

**Northeast
Utilities System**

Millstone Offices • Rope Ferry Rd., Waterford, CT

P.O. Box 128
Waterford, CT 06385-0128
(860) 447-1791

FEB 21 1997

Docket Nos. 50-245
50-423

B16273

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Millstone Nuclear Power Station, Unit Nos. 1 and 3
Independent Corrective Action Verification Program (ICAVP)
Response to Questions Regarding the Contractor Selection Process

In our letters dated December 18, 1996 and January 15, 1997, Northeast Nuclear Energy Company (NNECO) proposed Sargent & Lundy (S&L) as the contractor for the Independent Corrective Action Verification Program (ICAVP) for Millstone Units 1 and 3. During our meeting on February 5, 1997, NNECO discussed with the NRC the ICAVP contractor selection process. Enclosed with this letter is our response to questions raised during that meeting which required further clarification.

The original proposal developed by S&L for the ICAVP was based on the requirements of the NRC's August 14, 1996 Order. On January 30, 1997, the NRC issued their Oversight Inspection Plan for the ICAVP. This plan provides greater detail on NRC expectations for the ICAVP. The plan increases the scope of the ICAVP to include a review of the critical parameters for the systems used to mitigate accidents described in Chapter 15 of the FSAR. As a result, S&L has revised the organization structure of the Verification Team. The organization chart included with this letter reflects revisions made to address the increased scope of the ICAVP. Specifically, the Physical Configuration Review Group is now included as part of the System Review Group, and an Accident Analysis Review Group is now planned. However, S&L has not yet finalized the staffing necessary to perform the reviews required by the increased scope. Once finalized, NNECO will forward information regarding the fully staffed ICAVP project team to the NRC.

Commitments

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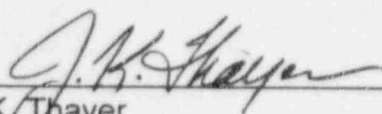
Attachment 1 contains a list of NNECO's commitments made in this letter.

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P PDR

If you have any questions, please contact me.

Very truly yours

NORTHEAST NUCLEAR ENERGY COMPANY



J. K. Thayer
Recovery Officer
Engineering and Support Services

Attachments (6)

cc: H. J. Miller, Region I Administrator
W. D. Travers, Director, Special Projects Office
E. V. Imbro, Deputy Director, ICAVP Oversight, Special Projects Office
P. F. McKee, Deputy Director of Licensing, Special Projects Office
W. D. Lanning, Deputy Director of Inspections, Special Projects Office
S. Dembek, NRC Project Manager, Millstone Unit No. 1
J. W. Andersen, NRC Project Manager, Millstone Unit No. 3
T. A. Easlick, Senior Resident Inspector, Millstone Unit No. 1
A. C. Cerne, Senior Resident Inspector, Millstone Unit No. 3

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Attachment 1

Millstone Nuclear Power Station, Unit Nos. 1 and 3

NNECO's Commitments

February 1997

List of Regulatory Commitments

The following table identifies those actions committed to by NNECO in this document. Any other actions discussed in the submittal represent intended or planned actions by NNECO. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the Director - Nuclear Licensing at the Millstone Nuclear Power Station of any questions regarding this document or any associated regulatory commitments.

Commitment		Committed Date or Outage
B16273-1	Submit resumes and final ICAVP Team Organization to NRC.	March 21, 1997

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Attachment 2

Millstone Nuclear Power Station, Unit Nos. 1 and 3

Response to Questions Regarding the Selection of the ICAVP Contractor

February 1997

**NNECO's Response to Questions Regarding the Selection of the ICAVP
Contractor for Millstone Units 1 and 3**

1. The Financial Independence of Sargent & Lundy (S&L)

To address the questions raised regarding Sargent & Lundy's financial Independence from Northeast Utilities, the co-owners of Millstone Unit 3, and the NSSS suppliers for Millstone Unit's 1 and 2, a Certification of Ownership Interests has been prepared by S&L. Attachment 3 contains a copy of this certification.

2. Previous Work Performed by S&L.

As mentioned at the public meeting, review of work in which S&L had prior involvement will be handled on a case by case basis. The NRC ICAVP Oversight Team will be notified of the circumstances of the involvement and how they will be handled prior to proceeding with the work.

In addition, the NRC requested specific details concerning an effort performed by Sargent & Lundy on Life Cycle Management. On January 23, 1996, Sargent & Lundy issued a report documenting cost saving opportunities through Life Cycle Management for the Haddam Neck Plant and Millstone Unit Nos. 1, 2, and 3. The emphasis of the study was the identification of opportunities that could be quickly implemented and would produce a favorable return on investment through direct cost reduction or increased revenue in a short period of time. The study also identified several longer term activities that could yield a similar result, but take longer to implement and longer to realize the results.

The method used in the study involved:

- examination of Northeast Utilities using industry data (e.g. capacity factor, O&M costs, O&M cost/kWh), NPRDS, and interviews of Northeast Utilities personnel;
- utilization of S&L experience by surveying their personnel, especially Project Managers, and by using the S&L EQ data base and comparing it to Northeast Utility's EQ records; and
- performance of a literature search of EPRI, INPO, NRC, NEI, Owner's Group, and other published industry data.

The study concluded that because of Northeast Utility's middle level performance they should focus on achieving breakthrough through strengthening their business approach to the existing program and activities. The specific short term recommendations were to:

- prioritize the specific cost saving opportunities, especially the extension of qualified life or surveillance intervals based on industry data;
- further development of the Life Cycle Management program through a pilot program intended to develop and test practical interfaces and work methods;
- expand the site interview process to aggressively elicit improvement opportunities from site personnel; and
- maintain and update the Life Cycle Management cost-saving database.

Additionally, the following longer term recommendations were made:

- utilize the lessons learned from the pilot programs to develop and implement a company wide Life Cycle Management program;
- continue to participate in, and monitor, industry activities related to license renewal and components; and
- continue to bring an economic factor into the decision making process.

In conclusion, the study focused mostly on the overall approach to Life Cycle Management. The component-specific recommendations were based on a comparison of NU's practices with industry practices. The effort did not directly impact issues related to the completeness or the correctness of the design and licensing bases.

3. Restrictions on S&L from Performing Future Work for NU

Sargent & Lundy will be contractually restricted from performing or seeking new work at any NU facility for the duration of the ICAVP project. Additionally, S&L will not seek work on Millstone Unit Nos. 1 and 3 for twelve months following completion of the ICAVP project for Millstone Unit Nos. 1 and 3. Should an individual team member leave the ICAVP project prior to the end of the project, they will still be subject to these conditions until twelve months after the ICAVP project ends.

4. The Process for Adding or Substituting ICAVP Team Members

The process for adding or substituting ICAVP personnel will be controlled by a Project Instruction that is part of the Project Manual that will be submitted for NRC approval, if S&L is approved as the ICAVP contractor. We plan to promptly notify NRC of the need to add or substitute personnel. In the event the addition or substitution is not approved, then the work performed by that individual will not be used.

5. Sargent & Lundy's Differing Professional Opinion (DPO) Process

Sargent & Lundy's DPO process includes the step to notify the NRC of the initiation of a DPO and its resolution. The S&L Project Instruction covering the DPO process will be included in the Project Manual that will be submitted for NRC approval, if S&L is approved as the ICAVP contractor. S&L has stated that they will accommodate any requirements the NRC may have in this area.

6. Quality Assurance (QA) Program Requirements

Sargent & Lundy will perform the ICAVP under their own QA Program. Based on an audit of the S&L QA Program, as performed by NUPIC, it was determined that their program meets the requirements of 10 CFR 50 Appendix B, and NU approved S&L to perform engineering and design services under Revision 11 of the S&L QA Program Topical Report. Therefore, S&L will use their own QA procedures to perform the ICAVP work. The work will be audited by the S&L QA organization.

7. Sargent & Lundy ICAVP Organization

NNECO was asked to tie the resumes that were previously submitted with S&L's proposal to the disciplines in which these individuals would conduct work activities. Sargent & Lundy's proposed ICAVP project organization chart is contained in Attachment 4. Also included as Attachment 5 is a matrix showing the areas in which the team members are experienced. Consistent with our earlier submittals, the names of the individuals fulfilling each role within the ICAVP project organization have been removed to assure objective review and assessment of their qualifications. Each identified position instead references a numbered resume. These resumes, previously submitted without numbers, are included in Attachment 5.

Sargent & Lundy's original proposal for the ICAVP was based on the requirements of the NRC's August 14, 1996 Order. On January 30, 1997, the NRC issued their Oversight Inspection Plan for the ICAVP. This plan provides greater detail on NRC expectations for the ICAVP. It increases the scope of the ICAVP to include a review of the critical parameters for the systems used to mitigate accidents described in Chapter 15 of the FSAR. As a result, S&L has revised the organization structure of the Verification Team. The chart shown in Attachment 4 reflects revisions made to address the increased scope of the ICAVP. Specifically, the Physical Configuration Review Group is now included as part of the System Review Group, and an Accident Analysis Review Group is now

planned. However, S&L has not yet finalized the staffing necessary to perform the reviews required by the increased scope. Once finalized, NNECO will forward information regarding the fully staffed ICAVP project team to the NRC.

8. Sargent & Lundy Staffing and Experience Level.

The NRC stated that the proposed team appeared not to have enough I&C expertise. Depending on which systems are chosen for review, that may prove to be the case. It may also be necessary to add additional I&C Engineers based on the greater ICAVP scope. In either case, S&L has additional I&C resources to draw upon and will add them to the project team if necessary as discussed in item 4.

The NRC also stated that the ICAVP team was staffed with too many high level management personnel and not enough personnel currently performing engineering work. Despite the level of personnel on the team, virtually every member of the Verification Team, including three of the four group leads, are currently involved in engineering activities, not managerial activities. In addition, the average experience for the ICAVP project team members is 21.5 years. Based on Sargent & Lundy's experience with this type of project, a much greater experience level is required than for the average engineering assignment.

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Attachment 3

Millstone Nuclear Power Station, Unit Nos. 1 and 3

Sargent & Lundy Certification of Ownership Interests

February 1997

Sargent & Lundy LLC

CERTIFICATION OF OWNERSHIP INTERESTS

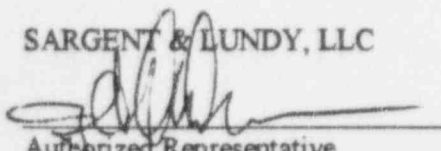
Sargent & Lundy, LLC certifies that:

As of the date entered below, Sargent & Lundy, LLC as an entity, and its subsidiaries do not hold, directly or indirectly, any stock or other ownership interests in the following entities:

Northeast Utilities
Central Maine Power
Central Vermont PS
City of Chicopee
CMEEC
MMWEC
Montaup Electric (EUA)
New England Power
United Illuminating
Fitchburg Gas & Electric (UNITIL)
Vermont Electric G & T
Village of Lyndonville
Stone & Webster
Westinghouse Electric Corp.
General Electric
Raytheon

Sargent & Lundy's Retirement Plan may hold stock or other ownership interests in the above entities either directly or indirectly through a Trust Fund. However, Sargent & Lundy does not participate directly in the selection of individual securities in which the Trust Fund invests. Such decisions are made by the Trust Fund's independent managers. Sargent & Lundy's Savings Investment Plan (including 401k) may hold stock or other ownership interests in the above entities indirectly through investments that participating individuals may make in mutual funds or similar instruments.

SARGENT & LUNDY, LLC


Authorized Representative
Vice President, Director of
Finance and Administration

Title

February 11, 1997

Date

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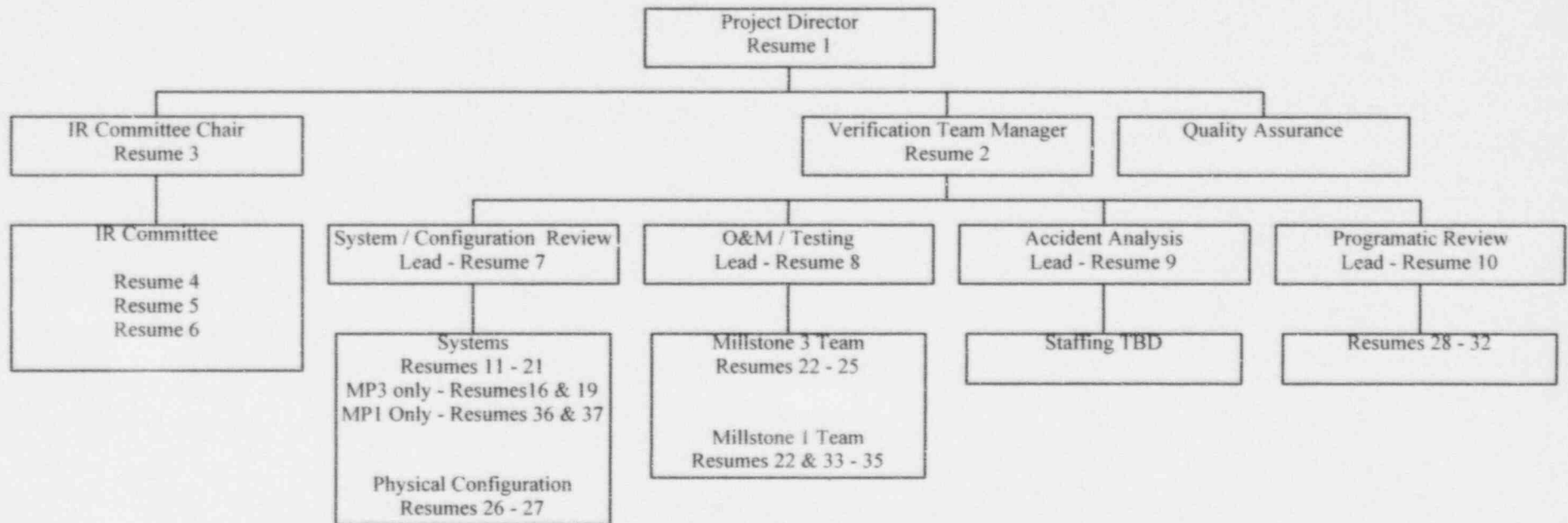
Attachment 4

Millstone Nuclear Power Station, Unit Nos. 1 and 3

ICAVP Project Team Organization

February 1997

ICAVP Project Team Organization - Millstone Units 1 and 3



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Attachment 5

Millstone Nuclear Power Station, Unit Nos. 1 and 3

ICAVP Project Team Experience Matrix

February 1997

ICAVP Project Team Experience

	Design	Modifications	Independent Review	Discipline
Project Team Management				
Resume 1	X	X	X	
Resume 2	X	X	X	
Resume 3	X	X	X	
IR Committee				
Resume 4	X	X	X	
Resume 5	X	X		
Resume 6	X	X	X	
Review Leads				
Resume 7	X	X	X	Mechanical
Resume 8		X	X	O&M
Resume 9	X	X	X	Mechanical
Resume 10	X	X	X	Civil/Structural
Support Personnel				
System Review				
Resume 11	X	X	X	Mechanical
Resume 12	X	X		Mechanical
Resume 13	X	X	X	Electrical
Resume 14		X	X	Electrical
Resume 15	X	X		I&C
Resume 16 (MP3 only)	X	X		I&C
Resume 17	X	X	X	Other - Piping Analysis
Resume 18	X	X	X	Mechanical
Resume 19 (MP3 only)	X	X	X	Civil/Structural
Resume 20	X	X	X	Other - HVAC Design
Resume 21	X	X	X	Other - HP/Radiological
Resume 36 (MP1 only)	X	X		Civil/Structural
Resume 37 (MP1 only)	X	X		I&C

ICAVP Project Team Experience (Continued)

	Design	Modifications	Independent Review	Discipline
O&M and Testing Review, Millstone Unit 3				
Resume 22 ⁽¹⁾	X	X	X	O&M
Resume 23	X	X	X	O&M
Resume 24		X	X	O&M
Resume 25		X	X	O&M
O&M and Testing Review, Millstone Unit 1				
Resume 22 ⁽¹⁾	X	X	X	O&M
Resume 33		X	X	O&M
Resume 34		X	X	O&M
Resume 35		X	X	O&M
Physical Configuration Review				
Resume 26	X	X	X	Mechanical
Resume 27		X	X	Electrical
Programmatic Review				
Resume 28	X	X	X	Other - ISI/IST
Resume 29	X	X	X	Electrical
Resume 30		X	X	Mechanical
Resume 31		X	X	PRA
Resume 32		X	X	Electrical

Note (1): Resume 22 will be used for both the Millstone Unit No. 1 and Millstone Unit No. 3 O&M and Testing Review.

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Attachment 6

Millstone Nuclear Power Station, Unit Nos. 1 and 3

ICAVP Project Team Resumes

February 1997

RESUME 1



██████████
Senior Vice President & Project Director

EDUCATION

Purdue University - M.S. Civil Engineering - 1970
Purdue University - B.S. Civil Engineering - 1969

REGISTRATIONS

Professional Engineer - Indiana, Kentucky,
Michigan, Minnesota, Nebraska, New Jersey,
New York, Ohio, Pennsylvania, Tennessee,
Texas, Virginia, Wisconsin
Structural Engineer - Illinois
Admitted to Ownership - 1986
Appointed Associate - 1979

PROFICIENCIES

Engineering management
Project management
Nuclear Power Plant Design and Engineering
Fossil Power Plant Design and Engineering
Nuclear Licensing and Code Requirements
International Business
Civil/structural design and analysis
Design and analysis of nuclear containments
Seismic analysis

RESPONSIBILITIES

██████████ is responsible for the implementation and technical integrity of all work for clients and projects under his direction. He directs a project team staffed by a project manager, project engineers, and other technical personnel. He works with the client and project team on technical, licensing, management, planning and scheduling requirements for the projects. Jointly with the client and project team, he works to set design parameters and operating philosophies which have significant engineering and economic implications. ██████████ regularly reports to the client's management regarding project status.

