A Study of Seismic Risk for Algeria." Technical Report No. 28, The John A. Blume Earthquake Engineering Center, Department of Civil Engineering, Stanford University, March, 1978.



LOREN STANLEY
Associate Principal Engineer

EDUCATION

M.B.A. University of Santa Clara
B.S.E.E. Carnegie Institute of Technology

SUMMARY OF EXPERIENCE

Mr. Stanley has twenty-six years of experience in engineering design, system evaluation, field and consulting services associated with nuclear plant systems and aerospace instrumentation. He has spent thirteen years managing technical groups performing design, licensing, and consulting activities. His principal areas of involvement have been FSAR licensing, response to NRC questions, failure mode and effects reliability analyses, safety-related component determinations, instrumentation system design and analysis, and design review of engineering work.

EXPERIENCE

Present Associate Principal Engineer, TERA Corporation.

1974 - 1983 Quadrex Corporation.

Group Manager, Licensing/Systems Analysis Department. Supervised consulting activities in licensing, design review, safety classification of plant components and probabilistic risk assessment. Directed a technical review of STP engineering work performed by Brown and Root for HL&P.

Deputy Director, Engineering Services. Responsible for technical proposals, application of personnel to engineering projects, and review of technical output for client projects. Participated in Q-List programs, licensing evaluations, environmental qualification assessments, and accident monitoring instrumentation programs.

Director, Project Services. Supervised consulting activities in Licensing and Safety, Quality Assurance, Environmental Services, Reliability and Risk Assessment, Records Management, and Project Management. Participated in a reliability improvement program for the MFTF Fusion Reactor, a licensing criteria evaluation of the TNS fusion project, and an EPRI study of PWR feedwater steam generator level spurious trips.

Manager, Licensing, Safety and Reliability. Supervised FSAR reformat and addition of technical information for six BWR FSAR's. Supervised development and implementation of Q-list methodology to identify and classify safety-related components and spare parts for LWR plants. Supervised an accident monitoring instrumentation study of a typical Westinghouse PWR and a pressure sensor response time verification program for EPRI. Prepared FMEA's for TMI 1/2 ECCS, BWR 5/6 ECCS, HTGR Steam Dump System, ATR PPS Upgrade, and LMFBF secondary control rod system and test facility. Performed hazard analysis and MTBF assessments for the ATR Upgrade program.



1963 - 1974 General Electric Company.

Manager, Nuclear Instrumentation and Protection Systems. Supervised the initial phases of conversion of the BWR safety system to a solid-state design. Supervised design of safety-related control systems, and prepared the technical system descriptions, compliance analyses, and technical responses to regulatory questions.

Technical Leader in Control and Electrical Systems. Performed design improvements for the BWR control rod drive system and reactor protection system. Designed instrumentation for the process computer system, rod worth minimizer system, and the prototype RWM system at Dresden I. Participated in the development and testing of intermediate range neutron monitoring system equipment.

PROFESSIONAL DATA

Registered Electrical Engineer, State of California

Senior Member, IEEE

Member, IEEE/PES Nuclear Power Engineering Committee

Past Chairman, IEEE/PES/NPEC Subcommittee 6, Safety-Related Systems

Member, American Nuclear Society

Chairman, ANS 4.5 Writing Group on "Criteria for Accident Monitoring

Functions in LWR's," 1979-1980

Member, ANS Nuclear Power Plant Standards Committee (NUPPSCO), 1981-1983

Member, IAEA Work Group on Protection System Safety Guide SG-D3, Vienna, 1976



RICHARD W. KELLER
Associate Electrical Engineer

EDUCATION

M.S. Electrical Engineering, University of Idaho
B.S. Electrical Engineering, University of Wyoming

SUMMARY OF EXPERIENCE

Mr. Keller has had more than twenty years of experience in all phases of electrical power generation projects, including system design, startup, and hands-on operation and maintenance in both nuclear and fossil plants. He has many years of specialized experience in the design and evaluation of Instrumentation and Control systems, including plant protection systems and engineered safety features. He most recently consulted to EPRI's (now INPO) Nuclear Safety Analysis Center. His responsibilities included Licensee Event Report (LER) evaluations to identify possible serious event precursors. He has directed multi-disciplined teams of engineers in many on-site investigations of nuclear and fossil power generating facilities for the purpose of identifying problems in design, management, operations and maintenance that were contributing to losses in electrical production. He has made many contributions to the state-of-the-art in performing studies and evaluations of power generating facilities. These works have been widely published.

Present	Associate Electrical Engineer, TERA Corporation
1982 - Present	Independent Consultant providing consulting and engineering services to industry, particularly the electric power industry
1982	Senior Project Manager, TERA Corporation. Responsibilities included providing to utilities the development and application of reliability, availability, and decision analysis techniques directed toward improving the productivity of large fossil and nuclear power plants.
1979 - 1982	Manager, Systems Engineering, S.M. Stoller Corporation. Served as Project Manager for the development of computer software specifications and analytical techniques for the EPRI sponsored National Data System. Additional responsibilities included LER evaluations as part of NSAC's SEEIN Program.
1973 - 1979	Manager of Nuclear and Fossil Energy, System Development Corporation (formerly Mechanics Research, Inc.). Responsibilities included program management of several joint industry/government programs. The objectives of these programs included development and on-site demonstration of methodology and improved auditing/evaluation techniques for (1) determining root causes of lost productivity and defining corrective actions, (2) modeling power plants to perform reliability and sensitivity trade-off studies, and (3) assessing total costs and benefits of implementing alternate unit improvement programs. These studies were cooperative efforts with utilities, A-E's, and designer/manufacturers of major power plant components and equipment.



1967 - 1973 Senior Research Engineer, Idaho Nuclear/Aerojet Nuclear. Responsible for the development of mathematical simulation models for power plant safety and control system designs. This included one of the earliest designs of a reactor protection system using solid state devices. Consultant to the AEC Reactor Safety Study (WASH-1400). Responsible for the development and application of fault tree methodology to perform reliability/risk evaluations of reactor protection systems and engineering safety features.

PROFESSIONAL ASSOCIATION^c

The Institute of Electrical and Electronics Engineers, Inc.

CERTIFICATION

Certified Reactor Engineer (Expired)
Certified EIT - State of Idaho



MEHMET CELEBI
PRINCIPAL SCIENTIST

EDUCATION

Ph.D. Civil Engineering, McGill University
M.S. Civil Engineering, Stanford University
B.S. Civil Engineering, Middle East Technical University

SUMMARY OF EXPERIENCE

Dr. Celebi has had over 16 years of experience in the fields of structural engineering, structural mechanics and dynamics, earthquake engineering, plasticity, and nuclear power, including 8 years on the faculties of the Civil Engineering Departments at the Middle East Technical University and San Francisco State University. He is author or co-author of over 40 formal publications (books and professional articles), regarding structural and seismic engineering and engineering mechanics. On his own and as an associate with engineering and consulting firms, he has carried major engineering responsibility for projects in such areas as development of design criteria for nuclear structures, vibration and seismic studies for structures, reactor containment structural design and analysis (including inelastic studies) and review of structural criteria and designs for nuclear power plants and equipment for seismic loadings. In addition to his engineering and design experience, Dr. Celebi held the position of Manager of Quality Assurance at a leading engineering consulting firm. He has also had extensive involvement with professional and code committees related to development of earthquake engineering design criteria.

PROFESSIONAL AFFILIATIONS AND HONORS

Registered Professional Engineer (California)
American Society of Civil Engineers, Full Member
Earthquake Engineering Research Institute, Full Member
Fulbright Scholarship, Stanford University
Dominion Bridge Co. Fellowship, McGill University
Japanese Government Scholarship at ISSEE, regarding dynamic testing studies



JORMA ARROS
Structural Engineer

Education

Ph.D. (candidate)	Civil Engineering, Stanford University
M.S.	Engineering, Helsinki University of Technology, Helsinki, Finland
B.S.	Engineering, Helsinki, University of Technology, Helsinki, Finland

Summary of Experience

Mr. Arros has experience in research and analysis in the nuclear engineering field. He has conducted analyses of both the dynamics of structures under earthquake conditions and a finite element model of groundwater seepage. He has also analyzed pressure vessels using structural analysis computer programs.

1980 - present	Structural Engineer, TERA Corporation. Responsible for seismic hazard analysis codes.
1978 - 1979	Consulting Engineer, Wartsila, Inc. Consulted on a study of mathematical modeling of paper web through a paper splitter.
1977 - 1978	Research Engineer, Technical Research center of Finland. Performed research in the Nuclear Engineering Laboratory and analyzed structures under earthquake conditions, groundwater seepage and pressure vessels.
1974 - 1977	Teaching Assistant, Helsinki University of Technology

Presentations/Publications

"Coupled Vibrations of a Structure and Fluid Excited by Pressure Shocks," presented to the Topical Meeting on Nuclear Power Safety in Brussels, 1978. Also published in Nuclear Technology, December 1979.



KENNETH W. CAMPBELL
Senior Earthquake Engineer

Education

Ph. D. Soil Mechanics Engineering, University of California
M. S. Soil Mechanics Engineering, University of California
B. S. Engineering, University of California

Summary of Experience

Mr. Campbell has ten years experience in soil mechanics engineering. In addition to responsibilities that have included shallow seismic geophysical surveys, and seismic risk and seismicity studies, he has been involved in research in the fields of Bayesian seismic risk analysis and investigated earthquake site effects. Mr. Campbell has published extensively in these and related areas and has served as an independent seismic risk consultant to several companies.

1978 - Present Senior Earthquake Engineer, TERA Corporation. Responsible for seismic risk analyses and other geotechnical studies.

1978 Research Engineer, J. H. Wiggins Company. Responsibilities included the development of a Bayesian seismic risk map of California based on geologic data on major faults in California and adjacent areas.

Consulting Earthquake Engineer. Responsible for shallow seismic geophysical surveys, seismic risk and seismicity studies, design earthquake motions, site response analyses, and characteristic site period determinations.

1977 - 1978 Postdoctoral Scholar, University of California. Conducted research in the fields of Bayesian seismic risk analysis, earthquake site effects, seismic reliability of lifeline systems, and the correlation of the seismic velocity of near surface deposits with geology, depth and soil type.

1973 - 1978 Earthquake/Geotechnical Engineer, LeRoy Crandall and Associates. Participated in the analysis and design of building foundations, and the performance of seismicity and seismic risk studies, seismic geophysical surveys and their analysis, liquefaction analyses, characteristic site period studies, and seismic site response analyses.

1972 - 1973 Research Geophysicist, National Oceanic and Atmospheric Administration. Responsible for research in engineering seismology and earthquake seismicity and risk. Developed site-dependent earthquake intensity distributions of large earthquakes.

Professional Affiliations

American Society of Civil Engineers
Earthquake Engineering Research Institute
Seismological Society of America
Tau Beta Pi, National Engineering Honor Society
International Society of Soils and Foundation Engineering



TERA CORPORATION

Publications

- Duke, C. M., J. A. Johnson, Y. Kharraz, K. W. Campbell, and N. A. Malpiede, Subsurface Site Conditions and Geology in the San Fernando Earthquake Area, School of Engineering and Applied Science, University of California, Los Angeles, (UCLA-ENG-7206), 1971.
- Campbell, K. W., An Empirical Earthquake Intensity Function in Bedrock, M.S. Thesis in Engineering, University of California, Los Angeles, 1972.
- Perkins D. M., S. T., Harding, K. W. Campbell, and A. F. Espinosa, Studies of Site Amplification in San Fernando, Proceedings of the Microzonation Conference, University of Washington, Seattle, Vol. II, pp. 910-927, 1972.
- Campbell, K. W., Site Properties and Bedrock Intensities in the San Fernando, California Earthquake of February 9, 1971, in Earthquake Research in NOAA, 1971-1972, edited by J. C. Stepp, Environmental Research Laboratories, National Oceanic and Atmospheric Administration, Boulder, Colorado, (NOAA TR ERL 256-ESL 28), p. 54, 1973.
- Algermissen, S. T., D. M. Perkins, W. Rinehart, K. W. Campbell, and M. Hopper, A Study of Earthquake Losses in the Los Angeles, California Area, Environmental Research Laboratories, National Oceanic and Atmospheric Administration, Boulder, Colorado (prepared for HUD), 1973.
- Campbell, K. W. and C. M. Duke, Bedrock Intensity Attenuation and Site Factors from San Fernando Earthquake Records, in Optimization of Water Resource Systems Incorporating Earthquake Risk: 1973 Contributions, edited by C. M. Duke and S. E. Jacobsen, University of California Water Resources Center, Contribution No. 141, pp. 81-114, 1973.
- Duke, C. M., J. A. Johnson, Y. Kharraz, K. W. Campbell, and N. A. Malpiede, Subsurface Site Conditions in the San Fernando Earthquake Area, in The San Fernando, California, Earthquake of February 9, 1971, (EERI/NOAA), Vol. IIB, 785-799, 1973.
- Campbell, K. W. and C. M. Duke, Bedrock Intensity Attenuation and Site Factors from San Francisco Earthquake Records, Bull. Seism. Soc. Am., 64:173-185, 1974.
- Campbell, K. W. and C. M. Duke, A Reply to a Discussion of Bedrock intensity Attenuation and Site Factors from San Fernando Earthquake Records by P. C. Jennings, Bull. Seism. Soc. Am., 64:2009-2010, 1974.
- Campbell, K. W., A Note on the Distribution of Earthquake Damage in Long Beach, 1933, Bull. Seism. Soc. Am., 66:1001-1005, 1976.
- Eguchi, R. T., K. W. Campbell, C. M. Duke, A. W. Chow, and J. Paternina, Shear Velocities and Near Surface Geologies at Accelerograph Sites That Recorded the San Fernando Earthquake, School of Engineering and Applied Science. University of California, Los Angeles, (UCLA-ENG-7653), 1976.



Publications, Cont.

- Campbell, K. W. and C. M. Duke, Correlations Among Seismic Velocity, Depth and Geology in the Los Angeles Area, School of Engineering and Applied Science, University of California, Los Angeles, (UCLA-ENG-7662), 1976.
- Duke, C. M., R. T. Eguchi, K. W. Campbell, and A. W. Chow, Effects of Site on Ground Motion in the San Fernando Earthquake, School of Engineering and Applied Science, University of California, Los Angeles, (UCLA-ENG-7688), 1976.
- Campbell, K. W., Design Earthquakes Based on the Statistics of Source, Path and Site Effects, Proceedings of the 6th World Conference on Earthquake Engineering, New Delhi, India, Vol. 2, 2-51 - 2-55, 1977.
- Duke, C. M., R. T. Eguchi, K. W. Campbell, and A. W. Chow, Effects of Site on Ground Motion in the San Fernando Earthquake, Proceedings of the 6th World Conference on Earthquake Engineering, New Delhi, India, Vol. 2, 2-93 - 2-99, 1977.
- Eguchi, R. T. and K. W. Campbell, Seismicity and Site Effects on Earthquake Risk, Proceedings of the 6th World Conference on Earthquake Engineering, New Delhi, India, Vol. 2, 2-399 - 2-404, 1977.
- Campbell, K. W., The Use of Seismotectonics in the Bayesian Estimation of Seismic Risk, School of Engineering and Applied Science, University of California, Los Angeles, (UCLA-ENG-7744), 1977.
- Campbell, K. W., Geotechnical Correlations of In Situ Seismic Velocity in Southern California, Proc. of Two Day Symposium on Living With the Seismic Code, Structural Engineers Assoc. of So. Calif., Los Angeles, March 7 & 14, Sess. 1 - Characteristic Site Period, Sect. B, pp. 1-13, 1978.
- Campbell, K. W., An Estimate of Recurrence Times from Seismotectonic Data on a Fault, in Geologic Guide and Engr. Geology Case Histories, Los Angeles Metropolitan Area, 1st Annual Calif. Sect. Meeting, Assoc. of Engr. Geol., May 12-14, 1978, Los Angeles, pp. 95-101, 1978.
- Campbell, K. W., Lifeline Reliability and Seismic Risk, (Summary), Proc. of Lifeline Earthquake Engineering Workshop, Earthquake Engineering and Soil Dynamics Conference and Exhibit, Pasadena, Calif., June 19-21, 1978, Geotechnical Engineering Div., ASCE, Vol. III, 1978.
- Campbell, K. W., Empirical Synthesis of Seismic Velocity Profiles from Geotechnical Data, Proc. Second International Conference on Microzonation, Nov. 26-Dec. 1, 1978, San Francisco, Vol. II, pp. 1063-1075 1978.
- Campbell, K. W., R. T. Eguchi, and C. M. Duke, Reliability in Lifeline Earthquake Engineering, American Society of Civil Engineers, Annual Convention and Exhibit, October 16-20, 1978, Chicago, Preprint 3427, 1978.



Publications, Cont.

Campbell, K. W., A Bayesian Procedure for Incorporating Seismotectonics in the Estimation of Seismic Risk on a Fault, Proc. ASCE Specialty Conference on Probabilistic Mechanics and Structural Reliability, January 10-12, 1979, Tucson, Arizona, pp. 290-294, 1979.

Campbell, K. W., R. T. Eguchi and C. M. Duke, The Use of Reliability in Lifeline Earthquake Engineering, Proc. ASCE Specialty Conference on Probabilistic Mechanics and Structural Reliability, January 10-12, 1979, Tucson, Arizona, pp. 305-310, 1979.

Presentations

"Subsurface Site Conditions and Geology in the San Fernando Earthquake Area," Presented at the San Fernando Earthquake Conference, Los Angeles, February, 1972 (With J. A. Johnson).

"Bedrock Intensity Attenuation and Site Factors from San Fernando Earthquake Records," Presented at the 68th Annual Meeting of the Seismological Society of America, Golden, Colorado, May, 1973.

"Distribution of Earthquake Damage in Long Beach in 1933 as Related to Propagation and Site Effects," Presented at the 70th Annual Meeting of the Seismological Society of America, Los Angeles, March 1975.

"A Comparison of Linear and Psuedo Nonlinear Methods of Site Response Analysis," Presented at the 70th Annual Meeting of the Seismological Society of America, Los Angeles, March, 1975 (M. Lew, Speaker).

"Site Effects in Earthquakes," Presented at the meeting of the Los Angeles Section of the American Society of Civil Engineers, Los Angeles, April, 1976 (with C. M. Duke and R. T. Eguchi).

"Design Earthquakes Based on a Damage Threshold Level," Presented at the 71st Annual Meeting of the Seismological Society of America, Edmonton, Alberta, Canada, May, 1976.

"Bayesian Estimation of Seismic Risk," Presented at the 72nd Annual Meeting of the Seismological Society of America, Sacramento, California, April, 1977.

"Correlations Among Seismic Velocity, Depth and Geology in the Los Angeles Area," Presented at the 72nd Annual Meeting of the Seismological Society of America, Sacramento, California, April, 1977.

"The Use of Seismotectonics in the Bayesian Estimation of Seismic Risk," Presented at the J. H. Wiggins Company, Redondo Beach, California, October, 1977.



Presentations, Cont.

- "Bayesian Estimation of Seismic Risk on a Fault with Emphasis on Lifeline Systems, Presented at the Two Day Course on Seismic Risk Analysis, EERI, Univ. of So. Calif., Los Angeles, February 8 and 9, 1978.
- "Geotechnical Correlations of In Situ Seismic Velocity in Southern California," Presented at the two Evening Symposium on Living with the Seismic Code, SEAOC, So. Calif. Section, Los Angeles, Calif., March 7 & 14, 1978, Session I, Characteristic Site Period.
- "Geotechnical Correlations of In Situ Seismic Velocity in Southern California," Presented at the 73rd Annual Meeting of the Seismological Society of America, Sparks, Nevada, April 6-8, 1978.
- "The Use of Seismotectonics in the Bayesian Estimation of Seismic Risk," Presented at the 73rd Annual Meeting of the Seismological Society of America, Sparks, Nevada, April 6-8, 1978.
- "Lifeline Reliability in Seismically Active Regions," Presented at 73rd Annual Meeting of the Seismological Society of America, Sparks, Nevada, April 6-8, 1978, (R. T. Eguchi, speaker).
- "Geotechnical Considerations of the Seismic Design Code," Presented at Portland State University, Portland, Oregon, May 22, 1978.
- "Lifeline Reliability and Seismic Risk," Presented at the Lifeline Earthquake Engineering Workshop Session, (Panelist), Earthquake Engineering and Soil Dynamics Conference and Exhibit, Geotechnical Engineering Div., ASCE, Pasadena, Calif., June 19-21, 1978.
- "Empirical Synthesis of Seismic Velocity Profiles from Geotechnical Data," Presented at the Second International Conference on Microzonation, San Francisco, California, November 26-December 1, 1978.
- "A Bayesian Procedure for Incorporating Seismotectonics in the Estimation of Seismic Risk on a Fault," Presented at the ASCE Specialty Conference on Probabilistic Mechanics and Structural Reliability, Tucson, Arizona, January 10-12, 1979.



EDWARD DUSTIN SCHRULL
Associate Senior Nuclear Engineer

EDUCATION

- M.S. Nuclear Power Systems Engineering,
University of Arizona
- B.S. Mathematics, Minor - Mechanical Engineering,
Worcester Polytechnic Institute

SUMMARY OF EXPERIENCE

Mr. Schrull has over nine years of experience in nuclear power engineering. His principal involvement has been in reactor safety systems, nuclear licensing, reliability and risk assessment, instrumentation and control and computer analyses. He has served as lead engineer for environmental and seismic qualification reviews and safety and accident analysis for several nuclear facilities.

EXPERIENCE

- Present Associate Senior Nuclear Engineer, TERA Corporation.
- Present Senior Engineer, Eigen Engineering. Provides project leadership in the licensing and systems engineering areas.
- 1982 - 1983 Senior Engineer, Western Omtec Corporation. Served as Project Engineer for the CNV and NMP-2 FSAR review and annotation projects. Responsible for initial review of all technical work as well as being the primary technical interface with the customer. Also directed the FSAR Chapter 6, 7, 8, 14 and 15 reviews conducted for Arkansas Power and Light at the customer's site.
- 1980 - 1982 Program Manager/Reliability and Risk Assessment, Quadrex. Directed company efforts in the safety analysis and risk assessment of the Taiwan Power Company low level radioactive waste transportation analysis; the diesel generator unavailability study in support of Commonwealth Edison's position on surveillance testing; and the Arizona Public Service Licensing Commitment Tracking System.
- 1979 - 1980 Unit Supervisor/Safety Analysis Group, Nutech. Responsible for the technical direction of projects encompassing: controls and instrumentation (C&I) engineering support activities, emergency planning procedures, reactor operation information displays and guidelines, and safety analysis report calculations. Lead engineer for the environmental and seismic qualification review effort for three BWR plants. Participated on a systems analysis task force evaluating the impact of the lessons learned from Three Mile Island to Fermi 2.
- 1977 - 1979 Lead Engineer, General Electric Company. Provided technical leadership for accident analysis licensing tasks which involved the preparation of safety analysis report responses to questions generated by the U.S. Nuclear Regulatory Commission, Architect-Engineers, and utilities.



1974 - 1977 Nuclear Engineer, Westinghouse Hanford Company. Served as cognizant safety engineer for the Fast Flux Test Facility (FFTF) Reactor System. Handled test assembly design proposals, design change implementation, and was responsible for the overall safety analysis of the FFTF reactor. Proposed a method for bounding protected reactivity insertion events which is presently used as a licensing basis for the operation of the FFTF.

COMPUTER EXPERIENCE

Mr. Schrull instructs FORTRAN programming at San Jose State University and has programmed in BASIC, COBOL, PASCAL and Assembler. He has used the following machines: IBM 360/370, Univac 1108, Xerox 5/7/9, CDC Cyber and 7600, PDP-11, Honeywell 6000, a PRIME minicomputer, and a SHARP microcomputer.

PROFESSIONAL DATA

EIT, State of California

STANISLAV FABIC
Principal Scientist

EDUCATION

Ph.D. Nuclear Engineering, University of California, Berkeley
M.S. Nuclear Engineering, University of California, Berkeley
M.E. Mechanical Engineering, University of Melbourne, Australia
B.E. Mechanical Engineering, University of Melbourne, Australia
Naval Architecture, University of Zagreb, Yugoslavia

SUMMARY OF EXPERIENCE

1982 - Present Principal Scientist, TERA Corporation.

1973 - 1981 Chief, Analysis Development Branch, Nuclear Regulatory Commission. Supervised professionals (all GS-15 grade) engaged in managing various research programs, conducted at five National Laboratories and various universities in the area of analysis development and verification, for application to nuclear safety. Yearly budget over \$10 M. As a Branch Chief, responsible for identification of goals, plans, work programs, selection of contractors, review of work progress, and reporting of accomplishments to NRC higher level management, Commissioners, Advisory Committee for Reactor Safeguards, and Congressional Committees. From July 1979 was a member of the Senior Executive Service.

Chairman of the NRC/RES Containment Review Group. Member of the following: (a) NRC/RES Advanced Code Review Group, (b) NRC/RES Code Assessment Review Group, (c) CSNI/NEA Working Group on ECCS (Paris, France), (d) CSNI/NEA Working Group on Containments, (e) NORHAV (Nordic Countries) Review Group, and (f) Marviken IV Project Board (Sweden).

1967 - 1973 Advisory Engineer, Westinghouse Nuclear Energy Systems. At Westinghouse, Pittsburgh, involved in the methods development for analyses of the following: (a) blowdown-induced forces on piping, reactor, and steam generator internals; (b) blowdown-induced thermal and hydraulic transients in the primary coolant system before and after injection of the emergency coolant; (c) pipe rupture (break opening time); (d) choked two-phase flow during blowdown; and (e) steam generator feed-line break (hydro-elastic analysis).

Participated in drafting Westinghouse position statements on matters pertaining to ECCS hearings.

- 1963 - 1967 Project Engineer, Kaiser Engineers. At Kaiser Engineers, Oakland, worked on the following projects: (a) Hallogen and noble gas removal; (b) blowdown analyses for the preliminary design of LOFT test facility; and (c) thermal radiation from the nuclear rocket exhaust plume at NERVA test facility.
- 1958 - 1963 Research Engineer, Institute of Engineering. At the Institute of Engineering Research, Berkeley, participated in a research project on transient boiling and boiling incipience.

PROFESSIONAL AFFILIATION

American Nuclear Society
Sigma-Xi

PUBLICATIONS AND LECTURES

Books

S. Fabic, "Review of Existing Codes for Loss-of-Coolant Accident Analysis", pp. 365-404 in ADVANCES IN NUCLEAR SCIENCE AND TECHNOLOGY, Vol. 10 Edited by E. Y. Henley, Y. Lewins, M. Becker, (Plenum Publishing Corp., 1977).

S. Fabic, "Accident Analysis", Chapter 6.6 in HANDBOOK OF MULTIPHASE SYSTEM, Editor G. Hetsroni, (Hemisphere Publishing Corp., 1981).

Technical Paper (Sole Author)

"BLODWN-2: Westinghouse APD Computer Program for Calculation of Fluid Pressure, Flow, and Density Transients During a Loss-of-Coolant Accident", ANS Transactions Vol. 12, No. 1, p. 358 (1969).

"Investigation of Methods for Coupled Structural Hydrodynamic Analysis of Reactor Internals" Proceedings, Conference on Flow Induced Vibrations in Reactor System Components, ANL-7685 (1970).

"BLODWN-2 Code Prediction of Pressure Undershoot During Transition from Subcooled to Saturated Blowdown" ANS Transactions Vol. 13, No. 1, p. 386 (1970).

"Two- and Three-Dimensional Fluid Transients" ANS Transactions Vol. 14, No. 1, p. 360 (1971).

"Comparisons Between Results of the Westinghouse Loss-of-Coolant Analyses and Semiscale (ECC) Test Data Part II: BLODWN-2A Code Results," CONF-730304, p. 702 (1973).

"Data Sources for LOCA Code Verification," Nuclear Safety Journal, Vol. 17, No. 6, (Nov.-Dec., 1976).

"Computer Codes in Water Reactor Safety: Problems in Modeling of Loss-of-Coolant Accident," Conf. Heat-Fluid Flow in Water Reactor Safety, Manchester, U.K., paper C201/77 in Proceedings, Institute of Mechanical Engineers, London, England (Sept. 1977).

"Analytical Modeling of Transient Two-Phase Flow," ANS Transactions 1979 Summer Annual Meeting in Atlanta, Georgia, (June 1979).

"Code Assessment for Nuclear Reactor Accident Analysis Programs," 1980 International Conf. on World Nuclear Energy, Washington, D.C., pp. 254-255, ANS Transactions Vol. 35, (1980).

Reports

I. Company Reports (All Sole Author)

- a. Kaiser Engineers Division of Kaiser Industries Corp.
 1. "Early Blowdown (WATER-HAMMER) Analysis for Loss-of-Fluid Test Facility," 65-28-RA (1965).
 2. "Digital Computer Blowdown Analysis for Loss-of-Fluid Test Facility, Part I: Engineering," 65-29-R (1965).
 3. "MERCURY: Digital Computer Program for Heat Transfer Analysis," 66-26-R (1966).
 4. "GASRAD: Digital Computer Program for Calculation of Thermal Radiation from Plumes," 67-11-R (1967).
 5. "Computer program WHAM for Calculation of Pressure, Velocity, and Force Transients in Liquid Filled Piping Networks," 67-49-R (1967).
- b. Westinghouse, Nuclear Energy Systems, PWR Systems Division
 1. "BLODWN-2: Digital Computer Program for Calculation of Hydraulic Transients During a Loss-of-Coolant Accident," WCAP-7235 (1968).
 2. "Tornado Induced Water Removal from Spent Fuel Storage Pool," WCAP 7313-L (1969).
 3. "Topical Report, Loss-of-Coolant Analysis: Comparison Between BLODWN-2 Code Results and Test Data," WCAP-7401 (1969).
 4. "Calculation of Loss-of-Coolant Through a Propagating Longitudinal Crack, Using the Modified BLODWN-2 Code," WCAP-7405 (1969).
 5. "Preliminary Report on Synthesis of Equivalent Piping Networks for Blowdown Analysis of the Reactor Primary Coolant System, with BLODWN-2 Code," WCAP-7421-L (1969).
 6. "Description of the BLODWN-2 Computer Code," WCAP-7593 (1970).
 7. "Application of BLODWN-2 Code to PWR Loss-of-Coolant Analysis," WCAP-7489 (1970).
 8. "Feed-Line Break Analysis for Model-D Steam Generator," WCAP-8158 (1973).