EXPERIENCE

██████████ has been an owner of Sargent & Lundy and Senior Vice President for more than ten years and held several key management positions. He has been Project Director on many nuclear service projects.

For many years ██████████ was Manager of the Plant Design & Engineering Department. He was responsible for managing the engineering and design of the physical aspects of all S&L nuclear and fossil power plants. This encompassed architectural and civil/structural engineering, mechanical and electrical equipment, and piping analysis and design. He oversaw the administration of personnel and technical policies for the Divisions in the Plant Design and Engineering Department.

For more than nine years, he was responsible for all of Sargent & Lundy's structural design work. During this time, numerous fossil and nuclear plant designs have been completed. As Structural Design Director, ██████████ had extensive experience in managing the design and engineering of nuclear- and fossil-fueled generating stations. Before this, ██████████ had been responsible for the design and analysis of all containment vessels and the seismic analysis of Sargent & Lundy nuclear power plant projects.

██████████ has also been a leader in the development of several national standards for nuclear plants. Through his work with professional committees, ██████████ has been involved in the development of criteria for the design for extreme conditions for nuclear power plants.

██████████ joined Sargent & Lundy in 1970. He has had specific experience and has provided management guidance for the following projects:

RESUME 1



Senior Vice President & Project Director

NUCLEAR

- Commonwealth Edison Company
 - Braidwood 1 and 2, 1175 MW each.
 - Byron 1 and 2, 1175 MW each;
 - LaSalle 1 and 2, 1122 MW each.
 - Zion 1 and 2, 1085 MW each.
 - Dresden, 2 and 3
 - Quad Cities, 1 and 2
- Tennessee Valley Authority
 - Watts Bar, 1177 MW.
- Illinois Power
 - Clinton 1, 985 MW.
- The Detroit Edison Company
 - Fermi 2, 1203 MW.
- Korea Power Electric Corporation
 - YGN 3&4
 - UCN 3&4
 - YGN 5&6
- Carolina Power & Light Company
 - Brunswick 1 and 2, 815 MW each.
- Indiana & Michigan Electric Company
 - D. C. Cook 1 and 2, 1126 MW total.

FOSSIL

- Central Louisiana Electric Company, Inc. - Dolet Hills
- Northern Indiana Public Service Company - Schahfer 17 and 18
- PSI Energy - Gibson 5
- Southwestern Electric Power Company - Pirkey
- Wisconsin Electric - Edgewater 5

MEMBERSHIPS

American Nuclear Society
American Society of Mechanical Engineers
American Society of Civil Engineers
American Concrete Institute (ACI)
American Institute of Steel Construction
Seismological Society of America
Earthquake Engineering Research Institute
Post-Tensioning Institute

Structural Engineers Association of Illinois
Structural Stability Research Council

COMMITTEES

ASME Board of Nuclear Codes and Standards

American Society of Mechanical Engineers
Section III Subcommittee on Nuclear Power
Chairman, ACI/ASME Joint Technical Committee
on Concrete Pressure Vessels for Nuclear
Application

ACI/ASME Subgroup on Materials, Construction,
and Examination

Member, Peer Review Panel for Sandia
Laboratories Scale Model Test of Prestressed
Concrete Containment

Member, NRC/Sandia Advisory Panel on
Containment Performance

Chairman, American Power Conference Program
Committee - Civil Engineering Division
Past President, Structural Engineers Association
of Illinois

American Society of Civil Engineers Session
Program Committee, Energy Division

PUBLICATIONS

"From 'Compliance-Based' To 'Performance-Based' Quality - A Trend In And Evolution Of U.S. Quality Standards"
(coauthor), Tenth KAIF/KNS Annual Conference, Seoul, Korea, April 1995

"Seismic Soil-Structure Interaction Analysis of a 600-MW Nuclear Power Plant Complex"
(coauthor), Fifth U.S. National Conference on Earthquake Engineering, Chicago, Illinois, July 1994

"Severe Accident Containment Design"
(coauthor), Fifth Workshop on Containment Integrity, Washington, D.C., May 1992

RESUME 2

Sargent & Lundy

Power Services Group
Vice President and Project Director

EDUCATION

Georgia Institute of Technology - M.S. Nuclear Engineering - 1972

University of Illinois - B.S. Physics - 1971

REGISTRATION

Professional Engineer - Illinois
Appointed Vice President - 1994

PROFICIENCIES

Project management
Nuclear design and engineering

RESPONSIBILITIES

establishes project teams and provides them with the resources and tools to accomplish given assignments. He assists the project teams in planning the work and developing procedural systems and processes for implementing the assignments in accordance with clients requirements and expectations. meets with the clients to fully understand their goals and priorities and to ensure they are reflected in the project work.

EXPERIENCE

has extensive experience in the design, engineering, and analysis of nuclear-fueled electric generating stations.

has 22 years of experience with Sargent & Lundy, including six years on site at a major nuclear project as Sargent & Lundy's Field Project Manager during the completion of construction and startup of the unit.

Currently, is serving as Project Director for various projects at Niagara Mohawk Power Corporation's Nine Mile Point - Units 1

and 2 nuclear station, Houston Lighting Power Company's South Texas Project, and Illinois Power Company's Clinton Power Station.

Prior to being appointed Project Director, was the project manager for Sargent & Lundy's work for these clients. He lead the project engineering staff in the preparation of management documents, such as the project procedures manual; the scopes of work; the engineering and construction schedules; and the cost estimates. was responsible for the overall management of Sargent & Lundy's work on these projects, ensuring that the work progressed satisfactorily in accordance with the project schedules and budgets, and reporting this information to the client.

spent 15 years of his career at Sargent & Lundy assigned to the design, licensing, construction, and startup of Clinton Power Station. His initial responsibilities included mechanical system design, procurement specification preparation, and proposal evaluation for systems and equipment associated with the main turbine cycle. Mr. Schopfer completed this assignment by spending the last 6 years as Sargent & Lundy's Field Project Manager on site. His responsibilities included managing the completion of the remaining design, resolving construction changes and nonconformances, and supporting the startup program. At its peak, managed over 400 Sargent & Lundy personnel to accomplish this work.

Prior to assuming these responsibilities, was an engineering analyst who did major equipment sizing, heat balance calculations, pressure drop calculations, and pipe sizing for power plants. He joined Sargent & Lundy in 1972.

RESUME 2

Sargent & Lundy

Power Services Group
Vice President and Project Director

His experience includes:

NUCLEAR SERVICES

- **Houston Lighting & Power Company**
 - South Texas Project 1 and 2, 1312 MW each.
Project Manager for various projects under general services agreement, including modification packages, conceptual studies, engineering backlog reduction program. (1991 to 1994)
- **Niagara Mohawk Power Corporation**
 - Nine Mile Point 2, 1150 MW.
Project Manager for various projects including implementation of a 5% power uprate of the unit and a turbine performance testing program. (1990 to 1994)
 - Nine Mile Point 1, 642 MW.
Project manager for engineering services and outage support work. Scope includes an instrument setpoint verification program, electrical system studies and analyses, and structural and mechanical analyses in support of the inservice inspection program. (1988 to 1994)
- **Nebraska Public Power District**
 - Cooper, 835 MW.
Project manager for modification work, including reactor recirculation pump upgrade and motor refurbishment; piping analysis and replacement projects; and heating, ventilating, and air conditioning modifications in various areas to reduce temperatures for personnel accessibility and to meet equipment environmental qualification requirements. (1988 to 1992)
- **Illinois Power**
 - Clinton 1, 990 MW.

Project manager for modification work during initial years of commercial operation. Primary interface with client and responsibility for development of, and adherence to, schedules and budgets for individual modification tasks and special programs. Developed and implemented design change package process and design basis maintenance program to complement the client's configuration management program. (1987 to 1992)

- **The Detroit Edison Company**
 - Fermi 2, 1203 MW.
Project manager for a safety parameter display system software validation testing program, including development of a test specification and test procedures, execution of the tests on the computer system, and evaluation of the test results. (1988)

NUCLEAR DESIGN


- **Illinois Power**
 - Clinton 1, 990 MW.
Assigned to project from initiation to commercial operation in positions ranging from mechanical engineer to project manager, including several years onsite as the field project manager, supervising an onsite staff of over 400 personnel. Responsible for day-to-day interface with client's management, engineering, and construction personnel and for coordinating field activities for successful completion of programs such as nonconformance disposition, over inspection, 79-14 walkdowns, and preoperational and startup test support. (1973 to 1987)

MEMBERSHIP

American Nuclear Society

RESUME 2

Sargent & Lundy


Power Services Group
Vice President and Project Director

PUBLICATION

"Approach to Configuration Management"
(coauthor), Sargent & Lundy General
Engineering Conference, Chicago, Illinois, 1988

RESUME 3

Power Services Business Group
Vice President and Project Director

EDUCATION

University of Illinois - Ph.D. Structural Engineering - 1972

University of Illinois - M.S. Structural Engineering - 1970

Indian Institute of Technology - B.S. Civil Engineering - 1965

REGISTRATION

Professional Engineer - Illinois
Structural Engineer - Illinois

PROFICIENCIES

Information Technology
Business process re-engineering
Vibrations and Seismic Analysis
Power plant engineering and design

RESPONSIBILITIES

provides high level business process and information technology consulting, evaluates new technology and products for applications to existing or reengineered processes, manages software development projects and projects which implement new technology.

EXPERIENCE

has more than 25 years of experience in Information Technology, business process reengineering, management, and power plant engineering and design. Selected highlights of his experience are as follows:

- **Project Director, Power Services Business Group (1995 to present)**

- **Director, Information Technology Services (1994 to 1995)**

managed the Information Technology Business Group. He was responsible for the business group's business plans, strategic plan, resource planning, and product and services development for future growth. resource planning, and product and services development for future growth.

- **Mechanical Design Director (1993 to 1994)**

- Managed the Component and Materials Engineering Division, the Engineering Mechanics Division, and the Mechanical Design Division in the Mechanical Department.

- Planned and implemented design process re-engineering, design process automation, technical design standards, and training.

- Lead the PLADES2000 development project team

- **Computer Systems Director (1990 to 1992)**

- Supervised and administered the planning, budgeting, developing, and operating of all computer hardware and software systems used by Sargent & Lundy.

- Developed and implemented the strategic plan to migrate from a centralized computer mainframe system to a distributed computing system consisting of personal computers (PC), workstations, PC servers, and super servers.

- Lead the PLADES2000 project team

RESUME 3

Power Services Business Group
Vice President and Project Director

- **Structural Design Director (1986 to 1991)**

- Managed the Structural Engineering Division, Structural Drafting Division, and Architectural Design Division in the Structural Department.
- Planned and implemented design process re-engineering, design process automation software, training, special studies, and technical design standards.
- Independent design reviews of Nuclear power plant designs

- **Structural Analytical Division (1972 to 1986)**

- Worked on the development of computer software for static and dynamic analysis of structures and piping, software for design and drafting of piping, heating, ventilating, and air conditioning (HVAC) systems, and cable tray supports, and software for nonlinear finite element analysis.
- Applied new concepts in earthquake and vibration-related engineering to power plant structures and foundations.
- Served as an expert on seismic design basis, boiling water reactor (BWR) pool dynamic response, and statistical sampling for construction-related reinspection programs at U.S. Nuclear Regulatory Commission and Atomic Safety Licensing Board hearings.
- Planned and collected data for investigation of BWR safety-relief valve and loss-of-coolant-accident load responses.

- Collected data and analyzed numerous machine foundation vibration-related problems.

MEMBERSHIP

American Society of Civil Engineers

- Committee on Nuclear Standards - Seismic Analysis of Safety Class Structures Committee

PUBLICATIONS

is the author or coauthor of 25 technical papers on many aspects of plant engineering and design and information technology. Listed below are those published after 1983.

'Application of Information Technology to Plant Maintenance and Operations' (coauthor), Sargent and Lundy General Engineering Conference, Chicago, May 1995

"Computer Systems for the Nineties," Sargent & Lundy General Engineering Conference, Chicago, Illinois, March 1993

"Practical Applications of Computer-Aided Design" (coauthor), Sargent & Lundy General Engineering Conference, Chicago, Illinois, Spring 1989

"Personal Computers in Engineering Practice," Sargent & Lundy General Engineering Conference, Chicago, Illinois, March 1988

"Is Artificial Intelligence Real?" (coauthor), Sargent & Lundy General Engineering Conference, Chicago, Illinois, March 1987

RESUME 4



██████████ Mechanical Department Manager

EDUCATION

Old Dominion University - M.S. Mechanical Engineering 1974

University of Illinois - B.S. Mechanical Engineering - 1971

REGISTRATION

Professional Engineer - Illinois

PROFICIENCIES

Project management
Design and engineering of mechanical systems for nuclear units
Nuclear shielding and safeguards
Licensing of nuclear units

RESPONSIBILITIES

██████████ is responsible for management of the Mechanical Engineering Department of Sargent & Lundy. This includes the Mechanical Project Management Division, Power Systems Engineering Division, Air and Water Quality Division, Nuclear Technology and Regulation Division, and Component and Materials Engineering Division. In this position, Mr. Green provides technical leadership, obtains and develops technical personnel, and supports project tasks.

EXPERIENCE

██████████ has more than 24 years of experience, 20 of which have been with Sargent & Lundy, in the mechanical design, engineering, and licensing of both pressurized water reactor (PWR) and boiling water reactor

(BWR) nuclear units. He was project manager for the development of a technical procurement specification for replacement steam generators. This specification is in use by a group which has included approximately 12 utilities considering steam generator replacement. He was a member of the evaluation and negotiation team that reviewed the replacement steam generator bids leading to award of contracts for four utilities.

He served as project manager for the first task of a first-of-a-kind engineering (FOAKE) program, assessing the scope of work for FOAKE for advanced light water reactors (ALWR).

██████████ supervised and coordinated the mechanical and nuclear design work for the Yonggwang units, which represent the state-of-the-art in design and incorporate many of EPRI's ALWR requirements. He has also served as the project manager for a 1,175 MW nuclear station design project.

Before assuming these responsibilities, ██████████ was a group leader in Sargent & Lundy's Nuclear Safeguards and Licensing Division. In this position, he served as the Sargent & Lundy representative on the General Electric Mark II Owners Group Technical Steering Committee and supervised and coordinated the work of Sargent & Lundy representatives on a number of technical sub-committees.

His experience includes:

NUCLEAR DESIGN

- Advanced Reactor Corporation

RESUME 4



Mechanical Department Manager

- Project Manager. Assessment of scope of work for FOAKE of ALWRs (first task of FOAKE program). (1991 to 1992)
- **Steam Generator Replacement Group**
 - Project Manager. Development of a master technical procurement specification for steam generator replacement for use by member utilities. Evaluation of proposals and negotiation of contract terms and conditions. (1991 to 1993)
- **Korea Electric Power Corporation**
 - Yonggwang 3 and 4, nuclear, 1000 MW each.
Project Engineer. Mechanical and nuclear design. (1987 to 1991)
- **Commonwealth Edison Company**
 - Project Manager for organization and transfer of design basis documentation to 12 nuclear units. (1995)
 - Dresden 2 and 3. Expert panel member to oversee responses to NRC ISI questions. (1996)
 - Quad Cities 1 and 2. Site engineering management support. (1994 to 1995)
 - LaSalle 1 and 2. Site engineering management support. (1993 to 1994)
 - Byron 1 and 2/Braidwood 1 and 2, nuclear, 1175 MW each.
Project Manager. (1986 to 1987)
Mechanical Project Engineer. (1981 to 1986)
- LaSalle 1 and 2, nuclear, 1132 MW each.
Safeguards Group Leader. (1978 to 1981)
- **The Cincinnati Gas & Electric Company**
 - Zimmer 1, nuclear, 839 MW (cancelled).
Safeguards Group Leader. (1978 to 1981)
- **Northern Indiana Public Service Company**
 - Bailly N-1, nuclear, 684 MW (cancelled).
Safeguards Group Leader. (1978 to 1981)
- **Numerous nuclear stations**
 - Various projects.
Safeguards Analyst. (1976 to 1978)

MEMBERSHIPS

American Nuclear Society
American Society of Mechanical Engineers

PUBLICATIONS

"Recent Procurement Experience in Support of Future Nuclear Plant Design" (coauthor), presented at the International Joint Power Generation Conference and Exposition, Atlanta, Georgia, October 1992

"Inherent Safety Features in Balance-of-Plant Layout" (coauthor), presented at the Eighth Pacific Basin Nuclear Conference, Taipei, Taiwan, April 1992

"Yonggwang and Ulchin: A Fully-Developed Detailed Design, Procurement, and Construction Model for U.S. Application" (coauthor), presented at the American Power Conference, Chicago, Illinois, April 1992

RESUME 4

Borgers & Lundy

Mechanical Department Manager

"Nuclear Plant Design in a Stabilized Environment," presented at the International Joint Power Generation Conference, San Diego, California, October 1991

"Yonggwang Nuclear Power Plant Units 3 & 4 - Bridging the Gap to the Next Generation" (coauthor), presented at the American Power Conference, April and May 1991

BELLEFONTE COMPLETION PROJECT (11/91)

[REDACTED] 15 years of experience with S&L have been in the successful mechanical design, engineering, and licensing of eight nuclear units, which is one of the reasons why he was selected for this project. He has served as the project manager for the Byron Station and as project engineer or supervisor on several other major nuclear design projects. As the lead mechanical project engineer for the design and construction of KEPCO's Yonggwang 3 and 4, [REDACTED] supervised and coordinated the mechanical and nuclear design, nuclear safety analysis, and licensing work for both 1,000 MW, PWR units. He is registered as a professional engineer in Illinois.