II. Government Sponsored Reports: Reactor Technology TID-4500

Issued by Institute of Engineering Research, University of California, Berkeley, under AEC Contract AT(II-1)-34, Project 42: "Reactor Heat Transients Project".

1. "Reactor Heat Transients Research, Annual Summary Report," SAN-I002, TID-4500, 16th Edition (Nov. 1961) (co-author).
2. "Reactor Heat Transients Research, 1962 Annual Report," SAN-I007, TID-4500, 18th Edition (March 1963) (co-author).
3. "Vapor Nucleation on Surfaces Subjected to Transient Heating: Ph.D. Thesis," SAN-I008, TID-4500 (August 1964) (sole author).
4. "A High Pressure Test Facility for Transient Boiling Studies," SAN-I010, TID-4500 (June 1963) (principal author).

III. Reports Issued by Nuclear Regulatory Commission

S. Fabic and P.S. Andersen, "Plans for Assessment of Best Estimate LWR Systems Codes," NUREG-0676 (July 1981).

Lectures (All Invited)

"Design Basis Accidents and Containment Criteria for LWR's"

Presented at IAEA Interregional Training Course on Nuclear Power Plant Construction and Operations Management, at Argonne National Laboratory. (Courses sponsored by the International Atomic Energy Agency).

Lectures presented during:

1. Fall Session (Sept.-Dec., 1976),
2. Spring Session (Jan.-April, 1977),
3. Fall Session (Oct.-Nov., 1977).
4. "Emergency Core Cooling System Performance," Two lectures presented at the IAEA Training Course in Nuclear Power Safety Analyses Review, at Argonne National Laboratory (Sept. 1978).
5. "Nuclear Reactor Safety Applications," Lecture presented at the course, "Two-Phase Flow" at Drexel University (Continuing Professional Education), Philadelphia (Dec. 18, 1978).

6. "Survey of LOCA Computer Codes," (Lecture #LWRS/80/7) and "LOCA Computer Code Assessment," (Lecture #LWRS/80/11), Two lectures presented at the ISPRA Course (1980) titled "Thermal-hydraulic Problems Related to LWR Safety", sponsored by Commission of the European Communities Joint Research Center, Ispra, Italy (May 19-23, 1980).
7. "Application of Computer Codes to Resolution of LWR Safety Issues," Lecture presented at a Seminar on Two-Phase Flow, Massachusetts Institute of Technology (April 30, 1981).

Panels

1. As a member of the panel on "Loss of Coolant Accidents in Nuclear Reactors," Eighth National Heat Transfer Conference (ASME-AICHE), in Los Angeles, presented a discussion of methods of blowdown analysis (August 8, 1965).
2. "Summary Review of Meeting Highlights - Understanding NSSS Response to Design Basis Events," presented at ANS Thermal Reactor Safety Meeting at Sun Valley, Idaho (August 1977).
3. "Problems in Simulation of Nuclear Reactor Plant Thermal Hydraulics for Postulated Small and Intermediate Break Accidents," presented at the Simulation and Analysis Panel, Working Conference on Advanced Electro Technology Applications to Nuclear Power Plants, sponsored by NRC and IEEE, Washington, D.C. (Jan. 15-17, 1980).
4. "How Good the Codes Have To Be," Third CSNI Specialist Meeting on Transient Two-Phase Flow, California Institute of Technology (March 1981).

NORMAND A. BERUBE

Senior Engineering Systems Analyst

Education

M.S. Mechanical Engineering, University of New Hampshire
B.S. Astronautical Engineering, U.S. Air Force Academy

Summary of Experience

Mr. Berube has extensive technical experience in the design and application of energy related systems analysis programs. In addition, he has over five years experience in computer programming and data management projects related to the development of analytical models to support energy technology development.

- 1981 - Present Senior Engineering Systems Analyst, Waste Management, Services Division, TERA Corporation. Primary responsibilities include analytical evaluation and modification of radwaste systems, computer programming and system analysis to support development of simulation modeling techniques, and participation in information retrieval software development projects associated with the nuclear utility industry.
- 1979 - 1981 Senior Systems Analyst - JBF Scientific Corporation. Developed and applied analytical models to simulate the operational performance of solar-electric energy systems along with methods and models to evaluate their economic potential in a wide variety of applications. Assessed the major technical, economic, resource, environmental, and institutional constraints to the successful commercialization of energy technologies. Prepared technology transfer strategies and market development plans. Principal investigator and author of technical reports containing recommendations to the U.S. Congress, the U.S. Department of Energy, and the Solar Energy Research Institute.
- 1978 - 1979 Mechanical Engineer, Research and Development - Data General Corporation. Performed analytical and experimental research in heat transfer, fluid dynamics, and contamination control. Inventor of patented equipment related to the operation of a computer disk drive.
- 1977 - 1978 University of New Hampshire. Designed and established a solar radiation data acquisition system. Conducted bi-weekly recitations in Heat Transfer and Fluid Mechanics.
- 1978 - 1980 Consulting Systems Analyst - Marine Systems Engineering Laboratory (part-time). Completed all heat transfer analysis and computer modeling of an unmanned thermal ice drill. Three-dimensional finite difference simulation verified by the U.S. Army Cold Regions Laboratory.
- 1971 - 1976 Captain, United States Air Force, Standard Evaluation Flight Examiner. Responsible for squadron navigational training and evaluation. Received the U.S.A.F. Commendation Medal for outstanding service.



JOSEPH A. MARTORE
Senior Engineering Mechanics Engineer

EDUCATION

M.S. Civil Engineering, Massachusetts Institute of Technology
B.S. Civil Engineering, Massachusetts Institute of Technology
M.B.A. Candidate George Washington University

SUMMARY OF EXPERIENCE

Mr. Martore has over eight years of engineering experience, with an emphasis on nuclear power plant design, construction, and licensing. At the NRC he managed the safety and environmental reviews for operating license applications, and performed technical reviews and evaluations of operating reactor safety issues. He has also had lead responsibility for the structural, mechanical, seismic, and accident analysis and design of nuclear plant facilities.

1981 - Present Senior Engineering Mechanics Engineer - TERA Corporation

1979 - 1981 Technical Assistant to the Director, Division of Licensing, NRC. Coordinated and reviewed the technical and project management efforts related to the licensing and safe operation of nuclear plants. Provided presentations of a variety of technical and safety matters for Congressional, Commission, ASLB, ACRS, and industry meetings.

Licensing Project Manager, NRC. Managed and participated in the safety and environmental review and evaluation of applications for operating licenses.

Structural Engineer, NRC. Responsible for the review, analysis, and evaluation of structural, mechanical, and seismic safety issues for operating nuclear facilities. Evaluated and recommended design criteria, acted as the principal NRC witness on these issues at public hearings and before ACRS, participated in the NRC sponsored research activities, and managed technical assistance programs.

1976 - 1979 Structural Engineer, Stone and Webster Corporation. Responsible for the analysis and design of nuclear power plant structures, systems and components. Emphasis on soil-structure interaction and seismic engineering.

1973 - 1976 Field Engineer, North East Post-tensioning Consultants, Inc. Responsible for structural design and construction management of bridges and office buildings.

AWARDS AND PROFESSIONAL AFFILIATIONS

NRC Special Achievement Award for superior efforts associated with his review of the seismic and structural issues related to the General Electric Test Reactor

Registered Professional Engineer, Rhode Island
American Society of Civil Engineers
Earthquake Engineering Research Institute



JOHN ANGELO
Senior Systems Engineer

EDUCATION

Graduate Studies	Mathematics, Physics, Chemistry, Rensselaer Polytechnic Institute, Troy, New York
M.S.	Solid and Fluid Mechanics, George Washington University, Washington, D.C.
B.S.	Engineering, Union College, Schenectady, New York
B.S.	Electrical Engineering, University of Idaho, Moscow, Idaho

SPECIALIZED TRAINING COURSES

Steam Turbine Supervisors Course, General Electric Company
Fluid Mechanics, General Electric Company
Heat Transfer, General Electric Company
Advanced Engineering Program, General Electric Company

SUMMARY OF EXPERIENCE

Mr. Angelo has thirty years of engineering experience covering a broad range of responsible assignments as a test, performance, installation and maintenance engineer for the General Electric Turbine Division; development and design of fluid systems and components for nuclear plants; supervisory and management experience on nuclear projects for the U.S. Navy; technical expert for the U.S. Army Engineers Reactor Group; and management of safety and licensing reviews of nuclear power plant construction permits and operating licenses for the Atomic Energy Commission and the Nuclear Regulatory Commission.

1981 - Present Senior Systems Engineer, TERA Corporation.

1972 - 1980 Task Manager for Systems Interaction in Nuclear Power Plants, Unresolved Safety Issues Program, NRC. This included managing a program for modeling nuclear plant systems and their interdependencies using fault trees, and developing methodologies for the purpose of identifying potential interactions between redundant systems or subsystems as a result of physical or spatial interconnections.

Senior Licensing Project Manager, NRC. Managed the activities associated with the safety review and evaluation of applications for construction permits and operating licenses.

1964 - 1972 Branch Chief, Nuclear Engineering Branch, Naval Facilities Engineering Command, U.S. Navy. Supervised the work of a number of engineers with responsibilities for engineering evaluations of nuclear projects for the shore-based naval nuclear program.



ANGELO, JOHN

Page 2

- 1963 - 1964 Mechanical Engineer, U.S. Army Engineers Reactor Group. Performed a wide variety of engineering assignments as a mechanical engineering in the design, operation, maintenance, installation, testing and inspection of power plants, systems and components.
- 1960 - 1963 Mechanical Engineer, Performed design engineering for fluid systems and components for the Nuclear Power Division of ALCO Products, Inc. and ALLIS CHALMERS MANUFACTURING CO, including transient analysis and final safety analysis for nuclear reactors.
- 1949 - 1958 Development Engineer, Large Steam Turbine-Generator Dept., General Electric Co. Provided specialized analysis of steam turbine and heat cycle performance in central power plants. Responsible for planning, performing, and analyzing the results of tests of power plant heat cycles for design improvements of large steam turbines. Developed specialized instrumentation and data gathering techniques needed to obtain the design information.
- Turbine Supervisor, General Electric Co. Responsible for general work in the installation, startup and maintenance of steam turbine generators in central power plants, including turbine vibration balancing.
- Performance Engineer, Large Steam-Turbine Dept., General Electric Co. Responsible for planning and performing overall efficiency and heat cycle performance tests in central power plants, including supervision and instruction of test personnel and calculation and analysis of test results for design information and contract obligations.

REGISTRATION

Professional Engineer in the State of Massachusetts



FARZIN RAMEZANBEIGI
Civil/Structural Engineer

Education

B.S. Structural Engineering, San Francisco State University

Summary of Experience

1982 - Present	Civil Engineer, TERA Corporation. Responsibilities include usage and interpretation of structural computer codes such as SAP IV, SAP V, and ADLPIPE.
1982	Teaching Assistant, San Francisco State University. Responsible for assisting advisor in use of computerized systems for engineering applications.
1981 - 1982	Assistant, Billman Construction Corporation. Assisted owner of this small business in determining technical engineering requirements for residential buildings. Also performed a wide range of general construction duties.



SUSAN SLY
Project Engineer

Education

B.S. Civil Engineering, University of Toledo

Summary of Experience

Ms. Sly coordinates the design, development, and implementation of large scale automated information retrieval and records management systems related to nuclear licensing and engineering in the utility industry. In this capacity, her experience in on-site client interface and program management has included participation in the development and application of systems hardware, software, and procedures tailored to meet specific user needs and satisfy a broad scope of regulatory and quality assurance requirements. As a civil engineer, she has been involved in the structural design and analysis of nuclear power plants and has actively participated in the technical review and update of engineering records for those plants, including the development of specialized keyword indexes used to analyze and update FSARs.

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|----------------|---|
| 1981 - Present | Project Engineer, TERA Corporation. Responsible for implementing automated information management systems within nuclear utilities. Developed keyword indexes used in FSAR update systems along with procedures for system implementation through program completion and acceptance. Provides interface between software development and user requirements as well as user training. Participated in the technical review and update of FSARs and other technical documents related to the nuclear utility industry, including participation in implementing specialized subject indexing capabilities for the Nuclear Regulatory Commission Document Control System. |
| 1978-1981 | Civil Engineer, Bechtel Power Corporation. Involved in the design of nuclear power plants; including structural design, dynamic analysis, computer applications, and seismic survey. Worked on-site during construction of a nuclear power plant where duties included design, design verification, and inspection.

Participated in a project involving oil to coal conversion of a steam plant. Responsibilities included structural design and interface with mechanical, electrical, and architectural design groups. Wrote specifications for purchase and placement of materials. |
| 1977-1978 | Engineering Aide, City of Toledo. Collected and compiled data on street measurements and conditions, inspected bridges, surveyed, and scheduled street maintenance. |



JAMES A. LONG
Vice President, Advanced Services Division

Education

B.S. U. S. Naval Academy

Summary of Experience

Mr. Long manages and participates in the analysis, design, implementation and operation of information, records, and management systems required to support licensing activities or the unique needs of any organization. He has extensive experience in the federal regulation of commercial nuclear power facilities. He has managed the environmental and safety evaluations used to support federal licensing decisions on applications to construct and operate nuclear power facilities.

1978 - Present Vice President, Advanced Services Division, TERA Corporation. Responsible for the investigation and definition of particular user requirements for major records and information management projects. Managed the design, installation and multiyear operation of large-scale information systems at two major federal agencies, the Nuclear Regulatory Commission and the Federal Energy Regulatory Commission.

1974 - 1978 Technical Assistant, Nuclear Regulatory Commission. Coordinated and reviewed the technical efforts to create the reports and proposals necessary to assist in formulating policy for the Director, Office of Nuclear Reactor Regulation.

Operating Reactor Project Manager. Managed the activities associated with the review and evaluation of operating reactor licensing actions and events.

Environmental Project Manager. Managed the activities associated with the review, analysis and evaluation of environmental reports and the preparation of NRC environmental statements. Acted as the principal NRC witness during the public hearings associated with his projects.

1966 - 1974 Officer, U. S. Navy, Qualified Chief Nuclear Engineer by AEC (NRC), Division of Naval Reactors, August 1972.

Awards

Received Navy Achievement Medal for superior performance of assigned duties between 1972 and 1974.

Received High Quality Performance Award for performance as Technical Assistant to the Director, Office of Nuclear Reactor Regulation, NRC.

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TERA CORPORATION

RICHARD R. MacDONALD
Senior Mechanical Engineer

Education

M.B.A. Management, Golden Gate University
B.S. Physics, U.S. Naval Academy (with merit)

Summary of Experience

Mr. MacDonald has diversified experience in all facets of the design, procurement, construction, and licensing of large power plants, including the development of various computerized systems for efficient plant operations. He has managed a wide range of engineering efforts at various stages of project development, such as conceptual and detailed design, construction, startup and continuing support to operating plants. He has directed and participated in the design and implementation of computerized systems which control data related to power plant equipment, maintenance management, engineering and construction task management, spare parts and material control, plant reliability assessment and tracking of radiological exposure data. His efforts have been focused on the development of systems to support utilities in the construction, operation and maintenance of power plants.

1980 - Present Senior Mechanical Engineer - Information Systems, TERA Corporation. Responsible for the development of computerized document control and operating data systems, as well as large-scale systems for project management and project control. Manages the development and implementation of multi-application records and data management systems for power plant environments. These systems and services are designed to yield immediate benefits to the client in terms of improved productivity and plant availability.

1971 - 1979 Project Engineer - Bechtel Power Corporation. Directed the analysis requirements, alternatives and costs for decommissioning nuclear power plants. Provided consulting support to an international team which developed a new reactor/containment design, including evaluation of plant arrangement, systems and structural design concepts.

Assistant to the Manager of Engineering, developed and maintained engineering standards and procedures and monitored research and development programs.

Engineering Group Supervisor, responsible for mechanical, nuclear, instrument and control, and HVAC systems design, procurement activities and project licensing efforts for two twin 1100 MWe nuclear power plants. Special assignment to BWR Owners' Group Task Force for the resolution of common containment design problems.

1967 - 1971 Officer, U.S. Navy. Assigned to the Engineering and Operations Departments and attended numerous training programs (e.g., nuclear power and engineering officer schools). Responsibilities included supervision of the operation and maintenance of all engineering systems of a destroyer and coordination of all material maintenance management activities for a guided missile cruiser.



CHRISTIAN C. NELSON
SENIOR REACTOR OPERATIONS ENGINEER

EDUCATION

B.S. Naval Engineering, U.S. Naval Academy

SUMMARY OF EXPERIENCE

Mr. Nelson has over twelve years of experience in the nuclear energy field. At the NRC he was responsible for maintaining an effective program for the inspection of operating nuclear power plants. He has managed numerous safety and environmental evaluations associated with operating nuclear power plants. He directed a multidisciplinary engineering team in reviewing implementation of TMI Lessons Learned at operating reactors. He has also been lead engineer in resolving several generic safety issues.

1983 - Present Senior Reactor Operations Engineer - TERA Corporation.

1975 - 1983 Operating Reactors Project Manager, Office of Nuclear Reactor Regulation, NRC. Responsible for directing and performing evaluations of licensing issues for numerous operating power plants. In particular coordinated safety evaluations for power upgrades, seismic design reviews and increases in spent fuel storage capacity. Responsible for resolution of various technical issues including PWR moderator dilution, station blackout procedures and natural circulation cooldown.

Senior Reactor Operations Engineer, Office of Inspection and Enforcement, NRC. Responsible for managing the operating reactor inspection program to assure proper emphasis on the priority among inspections, balance inspection requirements with manpower resources and integrate the inspection program with other NRC activities.

Team Leader, Lessons Learned Implementation Review, NRC. Directed review of TMI Category A Lessons Learned implementation at all Combustion Engineering and early Westinghouse designed power reactors.

1970 - 1975 Officer, U.S. Navy. Served as engineering officer during four deterrent patrols and shipyard overhaul aboard a nuclear powered submarine. Qualified in submarines.

AWARDS

NRC Special Achievement Award for managing evaluation of GETR seismic issues and representing NRC evaluation at public hearing.



JOSEPH PENZIEN
Senior Scientist

Sc.D. Civil Engineering, Massachusetts Institute of Technology
B.S. Civil Engineering, University of Washington

Summary of Experience

Dr. Penzien has had over thirty-five years of experience in structural engineering, including twenty-seven years on the faculty of the University of California at Berkeley. He is the Director of the Earthquake Engineering Research Center at the UC Berkeley. Dr. Penzien is an expert in the seismic response of structures including highway bridges.

Professional Affiliations

American Society of Civil Engineers
Structural Engineers Association of California
Earthquake Engineering Research Institute
Seismological Society of America
American Concrete Institute

Honors

1959 NSF Post Doctoral Fellowship
1965 Research Prize, ASCE
1969 NATO Senior Science Fellowship
1973 NSF Senior Science Fellowship
1977 Electec Member, National Academy of Engineering
1978 Elected Fellow, American Academy of Mechanics
1979 Elected Honorary Member, Peruvian Assoc. of Earthquake Engineering
1980 Silver Medal of Paris



TERA CORPORATION

DANIELE VENEZIANO
Associate Principal Civil Engineer

EDUCATION

Ph.D. Civil Engineering, Massachusetts Institute of Technology
Laurea Architecture, Facolta di Architettura, Firenze, Italy

SUMMARY OF EXPERIENCE

Dr. Veneziano has served on the engineering faculty of the Massachusetts Institute of Technology for nine years. His principal fields of interest are the engineering application of probability and statistics, safety of structural and geotechnical systems, and experimental design and data analysis. He has provided independent consulting services to a variety of clients, including Lawrence Livermore Laboratory, EPRI, Yankee Atomic Power Company, and Sandia National Laboratory. Dr. Veneziano has authored or co-authored over fifty professional publications on such topics as probabilistic seismic analyses, reliability analyses, computer modeling, and statistical uncertainty.

GOVERNMENT COMMITTEES

<u>Committee</u>	<u>Beginning</u>	<u>Ending</u>
Joint European Committee on Structural Safety CEB-CECM-CIB-FIP-IABSE	May, 1975	December, 1975
ASCE Committee on Reliability Subcommittee on Safety of Nuclear Structures	March, 1975	-----
CSCS Technical Committee on Limit States Design	July, 1980	-----

AWARDS

Award for Outstanding Graduate Teaching, M.I.T., June 1979
Award for Outstanding Graduate Teaching, M.I.T., June 1981

ORGANIZATION MEMBERSHIP

Sigma Xi
American Society of Civil Engineers



MICHAEL B. AYCOCK
Project Manager

EDUCATION

Graduate Studies Nuclear Engineering, Catholic University
B.S. Aerospace Engineering, U.S. Naval Academy

SUMMARY OF EXPERIENCE

Mr. Aycock has eight years of experience in the federal regulation of commercial nuclear power plants. Since joining TERA Corporation, he has managed and participated in a number of projects with nuclear utility clients. This includes acting as the Project Manager and/or principal engineer on projects involving the evaluation of heavy load handling operations at nuclear power plants. At the NRC he has developed programs for resolving important generic safety issues encompassing numerous technical disciplines and has participated in directing the efforts necessary to carry out the programs. He has also managed the safety reviews of nuclear power plant construction permit and operating license applications.

1980 - Present Project Manager - TERA Corporation

1972 - 1980 Deputy Director, Unresolved Safety Issues Program, NRC. Responsible for planning and carrying out the highest priority NRR tasks addressing generic safety issues.

Technical Assistant, NRC. Coordinated and reviewed the technical efforts necessary to develop proposals and recommendations to assist in the formulation of policy by Director, Office of Nuclear Reactor Regulations, with principal participation in the formulation of policy on generic safety issues. Acted as the principal NRC witness on generic safety issues at public hearings associated with licensing nuclear power plants.

Licensing Project Manager, NRC. Managed the activities associated with the safety review and evaluation of applications for construction permit and operating licenses.

AWARDS

Received NRC Meritorious Service Award in 1979 for outstanding performance in the development, organization, implementation and management of the NRC Generic Issues Program.

Received NRC Special Achievement Award in 1976 for superior efforts associated with his performance as Project Manager for the safety review of the Indiana Point Unit 3 operating license application.

PROFESSIONAL AFFILIATION

American Nuclear Society



GEORGE JOSEPH TRIGILIO, JR.
Engineering Manager

Education

B.S. Chemical Engineering, Northeastern University, Boston, Massachusetts

 Chemical Engineering Technology, Franklin Institute of Technology, Boston, Massachusetts

Summary of Experience

Mr. Trigilio has held numerous management and technical positions of increasing responsibilities. He is presently directs a multi-disciplined team of senior level professionals. Mr. Trigilio's technical expertise is in the design of waste treatment systems. He has worked extensively in the design and analysis of radioactive waste treatment systems for nuclear power plants and has been involved in the design, specification and purchase of waste treatment system components for numerous utility plants. In addition, he has supervised a research and development department and managed the technical and licensing requirements for a fleet of radioactive waste shipping casks used in the transportation of power plant wastes.

- 1979 - Present Engineering Manager - Waste Management Services Division, TERA Corporation. Responsibilities include all engineering aspects of the radwaste generation and disposal cycle with extensive involvement in the design and analysis of radwaste treatment systems, low-level waste storage facilities and the economic and engineering viability of volume reduction systems. During this time period a study was begun for the Nuclear Regulatory Commission which resulted in his authoring NUREG-2206 which represents a comprehensive completion and data base of volume reduction techniques for low-level radioactive waste.
- 1977 - 1979 Engineering Group Manager, Hittman Nuclear & Development Corporation, Columbia, Maryland. Responsibilities included department budgetary control, technical direction, and personnel supervision of: the Engineering Design; Research, Development and Testing; and the Planning/Scheduling and Document Control sections. Additionally, was Project Manager for a Shipping Cask project, with direct responsibility for all corporate radioactive waste shipping container design, safety analyses, and Nuclear Regulatory licensing certification.
- 1975 - 1977 Analysis Group Lead Engineer, Brown & Root, Incorporated, Houston, Texas. Responsible for supervising the development of a major program to simulate the operation of a Radioactive Waste Treatment system. Assisted in the preparation of an Environmental Report for licensing of a multiple-unit nuclear site, involving economic evaluation of power production alternatives and calculation of isotopic dispersion.



1972 - 1975 Engineer, Stone & Webster Engineering Corporation, Boston, Massachusetts. Responsible for determining the capital cost and operating economics of three processes for BTX extraction from reformed and/or pyrolysis feed stocks.

Assistant to the Head of Computational Methods Specialist. Prepared the specification for the purchase and assisted in the design of an Off-Gas treatment system. Co-authored a curve fitting program.

Professional Affiliations

American Institute of Chemical Engineers

American Nuclear Society

National Energy Coordinating Committee of the American Institute of Chemical Engineers (past member)

Board of Directors of Harris County Municipal Utility District #5 (past President)

LENNY R. LAAKSO
Senior Associate
Structural Engineer

EDUCATION

B.S.C.E. Tufts University, 1974
M.S.C.E. Massachusetts Institute of Technology, 1976

SUMMARY OF EXPERIENCE

Mr. Laakso has seven years of experience as a structural engineer in the power industry, primarily in the structural analysis and design of buildings and equipment for nuclear, hydroelectric, and fossil fuel power plants.

1980 - Present Sr. Associate Structural Engineer, TERA Corporation

Lead Structural Engineer, Riley Stoker Corporation, Worcester, Mass. Responsible for analysis and design of steam generator support structures from review of customer specifications through completion of construction. Designs boiler intimate steel for high temperature service. Determines feasibility of modifications to existing structures. Establishes and maintains structural engineering schedules and provides technical guidance to personnel in the group. Writes department technical standards.

1977 - 1980

Lead Civil Engineer, Hydroelectric Power Division, Chas. T. Main, Inc., Boston, Mass. Responsible for final civil and structural design of powerhouse, intake structure, spillway, roads, and bridges for 600 MW Shiroro Hydroelectric Project; scheduling and approval of construction drawings; development of structural design criteria; review of specifications. Administered technical aspects of contract for spillway radial gates, intake gates, and draft tube gates. Conducted technical studies and reviewed contractor submittals for the Construction Manager. Supervised conceptual design phase for Merrill Creek Reservoir Project.

Civil Engineer, C. T. Main. Analysis and design of reinforced concrete structures; review of construction drawings; review of vendors' calculations and drawings.

1974 - 1977

Engineer, Structural Mechanics Section, Stone & Webster Engineering Corporation, Boston Mass. Seismic analysis of nuclear power plants; analysis and design of steel support frame for polar crane; evaluated design of concrete shear walls for seismic and wind loads; finite analysis of stress in concrete ring girder.



TERA CORPORATION

1973 - 1974 Engineering Aide, Planning Branch, U.S. Army Corps of Engineers, Waltham, Mass. Collected and organized technical data relating to water resource projects; studied feasibility of structural and nonstructural flood control measures.

PROFESSIONAL AFFILIATIONS

Registered Professional Engineer (Structural), Massachusetts
Member, American Society of Civil Engineers

HONORS & PUBLICATIONS

Graduated summa cum laude from Tufts
Elected to Tau Beta Pi, National Engineering Honor Society
Design of Offshore Gravity Platforms, thesis presented at MIT, 1976



LOUIS L. FUSCO, JR.
Senior Associate Engineer

Education

B.S. Ocean Engineering, U.S. Naval Academy

Summary of Experience

Mr. Fusco has had over eight years of nuclear engineering experience, with emphasis on equipment qualification, systems engineering, licensing and project management.

Present Senior Associate Engineer, TERA Corporation.

1981 - Present Senior Engineer, Western OMTEC Corporation. Responsible for the preparation of field change instructions to operations and instruction sites.

1981 Staff Engineer, NUS Corporation. Assigned as on-site technical consultant to the Sacramento Municipal Utility District, in responding to the environmental qualification of Class 1E electrical equipment at Rancho Seco Nuclear Power Plant. Responsible for equipment inspection, record and test reviews, and vendor/client interface. Also responsible for nuclear engineering studies and evaluations in areas such as nuclear process system design and operation, seismic qualification, radioactive waste, shielding and licensing.

1980 - 1981 Senior Engineer, EDS Nuclear, Inc. Nuclear systems engineering and licensing lead responsible for the direction and supervision of up to eight engineers on three major projects. Review and preparation of FSAR chapters on electrical and control systems. Responsible for nuclear system piping rupture postulation with interaction analysis and protection of unacceptable scenarios. Responsible for NUREG-0660 reviews for nuclear utility clients.

1975 - 1980 Lieutenant, U.S. Navy. Qualified as engineer officer, officer of the deck and engineering officer of the watch on a nuclear-powered fast attack submarine. Major division officer assignments included: Main Propulsion Assistant, Damage Control Assistant, Reactor Controls Officer, Chemistry and Radiological Controls Officer, and Sonar Officer.