Nuclear Design - ALWR (04/92)

[REDACTED] holds bachelor's and master's degrees in mechanical engineering and is a registered professional engineer. He has more than twenty years of experience in the mechanical design, engineering, and licensing of nuclear units. Currently he is coordinating S&L's work on

ALWRs. He also is responsible for the Chicago-based coordination of S&L's design work on KEPCO's Yonggwang units, for which recent experience and industry guidelines (such as EPRI's ALWR requirements) were applied. He is the coauthor of a paper entitled "Yonggwang and Ulchin: A Fully Developed Detailed Design, Procurement, and Construction Model for U.S. Application" that was presented at S&L's General Engineering Conference on March 5 and 6, 1992, in Chicago.


[REDACTED] has served as a project manager, mechanical project engineer, and safeguards systems analyst and group leader for the design of 10 new nuclear units. His responsibilities for these projects have included:

- Design and engineering of mechanical systems
- Shielding and safeguards
- Licensing

Currently, [REDACTED] is project manager responsible for development of a master technical procurement specification for

RESUME 5

 Sargent & Lundy


Senior Vice President and Project Director

EDUCATION

Marquette University - B.E.E. - 1959



REGISTRATIONS

Professional Engineer - Alabama, Arizona, Illinois,
Indiana, Massachusetts, Michigan,
Minnesota, Nebraska, Wisconsin


PROFICIENCIES



Project management
Power plant design
Design control
Plant improvement services
Electrical engineering and design
Controls engineering and design
Transmission and distribution systems
Standards and procedures



RESPONSIBILITIES

As an owner of Sargent & Lundy,  is responsible both to the client and to the Sargent & Lundy ownership for the satisfactory implementation of all work for projects under his direction. He directs project teams staffed with project managers, project engineers, and other technical personnel. He consults with the client and project team in planning and scheduling the project and in developing appropriate cost control systems. He works jointly with the client and the project team to set project objectives, design parameters, and operating philosophies that have significant engineering and economic implications.  regularly interfaces with client management regarding Sargent & Lundy performance and the status of engineering and construction progress.

EXPERIENCE


 has served as a project director on power plant improvement projects since 1988. His power plant experience as Project Director includes control system retrofits at six fossil generating units, an extensive number of upgrades at three nuclear generating units and numerous transmission and substation designs and retrofits. His work has involved complex engineering challenges covering a wide range of conditions, including physical layout and arrangement, development of design criteria, design of piping instrumentation and control systems, equipment specification and procurement, and the production of construction drawings.


Prior to and concurrent with his assignments as a Project Director,  was the Assistant Manager of Sargent & Lundy's Electrical Department. In this capacity,  was responsible for the assignment of qualified electrical engineers and designers to the project teams. He was also responsible for the development and implementation of software and computer systems in the electrical engineering and design process, for the quality control of this implementation and for the overall quality of the electrical design processes and deliverables. This responsibility included the development and update of design standards and procedures.



 also has extensive experience in the electrical engineering and design of major steam-electric generating stations. Prior to becoming an Assistant Department Manager,  was a senior electrical project engineer and an electrical project engineer. He was involved in the overall electrical engineering


RESUME 5

 Sargent & Lundy


Senior Vice President and Project Director

and design of four nuclear power plants. This experience includes supervising the electrical design of the main power generation and auxiliary electrical power distribution systems and their interfaces with the nuclear steam supply, the turbine-generator auxiliaries, and the utility power distribution system. During these assignments,  authored or co-authored six technical papers and one magazine article on regulatory design aspects of nuclear generating stations.

 has had extensive experience in the development of nuclear design standards, both at Sargent & Lundy and in the industry as a member of the Nuclear Power Engineering and the Power Generation Committees of the IEEE Power Engineering Society.  served as a member of three IEEE working groups which developed electrical standards for the nuclear industry. He subsequently served as the Standards Administrator for each of the above committees at different times, thereby gaining broad knowledge of the extent and content of the standards which each committee sponsored.

Prior to joining Sargent & Lundy in 1966,  served in various capacities in the U.S. Navy as engineering, weapons, and operations officer responsible for the operation and maintenance of complex electrical and electronic systems. He was a qualified operator of naval nuclear propulsion plants of submarines and surface ships.

His relevant experience includes:

PLANT DESIGN


- **Commonwealth Edison Company**
 - LaSalle 1 and 2, 1122 MW each.
Senior Electrical Project Engineer.
(1970 to 1982)
 - Dresden 2 and 3, 850 MW each.
Electrical Project Engineer.
(1966 to 1970)
- **Illinois Power Company**
 - Clinton 1, 985 MW.
Senior Electrical Project Engineer.
(1983 to 1986)
- **The Detroit Edison Company**
 - Fermi 2, 1123 MW.
Senior Electrical Project Engineer.
(1982 to 1983)
 - Electrical Project Engineer.
(1970 to 1971)

PERFORMANCE UPGRADES

- **Arizona Public Service Company**
 - Palo Verde Nuclear Generating Station.
Design of plant improvements.
Project Director (1994 - Present)
- **Hawaiian Electric Company**
 - Waiau 7 and 8, Kahe 1 through 6,
82 to 135 MW each.
Condition assessments.
Project Director (1996)
 - Kahe 1 and 2, oil, 82 MW each.

RESUME 5

 Sargent & Lundy


Senior Vice President and Project Director

Upgrade of the boiler control systems.
Project Director (1993 to present)

- Waiau 3, 4, 5, and 6, oil, 52 to 55 MW each.
Upgrade of boiler control systems.
Project Director (1993 to 1996)

- Commonwealth Edison Company
 - Dresden 1, nuclear, 200 MW.
Design of core spray system.
Senior Electrical Project Engineer (1973)
- San Diego Gas & Electric
 - Encina Units 1&2, Drawing upgrades.
Project Director (1995)

STUDIES

- California State University, Long Beach
 - Review of the existing electrical distribution system.
Project Director (1989)
- Commonwealth Edison Company
 - Dresden 1, nuclear, 200 MW.
Addition of core spray system study
Senior Electrical Project Engineer (1973)
 - LaSalle 1 and 2, nuclear, 1122 MW each.
Plant site study.
Electrical Project Engineer (1970)
- Nevada Power Company
 - Reid Gardner Controls Upgrade Study.
Project Director (1995)
- Public Service New Mexico
 - Reeves Unit 1 Repowering Study.
Project Director (1995)

- Arizona Electric Power Cooperative
 - Apache Station Repowering Cost Analysis. Project Director (1995)
- EPRI for San Diego Gas & Electric
 - Repowering Studies and Repowering Technology Evaluation.
Project Director (1995)

MEMBERSHIPS

Institute of Electrical and Electronics Engineers (IEEE) - Senior Member
IEEE Power Engineering Society - Publications Chairman
Nuclear Power Engineering Committee
Power Generation Committee
Instrument Society of America

HONORS

IEEE Standards Medallion - 1984. For service as the Standards Administrator of the Power Generation Committee.

PUBLICATIONS


"IEEE Standards Relating to Control Room Design" (coauthor), International Atomic Energy Agency (IAEA) Specialists Meeting, San Francisco, California, July 1975

"Physical Separation Requirements for Nuclear Stations" (coauthor), Sargent & Lundy General Engineering Conference, Chicago, Illinois, March 1974

"Application of Separation Criteria in a Nuclear Power Plant," EEL Winter Meeting, Orlando, Florida, February 1974

RESUME 5

 Sargent & Lundy


Senior Vice President and Project Director

"Separation in the BWR Control Room," IEEE
Nuclear Power Systems Symposium, San
Francisco, California, November 1971

"Cable Systems Grow Complex, Expensive,"
Electrical World, August 1971

"Cable Systems for Nuclear Power Plants,"
Sargent & Lundy General Engineering
Conference, Chicago, Illinois, March 1971. Also,
Edison Electric Institute (EEI) Spring Meeting,
Portland, Oregon, May 1971

"Dresden Unit 3 Nuclear Steam Supply Systems,
Control and Instrumentation," Institute of
Electrical and Electronics Engineers (IEEE) Power
Generation Committee, Spring Meeting, Oak
Brook, Illinois, June 1970

RESUME 6

Sargent & Lundy

Consultant

Operations & Maintenance Support Services

EDUCATION

University of Chicago, Graduate School of Business - M.B.A. - Finance - 1973

University of Illinois, Champaign - B.S. General Engineering - 1958

REGISTRATIONS

Professional Engineer - Illinois
Nuclear Regulatory Commission (NRC) licensed senior reactor operator (SRO) - 1971 to 1974

PROFICIENCIES

Boiling water reactor (BWR) and pressurized water reactor (PWR) operations
Nuclear plant safety reviews and performance consulting
Plant operation and maintenance (O&M) and annual budgets

RESPONSIBILITIES

[REDACTED] maintains an active involvement in the nuclear industry with varied assignments as both a consultant and independent contractor. Among his activities are serving on safety review committees and providing consulting services for plant-specific performance issues.

EXPERIENCE

Before joining Sargent & Lundy as a consultant in 1993, [REDACTED] worked for Commonwealth Edison Company (ComEd) for 35 years. He held increasingly significant professional, managerial, and executive positions within ComEd, while exercising a leadership role in several nuclear industry organizations. During that time, his experience encompassed assignments within ComEd's fossil station operations and commercial operations as related

to the firm's commercial and industrial customers. Also, for 22 years he had extensive and varied responsibilities in the operation of BWRs and PWRs. He was licensed as an SRO for ComEd's Dresden plant.

Since joining Sargent & Lundy, [REDACTED] has provided consulting services on a variety of nuclear projects. He consulted on performance deficiencies at Entergy Operations, Inc.'s River Bend nuclear site and for Consumers Power Company's Palisades nuclear site, participated in the NRC Diagnostic Evaluation Team inspection. Also, he serves as an outside member on safety review committees for ComEd's Braidwood, Entergy Operations, Inc.'s Grand Gulf and River Bend, Omaha Public Power District's Fort Calhoun nuclear sites.

[REDACTED] also provided consulting services to the Nuclear Electric Insurance Limited (industry mutual insurance company providing replacement power insurance) regarding The Detroit Edison Company's Fermi site turbine failure incident.

His specific experience before joining Sargent & Lundy includes:

NUCLEAR OPERATIONS

- Commonwealth Edison Company
 - Vice President, BWR Operations. Responsible for three, two-unit BWR nuclear operating stations with a \$330 million annual O&M budget, \$125 million annual capital budget, and staff of 2,500. Also testified before public utility commission regarding prudence of nuclear operations. (1987 to 1992)
 - Assistant Vice President and General Manager, Nuclear Stations. Responsible for five, two-unit nuclear operating stations (3 BWR and 2 PWR) with a



RESUME 6

Consultant

Operations & Maintenance Support Services

\$280 million annual O&M budget, \$80 million annual capital budget, and staff of 3,090. (1982 to 1987)

- Operations Manager, Nuclear Stations Division. Assisted the executive responsible for three operating nuclear stations (2 BWR and 1 PWR) with a \$270 million annual O&M budget, \$116 million annual capital budget, and staff of 1,600. (1979 to 1982)
- Braidwood 1 and 2, nuclear, 1100 MW each. Station Manager. Responsible for initial staffing and startup planning for operating. (1977 to 1979)
- Section Engineer, Station Nuclear Engineering Department. Responsible for engineering for three BWR stations (two operating stations with five units and one, two-unit site under construction). Supervised 25 engineers in mechanical, structural, and electrical disciplines. Coordinated all operating station modifications and new plant design activities. (1974 to 1977)
- Project Engineer, Station Nuclear Engineering Department. Supervised 10 engineers in the coordination of engineering of modifications and operating support for two operating BWR nuclear stations. (1973 to 1974)
- Dresden 2 and 3, nuclear, 810 MW each. Startup Engineer, Generating Stations Department. First-line supervision of station operations during startup phase and also was licensed by the NRC as an SRO. (1971 to 1973)

- Staff Engineer, Generating Stations Department. Reviewed the design of a two-unit BWR nuclear power station providing operations/maintenance input. (1970 to 1971)

COMMERCIAL

- Commonwealth Edison Company
 - Sales Engineer, Division Sales Department. Customer relations with large commercial and industrial accounts regarding rate and policy matters and technical assistance. Various assignments leading to assistant area sales supervisor which involved supervising a department of 30 sales engineers. (1963 to 1970)

FOSSIL OPERATIONS

- Commonwealth Edison Company
 - Staffing Engineer, Generating Stations Department. Technical staff for fossil power stations, responsible for maintenance and performance of turbine, boiler and chemistry control systems. Staff to corporate superintendent of generating stations. (1958 to 1963)

RESUME 7

Sargent & Lundy

Power Services Management Project Manager

EDUCATION

University of Illinois at Chicago - B.S. Mechanical Engineering - 1979

REGISTRATION

Professional Engineer - Illinois

PROFICIENCIES

Project management
Mechanical system design and engineering
Nuclear services
System engineering
Component sizing and procurement

RESPONSIBILITIES

[REDACTED] currently serves as project manager for two 1312 MW nuclear stations and as the senior mechanical project engineer for a 835 MW, a 1100 MW, and a 1312 MW nuclear station.

As a project manager, [REDACTED] coordinates the engineering, design and licensing activities within Sargent & Lundy. He directly oversees the senior mechanical project engineer, senior electrical project engineer and senior structural project engineer assigned to the project. He directs the preparation of, and monitors performance to, schedules for the engineering and design. He functions as the primary interface between the client and Sargent & Lundy.

As a senior mechanical project engineer, he is responsible for coordinating mechanical engineering and design activities on his assigned projects and for ensuring the technical integrity of the project deliverables. He supervises mechanical engineers assigned to the project, coordinates activities between the Sargent & Lundy divisions, and reviews the work

performed. He is also responsible for development of project schedules, budgets and work plans, and for monitoring adherence to them.

EXPERIENCE

[REDACTED] has more than 16 years of experience in mechanical engineering and project management at Sargent & Lundy. He has worked on five fossil- and nuclear-fueled projects and has performed a variety of design, engineering, and licensing activities for these projects. His experience includes both initial design and nuclear services work.

[REDACTED] has extensive experience in the management, design and implementation of modification projects. He recently served as modifications manager for more than 30 modification projects at HL&P's South Texas Project. Additionally, he served as lead engineer for several modification projects at NMPC's Niagara Mohawk Unit 2 station, NPPD's Cooper Nuclear Station, and IPC's Clinton Power Station. He has had overall design and management responsibilities, including development of task work plans, design schedules and budgets, interface with client and vendors, development of design criteria, conceptual designs, design calculations, procurement specifications, installation and testing plans, and 10CFR50.59 safety evaluations. He has also served as the Sargent & Lundy field coordinator during the installation phase for several modifications. In this capacity, he was responsible for providing technical support to Construction Management, processing field changes and providing engineering support for post-modification testing.

[REDACTED] recently completed a design basis document project and a power uprate project for NMPC's Nine Mile Point - Unit 2 station. By participating in these projects, [REDACTED] gained

RESUME 7

Sergent & Lundy...

Power Services Management Project Manager

additional knowledge of nuclear steam supply system and balance of plant system design, including design basis, design margins, interrelationships between systems and the effects of design changes to these systems.

██████████ also worked on the Clinton project during the design and construction phase. He began on this project as a mechanical engineer and was promoted to mechanical project engineer and subsequently senior mechanical project engineer. During his assignment on this project, he had increasing levels of responsibility for mechanical engineering, design and licensing activities.

He also served as a field liaison engineer on this project for a period of five years. In this capacity, he was responsible for the overall coordination of small bore piping design, piping analysis and support design activities as well as other mechanical engineering and design activities.

██████████ has served as a mechanical engineer during the construction phase of the Chent 3 and 4 electric generating stations. On this project, he was responsible for processing pipe and pipe support field changes.

Prior to assuming the above responsibilities, ██████████ was an engineering analyst who did major equipment sizing, heat balance calculations, pressure drop calculations, and pipe sizing for power plants.

His specific experience includes:

- **Houston Lighting & Power Company**
 - South Texas Project Electric Generating Station 1 and 2, nuclear, 1312 MW each.
Project Manager. Overall project management. (1995 to present)

- Senior Mechanical Project Engineer.
Management and design of all modification work. (1992 to 1994)

- **Niagara Mohawk Power Corporation**

- Nine Mile Point 2, nuclear, 1100 MW.
Senior Mechanical Project Engineer.
System design basis document, power uprate, instrument air upgrade, auxiliary boiler upgrade, and control room nuisance alarm projects. (1992 to present)

- **Illinois Power**

- Clinton, nuclear, 990 MW.
Development of plant modification packages, including man-hour estimate, schedule, precedence diagram, design calculations, design package, and overall coordination of design activities by other divisions. (1987 to present)

Preparation of instructions for implementation of project activities.
(1987 to present)

Development of technical specifications for procurement of mechanical equipment, evaluation of vendor proposals, and review of vendors' technical data/drawings for conformance to the design specification. (1987 to present)

Preparation of conceptual designs including plan for issue resolution, affected scope, list of affected design documents, and order-of-magnitude estimates for design costs. (1987 to 1991)

Program Manager for the snubber reduction program. (1989 to 1991)

RESUME 7

Sargent & Lundy

Power Services Management Project Manager

Preparation of design criteria and design calculations for various plant systems. (1984 to 1990)

Evaluation and disposition of field change requests, nonconformance reports, and field problem reports pertaining to piping, piping components, and pipe supports. (1984 to 1988)

Small bore pipe design/analysis and support design coordinator.

Review of preoperational test procedures, hydrotest procedures, and test results. (1985 to 1987)

Evaluation and disposition of potential interaction reports prepared by the seismic interaction walkdown group (1983)

- **Nebraska Public Power District**

- Cooper, nuclear, 835 MW.
Program Manager. Intake Structure Guide Wall Modification. (1994)

Program Manager. Feedwater nozzle monitoring project. (1991 to 1992)

Program Manager. Reactor recirculation pump upgrade project. (1990 to 1992)

Mechanical Project Engineer.
Condensate storage tank study. (1989 to 1991)

Program Manager. Reactor water clean-up pipe replacement project. (1989 to 1990)

Mechanical Project Engineer. Control building cooling modification. (1989 to 1990)

- **Kentucky Utilities Company**

- Ghent 3 and 4, low-sulfur coal, 550 MW each.