STEPHEN F. SCHREURS
Project Manager, Waste Management Services Division

Education

B.S. University of Massachusetts, Chemical Engineering

Summary of Experience

Mr. Schreurs has nine years of nuclear experience in the area of radwaste processing, design, analysis and disposal. This experience has included both engineering analysis and group managerial responsibilities for private and governmental organizations. He has developed computerized analytical models of ECCS, CSS, and boron recovery systems. Mr. Schreurs has been involved in all facets of the nuclear waste problem, especially the immobilization and disposal of high-level and transuranic wastes and the solidification, packaging and disposal of low-level radioactive wastes.

- 1980 Project Manager, Waste Management Services Division, TERA Corporation. Primary responsibilities include radwaste system evaluation and analysis.
- 1977 - 1980 Project Manager, Performance Analysis Section, High-Level Waste Licensing Branch, Division of Waste Management, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission. Responsibilities included developing a capability to analyze the performance of a deep geologic nuclear waste repository. Mr. Schreurs assisted in the development of the proposed 10 CFR 60 regulation, along with the accompanying regulatory documents (i.e. regulatory guides and staff technical positions), and interfaced with other government agencies on matters concerning the performance assessment of repositories. He also monitored the technical aspects of contracts related to deep geologic repositories which were sponsored by other NRC offices.
- 1976 - 1977 Computational Methods Specialist and Sampling Systems Specialist, Process Engineering Specialty Group, Nuclear Industries Division, Stone and Webster Engineering Corporation. Major activities consisted of reviewing and updating specifications for buying sampling systems; laboratory testing of simulated nuclear plant radioactive wastes; preparation of sections pertaining to the processing systems for a PSAR of an Italian nuclear power plant; and modeling the CSS for redesign using eductors for pH control instead of injection pumps.
- 1972 - 1976 Computational Methods Specialist, Process Engineering Specialty Group, Nuclear Industries Division, Stone and Webster Engineering Corporation. Supervised the Computer Section of the Process Engineering Group. Responsible for modeling the complete radioactive waste system for BWRs (i.e. reactor core to drums); modeling and refining the existing computer program for the boron recovery systems in PWRs, and modeling other chemical process systems for nuclear power plants (e.g. waste evaporators and demineralizers). Further responsibilities included recruitment, managing the engineer-in-training program for the group, and teaching refresher courses in math for the Professional Engineers Exam.



Licenses

E.I.T. portion of professional engineer

Societies

American Institute of Chemical Engineers - Full Member

Publications

Schreurs, S.; "Overview of the High-Level and Transuranic Waste Branch Modeling Effort," U.S. Nuclear Regulatory Commission, 1978

Contributing author to "Technical Writing Style Guide," NUREG-0650, U.S. Nuclear Regulatory Commission, November 1979.

DOUGLAS M. WITT
Senior Mechanical Engineer

Education

M.S. Mechanical Engineering, Illinois Institute of Technology
B.S. Mechanical Engineering, Illinois Institute of Technology

Summary of Experience

Mr. Witt has more than 15 years of experience in the nuclear engineering and consulting field. His project work in this area has included safety sequence analysis, licensing, system design, equipment design, pipe rupture analysis, and procurement. He has managed and participated in numerous projects for several corporate organizations with responsibility for technical services and financial management. In addition, he has provided special technical services for an advanced analysis group performing thermal hydraulic analysis for nuclear and fossil power plants, and has served as technical manager for a design organization of more than 100 engineers.

1983 Senior Mechanical Engineer, TERA Corporation.

1973-1982 Manager, Structural Design Division, EDS Nuclear. Responsible for structural design services for operating nuclear plant backfit and for design modification and analytical qualification associated with licensing upgrades.

Manager, Advanced Analysis Section, EDS Nuclear. Managed analysis efforts to define thermal hydraulic forcing functions for plant structures and systems subjected to transients associated with both abnormal occurrences and anticipated operational conditions.

Project Manager, EDS Nuclear. Provided technical direction on multi-discipline projects for construction-stage and operating nuclear plants. Projects included both PWRs and BWRs with integrated design and analysis activities including safety sequence analysis, licensing, system design, pipe rupture mitigation, piping system qualification and design.

1972 - 1973 Industrial Consultant, Argonne National Laboratory. Designed mechanical test facilities, and test programs for equipment and components utilized in the sodium fast breeder program.

1971 - 1972 Mechanical Engineer, Projects Group, Sargent and Lundy. Directed interfacing mechanical design efforts for safety-related systems within the NSSS vendor scope of supply.

1967 - 1971 United States Navy, Nuclear Power Program. Completed tour of duty as Director, Heat Transfer and Fluid Flow Division at the nuclear training command with responsibility for establishing qualifications and implementing a training and testing program to qualify personnel.

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TERA CORPORATION

Registrations

Registered Professional Engineer - Mechanical Engineering, California and Illinois

Professional Affiliations

American Society of Mechanical Engineers



JAMES I. OWENS
Principal Associate Engineer

Education

B.S.E.E Iowa State University
Advanced Engineering Program, General Electric Company

Summary of Experience

Mr. Owens has had over 30 years of experience in the design and construction of power plants - fossil and nuclear. He was General Manager Production Engineering and Construction for a major utility with responsibility for generation planning, as well as design and construction of all production facilities. In this capacity he functioned as a member of the utility executive staff and worked with AEs, suppliers, NRC, other regulatory bodies and interfaced with the public. He has had major responsibility for cost and schedule performance.

1982 - Present Principal Associate Engineer, TERA Corporation.

1979 - 1982 General Manager, Production Engineering and Construction, Delmarva Power & Light Company. Responsible for the design and construction of a 500MWe coal fired power plant and the conversion of a two unit oil fired plant to coal, as well as additions and improvements to the existing system.

1978 - 1979 Manager, Production Engineering & Construction, Delmarva Power & Light Company. Responsible for planning new facilities and all preliminary engineering and licensing work on a 500MWe coal fired power plant.

1976 - 1978 Manager, Power Plant Design, Delmarva Power & Light Company. Responsible for the specification, bidding, and evaluation of twin unit Nuclear Steam Supply Systems and preliminary design of BOP.

1973 - 1976 Project Manager, Summit Nuclear Power Plant, Delmarva Power & Light Company. Staffed the Project Organization, negotiated contracts for the NSSS, Turbine Generator, and most major auxiliaries. Directed Preliminary Design and Licensing through the Construction Permit for twin HTGRs. Responsible for nuclear engineering for the station.

1950 - 1972 General Electric Company, Gibbs and Hill and General Atomic Company. Engineering and managerial assignments included development of control systems for Peach Bottom & Dresden Nuclear Power Plants and the Sea Wolf nuclear submarine, and preparation of PSARs for sixteen research and test reactors.

Professional Affiliations

Registered Professional Engineer, New York
Member, American Nuclear Society
Member, IEEE
Member, EPRI Nuclear Divisional Committee



LUIS E. FLORES, P.E.
Associate Principal Electrical Engineer

EDUCATION

B.S. Physics, University of Miami
B.S. Mechanical Engineering, University of Miami

SUMMARY OF EXPERIENCE

Mr. Flores has over eight years of experience in the nuclear power industry. He has been involved in the design, operation and testing of nuclear power plant systems, with an emphasis on instrumentation and control systems engineering. He has had lead responsibility for performing comprehensive failure analyses and developing the startup test program for several plants.

EXPERIENCE

Present Associate Principal Electrical Engineer, TERA Corporation.

1983 - Present Principal Engineer, Eigen Engineering. Provides consultation services in the systems engineering, operations, and licensing areas specializing in both analog and digital instrumentation and control (I&C) systems.

1981 - 1982 Principal Engineer, Western Omtec Corporation. Responsible for the complete review, revision and annotation of the Final Safety Analysis Report, Chapter 7 for the CNV and NMP 2 plants including resolution of system design and operational discrepancies. Performed comprehensive Control System Failure Analyses for the Hanford 2, Shoreham, Perry and Riverbend plants including identification of effects of power system and control system failures on the plant's safety systems and its ability to achieve cold shutdown. Managed the complete review and revision of all functional control diagrams and instrumentation and electrical diagrams for the Leibstadt, Susquehanna and Shoreham plants.

1980 - 1981 Manager of Data System Department, Validyne Engineering Corporation. Directed all systems engineering activities relating to the implementation of large Data Acquisition Systems in nuclear power plants. Responsibilities included development of customer-unique system configurations necessary to meet functional as well as licensing requirements of each plant. Coordinated a two year equipment qualifications effort which culminated in the full Class IE certification of the Validyne Data Acquisition System.

1975 - 1980 General Electric Company, Nuclear Energy Division.
Lead Startup Engineer, Zimmer Nuclear Power Station. During this two year assignment, directed a group of Startup Engineers in the development of Zimmer's Startup Test Program. Responsibilities included preparation of all test procedures and providing licensing support for Startup Test Program including answering NRC questions and revising the FSAR, and review of all applicable plant operation procedures.



Startup Engineer, Tokai 2 Nuclear Power Station, Japan. During this 18-month assignment, participated in all phases of the Startup Program. Responsibilities included installing and calibrating portions of a transient test recording system, conducting and analyzing numerous NSSS and BOP System tests at all power levels and providing reactor engineering and core management services to utility staff. Also directed special design verification tests for the reactor recirculation system and the plant process computer system.

Associate Engineer, GE Nuclear Energy Division. Responsibilities included analytical studies of fuel pin behavior in fast breeder reactors and development of a computerized model for predicting suppression pool response during various BWR transients such as LOCA, ATWS, and MSIV closure.

PROFESSIONAL DATA

Mechanical Engineer, State of California
Professional Engineer, State of Ohio
Senior Reactor Operator Certification, 1979



MONTE J. WISE
Principal Associate Engineer

EDUCATION

B.S. Chemical and Nuclear Engineering, Texas Tech University, Lubbock, Texas

SUMMARY OF EXPERIENCE

Mr. Wise has had extensive and diverse experience in nuclear and systems engineering. Throughout his career, he has worked at several levels, including superintendent, for nuclear power plants and been responsible for varied duties such as recruiting and training staff, directing engineering functions, supervising construction surveillance, and designing, constructing, modifying, and operating in-reactor and out-of-reactor research and development testing facilities. In systems engineering he has been responsible for welding and fabrication engineering, nondestructive examination technique and equipment development, maintenance engineering, quality and reliability assurance programs, and computer systems development.

1982 - Present Principal Associate Engineer.

1980 - 1982 Senior Project Manager, TERA Corporation. Responsible for providing senior level technical services to utilities. Since joining TERA, Mr. Wise has participated in and managed projects involving updating Final Safety Analysis Reports, developing and implementing information management systems, nuclear plant quality assurance program assessment and improvement, generating plant productivity improvement programs, inservice inspection program assessment and definition, and organizing and developing nuclear plant technical support programs.

1982 - 1980 Director and Assistant Director of Quality Systems Engineering Department, and Management, Operations Engineering Section, Southwest Research Institute. Functions included welding and fabrication engineering services, nondestructive examination (NDE) technique and equipment development, NDE services including inservice inspection, maintenance engineering services, quality and reliability assurance program development and implementation, vendor evaluation and surveillance services, and data processing and information management systems development and services. Project Manager and primary participant in the development, implementation, and operation of the Nuclear Plant Reliability Data System (NPRDS).

1964 - 1972 Superintendent and Assistant Superintendent of the LaCrosse Nuclear Power Plant, Dairyland Power Cooperative. Responsible for the overall management of the plant and several support functions including plant engineering, fuel management, quality assurance, and contract administration. Licensed Senior Reactor Operator.



MONTE J. WISE
Principal Associate Engineer

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1962 - 1964 Engineer, Coolant Systems Development Operations, General Electric Company. Responsibilities included the design, construction, modification, operation and results evaluation of in-reactor and out-of-reactor research and development testing facilities.

1957 - 1962 Supervisor, Reactor Operations, and Reactor Operations Specialist, General Electric Company.

PROFESSIONAL AFFILIATIONS

Wisconsin Professional Engineer Society
American Society for Quality Control
American Society for Nondestructive Testing
American Nuclear Society



STEPHEN N. BRISCOMBE
Associate Electrical Engineer

EDUCATION

B.S.E.E. (Equivalency), 1964
Electrical Guild Certificate, Leeds College of Engineering & Science,
England, 1964
Electrical Technician Certificate, 1964
National Technician Certificate, Harrogate Technical College,
England, 1959
American Management Association Certificate, 1974

SUMMARY OF EXPERIENCE

Mr. Briscoe has over 16 years of broad experience in the construction and operation of nuclear power plants. He has managed numerous projects involving technical and administrative direction in such diverse areas as field engineering activities, identification of design problems, electrical quality control programs and control room panel modification. He has conducted seminars for site installation and computerized cable and connection programs.

EXPERIENCE

Present Associate Electrical Engineer, TERA Corporation.

1980 - Present Western OMTEC Corporation.

Manager, Site Services. Responsibilities include Site Engineer selection, business development for site service contracts, technical and administrative direction of site supervisors and engineers.

Manager, C&I Design Engineering/Project Manager. Responsibilities included management direction of 30-man project providing system design, modifications documentation and Field Disposition Instructions (FDI) for the Perry & Cofrentes BWR Projects.

Senior Systems Engineer. Assigned to General Electric offices to provide system change reviews, modifications, FDI's and Field Deviation Disposition Requests (FDDR's) evaluations for the Hanford 2 (BWR). Major system reviews were HPCS, RHR, process and area radiation monitoring.

1977 - 1980 Engineer Staff Consultant, Bechtel Power Corporation. Provided site consulting responsibility in the construction area for all San Francisco Power Division Projects. Formulated and conducted training seminars for site engineers in the following areas: cable pulling, termination techniques, raceway (conduit and tray) installation and computerized cable and connection programs.

1976 - 1977 Senior Electrical Engineer, General Electric Company. Assigned to the Fermi site. Responsible engineer for coordination.



- Senior Electrical Engineer, Nuclear Energy Division. Wrote, designed and coordinated FDDR's for the C&I effort at La Salle. Wrote installation instructions and procedures, analyzed instrument and control schematics and designed control room panel schemes along with revamping existing design to provide more flexible and controllable systems.
- 1976 Senior Control's Engineer, Enrico Fermi Unit 2, Energy and Process Systems, Inc. Supervised 2 I&C Engineers in the Detroit Edison Offices, Detroit, Michigan. Work included the design review of the Fermi 2 I&C, schematics and elementaries, general drawing review, identification of design problems and document control evaluation. Initiated and wrote 100-page final report identifying problem areas and recommending solutions.
- 1974 - 1976 Assistant Project Field Engineer, Grand Gulf Nuclear Station, Bechtel Power Corporation. Organized and controlled the site Area Engineering organization. Responsibilities consisted of directing and supervising approximately 35 Area Engineers and 10 Technicians; coordinating all field engineering activities; ensuring uniformity of construction techniques between major building areas; and pre-planning and scheduling of construction activities.
- 1971 - 1974 Engineering Consultant, Hatch Nuclear Plant, Bechtel Power Corporation. Consultant Engineer's work involved liaison between Georgia Power Company site personnel and Bechtel Power Corporation design office. Instructed GPC personnel on field engineering techniques. Interfaced with GPC and Bechtel management on scheduling, design drawing and specification interpretation and construction techniques.
- 1970 - 1971 Senior Field Engineer, Pilgrim Nuclear Station, Bechtel Power Corporation. Responsibilities included start-up and checkout of nuclear systems and organization of Electrical Quality Control Program.
- 1967 - 1976 Field Engineer - Electrical, Monticello Nuclear Plant, (GE-BWR) Bechtel Power Corporation. Responsibilities included procurement of electrical material; design of temporary electrical; installation of motors up to 6,000 HP; electrical Q.C.; design cable tray and conduit layouts; construction and start-up checkout of all electrical control schemes; supervision of electrical construction; and checkout of installation for Q.C. and Quality Assurance programs.