Mechanical Analyst. Processing of field changes for piping/piping supports and processing of change order amendments for piping, boiler erection, gallery work, and control valve contracts. (1981 to 1983)

From 1979 to 1981, [REDACTED] work as mechanical analyst included projects at the following stations:

- **Central Louisiana Electric Company, Inc./
Southwestern Electric Power Company**

- Dolet Hills 1, lignite, 719 MW.

- **Commonwealth Edison Company**

- LaSalle 1, nuclear, 1132 MW.

- **Northern Indiana Public Service Company**

- Schahfer 17 and 18, coal and oil, 393 MW each.

- **Wisconsin Power & Light Company**

- Edgewater 5, coal, 400 MW.

- **Wisconsin Public Service Corporation**

- Weston 3, coal, 321 MW.

RESUME 8

[REDACTED] Nuclear Power Plant Management Consultant

EDUCATION

Illinois Institute of Technology, BSME 1965

REGISTRATIONS

Professional Engineer-Illinois

PROFICIENCIES

Nuclear power plant issues
Operational management
Plant performance
Corporate and vendor QA programs
Safety reviews

RESPONSIBILITIES

[REDACTED] is an active participant in the nuclear power industry as demonstrated by his continued past, present, and future involvement with ICON E and his nuclear consulting assignments. Among his assignments is participation in a safety review committees for an operating nuclear power plant.

EXPERIENCE

Before joining Sargent & Lundy as a consultant, **[REDACTED]** worked for Commonwealth Edison Company (ComEd) for 31 years. He held increasingly significant professional, managerial, and executive positions within ComEd, while exercising a leadership role in several nuclear industry organizations. During that time, his experience encompassed assignments within ComEd's nuclear station operations. Upon retiring in September of 1996 he was the Site Vice President for the LaSalle County Station of ComEd. Prior to that assignment in 1994 he had held many different nuclear positions, each with increasing levels of responsibility.

As an ANS member he was a participant in the International Committee and the Public Policy Committee.

He was also a committee participant in the Wisconsin Electric's Point Beach Nuclear Station Off-Site Safety Review Committee.

[REDACTED] has also been an active participant in the International Conference on Nuclear Engineering (ICONE). At ICONE 3 in April of 1995, he presented a technical paper, "Economic Factors in US Nuclear Plants." At ICONE 4 in March of 1996 he was the Track Leader for the Operations and Maintenance Sessions. For ICONE 5, scheduled for May of 1997, he will be the Conference Technical Chairman. For ICONE 6, scheduled for May of 1998, he will also be the Conference Technical Chairman.

INPO

- Division Director/Plant Performance Division. Loaned to INPO. Managed Advanced Light Water Reactor Department (ALWR) and Special Project Department. Included benchmarking to plants in Sweden and Russia. (1993)

Commonwealth Edison Company

- Site Vice President at LaSalle County Station. Managed all activities at site. (1994 to 1996)
- Manager/Nuclear Oversight Department. Managed nuclear oversight functions, including site and corporate QA, vendor QA, nuclear safety review, and nuclear safety review board support. (1992)
- General Manager/Quality Verification Department. Managed Corporate QA and nuclear oversight functions. Accomplished merger and downsize of

RESUME 8

Nuclear Power Plant Management Consultant

former QA and nuclear Division QA Departments. (1992)

- General Manager/Quality Programs & Assessment. Managed all nuclear oversight functions for 12 nuclear units, including site QA, nuclear safety review, and performance assessment. (1990-1992)
- Station Manager/Braidwood Station. Managed the overall operation of the station. Braidwood achieved INPO #1 rating in January 1991. Participated in IAEA OSART evaluation of St. Alban Nuclear Station of EDF in France. (1988 to 1992)
- Station Manager/Byron Station. Managed the overall operation of the station. Included pre-operational and start-up testing, and obtaining full power licenses for both units. Byron achieved INPO #1 rating in October of 1987. (1980 to 1988)
- Operating Assistant Superintendent/Byron Station. Managed the station's operations department during start-up and preoperative phases. (1977 to 1980)
- Technical Staff Supervisor/Quad Cities Station. Managed the station's technical support staff; consisting of electrical, thermal, nuclear, chemistry, radiation protection and quality control groups. (1974 to 1977)
- SRO Licensed Shift Foreman/Quad Cities Station. Directed the activities of licensed operators and shift support personnel (1973 to 1974)

EDUCATION

Northwestern University - M.B.A. - 1979

University of California - M.S. Applied
Mechanics - 1970

Indian Institute of Technology - B.S. Engineering
Mechanics - 1968

REGISTRATION

Professional Engineer - Illinois

PROFICIENCIES

Project management
Project cost, schedule, and budget management
Engineering/construction and startup design
changes
Cost beneficial licensing actions
Design Basis Documents & System Reviews
Equipment qualification
Valve and pump operability
Motor-operated valves
Component/Piping design and analysis
Commercial-grade dedication
Component/parts classification
Operations & Maintenance
Heating, ventilating, and air conditioning
ductwork and supports
American Society of Mechanical Engineers Boiler
and Pressure Vessel (ASME BP&V) Code
Sections III, VIII, and XI
Nuclear Regulatory Commission (NRC)
regulations for safety-related equipment
Computer applications
Component life extension and aging

RESPONSIBILITIES

Mr. [REDACTED] is responsible for development of new projects and technologies and optimization of work processes. He is also responsible for overall management of projects under his

supervision and maintaining the quality of deliverables and for completing projects within budget and on schedule.

Currently he is responsible for the overall management of projects at the Tennessee Valley Authority and assists in the management of projects at South Carolina Electric & Gas Co.

In August 1996, he completed a major FSAR review project for PSE&G which included a review of UFSAR Chapter 15 Accident Analysis versus plant design. Mr. [REDACTED] has led a pilot effort using risk based PSA techniques to determine component risk/safety significance within safety-related systems. Such an approach can have diverse applications and significant cost savings associated with truncation of the Q-List, ISI/IST programs, reduction in procurement requirements for components/parts and in the development of a graded MOV program. In 1995 he completed and presented to the Korean NRC a report on fatigue evaluation of components resulting from Diesel Generator Vibrations for Yongwang Unit 3. Mr. [REDACTED] has completed an independent assessment impact of high temperatures on electrical equipment at PSE&G's, Salem Units 1 and 2. He has written equipment evaluation design basis documents for various utilities including Consumers Power Company and PSE&G. Mr. [REDACTED] has directed equipment verification life cycle management and aging studies for Baltimore Gas & Electric Company's Calvert Cliffs Station work, and provides equipment qualification support for Consumers Power Company's Palisades Station and Commonwealth Edison Company's (ComEd) six nuclear stations.

Mr. [REDACTED] was responsible for managing the equipment qualification efforts for Commonwealth Edison Company's, Dresden, and Quad Cities stations; Consumers Power Company's Palisades station; Northern States Power Company's Monticello and Prairie Island

**Power Services Group
Project Manager**

stations; and Public Service Electric and Gas Company's Salem and Hope Creek stations from October 1991 through 1996.

From October 1989 through September 1991, Mr. [REDACTED] worked with the Tennessee Valley Authority as Project Manager and Group Project Manager responsible for the overall budget, schedule, engineering, construction activities, and startup on major capital projects totaling approximately \$75 million. His responsibility also included controlling and truncating engineering/construction costs using the available resources and tools. During this assignment the major projects consisted of mechanical/nuclear and civil calculations, ASME piping and supports, miscellaneous commodities (cable trays; heating, ventilating, and air conditioning ducts; and conduit supports), equipment environmental/seismic qualification, and seismic interaction between commodities.

Mr. [REDACTED] has supervised the work of mechanical and electrical engineers working on nuclear generating stations. Areas of supervision included dynamic and environmental qualification of safety-related mechanical and electrical equipment, including field verification of equipment and the determination of the maintenance, surveillance, and replacement schedules for components; stress and seismic analysis of ASME BP&V Code Section III Class 1, 2, and 3 equipment; and stress analysis of heating, ventilating, and air conditioning components, supports, and ductwork.

Mr. [REDACTED] coordinates and reviews project schedules with utilities and provides the necessary consultation for NRC publications such as regulatory guides, information and enforcement bulletins, and NURIGs. He writes and evaluates portions of the Safety Analysis Reports and responds to NRC questions on project-specific designs. He represents utilities in the review of equipment vendor bids for

mechanical and electrical equipment and represents clients during negotiation with vendors. He assists construction personnel in resolving site-related construction problems initiated by field change requests and nonconformance reports; prepares reports on project schedules; and monitors manpower, project progress, and personnel productivity.

EXPERIENCE

Mr. [REDACTED] has experience in system and component design, analysis, engineering, layout, and licensing of major nuclear generating stations. He has supervised the work of several engineers on ComEd's Dresden, Quad Cities, and Zion operating nuclear stations. The work primarily involved specific plant modification packages, which required equipment modifications, replacement, and qualification. Mr. [REDACTED] has also been the supervisor responsible for equipment qualification on ComEd's Byron and Braidwood and Illinois Power's Clinton nuclear power plants.

Mr. [REDACTED] has performed environmental qualification of Class 1E electrical and active mechanical equipment and has also successfully assisted clients in several environmental qualification and Regulatory Guide 1.97 presentations as well as audits with the NRC.

He coordinated the Pump & Valve Operability Review (PVORT) program for Clinton Power Station, which included the review of operator torque requirements to assure proper sizing for the specific valve applications.

He has performed stress analysis of structures, systems, and components under extreme dynamic loads using finite element methods. He has successfully assisted clients during several NRC seismic qualification review team audits and has directed and coordinated the presentation of reports and documents for audits.

**Power Services Group
Project Manager**

He is familiar with industry codes and standards, including ASME B&PV Sections III, VIII, and XI, and Institute of Electrical and Electronics Engineers standards.

His experience includes the projects listed below.

- **Baltimore Gas & Electric Company**
 - Calvert Cliffs 1 and 2, nuclear, 1829 MW.
Manager. (1992 to present)
- **Consumers Power Company**
 - Palisades 1, nuclear, 780 MW.
Manager. (1991 to present)
- **Commonwealth Edison Company**
 - Dresden 2 and 3/Quad Cities 1 and 2, nuclear, 850 MW each.
Supervisor. (1991 to 1992)
(1983 to 1984)
 - Byron 1 and 2/Braidwood 1 and 2, nuclear, 1175 MW each.
Supervisor. (1982 to 1989)
 - Zion 1 and 2, nuclear, 1085 MW each.
Supervisor. (1983 to 1984)
- **Northern States Power Company**
 - Monticello, nuclear, 569 MW.
Supervisor. (1991 to 1992)
 - Prairie Island 1 and 2, nuclear, 593 MW each.
Supervisor. (1991 to 1992)
- **Public Service Electric & Gas Company**
 - Hope Creek Station, nuclear, 1000 MW.
Supervisor. (1991 to 1992)
 - Salem Units 1 and 2, nuclear, 2298 MW.
Supervisor. (1991 to Present)

- **Tennessee Valley Authority**
 - Watts Bar 1, nuclear, 1200 MW.
Project Manager. (1989 to 1991)
- **Tennessee Valley Authority**
 - Watts Bar 1, nuclear, 1200 MW.
Project Manager. (1996 to present)
- **Illinois Power**
 - Clinton 1, nuclear, 985 MW.
Supervisor. (1982 to 1989)
- **South Carolina Electric & Gas Co.**
 - V. C. Summer Station.
Project Manager. (1996)

MEMBERSHIPS

Chairman of the Structural Subgroup,
Committee on Nuclear Air and Gas Treatment
(CONAGT);
Member: Subcommittee on General
Requirements (CONAGT)
Member: Main Committee

PUBLICATIONS

Mr. [REDACTED] has submitted numerous reports to utilities. In August 1996, he submitted a report to PSE&G on Design Basis verification-titled "Verification of Analysis Input Assumptions for UFSAR, Chapter 15 Accidents for Safety Related Systems."

He is the author of the following papers:

"Impact of Power Uprate for EQ Equipment in Nuclear Power Plants" presented at the IEEE 1996 Nuclear Symposium and Anaheim, California, November 3-6 1996.

"Reduction of EQ Burden for Mechanical Equipment," IEEE 1995 Nuclear Science Symposium

PUBLICATIONS (continued)

"Fracture Mechanics Evaluation of Reactor Vessel Using Stress Intensity Factors from Enriched Finite Elements," Fifth International SMiRT Conference, Berlin, Germany, August 1979

"Thermal Analysis of Guarded Penetration Assemblies in a Reactor Containment and Cooling Coil Requirements," Fifth International SMiRT Conference, Berlin, Germany, August 1979

"Design of Prequalified Support Systems Subjected to Dynamic Loads," Fifth International SMiRT Conference, Berlin, Germany, August 1979

"Structural Analysis for Safety Relief Valve Discharge Loads," Fourth International SMiRT Conference, San Francisco, California, August 1977

Stress Singularities at the Corner of Plates in Extension, M.S. Thesis at the University of California, 1969

**Power Generation Systems Group
Proposal Manager/Associate and
Senior Structural Project Engineer**

EDUCATION

Purdue University - M.S. Civil Engineering - 1972

Purdue University - B.S. Civil Engineering - 1971

REGISTRATIONS

Structural Engineer - Illinois
Professional Engineer - Arizona, Louisiana
Appointed Associate - 1988

PROFICIENCIES

Power plant design and engineering
Project management
Structural project engineering
Plant assessment programs
Concrete frame analysis
Reinforced concrete design
Containment penetration design

RESPONSIBILITIES

As a senior project engineer, [REDACTED] manages the work of project engineers, designers, and specialists. He ensures that designs conform to applicable client, industry, and Sargent & Lundy standards and procedures. He participates in major decisions concerning the plant design and construction with the client and other project-related disciplines. He is also involved in siting, site development, and all civil, structural, and architectural work. He reviews and approves the basic plant design criteria and any unique engineering design concepts, and he authorizes Sargent & Lundy drawings for construction. He reviews engineering and construction schedules and the project scope of work. He coordinates the work of various personnel in the preparation of monthly project engineering and construction reports. [REDACTED] coordinates preparation of specifications for equipment, materials, and

labor packages. He evaluates proposals and makes purchase recommendations.

As a proposal manager, [REDACTED] is responsible for the preparation of conceptual design and development of all phases of power plant projects. This includes developing and/or establishing general arrangements, piping and instrumentation diagrams (P&ID), equipment lists, auxiliary power requirements, schedules, performance levels, process diagrams, and engineer, procure, construct (EPC) cost estimates. [REDACTED] also prepares conceptual civil and structural designs for these projects.

EXPERIENCE

[REDACTED] has more than 24 years of experience in the design and engineering of major steam-electric generating stations. He is currently involved in assessment programs at an operating nuclear plant. His recent assignments have included conceptual and developed designs for coal-fired, gas turbine, and combined cycle projects. Among these recent projects are the conceptual design of a lignite-fired boiler island in Indonesia; owner's engineering services and conceptual design of a 2 x 350 MW coal-fired plant in China (the first independent power project in China); and civil/structural developed designs for various combined cycle plants.

[REDACTED] has been responsible for preliminary project work on a new combined cycle cogeneration plant in Mexico. In addition, he recently served as the project manager for the design of a high-voltage electrical testing facility. He has served as the senior project engineer for modification work on two nuclear power stations with two boiling water reactor units each. He has also served as the structural project engineer for structural engineering activities and final licensing reconciliation for four major pressurized water reactor units. He

**Power Generation Systems Group
Proposal Manager/Associate and
Senior Structural Project Engineer**

was instrumental in the construction and design review programs for three nuclear stations. As a supervising design engineer, [REDACTED] has directed the engineering and drafting for a major nuclear power station during both the active design phase and construction. As an assistant division head in the Structural Engineering Division, he was responsible for the structural engineering work on several major fossil- and nuclear-fueled generating stations. His assignments as a structural and senior structural design engineer have included complete concrete frame analysis for the reactor building in a nuclear power station, analysis and design of a structural steel equipment access building, and complete structural design of a reinforced concrete radwaste building. Other assignments have included preparing and coordinating the structural portions of the safety analysis report and environmental report for a nuclear unit, coordinating the complete calculation review for all structures of a power station, and developing a design method for penetration anchorage in concrete.

[REDACTED] joined Sargent & Lundy in 1972. His specific experience includes:

PLANT DESIGN

- **Consumers Power Company**
 - Palisades 1, nuclear, 812 MW.
Senior Project Engineer. (1996)
- **Southern Electric International**
 - Energia de Nuevo Leon, combined cycle cogeneration, 225 MW.
Senior Structural Project Engineer. (1994 to 1995)
- **Carolina Power and Light Company**
 - Brunswick 1 and 2, nuclear, 815 MW each.
Senior Structural Project Engineer.
Modification and surveillance programs. (1993 to 1995)
- **S&C Electric Company**
 - Various plant engineering projects and evaluations. (1993 to 1995)
 - Advanced Technology Center.
Project Manager. High-voltage electrical testing facility. (1992 to 1993)
- **Arizona Public Service Company**
 - Palo Verde 1-3, nuclear, 1200 MW each.
Senior Structural Project Engineer.
Backlog Reduction Program
Engineering Partnership Program. (1989 to present)
- **Commonwealth Edison Company**
 - Dresden 2 and 3/Quad Cities 1 and 2, nuclear, 800 MW each.
Senior Structural Project Engineer. (1988 to 1992)
 - Byron 1 and 2, nuclear, 1175 MW each.
Senior Structural Project Engineer. (1986 to 1987)
 - Structural Project Engineer. (1983 to 1986)
 - Braidwood 1 and 2, nuclear, 1175 MW each.
Structural Project Engineer. (1983 to 1985)
 - Construction Assessment Program
Technical Advisor. (1984 to 1985)

RESUME 10

Power Generation Systems Group Proposal Manager/Associate and Senior Structural Project Engineer

- **Tennessee Valley Authority**
 - Watts Bar 1, nuclear, 1177 MW.
Independent design and construction review. (1988 to 1989)
 - Browns Ferry 1-3, nuclear, 1100 MW each.
Design integration contract. (1987 to 1988)
- **Central Louisiana Electric Company, Inc.**
 - Rodemacher 2, coal, lignite, oil, and gas, 511 MW.
Assistant Chief Structural Designer Engineer. (1980 to 1983)
- **New York Power Authority**
 - MTA Fossil Plant, coal, oil, and refuse, 697 MW.
Assistant Chief Structural Design Engineer. (1980 to 1983)
- **Illinois Power**
 - Clinton 1, nuclear, 985 MW.
Assistant Chief Structural Design Engineer. (1979 to 1983)
 - Supervising Design Engineer. (1976 to 1979)
- **Middle South Services, Inc.**
 - Six Standard Coal/Lignite-Fired Units (A1,A2, coal; B1,B2, lignite; C1,C2), 750 MW each.
Assistant Chief Structural Design Engineer. (1979 to 1983)
- **PSI Energy**
 - Gibson 5, coal, 618 MW.
Assistant Chief Structural Design Engineer. (1979 to 1983)
- **Southwestern Electric Power Company**
 - Welsh 3, coal, 512 MW.