SIDNEY J. BROWN
Construction Services

Education

Engineering Management, University of California, Berkeley, California
Electrical Engineering, San Francisco City College, San Francisco, California

Summary of Experience

Throughout his 30 years in the engineering/construction profession, Mr. Brown has gained extensive experience in the areas of construction management and scheduling, labor relations, craft supervision and personnel administration. As manager of a construction computer systems group, Mr. Brown developed systems to facilitate the processing of project data and quality control reports related to both nuclear and nonnuclear power projects. Developed a TERA site access monitoring and security system for the construction industry. Most recently, completed the construction, startup, initial operation and maintenance of the nation's first residential electric cogeneration power plant at a large apartment complex for Southern California Edison.

- 1980 - Present Manager, Construction Services, TERA Corporation. Primarily responsible for coordinating tasks associated with the design, construction, startup and operation of major power-generating facilities. Controls all phases of project implementation relating to construction, engineering review, cost engineering, planning and scheduling, field construction and quality control engineering. Serves as interface between construction contractors and subcontractors, suppliers, architect/engineers, and owners of property involved with projects.
- 1965 - 1980 Construction Specialist, Bechtel Power Corporation. Held various positions, ranging from field engineer, craft supervisor, assistant site manager and assistant project engineer to construction coordinator, responsible for project control systems design, implementation, training and auditing. Supervised the mechanical/piping area on three-unit nuclear power project.
- 1964 - 1965 Area Administrator and Construction Planning Consultant, H. L. Yoh and McDonnell Douglas Corporation. Directed support services for an aerospace facilities project during design and construction operations.
- 1961 - 1964 Assistant Project Superintendent, Field Project Engineer, and Contracts Administrator, Noble Company. Responsible for the engineering/procurement administration of support services contracts.
- 1960 - 1961 Manager of Engineering, Bloxham Engineering. Supervised the design and fabrication of prototype equipment.
- 1955 - 1960 Lead Research and Development Engineer, Senior Layout Specialist, and Assistant Production Manager, Noble Company. Responsible for the manufacture of construction-related equipment.
- 1951 - 1954 U.S. Army, Army Security Agency, Electronics installations and maintenance.



TERA CORPORATION

LEONARD M. STOUT
Senior Project Manager

Education

B.S. Engineering Management, University of Missouri School of Mines. Majored in Mechanical Engineering and Business Management.

Summary of Experience

Mr. Stout has a broad background in the energy industry including cost engineering, construction field engineering, design development and field implementation of computerized project control systems and managing "grass-roots" implementations of minicomputer facilities and systems. His extensive knowledge of the work process and control aspects of the design, construction, startup and operations phases of fossil and nuclear projects has been incorporated into computerized scope, schedule and cost control systems developed by TERA for our clients.

- 1977 - Present** Senior Project Manager - Information Systems, TERA Corporation. Mr. Stout has provided project leadership to several major projects. These projects include the conceptual phase studies for a utility-wide information management system, technical services implementation plan for a developing Engineering and Construction Department within a utility service company, development of material control systems that integrate activities of manufacturers, architect/engineers, and constructors, the design and management of projects in Michigan, Texas, New Jersey, Georgia, Pennsylvania, California, Arizona, Colorado and New York.
- 1976 - 1977** Project Control Systems Group Supervisor, Bechtel. Provided consulting services and technical direction to project scheduling and cost groups to ensure technical quality of methods and procedures as related to computerized project control systems.
- In this capacity, Mr. Stout has traveled extensively throughout the U.S. to consult on both nuclear and fossil projects, including BWR, lignite, and low sulfur coal plants.
- 1975 - 1976** Project Control Engineer, Bechtel. Implemented material, cost and scheduling control systems on two Bechtel nuclear projects in the Engineering Design phase.
- 1974** Staff Assistant to Field Construction Manager on a three-unit (each 500-MWe) mine mouth coal station in Wyoming. Responsibilities included coordinating the activities of cost engineering, scheduling, subcontracts, field engineering, supervision, and startup.
- 1971 - 1973** Senior Field Engineer on a two-unit, 600-MWe oil-fired station in New York. Successively served as a Field Cost Engineer, Assistant Field Electrical Engineering Group Leader, and Staff Assistant to the Project Superintendent, responsible for all computer and material control activities.
- 1968 - 1969** Design and Field Engineer for Trunkline Gas Company in Texas and Illinois.



FREDERICK M. BERTHRONG
Senior Mechanical Engineer

Education

M.S. Nuclear Engineering, University of Washington
B.S. U.S. Naval Academy

Summary of Experience

Mr. Berthrong has extensive experience in the management and administration of design, licensing, procurement and construction of large power plant projects. He is currently involved in the design and implementation of information and management systems including computerized systems for on-line performance of a variety of administrative tasks. He has recently completed the design and implementation of a Maintenance and Operating Data System for a large electric generating station. His responsibilities have included day-to-day supervision and management of large-scale projects both in the design office and at construction sites.

- 1977 - Present Senior Mechanical Engineer - Information Systems Division, TERA Corporation. Performed and managed numerous projects related to information management including the design and implementation of large-scale records management, maintenance management and material control systems and the development of other computer applications.
- 1975 - 1977 Lead Project Field Engineer, Bechtel. Directly responsible for all field engineering activities in the Reactor Building and Containment complex (2-1100 MWe Units) and interfacing with all other on-site organizations. Coordinated directly with superintendents for planning, scheduling and problem solving. Acted as lead superintendent during various project phases.
- 1972 - 1976 Engineering Supervisor, Bechtel. Mechanical Group Supervisor responsible for supervising all nuclear, mechanical and HVAC systems design and procurement and for project licensing.
- 1965 - 1970 U.S. Navy. Completed nuclear power training and served aboard a nuclear submarine with primary responsibilities in the engineering department.

Registrations

Registered Professional Engineer - Mechanical Engineering, California and Washington

Awards

Awarded an Atomic Energy Commission Special Fellowship in Nuclear Engineering by the University of Washington.



DONALD B. TULODIESKI
Project Manager

Education

B.S. U. S. Naval Academy

Summary of Experience

Mr. Tulodieski manages projects ranging in scope from project control and management systems to integrated information systems including material control, maintenance management, cost and schedule control, records management, and systems interface evaluation. He has extensive management experience in nuclear and fossil-fueled power plant licensing, warehousing procurement, testing and operations. Mr. Tulodieski has designed and implemented data base systems which provide quantitative means of evaluating power plant reliability and availability in addition to automated systems designed to provide professionals access to vital technical and contractual information and data.

1978 - Present Project Manager, TERA Corporation. Manages and participates in the evaluation, design, development, and implementation of projects relating to document, information and management control systems. Additionally, he has conducted evaluations and seminars and consulted in major utility corporate material control programs.

1973 - 1978 Project Manager, Babcock & Wilcox Company; Supervisor, Site Support and Testing, Babcock & Wilcox Company. Directly responsible for all aspects of interfacing and focusing technical and licensing related resources to satisfy client's needs as stipulated in contractual agreements while maintaining cost and schedule goals as promulgated by company guidelines and as required by the client. The above project management activities were performed for two separate NSSS contracts consisting of a total of four nuclear generating facilities.

As supervisor, site support and testing, established data base and real-time systems for site-generated test data and implemented a reliability and availability tracking system for B&W systems and equipment. Resolved operating and start-up site problems associated with the performance of equipment and system testing and core physics test programs.

1970 - 1973 Engineer, Public Service Electric & Gas Company of New Jersey. Qualified stationary engineer in the operation of 1,100 MW oil-fired generating station and the start-up and operation of gas turbine peaking units. Responsible for the generation and implementation of start-up testing procedures associated with the pre-critical and critical testing of two 1,100 MW nuclear generating units.

1965 - 1970 Lieutenant, U. S. Navy Nuclear Submarine Force. Responsible for the maintenance and operation of nuclear and diesel powered propulsion and auxiliary equipment.

Professional Affiliation

American Nuclear Society
National Micrographics Association



ALBERT V. MARTORE
Principal Engineer - Construction Services

EDUCATION

B.S., Civil Engineering, Massachusetts Institute of Technology
Graduate Studies, Business Management, Harvard University

SUMMARY OF EXPERIENCE

Mr. Martore has over 30 years of experience in engineering and construction, with an expertise in the area of structural engineering. His extensive experience includes all areas of light and heavy construction, commercial, and industrial projects, both domestically and internationally. As Vice President of Prescon Corporation and President of North East Post-tensioning Consultants, Inc., he has been responsible for the entire range of engineering and construction activities, including conceptual and final design; specification, fabrication, and supply of construction materials; preparation of design drawings and specifications; construction management, scheduling, supervision, and inspection. In addition, he was directly involved in the design and construction of nuclear plant containment structures for Arkansas 1 and 2; Crystal River 3; Calvert Cliffs 1 and 2; Oconee 1, 2 and 3; and Turkey Point 3.

PROFESSIONAL AFFILIATIONS

Registered Professional Engineer, Massachusetts

Member, American Society of Civil Engineers

Member, American Concrete Institute



TERA CORPORATION

ROBERT C. SNYDER
Project Engineer

SUMMARY OF EXPERIENCE

Mr. Snyder is highly qualified in the field of facilities design and construction. He has worked extensively in the design and analysis of waste treatment systems for nuclear power plants and industrial manufacturing plants. In addition, he has had overall project management experience from formulation of concept through construction, start-up and operation. Control of A&E efforts, construction operations; budgets; subcontracts; purchasing; and equipment design are elements of his expertise. His experience has included mechanical and electrical design of facilities, equipment and processes for radwaste and heavy industrial manufacture.

- Present** Project Engineer, Waste Management Services Division TERA Corporation. Responsibilities include evaluation and design of radwaste facilities, processes, and equipment with emphasis on operations and maintainability.
- 1977-1980** Principle Engineer, Hittman Nuclear & Development Corporation, Columbia, Maryland. Provided design concepts and engineering analysis for all HNDC activities. Fields of endeavors covered; solidification systems, storage facilities solidification machinery, and casks. Particular tasks covered: powdered resin dewatering equipment, pumping systems, structures, machine design mechanical and pneumatic conveyors, electrical control, filtration equipment, ion exchange equipment, process, system and equipment specifications, shipping cask safety analysis, hydraulic and pneumatic power units and controls, instrumentation and others.
- 1966-1977** Project Manager, Assistant Division Engineer, Plant and Facilities Engineer, Kaiser Aluminum & Chemical Corporation, Oakland, California. Projects included construction of casting, extrusion, fabricating facilities, water and air pollution control and complete processing plants. Consulted with foreign affiliates, and Saudi Industrial Development Fund. Performed new plant planning function. Controlled multi-million dollar projects from concept to start-up. Supervised A&E and Construction operations directly and through subordinates.
- 1962-1966** Vice President, Division Manager Container Division, The Baltimore Steel Company, Baltimore, Maryland. Designed, tested and fabricated military and engine containers for companies such as General Dynamics, Kholmorgen, Nortronics, Martin, General Electric, Westinghouse, North America Aviation, Pratt & Whitney Aircraft, Thiokol, U.S. Navy, U.S. Army, and others.
- 1959-1962** Chief Engineer, Charles T. Brandt, Baltimore, Maryland. Duties involved overall supervision of Engineering Department engaged in design of fabricated metal products, machinery, military and commercial vehicle components, process equipment and architectural products.



GARY SMITH
Senior Civil Engineer

Education

M.S. Civil Engineering, University of Texas at Arlington
B.S. Civil Engineering, Lamar University

Summary of Experience

Mr. Smith has extensive experience in the field of civil engineering ranging from the design and field inspection of civil structures to the implementation of state-of-the-art computerized systems for specific civil engineering applications. He is thoroughly knowledgeable of the utilization of data collection techniques, survey methodologies and critical path procedures for major engineering projects.

- 1979 - Present Senior Civil Engineer, TERA Corporation. Responsible for providing civil engineering and computerized system support services to engineering projects in his area of expertise.
- 1971 - 1979 Deputy Director of Transportation and Energy, North Central Texas Council of Governments. Managed and directed the successful development of the state-of-the-art computerized Transportation Planning System. Participated in strategic energy planning and managed the development of socioeconomic data base and analysis process.
- 1971 - 1972 Assistant Director of Public Transportation Studies, City of Fort Worth. Directed the technical efforts of a consultant team in the comprehensive analysis and acquisition of the privately-owned transportation system.
- 1968 - 1971 Design Engineer, City of Fort Worth. Responsible for the design and field inspection of major public works improvement projects.

Registrations and Professional Associations

Registered Professional Engineer - Texas
Transportation Research Board
American Society of Civil Engineers
American Institute of Planners
Chi Epsilon
Tau Beta Pi

Awards

U.S. Department of Transportation, Certificate of Merit to North Central Texas Council of Governments, Key Staff Member, 1977

Outstanding Young American, 1979



STANLEY W. KAUT
Associate Electrical Engineer

Education

B.S. Electrical Engineering, Rochester Institute of Technology

Summary of Experience

Mr. Kaut has had 20 years of diversified engineering experience with emphasis in design review, construction, testing, operation, licensing and quality assurance of electrical power, instrumentation and control systems and equipment. He has made continuous contributions to the nuclear power industry since his involvement with the BWR turnkey program. His experience with electrical power includes the installation, testing, and servicing of substations, motor control centers, switchgear, power transformers, motors, generators, D.C. battery systems, bus duct, cabling and related metering, and relaying. His experience with instrumentation and control includes the installation, testing, design, calibration, and maintenance of process systems and equipment that measure such variables as level, flow, pressure, temperature, and vibration; and of nuclear systems such as neutron monitoring, area and process radiation monitoring, and rod control. Mr. Kaut has also had significant experience with design review, plant procedures and Quality Assurance (QA). He has directed a technical group responsible for providing design review services to nuclear utilities. The services have been directed toward providing an independent assessment of plant safety, operability, maintainability, inspectability, and availability features. Mr. Kaut has developed procedure programs for several BWR and PWR power plants providing for the administrative control of plant personnel during startup testing, operation, maintenance or on-line surveillance testing. Mr. Kaut's involvement with quality (QA/QC) includes first-hand experience performing QC activities in manufacturing shops, electrical equipment installation sites and at nuclear power plant construction sites. He has been involved in the development and review of quality programs and procedures (including training) for AE's utilities, and manufacturing organizations. He has participated in many audits and is certified as a lead auditor.