Assistant Chief Structural Design Engineer. (1979 to 1983)

- **The Cincinnati Gas & Electric Company**
 - Zimmer 1, nuclear, 839 MW (canceled).
Senior Structural Engineer/Structural Engineer. (1972 to 1976)

CONCEPTUAL PLANT DESIGNS

- **People's Government of Guangxi, P. R. China**
 - Laibin B, coal, 2 x 350 MW.
Owner's engineering services. (1996)
- **Perusahaan Umum Listrik Negara, Indonesia**
 - Banjarmasin, lignite, 2 x 65 MW.
Proposal Manager. (1995)

MEMBERSHIP

American Society of Civil Engineers
Structural Engineers Association of Illinois

Mechanical Project Engineering Division
Senior Mechanical Project Engineer/Project Manager

EDUCATION

Purdue University - B.S. Engineering - 1975

REGISTRATIONS

Professional Engineer - Illinois, Indiana

PROFICIENCIES

Mechanical engineering
Service water system evaluations and modifications
Erosion/corrosion programs and modifications
Auxiliary feedwater system reviews and modifications
Main cycle reviews
Station design change packages (DCP)
Configuration management and design control
Design basis reconstitution
Nuclear services
Fossil services
Project management - Task management

RESPONSIBILITIES

leads the mechanical engineering effort on projects to which he is assigned and coordinates engineering in other disciplines. He is responsible for seeing that Sargent & Lundy's work is of the highest quality and performed within project schedules. He works with the project team in defining the scope of project work, studying alternatives, determining system parameters, preparing design documents, providing licensing support, scheduling procurement activities and construction contracts, and resolving construction problems. He communicates with the client, as needed to facilitate the progress of work.

EXPERIENCE

has 25 years of experience in the mechanical engineering and design of steam-

electric generating stations. He is currently serving as a Project Manager for Public Service Electric & Gas (PSE&G) at the Hope Creek Nuclear Plant. is responsible for managing S&L's engineering for Hope Creek design modifications.

has extensive field experience, interfacing with station departments, support engineering groups and installation engineers. He has a working knowledge of the plant modification process at several nuclear plants.

In previous assignments with Public Service Electric & Gas Company (PSE&G), has engineered various design changes and configuration reviews at both the Hope Creek and Salem generating stations, including:

- Project Manager for Salem HVAC design basis document improvement program.
- Preparing, implementing and closing out plant modifications, including document revisions, calculations, engineering evaluations, and safety evaluations.
- Developing configuration baseline documents, including categorizing, prioritizing, and resolving design-basis open items.
- Salem and Hope Creek service water system piping, instrumentation and valve material upgrade modifications.
- Implementation of Generic Letter 89-16 recommendations at Hope Creek, involving addition of a direct torus vent system, torus-attached piping modifications, replacement of containment isolation valves and snubber reduction for the Standby Gas Treatment System.

RESUME 11

Mechanical Project Engineering Division Senior Mechanical Project Engineer/Project Manager

- Modifications to the Salem Unit 1 auxiliary feedwater system (AFS) turbine-driven AFS pump governor and bearing-jacket cooling relief valve.
- Design basis reconstitution analyses at Salem Units 1 and 2 to reconcile AFS configuration baseline open items.

He has completed several other nuclear service assignments, including:

- S&L Project Manager for restart modifications during extended forced outages of a two-unit nuclear plant (Salem).
- Feasibility study for replacement of degraded service water piping at a large single-unit nuclear plant (Perry).
- Independent engineering review to convert the circulating water system at a large two-unit nuclear plant (Salem) from once-through cooling to closed cycle cooling.
- Engineering support for NRC Diagnostic Examination Team (DET) reviews at a single-unit PWR (Palisades).
- Review of corrective action programs associated with the Tennessee Valley Authority Watts Bar nuclear recovery efforts.
- Service Building and Radwaste Building additions to Omaha Public Power District's Fort Calhoun Station.
- Design basis specifications for the Illinois Department of Nuclear Safety's proposed low-level radwaste storage facility.

He has worked on the design of five new nuclear plants and one new fossil plant. He has completed nuclear service projects for three pressurized water reactor (PWR) plants

and two boiling water (BWR) reactor plants, and betterment projects for six fossil units. His nuclear experience includes assignments as mechanical project engineer on duplicate two-unit PWR plants, non-power block engineering for a standardized nuclear power plant system, mechanical design for a Swiss nuclear plant, and system engineering for a two-unit BWR plant. He has completed several nuclear service assignments as senior mechanical project engineer and as project manager for nuclear plant modifications, design basis reviews, and configuration control activities.

His fossil work has included mechanical engineering for a new two-unit plant and several plant betterment projects. He has been responsible for reviewing and approving design documents, preparing and conforming specifications, evaluating bids, and providing interface between equipment suppliers and construction contractors.

Before joining Sargent & Lundy full-time in 1976, he had participated for five years in Sargent & Lundy's cooperative engineering work-study program.

His relevant career experience includes:

NUCLEAR SERVICES

- **Commonwealth Edison Company**
 - Quad Cities 1 and 2, nuclear, 800 MW ea.
Mechanical issues and mentoring program. (1995)
- **Consumers Power Company**
 - Palisades 1, nuclear, 700 MW.
Plant modifications and design basis reviews. (1994 to 1995)
- **Cleveland Electric**
 - Perry 1, nuclear

RESUME 11

Mechanical Project Engineering Division Senior Mechanical Project Engineer/Project Manager

Study to replace service water yard piping. (1994 to 1995)

Mechanical Project Engineer. Service building and radwaste storage building additions. (1987 to 1988)

- **Public Service Electric and Gas Company**
 - Hope Creek 1, nuclear, 1117 MW. Project Manager and Senior Mechanical Project Engineer. Preparation of DCPs. (1990 to 1994, 1995, 1996)
 - Salem 1 and 2, nuclear, 2298 MW total. Project Manager. Preparation of DCPs and resolution of design-basis open items. (1989 to 1994, 1995)
 - Program Manager. Pilot effort for system operating diagrams. (1989)
 - Program Manager. System functionality reviews for component and parts classification. (1987)
- **Niagara Mohawk Power Corporation**
 - Nine Mile Point 1, nuclear, 642 MW. Mechanical Project Engineer. Plant modifications and design basis reviews. (1989)
- **Tennessee Valley Authority**
 - Watts Bar 1 and 2, nuclear, 1270 MW ea. Mechanical Project Engineer. Review of corrective action programs and vertical slice results. (1988 to 1989)
- **Westinghouse/Illinois Department of Nuclear Safety**
 - Low-level radwaste storage facility. Mechanical Project Engineer. Preparation of design-basis specification. (1989)
- **Omaha Public Power District**
 - Fort Calhoun 1, nuclear, 502 MW.

PLANT DESIGN

- **Commonwealth Edison Company**
 - Byron 1 and 2/Braidwood 1 and 2, nuclear, 1175 MW each. Mechanical Project Engineer. Work breakdown structure, Braidwood Construction Assessment Program (BCAP), main cycle reviews. (1983 to 1987)
 - Mechanical Engineer. System interaction reviews and resolution of design problems. (1982 to 1983)
- **Kansas Gas and Electric Company**
 - Wolf Creek 1, nuclear 1181 MW. Mechanical Engineer. Design of circulating water system and non-power-block engineering. (1982 to 1983)
- **Northern Indiana Public Service Company**
 - Schahfer 17 and 18, coal, 393 MW each. Mechanical Engineer. Evaluation of equipment bids. (1980 to 1982)
- **General Electric Company**
 - GEX-Kaiseraugst, nuclear, 932 MW. Mechanical Engineer. Mechanical engineering for nuclear steam supply system. (1977)
- **Commonwealth Edison Company**
 - LaSalle 1 and 2, nuclear, 1132 MW each.

RESUME 11

Mechanical Project Engineering Division
Senior Mechanical Project Engineer/Project Manager

Nuclear Process Engineer. Radwaste system design and engineering. (1975 to 1977)

FOSSIL PLANT BETTERMENT

- Northern Indiana Public Service Company
 - D. H. Mitchell 4-6 and 11, coal, 529 MW total
Mechanical Engineer. Dry fly-ash addition and miscellaneous retrofits. (1978 to 1982)
 - Bailly 7 and 8, coal, 616 MW total.
Mechanical Engineer. Balanced-draft conversion, precipitator addition, and miscellaneous retrofits. (1977 to 1982)

MEMBERSHIPS

American Nuclear Society
American Society of Mechanical Engineers

PUBLICATIONS

Effective Flow-Accelerated Corrosion Program - presented at the PVP '94 ASME Pressure Vessels & Piping Division Conference, Minneapolis, Minnesota, June 1994.

RESUME 12

Sargent & Lundy

Power Services Group
Project Manager

EDUCATION

University of Wisconsin - B.S. Mechanical
Engineering - 1968

REGISTRATION

Professional Engineer - Illinois

PROFICIENCIES

Engineering management

Project management

Mechanical engineering

Nuclear units

Plant water systems

RESPONSIBILITIES

As Project Manager, [REDACTED] is responsible for project management and coordination of engineering in the mechanical, electrical, and structural disciplines on projects to which he is assigned. He is responsible for establishing the needs and plans of the client and communicating them to the appropriate project team so that S&L's resources are appropriately matched and allocated to fill those needs.

EXPERIENCE

[REDACTED] joined Sargent & Lundy in 1971. Since then, he has worked on nine major central-station power plant projects, eight nuclear and one coal-fired. From 1971 to 1976, he served as a mechanical engineer on the Wm. H. Zimmer BWR Station for Cincinnati Gas & Electric Company and was involved in the design of main process and balance-of-plant systems, the preparation and issuance of procurement specifications, the incorporation of

design basis requirements (including regulatory and code requirements) for equipment and material, the evaluation of vendor proposals, the preparation of recommendations for purchase, and the subsequent interface with the successful suppliers.

With his promotion to mechanical project engineer in 1976, [REDACTED] assumed responsibility of supervising the work of five to ten mechanical engineers performing many of the above activities and indirectly supervised the work of engineering and drafting personnel in other divisions of the Mechanical Department to meet project goals, schedules, and commitments. In addition, he has coordinated the efforts of the Mechanical, Electrical, and Structural Departments in interdisciplinary activity on a project basis.

[REDACTED] was instrumental in the redesign and integration of the overall site water usage facilities for two existing coal-fired units with two new units under construction on the same site. [REDACTED] also evaluated proposals submitted for the general work contract covering all aspects of construction of a two-unit coal-fired station.

[REDACTED] has supervised the work by mechanical and structural engineering and drafting disciplines performing the formal computerized large bore piping analysis and support design for Commonwealth Edison Company's Braidwood Station Units 1 and 2. He supervised the simplified analysis and support design work on small bore field-routed piping for the same station. [REDACTED] supervised the personnel responsible for incorporating changes on the control room critical drawings in preparation for fuel load on Braidwood Unit 1 and coordinated efforts to

RESUME 12

Sargent & Lundy

Power Services Group Project Manager

close-out engineering-related turnover deficiencies for the Braidwood project. He has assisted Commonwealth Edison Company in preparing testimony for licensing hearings and responses to prudency audits in rate case proceedings. [REDACTED] actively organized, prioritized, coordinated, and scheduled activities associated with preparation of the Byron and Braidwood updated final safety analysis reports.

In 1989, [REDACTED] was appointed project manager for engineering activities in Sargent & Lundy's Chicago office for Arizona Public Service Company's Palo Verde nuclear generating station.

From 1990 to 1991, he served as project manager for a Performance Enhancement Program at Commonwealth Edison Company's Quad Cities Station which identified, scoped, budgeted, and resolved various regulatory and Institute of Nuclear Power Operations-related issues for the two-unit nuclear station. This effort required supervision of 25 to 40 individuals at two separate locations, with a total scope in excess of 44,000 man-hours over 14 months.

Following completion of the Quad Cities task, he was assigned to Commonwealth Edison Company's Zion Station where his responsibilities included providing mechanical discipline support for the Nuclear Regulatory Commission's electrical distribution system functional inspection (EDSFI) conducted in 1992, and supervision of the completion of a major modification involving replacement of Zion's nuclear instrumentation system. He also coordinated design interface activities associated with a dual-unit outage during which major modifications to the plant service water systems were to be implemented.

In 1993 [REDACTED] was promoted to the position of Manager, I&C Nuclear Services where he supervised the company's staff of 50 I&C engineers performing I&C work on nuclear facilities with responsibilities as outlined above.


In 1994 he was assigned to the Power Services Group as Project Manager where he has supervised activities including nuclear modifications, design basis document preparation and open item resolutions, and independent design review of plant service water and related systems.

The scopes of work [REDACTED] has overseen range from scoping studies and estimates, preliminary design studies, and plant layout development, to equipment sizing and procurement, preparation of piping and instrumentation diagrams, and sizing of piping including analysis and design of support systems. He has assured that design changes and modifications are properly integrated into overall plant design, taking into account the current status of a plant's design and construction. He has supervised individuals responsible for overseeing the implementation of design requirements onto physical drawings by design personnel. He has interfaced with the client and with equipment suppliers for selection of equipment, material, and labor packages, including evaluating proposals and making recommendations for purchase. He has assisted the project director in management and administrative areas, including project scheduling and cost control.

[REDACTED] served as chairman of Sargent & Lundy's equipment specialists group for miscellaneous plant services, which includes specialists in diesel generators, miscellaneous water pumps, and other plant equipment.

RESUME 12

 Sargent & Lundy


Power Services Group
Project Manager

His experience includes assignments as described above for the following stations:

PLANT DESIGN

- **Nebraska Public Power District**
 - Cooper Nuclear Station, 835 MW.
Project Manager. (1994 to present)
- **Commonwealth Edison Company**
 - Zion 1 and 2, nuclear, 1050 MW each.
Project Manager. (1991 to 1993)
 - Quad Cities 1 and 2, nuclear, 769 MW each.
Project Manager. (1991)
 - Senior Mechanical Project Engineer.
(1990)
 - Braidwood 1 and 2, nuclear, 1120 MW each.
Mechanical Project Engineer. (1983 to 1989)
 - Carroll County 1 and 2, nuclear,
1120 MW each (canceled).
Mechanical Project Engineer. (1976 to 1977)
- **Arizona Public Service Company**
 - Palo Verde 1-3, nuclear, 1221 MW each.
Project Manager. (1989 to 1990)
- **Northern Indiana Public Service Company**
 - R. M. Schahfer 17 and 18, coal,
421 MW each.
Mechanical Project Engineer. (1978 to 1982)

- **PSI Energy**

- Marble Hill 3 and 4, nuclear, 1120 MW each.
Mechanical Project Engineer. (1977 to 1978)

- **The Cincinnati Gas & Electric Company**

- Zimmer 1, nuclear, 840 MW.
Mechanical Project Engineer. (1975 to 1976)
- Mechanical Engineer. (1971 to 1975)

RESUME 12

Sargent & Lundy...

[REDACTED]
Power Services Group
Project Manager

GENERIC (11-05-91)

[REDACTED] has more than 20 years of experience in mechanical and project engineering with S&L. He served as the project manager for S&L's Chicago office engineering activities for Arizona Public Service Company's Palo Verde Station (a three-unit, 3663 MW PWR) during 1989 and 1990. In addition to this assignment, [REDACTED] has served as mechanical project engineer or project manager for the design of six major nuclear plants and one coal-fired power plant. In his most recent assignment to the Zion Station, [REDACTED] coordinated the mechanical discipline support to Commonwealth Edison Company during the NRC's electrical distribution functional inspection (EDSFI). He is a registered professional engineer in Illinois.

RESUME 13

[REDACTED]
3153 University
Highland Park, IL 60035
[REDACTED]
(630) 663-5044 - work (ETW-II)

SUMMARY:

Twenty five years of engineering experience provide the insight and training required to produce a successful Engineering and Project Manager. Demonstrated skills in:

Creating a Cohesive Engineering Group from Junior Engineers and Unskilled Supervisors
Administrative and Technical Problem Solving Analysis
Project and Cost Control
Innovative Approaches In Quality Improvement Techniques
Initiation of New Technologies
Ability to Motivate Project Teams Has Lead to Multiple Successfully Completed Projects and Repeat Business From Clients.

EXPERIENCE:

1994 - Present Commonwealth Edison - Downers Grove, IL

Fossil Engineering Manager

- ♦ Responsible for mechanical, structural, electrical and instrumentation/control engineering, design and drafting for the fossil division. Introduced scope of work documents, project cost estimating, manhour tracking, individual responsibility and project engineering responsibility to the division.

1988 - 1994 VECTRA Technologies/ABB Impell - Lincolnshire, IL

Section Manager

- ♦ Increased electrical group revenue from \$1.4 million/year to greater than \$8 million/year all while maintaining productivity at greater than 95% billability.
- ♦ Expanded engineering resources from 15 engineers to over 40 engineers.
- ♦ Fully responsible for all Human Resource actions including interviewing, hiring, personnel reviews and salary levels, and overall management of the electrical group.

Technical Manager

- ♦ Initiated, developed and implemented company wide changes in Project Manager requirements.
- ♦ Developed and implemented technical training programs for staff engineers.
- ♦ Performed technical reviews of all ongoing projects and initiated changes in performance requirements in order to decrease errors and improve manhour usage.

RESUME 13

Project Manager

- ◆ Preparation of pricing and scoping of multiple projects ranging in size from \$1,000 to \$8,000,000. Control of multiple discipline manpower allocation, task assignments, budget control, scope changes, schedule control, client interface and invoicing. Major projects include:
 - ◆ \$1,000,000 (engineering dollars) revision to Main Control Board instrumentation and control
 - ◆ \$1,900,000 (engineering dollars) upgrade of Reactor Protection System from analog to digital system
 - ◆ \$8,000,000 (engineering dollars) installation of Distributed Control System, Data Historian, Monitoring System and new governors for five diesel generators

Quality Instructor

- ◆ One of eight company wide Crosby Quality Instructors providing 10 hours of instruction to every company employee.

1971 - 1988 Sargent & Lundy Engineers - Chicago, IL

Senior Electrical Project Engineer (1984-1988)

- ◆ Preparation of pricing and scoping of multiple projects ranging in size from \$1,000 to \$1,000,000.
- ◆ Control of task assignments, manhour control, scope changes, schedule control and client interface.
- ◆ Technical decision maker for all Commonwealth Edison's Zion Station electrical projects.

Electrical Project Engineer/Electrical Engineer (1971-1984)

- ◆ Responsible for design of electrical distribution systems and auxiliary control systems associated with coal fired power stations. Scope of assigned work ranged from conceptual design and preparation of equipment and installation specifications to bid evaluations and evaluation of scope changes. Scope of work continued through review of vendor documentation and preparation of drawings to issuance of construction packages and interface with contractor and client engineers.
- ◆ General responsibilities included:
 - small control panels to Main Control Boards
 - all types of electrical distribution equipment ranging in ratings from 120V through 480V MCC and switchgear, air magnetic and vacuum medium voltage switchgear to 345kV distribution equipment
 - cable and bus duct systems
 - burner management and boiler systems
 - ash handling and soot blowing systems
 - majority of the various control schemes within a power plant

RESUME 13

NUCLEAR PLANT SPECIFIC HISTORY

(1981-1988) Electrical Project Engineer/Senior Electrical Project Engineer working mainly on Zion Station modifications

During the seven year period was involved with almost every electrical modification at Zion station, including RVLIS, ATWS, Appendix R, battery replacement, along with over 100 smaller mods. Responsibilities included budget preparation, scope definition, detailed design, manpower allocation, FCR approval, drafting coordination and DCR closeout.

1988-1991 Project Manager - Zion Station DCRDR

1990-1991 Project Manager - Fermi Station DCRDR - Detroit Edison

Both of these project consisted of multiple modifications to the control rooms in response to the NRC mandated Human Factors review. Responsible for proposal pricing, budget and invoicing control, scope definition, specification preparation, detailed design and overall design control, manpower allocation, drafting coordination and staffing, modification design package preparation and review.

1988-1992 Project Manager - Dresden/Quad Cities/Byron/Braidwood miscellaneous small modifications

9
1889-1992 Technical Manager - Palisades - Consumers Power
Technical Manager - Fermi - Detroit Edison

Responsible for independent technical review mandated by utility modification practices.

1990-1992 Project Manager - Eagle 21 -Zion Station

Zion station replaced their Hagan 7100 reactor protection system with a Westinghouse Eagle 21 system. As Project Manager was responsible for proposal pricing, budget and invoicing control, scope definition, specification preparation, detailed design and overall design control, manpower allocation, drafting coordination and staffing, modification design package preparation and review.

1991-1994 Project Manager - Diesel Control System Upgrade - Zion Station

As Project Manager was responsible for the proposal pricing, budget and invoicing control, scope definition, specification preparation, overall design control, manpower allocation, drafting coordination and staffing, modification design package preparation and review of the installation of a Distributed Control System, Data Historian, and Monitoring System for five diesel generators.

RESUME 13

[REDACTED]

Education:

M.S.E. Computer, Information and Control Engineer
University of Michigan, Ann Arbor, Michigan, 1971

B.S.E. Electrical Engineering
University of Michigan, Ann Arbor, Michigan, 1969

Professional Registration:

P.E. Illinois

Computers:

Intermediate user level: Excel, Microsoft Word, WordPerfect, ClarisCad, Access and data access via the internet.

Publications:

Co-authored paper "Applications for Electronic Connecting Rod Bearing Trip"

Supervisor, Systems Engineering

WORK EXPERIENCE SUMMARY

██████████ has over 17 years of experience in the nuclear and fossil power industries. His experience encompasses the broad spectrum of activities associated with electrical distribution systems, I&C systems, battery systems, protective relaying and coordination, licensing and regulatory compliance, and circuit and raceway tracking systems. He has been actively engaged in the design and review of electrical systems (SSFI and EDSFI), their design calculations and analyses, compliance with regulatory requirements and industry standards, 10CFR50 Appendix R, station blackout, IPE and IPEEE, and application PRAs. ██████████ is fluent in applicable NRC requirements and industry standards, and practices associated with electrical system operation, maintenance design, protection, and installation.

██████████ has been involved in numerous power plant design and evaluation activities. Units that he has provided services for include SONGS, Brunswick, Comanche Peak, Cooper Nuclear Station, Diablo Canyon, Duane Arnold, Fermi-2, Trojan, Peach Bottom, Susquehanna, ANO-1, 2, and Colstrip.

AREAS OF EXPERTISE

- Electrical System Design
- Single Failure Analysis
- Electrical Separation
- Reliability Analysis
- Fire Risk Studies
- CFR 50, Appendix R
- Systems Engineering
- FMEA
- Instrumentation and Controls
- DC Power Systems
- Station Blackout

WORK EXPERIENCE

██████████ is a Supervising Engineer at ERIN Engineering and Research, Inc., where he has performed numerous projects involving both probabilistic and deterministic technologies. These projects included detailed plant system design, preparation of electrical design analyses, electrical separation and single failure analyses, Station Blackout, Appendix R, and R.G. 1.97 studies, maintenance program optimization, IPE, IPEEE, and Fire PRA, and USAR updates. He has effectively applied this broad technology knowledge and background to develop innovative and cost effective problem solutions. His project specific activities have included both the performance of detailed technical tasks as well as overall project management.

██████████ has performed detailed electrical system design adequacy reviews for Texas Utilities', Comanche Peak Steam Electric Station and Nebraska Public Power District's Cooper Nuclear Station (CNS). The review performed for Comanche Peak was in support of initial plant licensing and involved the comprehensive examination of the AC and DC system voltage and short circuit analyses, diesel generator analyses, coordination studies, and supporting analyses. The reviews performed for CNS were in support of an NRC SSFI and a subsequent EDSFI. All of the key electrical system analyses were reviewed in detail and appropriate revisions performed to resolve weaknesses and/or to enhance the documents. These analyses included both steady state and transient studies for the AC and DC distribution systems and the emergency diesel generators.

██████████ performed analyses and design reviews to verify that the guidelines presented in Branch Technical Position PSB-1 regarding system configurations, loading conditions, and degraded grid voltages were accurately translated into the analysis. He has experience in the area of bus transfer and transfer logic and has performed timing studies for fast and delayed transfer schemes.

 Sargent & Lundy

Instrumentation & Controls Project Engineering Division
Senior Project Engineer

EDUCATION

University of Illinois at Chicago - B.S. Computer
and Information Systems - 1980

PROFICIENCIES

Instrumentation and control engineering and
design
Nuclear plant modifications
Instrumentation and sampling system piping
Process controls
Post-accident instrumentation
Instrument design
Data management

RESPONSIBILITIES

As a senior instrumentation and control project engineer, [REDACTED] has primary responsibility for the development of instrumentation and control systems for nuclear-fueled generating stations. He performs or delegates all tasks required to be performed on his project. These include preparation of design criteria and safety analysis reports; general arrangements of control rooms, computer rooms, and other instrumentation and control areas; instrumentation and control diagrams; instrument portions of the piping and instrumentation diagrams; preparation of instrument indexes, data sheets, logic diagrams, master/block interconnection diagrams, loop schematics, instrument location drawings, and installation details; control board layouts and arrangements; preparation of instrumentation and control specifications, evaluation of proposals and purchase recommendations; monitoring vendors' engineering and manufacturing schedules and reviewing vendors' drawings; and the establishment of budgetary estimates and schedules for assigned projects.

He also trains instrumentation and control engineers in the performance of these tasks.

EXPERIENCE

[REDACTED] has supervised both client and Sargent & Lundy personnel at Houston Lighting & Power Company's South Texas Project in the design of station modifications, resolving station problem reports, assisting in the resolution of potential generic issues, and interfacing with plant personnel as necessary for design implementation.

[REDACTED] overviewed, coordinated, and resolved comments for the rebaseline of the instrumentation and control portion of Commonwealth Edison Company's Quad Cities station's updated final safety analysis report and participated in third-party reviews for improving quality of modifications at Consumers Power Company's Palisades nuclear plant, including an analog-to-digital programmable controller replacement.

[REDACTED] supervised the development of an instrument design database and instrument accuracy and setpoint program using Sargent & Lundy's proprietary personal computer software for a pressurized water reactor plant.

[REDACTED] also supervised the development of a common database for instrument design data and setpoints for six nuclear stations. This included instrument data collection activities at two nuclear stations and interfacing with architect-engineering companies performing similar activities at two other nuclear stations. In addition, [REDACTED] has performed root cause investigations of feedwater vibration, which included operational testing of the feedwater piping and control systems; main steam turbine low-pressure trips refueling machine controls; and other systems.

██████████
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EDUCATION

*B.S. Electrical Engineering,
San Jose University*

SECURITY CLEARANCE

U.S. Citizen

LICENSES/REGISTRATIONS/ PROFESSIONAL SOCIETIES

*Registered Professional
Engineer, State of California*

*Member, Institute of Electrical
and Electronics Engineers*

██████████ has performed numerous plant modification reviews and prepared supporting Safety Evaluations as required by 10CFR50.59. He has provided key technical oversight to ensure that required technical, installation, licensing, and design basis issues were properly addressed. This included issues such as interface with plant programs (IST, Appendix R, EQ, plant procedure, etc.), Single Failure, Electrical Separation, and Seismic.

██████████ has performed regulatory compliance reviews for issues such as Electrical Separation, Single Failure, Station Blackout, R.G. 1.97, Appendix R, Generic Letters 89-10 and 96-01. He assisted in a comprehensive Electrical Separation assessment for SONGS-1 in support of Systematic Evaluation Program (SEP) Topic closure. SONGS-1 was designed and constructed prior to the issuance of industry and regulatory guidance and presented numerous unique challenges. The scope of work required the development of an appropriate review criteria, evaluation methodology, and resolution plan for discrepant conditions. He also performed detailed Single Failure analyses for Service Water and electrical systems, as well as the ECCS for G.E. BWRs.

Numerous reviews and evaluation relating to compliance with 10CFR50, Appendix R have been performed by ██████████. His expertise includes safe shutdown equipment selection, safe shutdown logic development, support system reviews, identification of cabling vulnerabilities, hot short assessments, multiple high impedance short circuit studies, and regulatory compliance. His support of industry issues includes Generic Letter 89-10 and 96-01. He has developed and implemented an analysis methodology for evaluating DC valve motor speed under reduced voltage and elevated temperature conditions. He has also performed comprehensive reviews of plant surveillance procedures to verify compliance with plant Technical Specification requirements.

██████████ developed and independently reviewed system models in support of IPEs for San Onofre Units 1, 2, and 3, Trojan, and Arkansas Nuclear One. These activities included the detail review of system operation (success criteria) and credible failure modes. He has the unique capability to effectively translate detailed electrical system analysis and design experience to PRA tasks such as special initiators and subtle interactions.

██████████ has performed fire risk studies using both the EPRI developed Fire Induced Vulnerability Evaluation (FIVE) methodology and the Fire PSA Implementation Guide. Tasks included detailed reviews for treatment of non-Appendix R systems, hot short induced spurious actuation, and operator actions, and he also performed detailed fire modeling for fire source and target interaction and suppression system response.

██████████ participated in the development of the UFSAR for SONGS-1. This project was unique in that it was the Revision 0 document following completion of the SEP effort. He developed Design Basis and Criteria Documents for Electrical Separation and Single Failure and performed a detailed electrical separation review for SONGS-1. This plant was constructed prior to the development of industry standards and required the development of a unique review criteria. He also performed detailed Single Failure reviews for both NSSS and BOP systems, participated in projects to support both original plant construction and operating plants, and has addressed configuration control issues.

Sargent & Lundy

Instrumentation & Controls Project Engineering Division
Senior Project Engineer

██████████ has experience in instrumentation and control engineering and design for modifications to nuclear-fueled generating station projects. ██████████ experience includes supervising the development and testing of nuclear plant modification to replace condensate filter/demineralizer pneumatic control system with a digital control system for a boiling water reactor plant, designing automatic control systems, local instrumentation racks, logic diagrams, and control board layouts. He has developed specifications for a post-accident sampling system that included analysis equipment to monitor hydrogen in water and air; main steamline radiation monitor replacement; a process radiation monitoring system and radiation effluent monitoring with computer interface; a data acquisition system for interface with an emergency response information computer; a safety parameter display system interface; monitoring and controls for a demineralized water treatment system; and a hydrogen addition system and reactor water chemistry verification system. ██████████ has also performed a review of Regulatory Guide 1.97 instrumentation requirements, specified instrumentation modifications required for Regulatory Guide 1.97 implementation at four different nuclear power stations, and performed environmental qualification review of various nuclear safety-related instrumentation.

██████████ has been involved in developing instrument setpoint and loop accuracy calculation standards. He has participated in the development of a training module for performing setpoint calculations.

Prior to joining Sargent & Lundy in 1980, ██████████ served in the U.S. Navy as an electronics technician and instructor, where his experience included assignments as a shutdown and reactor operator, supervisor in the Reactor

Controls Division, and supervisor in statistics and records. In the Naval Reserve, he earned the rank of chief petty officer. His responsibilities included serving as an electronics material officer assistant and preventive maintenance supervisor.

His specific experience includes:

PLANT DESIGN

- **Illinois Power**
 - Clinton 1, nuclear, 990 MW. Instrumentation and Control Project Engineer. (1985)
FSAR/Design Verification Review. (1983)
 - **The Cincinnati Gas & Electric Company**
 - Zimmer 1, nuclear, 839 MW (cancelled). Instrumentation and Control Project Engineer. (1983 to 1984)
- Instrumentation and Control Engineer.
(1980 to 1983)

PLANT BETTERMENT

- **Philadelphia Electric Company (PECO Energy)**
 - Peach Bottom Atomic Power Station Units 1&2, nuclear, 1065 MW each. Instrumentation and Control Senior Project Engineer. Condensate Filter Demineralizer Controls Upgrade. (1996)
- **Detroit Edison Company**
 - Enrico Fermi Unit 2, nuclear 1093 MW. Instrumentation and Control Senior Project Engineer. Third Party Review of a Plant Modification to Containment Inerting System. (1996)

Bergent & Lundy

Instrumentation & Controls Project Engineering Division
Senior Project Engineer

- **Nebraska Public Power District**
 - Cooper Nuclear Station. 778 MW. Instrumentation and Control Senior Project Engineer. Plant Computer Replacement. Emergency Operations Facility Communication Room and Fire Protection Modification. (1996)
- **Public Service Electric and Gas Company**
 - Salem 1 and 2, nuclear, 1110 MW, each. Senior Instrument and Control Project Engineer. Salem Engineering Intervention. Backlog Reduction. (1995 to 1996)
- **Lower Colorado River Authority**
 - Sim Gideon 1-3, gas and oil, 639 MW total. (1995) Senior Instrumentation and Control Project Engineer. Turbine control system upgrade to a distributed control system. Specification of miscellaneous Process Instruments, including "intelligent" transmitters Process Transmitter. Control console design. (1995)
- **Houston Lighting & Power Company**
 - South Texas Project 1 and 2, nuclear, 1312 MW each. Design Engineering Senior Instrumentation & Controls Project Engineer and Design Engineering Instrumentation & Controls Supervisor (Acting) Plant support for all instrumentation and control design activities. (1993 to 1995)
- **Wolf Creek Nuclear Operating Corporation**
 - Wolf Creek, nuclear, 1181 MW. Senior Instrumentation and Control Project Engineer. Chemical injection modification. (1991 to 1992)
- **TU Electric Company**
 - Comanche Peak 1 and 2, nuclear, 1192 MW each. Senior Instrumentation and Control Project Engineer. Design basis document updates. Modifications for chemical injection replacement, secondary sampling monitors, condenser air leakage monitoring, and effluent radiation monitor. (1990 to 1993)
- **Wisconsin Public Service Corporation**
 - Kewaunee, nuclear, 503 MW. Senior Instrumentation and Control Project Engineer. Main control board panel modification. (1990 to 1991)
- **Tennessee Valley Authority**
 - Watts Bar 1, nuclear, 1177 MW. Senior Instrumentation and Control Project Engineer. Instrument design database and instrument accuracy and setpoint calculation program. (1989 to 1990)
- **Commonwealth Edison Company**
 - All nuclear units. Senior Instrumentation and Control Project Engineer. Common database for instrument design data and setpoints. (1988 to 1989)
 - Dresden 2 and 3, nuclear, 850 MW each. Instrumentation and Control Project Engineer. Fire protection/Appendix R/Regulatory Guide 1.97 upgrades. Main steamline radiation monitor replacement (1985 to 1989)
 - Quad Cities 1 and 2, nuclear, 850 MW each. Instrumentation and Control Project Engineer. Hydrogen addition/water