Present Associate Electrical Engineer, TERA Corporation.
1975 - Present Manager, Systems Engineering, NUTECH.
1970 - 1975 Manager of Projects, Nuclear Services Corporation.
1963 - 1970 Field Engineer, General Electric Company.

Registration

Electrical Engineer, State of California
Nuclear Engineer, State of California
Control System Engineer, State of California



RANDY S. CLELAND
Project Engineer

Education

M.A. Business Administration, Sangamon State University
B.S. Mechanical Engineering, Purdue University

Summary of Experience

Mr. Cleland has over ten years of experience in the design, construction, operation, and maintenance of power generation facilities with emphasis on mechanical engineering, construction management and results engineering.

1983 - Present Project Engineer - TERA Corporation. Responsible for providing construction management and plant operations support services.

1975 - 1983 Results Engineering Supervisor, Coffeen Power Station, Central Illinois Public Service Company. Responsible for coal fired power plant operating efficiency, instrument and control maintenance, and laboratory activities. Developed performance test procedures, periodic testing programs, equipment inspection procedures, and preventive maintenance programs. Recommended improvements in operating procedures and managed plant betterment projects.

Mechanical Engineer, Power Plant Construction. Responsible for review and monitoring of mechanical design portion of a major fossil fueled power plant and other operating station additions.

Area Construction Engineer, Power Plant Construction. Responsible for contractor management and monitoring of various construction activities for a major fossil fueled power plant.

1971 - 1975 Cooperative Engineer, Sargent and Lundy Engineers. Completed work-study program which included positions as draftsman, designer, assistant engineer, and mechanical engineer on nuclear and fossil power plant design projects.

Registration

Registered Professional Engineer - Illinois

Professional Affiliations

American Society of Mechanical Engineers
Tau Beta Pi, Engineering Honorary Society
Pi Tau Sigma, Mechanical Engineering Honorary Society



EDWARD M. BECK
Principal Associate Engineer, Nondestructive Testing

Education

B.C.E. Auburn University

Summary of Experience

Mr. Beck has over 15 years experience in the area of nondestructive testing. He has been responsible for the direction and management of several major projects. He has distinguished himself by serving as Section Chairman and Director of the AWS and ASNT.

Present Principal Associate Engineer, Nondestructive Testing

1978 - Present Assistant Vice President, Corporate Consultant/Metals, Radiation Safety Officer for Carolinas. Responsible for the development of new techniques and services. Responsible to the Director of Engineering for the approval of all NDE procedures established in the Engineering Procedures Manual. Responsible to the Director of Engineering for approval of all NDE Level III candidates.

1976 - 1978 Manager of NDE Services - Charlotte Branch, Law Engineering Testing Company. Managed nondestructive testing services for the District. Responsible for Virginia and Carolinas.

1972 - 1975 Project Manager, Law Engineering Testing Company. Administered and controlled radiographic, magnetic particle, and dye penetrant investigations for the Brunswick Steam and Electric Plant. Responsible for the supervision of up to 25 engineering technicians.

1968 - 1972 Manager of the Nondestructive Testing Department, Georgia Division, Law Engineering Testing Company. Administered and controlled all work which included radiography, ultrasonic, and magnetic particle investigation, dye penetrant tests and in general, all metal inspection in building and construction.

1964 - 1967 Assistant to Chief of Operations, United States Public Service Commission.

Certifications/Registrations

Professional Engineer, North Carolina and New York
Level III ASNT certification in ultrasonic, radiographic, liquid penetrant and magnetic particle testing.

Professional Associations

American Welding Society - past Section Chairman and Director
American Society for Nondestructive Testing - past Section Director
American Society of Mechanical Engineers
American Institute of Steel Construction
American Society for Metals
Numerous technical committees and task forces



TERA CORPORATION

ROBERT A. RENEAU
Associate Engineer, Nondestructive Testing

Education

B.C.E. Georgia Tech

Summary of Experience

Mr. Reneau has ten years experience in the areas of nondestructive examination and material testing. He has been responsible for the direction and supervision of engineers and technicians performing radiographic, magnetic particle, liquid penetrant, and ultrasonic evaluations on several major industry and nuclear projects.

Present	Associate Engineer, Nondestructive Testing, TERA Corporation.
1980 - Present	Engineer, Law Engineering Testing Company. Technical responsibility for metals services of Charlotte, North Carolina branch.
1975 - 1980	Service Engineer, Westinghouse Electric Corporation. Provided technical assistance during disassembly, reassembly, and operation of power generation equipment including steam turbines and generators for utility and industrial customers in U.S. and abroad. In addition to technical responsibilities, duties included supervision, scheduling and cost accounting.
1974 - 1975	Project Manager, Law Engineering Testing Company. Responsible for supervision of engineering technicians performing radiographic, magnetic particle, and dye penetrant evaluations during construction of Brunswick Steam Electric Plant.
1973 - 1974	Branch Engineer, Law Engineering Testing Company. Technical responsibilities for soil and foundation engineering activities including the test pile programs and foundation investigations for the LMFBR.

Certifications/Registrations

Professional Engineer, North Carolina
Level II ASNT certification in radiographic, magnetic particle, liquid penetrant and ultrasonic testing.

Professional Associations

American Welding Society
American Society for Metals
The American Institute of Plant Engineers



TERA CORPORATION

ORIN W. KILGORE
Associate Senior Quality Engineer

EDUCATION

B.S.	University of Tennessee
Mechanical Engineering	University of Missouri
U.S. Navy	Nuclear Power School

SUMMARY OF EXPERIENCE

Mr. Kilgore has over twenty-six years of nuclear power experience in the areas of quality assurance, construction, startup, and operations. His operations experience extends from Naval prototype and power reactors, through University Test Reactor and Commercial Reactors. He has over nine years experience in quality systems with TVA, where he wrote, audited, and trained others in the quality discipline. Certified Lead Auditor, ANSI N45.2.23.

EXPERIENCE

Present	Associate Senior Quality Engineer, TERA Corporation.
1961 - Present	Independent Startup Engineer, Waterford-3 SES, certified Level II (UNID Group). Responsible for the development and implementation of a program to assign a unique identification descriptive number for each mechanical system, valve, or component at Waterford-3. Research and coordinate startup operations and maintenance for documentation and history relating to unique identifiers as input to plant operations manual procedures and drawings.
1980 - 1981	Quality Assurance Engineer, TVA. Assigned to Chattanooga office to provide general engineering support and inspection supervision for special projects. Responsible for correspondence, evaluations, vendor selection, code compliance, and contract conformance. Developed an Auditor Training program and an Inspection Training program; implemented both programs.
1978 - 1980	Quality Assurance Evaluator, TVA. Assigned to Chattanooga Office of Power for auditing and evaluating Quality Assurance programs of suppliers, operating plants, plants under construction, and various other TVA organizations in support of TVA's nuclear plants and power projects. As Audit Team Leader, conducted audits, trained auditors, and prepared audit reports, evaluations, and follow-up. Developed guidelines for audit checklist preparation. Interfaced with NRC; provided pre-audit and post-audit representation for QA during NRC audits.
1975 - 1978	Quality Assurance Engineer, TVA. Assigned to Sequoyah Nuclear Plant as Lead Auditor for construction activities. Formulated audit plans; responsible for turnover package documentation review, and audit of all construction activities. Vendor and subcontractor QA program audits.



Responsible for Certification Program whereby Quality Control Engineering Inspectors were certified to appropriate levels for performing inspections and audits of construction procedures and activities.

1972 - 1975

Assistant Unit Operator, TVA. Assigned to Sequoyah Nuclear Plant for training and for plant startup duties. Functioned as startup engineer while engaged in studies for cold licensing. Reviewed system descriptions, operating procedures, and test procedures. Wrote system operating and test procedures. Performed checkout and walkdown of systems under construction and during testing. Inspected systems for compliance to code, design, and operational requirements. Assisted with system lineup for integrated testing.

1967 - 1972

Senior Reactor Operator at the University of Missouri's Research Reactor Facility, a 10 MW pressurized, water moderated reactor. (AEC licensed, Senior Reactor Operator). Trained new operators, supervised operations, maintenance, and periodic testing of the reactor and its supporting equipment. Kept records of operations, and ensured that operations were in compliance with the licensing requirements. Reviewed and wrote operating and test procedures. Assisted in developing the list of material and equipment necessary to upgrade the Reactor from 5 MW to 10 MW in compliance with AEC's Licensing Specifications. Helped write installation and testing procedures for the new equipment, helped install and supervise testing of pipes, pumps, motors, valves, heat exchangers, and instrumentation.

WILLIAM D. PRYOR
Associate Senior Quality Engineer

EDUCATION

B.S. Chemistry, Old Dominion University

SUMMARY OF EXPERIENCE

Mr. Pryor has over twenty years experience in nuclear power. His background includes plant chemistry, radiography, plant testing, test supervision, training, quality assurance, and technical writing. He is experienced in Navy nuclear plant construction, testing and start-up, construction, quality assurance, and operations. He has developed off-normal, emergency, and operating procedures for nuclear operations departments. He has spent the last eight years in consulting capacities. He holds ANSI N45.25, Level III, and ASQC Certifications.

EXPERIENCE

Present	Associate Senior Quality Engineer, TERA Corporation.
1982 - Present	Independent Project Engineer (Waterford 3 SES). Writes and revises operations procedure, surveillance procedures, off-normal, and emergency procedures with specific regard to human factors in routine tasks and in response to abnormal symptoms.
1981 - 1982	Quality Engineer (William H. Zimmer NPS). Responsible for overview of construction progress, construction turnover, nonconformance reports, and procedure review. Reviewed construction turnover packages, met with Construction Manager and Nuclear Vice President weekly for Start-up coordination. Certified to Level III for review of nonconformances and procedures. Material Review Board member. Training Coordinator and Certification Coordinator for QA Department.
1976 - 1981	Senior Engineer. Performed preliminary work for A/E Plant Test and Operators Group, N-Stamp (ASME). Assigned to Guatemala for power plant start-up, test and operations (advisor); to Saudi Arabia as Results Engineer for 800 MW fossil plant 2,400 MW (units); Quality Control Supervisor, wrote I&C Training manual, wrote contract proposals, job descriptions, operations, quality and maintenance manuals. Assigned to Department of Energy.
1974 - 1976	Mechanical Start-Up Engineer (Salem Units 1 and 2). Mechanical Test Engineer on Unit 1; Construction Engineer on Unit 2. Wrote start-up testing on selected systems. Assisted in RCS Cold Hydro, Hot functional testing for commercial operations on Unit 1; Construction Engineer for I&C on Unit 2.
1968 - 1974	Shift Test Engineer, U.S. Navy, assigned to USS Nimitz. Supervised testing and operations in one propulsion plant on shift. Directed a staff



of Mechanical Test Engineers and Electrical Test Engineers, crafts, and administrative support. Also had been assigned to Mare Island Naval Shipyard on loan for second refueling and overhaul and test program for USS Long Beach (Nuclear powered cruiser). Assigned for USS Enterprise second refueling, overhaul, and test program. Wrote test procedures, test operating procedures.

CERTIFICATIONS

Level III (ANSI N45.2.6) Mechanical

Level III (ANSI N45.2.6) Piping

Level III (ANSI N45.2.6) Electrical

Level III (ANSI N45.2.6) Instrumentation

Certified Quality Engineer (ASQC) June, 1982



FREDERICK A. PELLERIN
Associate Quality Engineer

EDUCATION

Management/QA Engineering
Management/QA/QC Engineering
Graduate

University of Rhode Island
Thomas Valley State Technical College
U.S. Army Corps of Engineers School

SUMMARY OF EXPERIENCE

Mr. Pellerin has over twenty years experience in all facets of developing, implementing, monitoring, supervising, and evaluating nuclear QA/QC programs. He was responsible for the development and administration of an on-site construction completion control program for Nine Mile Point Nuclear Plant, as well as quality and audit plans for Mexican and South African nuclear projects.

EXPERIENCE

Present	Associate Quality Engineer, TERA Corporation.
1982	Field QA Supervisor, Mercury Company Co. of Norwood, Inc. Responsible for the installation of instrument control systems at Waterford-3 Nuclear Power Station for Louisiana Power & Light.
1981 - 1982	Field QA Engineer, Gilbane Building Company. Provided construction management on EXXON New Facilities Project.
1980 - 1981	Field QA Supervisor, Pullman Power Products. Monitored power piping fabrication and installation at A.W. Vogtle Nuclear Power Station for Georgia Power Company.
1980	Manager of QA, Zurn Industries. Responsible for the design and construction of natural draft and mechanical draft cooling towers for various nuclear and fossil fueled power plants.
1979 - 1980	Manager of QA, Mercury Company of Norwood. Supervised the design, fabrication, and installation instrumentation racks and panels for various nuclear and fossil fueled power plants.
1977 - 1979	Senior Construction Engineer, Stone & Webster Engineering Company. Responsible for the development and implementation of on-site Construction Completion Control Program and construction management at Nine Mile Point, Unit 2, for Niagara Mohawk Power Company.



1976 - 1977 Construction QA/QC Analyst and Lead Auditor, Gilbert Associates. Performed on-site audits at Susquehanna Nuclear Power Plant for compliance with 10 CFR 50, Appendix B. Also involved in quality programs for Laguana Verde Nuclear Power Plant and a South African Project.

PROFESSIONAL DATA

Professional Engineer, State of California

ROBERT W. FELTON
Executive Vice President

Education

M.S. Nuclear Engineering, University of Washington
B.S. Mechanical Engineering, Cornell University

Summary of Experience

Mr. Felton is a founding member of TERA Corporation and has been Executive Vice President since TERA's inception. As Executive Vice President he has operational responsibility for the firm. He also provides project management, supervision and client interface for some of TERA's larger projects. His extensive experience includes the management and administration of design, licensing, and procurement efforts on large energy-related facilities. Mr. Felton has also been responsible for projects dealing with the design and implementation of information and management systems, including computerized systems for on-line performance of a variety of administrative and security tasks. In addition, Mr. Felton has supervised TERA projects involving environmental impacts, engineering criteria and licensing at local, state and federal levels, quality assurance programs and nuclear services.

1974 - Present Executive Vice President - TERA Corporation. Mr. Felton has operational responsibility for the firm, including the supervision of the managers responsible for document, information and management control; security systems development and implementation; environmental impact projects; and the development of engineering criteria, specifications, and licensing data for fossil and nuclear projects.

1973-1974 Manager of Environmental and Information Management Services, Teknekron, Inc. Responsible for marketing and managing the firm's comprehensive and computer-based site selection activities and the review of project control systems.