Bergent & Lundy

Instrumentation & Controls Project Engineering Division
Senior Project Engineer

chemistry upgrade. Main steamline radiation monitor replacement. (1985 to 1989)

- **Wisconsin Electric**

- Point Beach 1 and 2, nuclear, 497 MW each.
Instrumentation and Control Project Engineer. Water treatment upgrade. (1985 to 1986)

- **Carolina Power & Light Company**

- Brunswick 1 and 2, nuclear, 790 MW each.
Instrumentation and Control Project Engineer. Developed procedures and analysis techniques for determining the relative nuclear safety-related functions of equipment, components, and instruments (Q-list); performed Q analyses on two test systems. (1984)

evaluation and transient event root cause analysis. (1987 to 1988)

- Dresden 2 and 3, nuclear, 810 MW each;
- Quad Cities 1 and 2, nuclear, 828 MW each. Senior Instrumentation and Control Project Engineer. Reactor water level reference leg boiloff study. (1987)

Instrumentation and Control Project Engineer. Compliance report for Regulatory Guide 1.97. (1985)

- **Virginia Power**

- North Anna, nuclear, 890 MW.
Main steam discharge flow and line radiation monitoring with computer data acquisition interface for Regulatory Guide 1.97 compliance requirements. (1983)

STUDIES

- **Public Service Electric and Gas Company**

- Hope Creek 1, nuclear, 1060 MW.
Senior Instrumentation and Control Project Engineer. Decontamination Solution Evaporator Design Adequacy. (1995)

- **Commonwealth Edison Company**

- Dresden 2 and 3, nuclear, 850 MW each.
Senior Instrumentation and Control Project Engineer. Leak detection study for reactor water cleanup piping susceptible to intergranular stress corrosion cracking. (1991)
- Dresden 3, nuclear, 850 MW.
Instrumentation and Control Project Engineer. Feedwater system operability

RESUME 16

Instrumentation & Controls Project Engineering Division Control & Instrumentation Project Engineer

EDUCATION

Alexander Hamilton - Management Courses - 1970

University of Michigan - Technical Correspondence Courses - 1953

Wright College - Associate Degree, Mechanical Engineering - 1950

PROFICIENCIES

Nuclear instrumentation and control (I&C) systems
Design criteria and safety analysis reports
Setpoint margin and instrument loop accuracy calculations

RESPONSIBILITIES

As an I&C project engineer, [REDACTED] has primary responsibility for the development of I&C systems for nuclear generating stations. He performs or oversees all of the tasks required for completion of his projects. These include preparation of design criteria and safety analysis reports; general arrangements of control rooms, computer rooms, and other I&C areas; I&C diagrams; instrument portions of piping and instrumentation diagrams; preparation of setpoint margin and loop accuracy calculations, instrument indexes, data sheets, logic diagrams, master diagrams, loop schematics, instrument location drawings, and installation details; control board layouts and arrangements; preparation of I&C specifications, evaluation of proposals and purchase recommendations; monitoring vendors' engineering and manufacturing schedules; and review of vendors' drawings. He also trains I&C engineers in the performance of these tasks.

EXPERIENCE

[REDACTED] has experience in design, engineering, and licensing of major nuclear-fueled steam-electric generating stations. From 1984 to the present, he has been assigned to Commonwealth Edison Company's Byron and Braidwood nuclear power plants, each consisting of two 1175 MW units. From 1977 until early in 1984, he was assigned to PSI Energy's Marble Hill nuclear power plant, consisting of two 1175 MW units. He was initially assigned as an I&C engineer, then as project engineer in the Instrumentation & Controls Project Engineering Division. Prior to his assignment as project engineer on the Marble Hill and Byron/Braidwood projects, he was responsible for the initial design through contract award of the majority of Sargent & Lundy's mechanically-oriented Instrumentation & Controls Project Engineering Division procurement specifications on Marble Hill. These specifications included local instrument panels, secondary process sampling systems, miscellaneous balance-of-plant control systems, instrument installation, and instrument calibration facilities.

As a project engineer in the Instrumentation & Controls Project Engineering Division, he has been involved in other I&C procurement specifications such as main control boards, transducers and sensors, radiation monitoring strong motion seismic, vibration monitoring, and high-radiation sample systems. He was the prime I&C contact on the Marble Hill project for the nuclear steam supply systems (NSSS) contract with Westinghouse. He is versed in most balance-of-plant and NSSS equipment and operation. He is familiar with the IEEE-323 qualification requirements of instruments, ANSI and ASME pipe code sections, ISA pipe classification requirements, and installation details of instrument process sensing lines and pneumatic tubing. He has worked on Three Mile Island

RESUME 16

Instrumentation & Controls Project Engineering Division Control & Instrumentation Project Engineer

modifications requiring instruments, which include Regulatory Guide 1.97 requirements and Human Factor Engineering improvements. He contributed to the design and selection of equipment for the technical support center, emergency operating facility, safety parameter display system, equipment status display, and emergency safety features status panel. He reviewed and answered licensing questions on instrument sections in the preliminary safety analysis report and final safety analysis report for Marble Hill. He was the I&C cognizant engineer for most mechanical package system specifications on the Marble Hill project. Other project assignments include Northern Indiana Public Service Company's Bailly nuclear power plant (684 MW) in 1977. His experience is being used in all design and installation phases of the Byron and Braidwood projects. Mr. Kral joined Sargent & Lundy in 1977.

Prior to joining Sargent & Lundy, [REDACTED] participated on approximately 250 projects. Several foreign projects are included in this experience. The projects varied from chemical and power plants to commercial, religious, and institutional buildings. His range of responsibility advanced from technical to management areas of design engineering.

Management level responsibilities included technical and administration guidance of up to 40 individuals of a 120 individual work force. As part of the management team, experience was gained by preparing project proposals and additions to contract work, assisting the sales force on proposal presentations, estimating engineering man-hours for complete projects, preparing company 90-day and long-term manning forecasts, employee selection, employee salary and appraisal reviews, contract administration, and manpower budget control. He was instrumental in the development of company cost improvements including project filing systems, document numbering systems,

supervisor work list forms, technical standards, computerized job status reports, proposal assembly guides, and monthly job progress report forms.

Project-level responsibility was to direct and assure completion of all design activities on six domestic chemical plant projects and two foreign projects.

Project-level work consisted of directing, planning, scheduling, coordinating interdepartmental designs and client/company liaison. Scheduling was done by CPM, PERT, or bar chart, depending on the complexity of the job.

Supervisory-level work required manpower planning by scheduling several jobs simultaneously, field assistance, and technical guidance of personnel.

Technical experience involved procurement and performance specification writing, bid evaluation, recommending purchase, development and sizing of process and utility flow diagrams complete with instrumentation, routing of piping, and selection of materials of construction suitable for service conditions. Thermodynamics, heat transfer, flexibility, and fluid dynamics calculations were necessary to complement the above technical work.

In addition to extensive experience in the use, design, and installation of metallic, non-metallic, and lined pipe and valves, other mechanical equipment consistently specified and evaluated included boilers, turbines, feedwater heaters, demineralizers, hot lime softeners, zeolite softeners, cation/anion water treatment, process and utility pumps, economizers, fans, blowers, heat exchangers, water cooling towers, air compressors, instrument air dryers, chemical feeders, insulation and waterproofing, painting and surface preparation, instrument

RESUME 16

[REDACTED]

Instrumentation & Controls Project Engineering Division
Control & Instrumentation Project Engineer

components, control valves, and HVAC
equipment.

Sargent & Lundy

Engineering Mechanics Division
Senior Systems Project Engineer

EDUCATION

University of Illinois - B.S. Mechanical
Engineering - 1973

PROFICIENCIES

Nuclear and fossil piping design
Piping stress analysis
Pipe support design
Thermal and fluid transients analysis
Finite element analysis
Resolution of installation problems
Backfit and betterment
Technical audits

RESPONSIBILITIES

is responsible for the coordination of project and design work pertaining to the analysis of power plant piping systems. Working with engineering project teams, he coordinates task efforts related to all aspects of piping system designs and evaluations in accordance with American Society of Mechanical Engineers and American National Standards Institute codes. This includes task management for all phases of technical work related to piping stress analysis, pipe support design, thermal and fluid transients analysis, special design problems, finite element analysis, resolution of field installation problems, and backfit and betterment programs on new and existing nuclear and fossil power plants.

is also responsible for task related functions such as preparing budget estimates and project scopes of work, estimating manpower needs, and scheduling. In this capacity he works closely with Sargent & Lundy project teams and clients to accommodate the

requirements of various departments with plant construction schedules and licensing requirements in support of plant modifications.

EXPERIENCE

Over the last 22 years, has performed or directed layouts, designs, and analyses for all phases of piping work at both fossil and nuclear plants. He has been actively involved in the complete piping design effort for three major nuclear facilities and has managed various aspects of numerous backfit and betterment projects for fossil and nuclear plants, including both pressurized water reactor (PWR) and boiling water reactor (BWR) nuclear plants. also has experience in the preparation of design specifications, review of component support designs, preparation of licensing documents and special studies which support piping system designs and modifications, and has proven his ability to coordinate interdivisional and client/vendor communications to resolve design problems on numerous projects.

helped to develop and apply hydrodynamic loads and acceptance criteria for BWR Mark I, II, and III designs. He has participated in the designs, analyses, field reviews, and startup-program system walkdowns for two PWR units. As a follow-up to these activities, he monitored industry needs to address emerging issues identified by the Institute of Nuclear Power Operation, the Nuclear Utilities Management and Resources Council, and the Nuclear Regulatory Commission. In response to various industry initiatives—such as ongoing snubber reduction, or concerns—such as the erosion/corrosion and thermal stratification of piping, he has outlined programmatic approaches and engineering

Sargent & Lundy

**Engineering Mechanics Division
Senior Systems Project Engineer**

activities to complete comprehensive evaluations of the plant systems involved.

has participated in three major technical and management review programs in support of client licensing activities. These include a special technical audit for Mark I design load evaluations, a utility management prudence audit and the independent design verification program for the Hope Creek Station. In addition he coordinated an extensive evaluation of piping and support design basis documentation for Omaha Public Power District's Fort Calhoun Station and conducted numerous independent design verifications for design modification packages. His experience includes the projects listed below.

PIPING DESIGN

- **Commonwealth Edison Company**
 - Dresden 2 and 3, nuclear, 810 MW each;
 - Quad Cities 1 and 2, nuclear, 828 MW each.
Supervisor. System design and modifications. (1984 to 1990)
 - Zion 1 and 2, nuclear, 1098 MW each.
Supervisor. System design and modifications. (1984 to 1990)
 - Analyst/Systems Engineer. System design. (1973 to 1974)
 - Byron 1 and 2, nuclear, 1175 MW each.
Project Engineer. System design and analysis. (1975 to 1976)
 - LaSalle 1 and 2, nuclear, 1132 MW each.
Analyst. Piping analysis. (1973 to 1974)

- **The Cincinnati Gas & Electric Company**
 - Zimmer 1, nuclear, 839 MW.
Supervisor. System design. (1980 to 1984)
- **Illinois Power**
 - Clinton 1, nuclear, 990 MW.
Supervisor/Project Engineer. Design and licensing support. (1976 to 1984)
- **Northern Indiana Public Service Company**
 - Bailly N1, nuclear, 684 MW.
Supervisor/Project Engineer. System design. (1977 to 1979)

PLANT MODIFICATIONS AND EVALUATIONS

- **Omaha Public Power District**
 - Fort Calhoun 1, nuclear, 502 MW.
Program Manager. Evaluation of piping and support design basis documentation issues. (1992)
 - Supervisor. Technical review of Class I piping modifications. (1986)
- **Public Service Electric and Gas Company**
 - Hope Creek 1, nuclear, 1117 MW.
Analysis and design change package coordination (torus hardened vent). (1992)
 - Design change package coordination. (1990)
 - Independent design verification program. (1985)
 - Salem 1 and 2, Design Change Package Coordination, Service Water. (1985)

RESUME 17

Sargent & Lundy

Engineering Mechanics Division
Senior Systems Project Engineer

- **The Detroit Edison Company**

- Fermi 2, nuclear, 1203 MW.
Supervisor. Startup testing. (1987)

Supervisor and Lead Discipline Engineer.
Design review of small bore piping.
(1986)

Design Change Package Coordination,
RHR system. (1994)

- **Commonwealth Edison Company**

- Braidwood 1 and 2, nuclear, 1175 MW
each.
Supervisor and Technical Auditor. Utility
management review program. (1985)

Project Engineer. System design studies.
(1975 to 1976)

- Dresden 2, nuclear, 810 MW.
Supervisor and Technical Auditor.
Support of utility design review activities
for Mark I loads. (1985)

Supervisor and Lead Discipline Engineer.
Fatigue evaluations for startup transients.
(1985)

- **Fossil plants**

- Numerous coal-fired stations.
Supervisor. High-energy piping
evaluations. (1985)

- **Illinois Power**

- Clinton 1, nuclear, 990 MW.
Supervisor and Lead Discipline Engineer.
Design review evaluation of small-bore
piping. (1984)

- **Entergy, Inc**

- River Bend, Design Change Package
preparation. (1995)

BETTERMENT AND BACKFIT

- **Wisconsin Electric**

- Point Beach 1 and 2, nuclear, 524 MW
each.
Surge line piping thermal stratification
assessment. (1991 to 1992)

Supervisor. Piping analysis training.
(1985)

- **Niagara Mohawk Power Corporation**

- Nine Mile Point 1, nuclear, 642 MW.
Supervisor. Liaison for in-service
inspection program and modification
activities. (1988 to 1991)

- **Virginia Power**

- North Anna 1 and 2, nuclear, 941 MW
each.
Supervisor. Class I piping modifications.
(1985)

MEMBERSHIPS

American Society of Mechanical Engineers
American Society of Mechanical Engineers
Special Working Group on Faulted
Conditions
Past Member - Mark III Containment Owners
SRSS Subgroup

PUBLICATION

"Programmatic Approach to Erosion/Corrosion-A
Case Study" (coauthor), American Nuclear
Society Transactions, April 1988

RESUME 18

Component and Materials Engineering Division Senior Component Engineer

EDUCATION

University of Illinois at Chicago - B.S.E.
1982

REGISTRATION

Professional Engineer - Illinois

PROFICIENCIES

Component Seismic Qualification
Equipment Safety Classification
Replacement Parts Procurement
Commercial-Grade Dedication
Computer Software including Microsoft

RESPONSIBILITIES

As a Senior Component Engineer, [REDACTED] performs evaluations of plant equipment to assure operability and conformance with design requirements, reviews component and part functions with respect to performance of system safety functions to establish safety classification, and determines the technical and quality requirements for the procurement of replacement parts. In this capacity, he reviews test reports, equipment specifications and licensing commitments and prepares calculations and engineering reports to ensure that plant equipment meets all functional and regulatory requirements.

EXPERIENCE

[REDACTED] has extensive field and office experience in the component engineering of nuclear-fueled generating stations. On his current assignment for Public Service Electric & Gas Company's Salem Nuclear Station he is performing technical evaluations of replacements for obsolete components and parts. This task includes preparation of Design Change Packages to implement these changes

to the plant configuration. In addition, he has prepared engineering reassessments of replacement part safety classifications for the Bill of Material Validation project.

For Commonwealth Edison Company's LaSalle County Nuclear Station he performs evaluations of various plant equipment to assure operability for all design and operating conditions using calculations and test results. He also performs functional reviews of components and replacement parts to determine their role in meeting the system safety functions and to establish their safety classification.

He has performed the analysis of test data for lubricants to determine their qualified life, extend the lubrication maintenance interval and resolve issues concerning the use of mixed greases for Commonwealth Edison.

[REDACTED] also developed a manual of generic guidelines for the functional analysis of replacement parts for various components to be used by Commonwealth Edison engineers in determining safety classification.

Other recent assignments include a reassessment of manual valves at Nebraska Public Power District's Cooper Nuclear Station as a result of an ISI boundary expansion and a review of technical procurement requirements for a chiller modification at Houston Lighting & Power Company's South Texas Project.

At Commonwealth Edison's Byron nuclear Station, [REDACTED] provided technical support for the replacement part procurement process. His activities included functional review of replacement parts to establish safety classification, specification of technical procurement requirements and evaluation of alternate replacements.

RESUME 18

Component and Materials Engineering Division Senior Component Engineer

During his assignment at Tennessee Valley Authority's Watts Bar site, he was responsible for the reassessment of structural steel floor framing systems as part of the Welding Evaluation Program. His duties included preparation of design criteria, procedures and calculations, and support of field inspections.

In earlier work for Commonwealth Edison's Braidwood station and Cincinnati Gas & Electric Company's Zimmer station, assignments included analysis and design of pipe hangers, cable tray supports, conduit supports, and HVAC duct supports. He was involved in the resolution of field construction problems and nonconformances, and developed design criteria and engineering training packages.