1971 - 1972 Prior to joining TERA, as manager of Kaiser Engineers Licensing Services, Mr. Felton supervised a project group of 26 engineers and scientists. He was responsible for marketing and performing the licensing services provided by that staff.

Mr. Felton personally designed and developed Kaiser Engineers' computerized nuclear power plant licensing and data bank program.

1962 - 1970 Mr. Felton served in the navy as a nuclear submarine officer. He was a qualified nuclear engineer and served as nuclear material officer for Commander, Submarine Forces Pacific (COMSUB PAC).

Awards

Awarded an Atomic Energy Commission Special Fellowship in Nuclear Engineering by University of Washington.

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TERA CORPORATION

Awards (Cont'd)

Received a U.S. Navy Commendation for superior performance of duty while serving as Material Officer for Polaris Submarine as Commander, Submarine Force Pacific Staff.

Registrations

Registered Professional Engineer - Nuclear Engineering, California

Professional Affiliations

American Society of Mechanical Engineers
American Nuclear Society
American Management Association



LAWRENCE H. WIGHT
Vice President - Engineering Analysis

Education

M.S. Graduate Studies, Geophysics, University of Washington
Engineering Mechanics, Penn State University
B.S. Engineering Management, Boston University

Summary of Experience

Mr. Wight has over 15 years of engineering experience ranging from geotechnical engineering to civil engineering and engineering management. He has worked extensively in the areas of seismic hazard analysis, geophysical instrumentation, enhanced oil recovery, arctic geophysics, seismic monitoring, and earthquake engineering of structures. He has managed major seismic hazard projects and has been principal investigator for several projects addressing the earthquake response of structures. Mr. Wight has published articles on various geophysical and seismological topics. He also has taught civil engineering and geophysics at several universities.

1979 - Present Vice President - Engineering Analysis, TERA Corporation. Responsible for the coordination and management of the firm's efforts in the areas of geotechnical engineering, structure reliability, and system safety analysis.

1976 - 1979 Director, Geotechnical Engineering, TERA Corporation. Project Director on major projects assessing the seismic hazard at 35 different sites around the United States. Project Manager on projects evaluating the seismic safety at six plutonium facilities in the U.S. and several reactor sites. Serving on an Expert Panel representing seismology for the Battelle Pacific Northwest Laboratory. Participant in several critical facility siting studies.

1972 - 1976 Geotechnical Engineer, Lawrence Livermore Laboratory. Principal investigator for a soil-structure interaction research project and co-investigator for a seismic design basis project. Contributed to many other projects that evaluated seismic scram techniques and methods for seismic analysis of nuclear fuel reprocessing plants and nuclear reactor physical security. Also supervised all geological and seismological studies necessary for the preparation of Safety Analysis Reports for the Laboratory's critical facilities.

1969 - 1971 University Instructor. Instructor in the Civil Engineering Department of the Middle East Technical University in Turkey and helped develop its earthquake engineering laboratory. Taught math, physics, and geophysics at the Caribbean Meteorological Institute of the University of the West Indies.

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TERA CORPORATION

LAWRENCE H. WIGHT

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1967 - 1969 Mechanical Engineer, Lawrence Livermore Laboratory. Worked with a geophysics group studying theoretical and experimental problems in nuclear seismology. Responsible for siting, maintaining, and interpreting data from several seismic stations.

Mr. Wight is the author of numerous scientific publications; a complete list will be furnished upon request.

Professional Associations

Member, American Geophysical Union
Member, Seismological Society of America
Member, Earthquake Engineering Research Institute
Member, American Society for the Advancement of Science

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TERA CORPORATION

PETER S. ANDERSEN
Associate Mechanical Engineer

EDUCATION

Ph.D. Stanford University
M.S. Mechanical Engineering, Institute of Technology of Denmark

SUMMARY OF EXPERIENCE

Dr. Andersen has over fifteen years of experience in nuclear power specializing in the fields of heat transfer and fluid dynamics. He has worked extensively with computer codes and has produced numerous publications on computer modeling and dynamic analysis.

EXPERIENCE

Present Associate Mechanical Engineer, TERA Corporation.

1981 - Present Vice President, Dynatrek, Inc.

1978 - 1981 Independent Consultant, U.S. Nuclear Regulatory Commission. Responsibilities included planning the strategy for assessment of best estimate LWR (Light Water Reactor) Systems codes sponsored by the NRC. Required an intimate knowledge of the modeling in the codes, and of the available world-wide data base. Also coordinated U.S. contribution to the International Standard Problem Exercise and represented the Commission's interests in various international projects (Marviken and NORHAV).

1972 - 1978 Group Leader, Riso National Laboratory, Denmark. Responsibilities included work within the fields of heat transfer and fluid dynamics generally relating to safety problems with water cooled reactors. Projects included experimental and theoretical investigation of annular film flow and high quality CHF, development of a dynamic subchannel code, and theoretical investigation of basic models for two-phase flow. Other responsibilities included alternative energy systems, particularly wind energy systems. Wrote handbook on the design of large wind energy systems.

 Advisor, Institute of Technology of Denmark (DTH). Advised Ph.D. students and external examiner at the Laboratory for Fluid Mechanics at the Institute of Technology.

1966 - 1968 Engineer, Riso National Laboratory, Denmark. Participated in the design and experimental work regarding a Boiling Heavy Water Reactor project. Also developed a large computer code for analysis of transient heat conduction by means of the finite element method.



1963 - 1966

Engineer, Sud-Aviation (now Aerospatiale), France. Was engaged in theoretical and experimental aerodynamic work on the CONCORDE SST. The responsibilities included the simulation of the engines on supersonic models, automatic numerical analysis of wind tunnel results, and stability analyses.



ATTACHMENT 4

**CLARIFICATION OF INDIVIDUALS WHO INCLUDED MUTUAL
OR OTHER FUND LISTINGS AS ATTACHMENTS
TO THEIR AFFIDAVITS**



TERA CORPORATION

ATTACHMENT 4

CLARIFICATION OF INDIVIDUALS WHO INCLUDED MUTUAL OR OTHER FUND LISTINGS AS ATTACHMENTS TO THEIR AFFIDAVITS

<u>Individual</u>	<u>No Funds Listed</u>	<u>Included Attachment Listing Funds</u>	<u>Funds Listed on Affidavit</u>
John Beck		X	
Howard Levin			X
William Hall	X		
Donald Davis		X	
Robert Wilson	X		
Curt Staley		X	
Frank Dougherty		X	
Richard Snaider		X	
Lionel Bates	X		
Martin Jones	X		
Charles Lemon	X		
Mark Polit	X		
Robert Cudlin			X
Henry George	X		
Christian Mortgat	X		
Loren Stanley	X		
Richard Keller	X		
Mehmet Celebi	X		
Jorma Arros	X		
Kenneth Campbell	X		
Edward Schrull	X		
Stan Fabic	X		
Normand Berube	X		
Joseph Martore	X		
John Angelo		X	
Farzin Ramezanbeigi	X		

ATTACHMENT 4
(continued)

<u>Individual</u>	<u>No Funds Listed</u>	<u>Included Attachment Listing Funds</u>	<u>Funds Listed on Affidavit</u>
Susan Sly Burke	X		
James Long	X		
Richard MacDonald	X		
Christian Nelson	X		
Joseph Penzien	X		
Daniele Veneziano	X		
Michael Aycock	X		
George Trigilio	X		
Lenny Laakso	X		
Louis Fusco	X		
Stephen Schreurs	X		
Douglas Witt	X		
James Owens		X	
Luis Flores	X		
Monte Wise	X		
Stephen Briscoombe	X		
Sidney Brown	X		
Leonard Stout	X		
Frederick Berthrong	X		
Donald Tulodieski	X		
Albert Martore	X		
Robert Snyder	X		
Gary Smith		X	
Stanley Kaut	X		
Randy Cleland		X	
Edward Beck	X		
Robert Reneau		X	
Orin Kilgore	X		
William Pryor	X		

ATTACHMENT 4
(continued)

<u>Individual</u>	<u>No Funds Listed</u>	<u>Included Attachment Listing Funds</u>	<u>Funds Listed on Affidavit</u>
Frederick Pellerin	X		
Robert Felton	X		
Lawrence Wight	X		
Peter Andersen	X		

ATTACHMENT 5

**INDIVIDUAL AFFIDAVITS FOR PERSONNEL
PREVIOUSLY EMPLOYED BY THE
NUCLEAR REGULATORY COMMISSION**

MIDLAND IDCV PROGRAM



TERA CORPORATION

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF JOSEPH MARTORE

My name is JOSEPH MARTORE. I am employed by TERA Corporation.

I am currently assigned to the team which is conducting an independent design and construction verification (IDCV) at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

Prior to my employment with TERA Corporation, I was employed by the Nuclear Regulatory Commission (NRC). While a member of the NRC staff, I did not provide safety evaluations on aspects of Consumers Power Company's Construction Permit and Operating License Applications which are within the scope of the Midland IDCX Program.

Signed

Joseph Martore

Sworn and Subscribed Before Me This 31st Day of March 1983

John Lee Robb
Notary Public

My Commission Expires My Commission Expires July 1, 1985

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF PETER ANDERSEN

My name is Peter Andersen. I am employed by TERA Corporation.

I am currently assigned to the team which is conducting an independent design and construction verification (IDCV) at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

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Signed

Peter S. Andersen

Sworn and Subscribed Before Me This 31 Day of March 1983

Maria Rufino-LoSchiavo
Notary Public

My Commission Expires July 1, 1986

*served as a consultant to NRC

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF STANISLAV FABIC

My name is Stanislav Fabic. I am employed by TERA Corporation.

I am currently assigned to the team which is conducting an independent design and construction verification (IDCV) at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

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Signed

Stanislav Fabic

Sworn and Subscribed Before Me This 31 Day of March 1983

Maria Rufino - LaSchiavo
Notary Public

My Commission Expires July 1, 1986

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF STEPHEN F. SCHREURS

My name is STEPHEN F. SCHREURS. I am employed by TERA Corporation.

I am currently assigned to the team which is conducting an independent design and construction verification (IDCV) at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

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Signed

Stephen F. Schreurs

Sworn and Subscribed Before Me This 31ST Day of March 1983

André Lee Robt
Notary Public

My Commission Expires My Commission Expires July 1, 1986

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF HOWARD A. LEVIN

My name is HOWARD A. LEVIN. I am employed by TERA Corporation.

I am currently assigned to the team which is conducting an independent design and construction verification (IDCV) at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached.* I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

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A MORRILL WILCH CMA,
FACE FUND

Signed

Howard A. Levin

Sworn and Subscribed Before Me This 31ST Day of March 1983

André Le Robt
Notary Public

My Commission Expires July 1, 1985

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF Michael B. Aycock

My name is Michael B. Aycock. I am employed by TERA Corporation.

I am currently assigned to the team which is conducting an independent design and construction verification (IDCV) at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

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Signed

Michael B. Aycock

Sworn and Subscribed Before Me This 3rd Day of March 1983

John Lee Rott
Notary Public

My Commission Expires My Commission Expires July 1, 1986

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF Henry J. George

My name is Henry J. George. I am employed by TERA Corporation.

I am currently assigned to the team which is conducting an independent design and construction verification (IDCV) at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

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Signed

Henry J. George

Sworn and Subscribed Before Me This 31st Day of March 1983

Inde Lee Holt
Notary Public

My Commission Expires My Commission Expires July 1, 1986

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF CHRISTIAN C NELSON

My name is CHRISTIAN C NELSON. I am employed by TERA Corporation.

I am currently assigned to the team which is conducting an independent design and construction verification (IDCV) at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

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Signed

Christian C. Nelson

Sworn and Subscribed Before Me This 31st Day of March 1983

André H. Roth
Notary Public

My Commission Expires My Commission Expires July 1, 1986

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF JAMES A. LONG III

My name is James A. Long III. I am employed by TERA Corporation.

I am currently assigned to the team which is conducting an independent design and construction verification (IDCV) at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

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Signed

James A. Long III

Sworn and Subscribed Before Me This 31ST Day of March 1983

David Lee Cobb
Notary Public

My Commission Expires My Commission Expires July 1, 1986

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF ROBERT L. CUDLIN

My name is ROBERT L. CUDLIN. I am employed by TERA Corporation as Project Manager.

I am currently assigned to the team which is conducting an independent design and construction verification at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached.* I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox. **

Prior to my employment with TERA Corporation, I was employed by the NRC. While a member of the NRC staff, I did not provide safety evaluations on aspects of Consumer Power Company's Midland CP and OL applications which are within the scope of the Midland IDCX program.

Signed

Robert L. Cudlin

Sworn and Subscribed Before Me This 30 Day of March 1983

Mary E. O. Bolint
Notary Public

My Commission Expires 6/20/83



* First Jersey Securities

** Brother, Joseph Cudlin, is currently employed by B&W as Manager, Analysis Technology

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF Don K. Davis

My name is DON K. DAVIS. I am employed by TERA Corporation as Mgr. Engr. and Analysis.

I am currently assigned to the team which is conducting an independent design and construction verification at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

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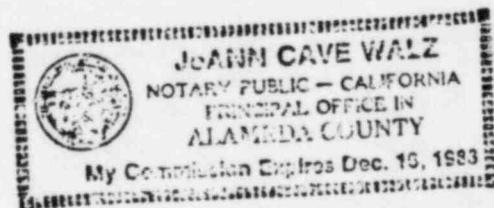
Signed

Don K Davis

Sworn and Subscribed Before Me This 30th Day of March 1983

Joann Cave Walz
Notary Public

My Commission Expires 12/16/83



Funds in which D.K. Davis has an interest

1. Franklin Tax-Free - California
2. Inter Capital Liquid Asset
3. TERA Deferred Compensation (Retirement)

STATEMENT OF INDEPENDENCE

AFFIDAVIT OF RICHARD P. SNAIDER

My name is RICHARD P. SNAIDER. I am employed by TERA Corporation.

I am currently assigned to the team which is conducting an independent design and construction verification (IDCV) at the Midland Nuclear Plant site. Prior to being given this assignment, I have never worked on any job or task associated with the Midland Project, or any job or task for or on behalf of Consumers Power Company, Bechtel, or the Babcock and Wilcox Company relating to issues that I am reviewing. I have never been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox Company. I do not own any shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock. Mutual fund or other funds in which I may have a beneficial interest, but over which I have no control, may own shares of Consumers Power Company, Bechtel, or Babcock and Wilcox stock, of which I am unaware. A list of such funds in which I have an interest are attached. I have no relatives which are or have been employed by Consumers Power Company, Bechtel, or Babcock and Wilcox.

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Signed

Richard P. Snider

Sworn and Subscribed Before Me This 3rd Day of March 1983

John G. Rott
Notary Public

My Commission Expires My Commission Expires July 1, 1985

SNIDER

MUTUAL FUNDS

ENERGY (NEUBERGER-BERMAN)

PACE (AMERICAN GENERAL)

MERRILL-LYNCH HIGH INCOME BOND FUND