His specific experience includes:

- **Public Service Electric & Gas Company**
 - Salem 1 & 2, Nuclear, 1106 MW each. Component Engineer. Technical evaluation and DCP preparation for alternate replacement components and parts. Reassessment of replacement part safety classifications. (1995 to 1996)
- **Baltimore Gas & Electric Company**
 - Calvert Cliffs 1 & 2, Nuclear, 910 MW each. Component Engineer. Safety classification of Emergency DG and MSIV parts. (1995)
- **Commonwealth Edison Company**
 - LaSalle 1 & 2, Nuclear, 1132 MW each. Component Engineer. Equipment seismic evaluations, safety classification of components and replacement parts. (1993 to 1995)
- **Nebraska Public Power District**
 - Cooper 1, Nuclear, 764 MW each. Component Engineer. Manual valve reassessment due to ISI boundary expansion. (1994)
- **Houston Lighting & Power Company**
 - South Texas Project 1 & 2, Nuclear, 1250 MW each. Component Engineer. Classification procedure review, technical procurement requirements for chiller modification. (1994)
- **Wolf Creek Nuclear Operation Corporation**
 - Wolf Creek 1, Nuclear, 1128 MW each. Component Engineer. Safety classification of RC Pump and AFW Turbine parts. (1993)
- **Commonwealth Edison Company**
 - Zion 1 & 2, Nuclear, 1098 MW each. Component Engineer. Safety classification of Masoneilan AOV parts. (1992)
- **Commonwealth Edison Company**
 - Byron 1 & 2, Nuclear, 1175 MW each. Component Engineer. Functional review of replacement parts for safety classification. Specification of technical procurement requirements. (1987 to 1992)
- **Tennessee Valley Authority**
 - Watts Bar 1 and 2, Nuclear, 1270 MW each. Structural Engineer. Reassessment of structural steel framing and weld evaluation (1986 to 1987)
- **Commonwealth Edison Company**
 - Braidwood 1 & 2, Nuclear, 1175 MW each. Structural Engineer. Resolution of field construction problems and nonconformances on electrical system supports. (1984 to 1986)

RESUME 18

[REDACTED]

Component and Materials Engineering Division
Senior Component Engineer

- Cincinnati Gas & Electric Company
 - Zimmer 1 & 2, Nuclear, 839 MW.
Structural Engineer. Design and analysis
of HVAC, pipe and cable tray supports.
(1982 to 1983)

RESUME 19

Nuclear Plant Division Project Engineer

EDUCATION

University of Wisconsin - M.S. Civil Engineering - 1970

Gujarat University, India - B.S. Civil Engineering - 1968

REGISTRATIONS

Structural Engineer - Illinois
Professional Engineer - Illinois

PROFICIENCIES

All areas of initial design and modification design for nuclear and fossil plants

RESPONSIBILITIES

██████████ is responsible for supervising and coordinating the work on assigned projects with direction toward achieving technical adequacy, consistency, and efficiency, as well as meeting project schedules and man-hour budgets. He is responsible for ensuring all applicable standards and procedures of the client and of Sargent & Lundy are followed.

EXPERIENCE

██████████ has 25 years of structural engineering experience with over 18 years in nuclear power plant design. He has recently completed a staff augmentation assignment to Consumers Power Company (CPCo) in Jackson, Michigan. While there, he has performed a technical assessment of corrective action resolutions completed by CPCo on the Palisades Nuclear Plant. In addition, he has prepared Design Basis Documents for the Plant Flood protection System and the Biological Shieldwall Cooling System. Prior to this position, he was the engineering supervisor responsible for three of Commonwealth Edison Company's operating

nuclear stations. The work at Dresden, Quad Cities and LaSalle plants involved the design of plant modifications. ██████████ has worked on the original design of Illinois Power's Clinton Nuclear power station and Commonwealth Edison Company's LaSalle County Nuclear Power Station.

His experience has included the technical supervision of the structural design of such power plant components as reinforced concrete and structural steel framing; shear walls; pipe whip restraints and mechanical and electrical component supports. He has planned and scheduled the structural work for these projects and interfaced with other disciplines within Sargent & Lundy, as well as with vendors and clients. ██████████ has also been involved in the technical resolution of numerous design and construction issues. He has also participated in the presentations to the Nuclear Regulatory Commission (NRC) on some of these issues.

As a senior structural engineer, ██████████ worked on Northern Indiana Public Service Company's R. M. Schahfer generating station as well as The Cincinnati Gas & Electric Company's W. H. Zimmer nuclear power station. He prepared project-related structural design criteria, reviewed structural project specifications, and assured that all designs were being completed in accordance with project design criteria, Sargent & Lundy policies, and procedures.

Through ██████████ involvement with his design projects, he has become familiar with the NRC's structural design requirements and the American Institute of Steel Construction, American Concrete Institute, and American Welding Society codes. He has also participated in the development of Sargent & Lundy design and administrative standards.

RESUME 19

Nuclear Plant Division Project Engineer

Before joining Sargent & Lundy in 1976, [REDACTED] worked for both an engineering firm and a local transportation company as a structural engineer. In this capacity he was responsible for the design of railroad and highway bridges. His relevant experience includes:

PLANT DESIGN

- **Commonwealth Edison Company**
 - LaSalle 2, nuclear, 1122 MW.
Assistant Division Head/Supervising Design Engineer. Technical resolution of structural steel construction deficiencies prior to fuel load. (1981 to 1982, 1991 to 1994)
- **Illinois Power**
 - Clinton 1, nuclear, 985 MW.
Supervising Design Engineer/Structural Engineer. Initial design of turbine and reactor building concrete framing; coordination of final load check of structures; and technical resolution of field design change documents. (1976, 1977, 1983 to 1986)
- **The Cincinnati Gas & Electric Company**
 - Zimmer 1, nuclear, 839 MW (cancelled).
Senior Structural Engineer. Design of conduits, cable trays, and HVAC supports; assessment of structural steel framing. (1979 to 1981)
- **Northern Indiana Public Service Company**
 - R. M. Schahfer 17, coal, 393 MW.
Senior Structural Engineer. Turbine building design. (1979)

PLANT BETTERMENT

- **Consumers Power Company**
 - Palisades, nuclear, 780 MW
Project Engineer
Staff Augmentation (1994, 1995)
- **Commonwealth Edison Company**
 - Dresden 2 and 3/Quad Cities 1 and 2, nuclear, 850 MW each.
Engineering Supervisor and Assistant Division Head. (1986 to 1989, 1991 to 1994)
 - Zion 1 and 2, nuclear, 1085 MW each.
Supervising Design Engineer. Nuclear services. Design of plant modifications; assessment of structures for load changes; and resolution of field change requests. (1986 to 1989)
 - Dresden 1, nuclear, 200 MW.
Structural Engineer. Design of HPCI system components. (1977 to 1979)
- **Tennessee Valley Authority**
 - Watts Bar, nuclear, 1177 MW.
Assistant Division Head. Technical resolution of construction deficiencies in conduit systems. (1989 to 1990)

PUBLICATION

"Nuclear Plant License Renewal-Structural Issues" (coauthor), American Power Conference, 1991

Sargent & Lundy

Heating, Ventilating and Air Conditioning Division
Senior HVAC Project Engineer

EDUCATION

Michigan Technological University - M.S.
Mechanical Engineering - 1978

Michigan Technological University - B.S.
Mechanical Engineering - 1976

REGISTRATIONS

Professional Engineer - Illinois, Michigan

PROFICIENCIES

Fossil-fueled heating, ventilating, and air
conditioning (HVAC) system design
Nuclear HVAC system design
HVAC startup testing support
HVAC system performance improvements
HVAC system software

RESPONSIBILITIES

supervises project engineers responsible for the engineering and design of HVAC systems and system modification work for steam-electric generating stations and industrial and institutional facilities. Activities include preparation of conceptual system design, design criteria, design calculations, technical requirements for specifications, and licensing documentation. He ensures that HVAC design work conforms to applicable client, industry, and Sargent & Lundy standards and procedures. He is also responsible for monitoring and support of HVAC system construction, startup, and test balance activities.

is also responsible for the development and implementation of HVAC system and equipment performance analysis software.

EXPERIENCE

has more than 16 years of experience in the design and engineering of HVAC systems for power stations and industrial and institutional facilities. He has been involved in the design, specification, installation, testing, and modification of HVAC, dust collection, and air cleaning systems since joining Sargent & Lundy. He also has developed in-house engineering software as well as validating commercial energy analysis software.

His experience includes:

HVAC SYSTEM ANALYSIS

developed the following engineering software:

- **Performance of HVAC Water Coils (WTRCOIL)**
 - Performance of HVAC Water Coils (WTRCOIL) program analyzes performance of HVAC cooling coils using water as the tube side fluid.
- **Nuclear Ventilation System Network Analysis (NUVENT)**
 - Program determines the steady static energy and mass balance and resulting loads and environmental conditions for areas served by an HVAC system.

CONTROL ROOM HVAC

For the following projects, reviewed control room HVAC design for plant life extensions and controls upgrade. (1987 to 1989)

- **TU Electric**
 - Big Brown 1 and 2, lignite, 593 MW each;
 - Collin 1, gas, 156 MW;
 - Handley 3, gas, 405 MW;
 - Permian Basin 5, gas, 115 MW.

RESUME 20

Sargent & Lundy

Heating, Ventilating and Air Conditioning Division Senior HVAC Project Engineer

- **Missouri Public Service Company**
 - Sibley 1 and 2, coal, 103 MW total.

On the following projects, Mr. Stout was responsible for startup liaison and/or troubleshooting for control room HVAC and nuclear air cleaning systems. (1984 to 1988)

- **The Detroit Edison Company**
 - Fermi 2, nuclear, 1203 MW.
- **Illinois Power**
 - Clinton 1, nuclear, 990 MW.
- **Arizona Public Service Company**
 - Palo Verde 1-3, nuclear, 1304 MW each.

FOSSIL PLANT HVAC

- **TU Electric**
 - Lake Creek 1 and 2, gas, 316 MW total.
HVAC design for new water treatment building. (1989)
- **Wisconsin Electric**
 - Pleasant Prairie 1 and 2, coal, 617 MW each.
Study and conceptual design for outage ventilation of boiler and flue gas ducts. (1989)
- **Huaneng International Power Development Corporation**
 - Shidongkou 1 and 2, coal, 600 MW each.
HVAC system design and equipment procurement for control building, turbine building, and site facilities. (1988 to 1989)
- **Northern Indiana Public Service Company**
 - Schahfer 17 and 18, coal, 393 MW each.
HVAC system design for power block, coal handling, and flue gas desulfurization facilities. (1981 to 1983)

- **Wisconsin Power & Light Company**
 - Columbia 1 and 2, coal, 556 MW each.
Dust collection system design for coal reclaim facility. (1981 to 1983)
 - Edgewater 5, coal, 400 MW.
HVAC design for power block and coal handling facilities. (1978 to 1983)
- **Central Louisiana Electric Company, Inc.**
 - Rodemacher 2, coal, 552 MW.
HVAC design for power block and coal handling facilities. (1978 to 1983)
- **The Goodyear Tire & Rubber Company**
 - Lawton Power House 2, coal and oil.
HVAC design for boiler room and coal handling facilities. (1978 to 1979)

NUCLEAR PLANT HVAC

- **Niagara Mohawk Power Corporation**
 - Nine Mile Point 1 and 2, 1742 MW total.
Conceptual design of HVAC for standby gas treatment system, design of HVAC for chemical injection building, and independent review of HVAC calculations for secondary containment. (1991 to present)
- **Northern States Power Company**
 - Monticello, 569 MW.
Studies of performance improvement for secondary containment and standby gas treatment HVAC systems; design for replacement of secondary containment damper. (1991 to present)
- **Illinois Power**
 - Clinton 1, 990 MW.
HVAC system startup, licensing support, and modification work. (1985 to 1991)

Sargent & Lundy

Heating, Ventilating and Air Conditioning Division
Senior HVAC Project Engineer

- **Tennessee Valley Authority**
 - Watts Bar 1 and 2, 1270 MW each.
HVAC design baseline documents, control room habitability review, and HVAC design basis calculations. (1988 to 1990)
 - Sequoyah 1 and 2, 1220 MW each.
HVAC calculation reverification support. (1987)
- **ComEd**
 - Dresden 2 and 3, 810 MW each;
 - LaSalle 1 and 2, 1132 MW each;
 - Quad Cities 1 and 2, 828 MW each.
HVAC system studies and modifications. (1987 to 1988)
- **The Detroit Edison Company**
 - Fermi 2, 1203 MW.
HVAC system startup and licensing support, HVAC design of metrology lab, and modification work. (1984 to 1988)
- **Arizona Public Service Company**
 - Palo Verde 1-3, 1304 MW each.
Control room HVAC system review. (1987)
- **The Cincinnati Gas & Electric Company**
 - Zimmer 1, 839 MW.
HVAC system construction and air balance support. (1983 to 1984)

HVAC STARTUP TESTING SUPPORT

On the following projects, [REDACTED] was responsible for engineering review procedures and results for preoperational, air balance, and air cleaning system testing. (1984 to 1987)

- **The Detroit Edison Company**
 - Fermi 2, nuclear, 1203 MW.
- **Illinois Power**

Clinton 1, nuclear, 990 MW.

HVAC PERFORMANCE IMPROVEMENTS

On the following projects, [REDACTED] was responsible for the evaluation of HVAC system performance and/or design of system modifications to maintain design conditions. (1982 to 1991)

- **Northern States Power Company**
 - Monticello, nuclear, 369 MW.
Standby gas treatment system (SGTS) and secondary containment capability evaluation.
- **Niagara Mohawk Power Corporation**
 - Nine Mile Point 2, nuclear, 1100 MW.
SGTS and secondary containment design review; SGTS capacity increase feasibility study.
- **The Detroit Edison Company**
 - Fermi 2, nuclear, 1203 MW.
Reactor building, turbine building, radwaste building, control room, and drywell cooling system evaluation and modifications.
- **Illinois Power**
 - Clinton 1, nuclear, 990 MW.
Drywell, turbine building, and steam tunnel cooling systems evaluations.
HVAC heat exchanger performance evaluations.
- **ComEd**
 - Dresden 2 and 3, nuclear, 810 MW each.
Secondary containment leakage reduction evaluation.
 - Kincaid 1 and 2, coal, 660 MW each.
Control room and precipitator control room HVAC system evaluation.

Sargent & Lundy

Heating, Ventilating and Air Conditioning Division
Senior HVAC Project Engineer

- Quad Cities 1 and 2, nuclear, 828 MW each.
Drywell cooling evaluation and modifications. Secondary containment leakage reduction evaluation.
- **Northern Indiana Public Service Company**
 - Schahfer 14 and 15, coal, 1032 MW total.
Coal handling facility station heating system evaluation.
- **Central Illinois Public Service Company**
 - Meredosia 1 and 2, coal, 58 MW each.
Station heating system evaluation.
- **Missouri Public Service Company**
 - Sibley 1 and 2, coal, 103 MW total.
Station heating system evaluation.
- **Northwestern University**
 - Evanston Campus central chilled water system evaluation to improve system performance and future system load growth.

MEMBERSHIPS

American Society of Heating, Refrigerating, and
Air Conditioning Engineers
International District Energy Association

RESUME 21

Nuclear Technologies and Regulations Division Senior Principal Engineer

EDUCATION

Michigan State University - M.S. Physics - 1966

Aquinas College - B.S. Physics - 1961

REGISTRATION

Professional Engineer - Illinois

CERTIFICATIONS

Certified Health Physicist - American Board of Health Physics

PROFICIENCIES

Health physics
Radiation monitoring systems
As low as reasonably achievable (ALARA) design and reviews
Nuclear general employee training
Dose assessment
Shielding and radiation protection for backfits and modifications
Radiological Decontamination and Decommissioning

RESPONSIBILITIES

[REDACTED] coordinates and performs activities of the Shielding and Radiological Safety Group in Sargent & Lundy's Nuclear Technologies and Regulations Division. These activities include the design of all radiation protection features incorporated in nuclear power plant design, and nuclear plant decommissioning. He has served as the shielding project engineer for five nuclear power stations.

EXPERIENCE

[REDACTED] has over 25 years of experience in the nuclear industry. His experience covers the areas of health physics, radiation protection and shielding, core physics analyses, radiological

monitoring and instrumentation, licensing, and regulatory compliance.

[REDACTED] has written and presented ALARA design training programs for Sargent & Lundy, Illinois Power's Clinton Station and Pennsylvania Power & Light's Susquehanna Station. He has assisted the ALARA group at ComEd's Byron station during outages, and conducted independent Audits of ALARA programs and design features.

[REDACTED] recently provided radiological direction and support for decontamination and demolition of radwaste storage structures at Argonne National Laboratory's Argonne, IL site.

In the course of his work at Sargent & Lundy, [REDACTED] served as the radiation protection engineer for both pressurized and boiling water reactors, specified the functional aspects of radiological monitoring systems (including range, setpoint, and location), performed numerous shielding and radiation dose analyses, and wrote major sections of safety analysis reports. [REDACTED] has performed independent technical design reviews. [REDACTED] has also instructed nuclear general employee training programs.

[REDACTED] established criteria, setpoints, and technical requirements for radiation monitors as part of new station design, and performed setpoint analyses for Niagara Mohawk Power Corporation's Nine Mile Point Unit 1 Station. He has also provided the radiological design input for upgrades to the radiation monitoring system at Public Service Electric and Gas's Salem 1 and 2 Stations.

[REDACTED] joined Sargent & Lundy in 1974. Some of his relevant experience includes:

RELEVANT PROJECT ASSIGNMENTS

- Arizona Public Service Company
 - Palo Verde 1-3, nuclear, 1221 MW each

RESUME 21

Nuclear Technologies and Regulations Division Senior Principal Engineer

Performed skyshine and direct dose calculations for evaporation pond studies (1994).

Performed the design basis accident and hydrogen generation calculations for the LLRMSF, and control room habitability calculation. (1994-1995).

- **Commonwealth Edison Company**

- All nuclear stations.
Support for update of offsite dose calculation manual to meet revised 10 CFR 20 requirements. (1992 to 1995)

Performed a postaccident sample study. Study results included shipping requirements for the samples, shielding requirements (as a function of time), and information required for training purposes. Study included liquid and gaseous samples. (1988)

- Dresden 2 and 3, nuclear 810 MW each;
- Quad Cities 1 and 2, nuclear, 828 MW;
- Zion 1 and 2, nuclear, 1098 MW each.
Supervised shielding and radiological safety activities. (1991 to present)
- Byron 1 and 2/Braidwood 1 and 2, nuclear, 1175 MW each.
Provided onsite radiological support to the ALARA coordinator during refueling outages. (1988 to present)
- Quad Cities 1 and 2, nuclear, 828 MW each.
Performed ALARA reviews for backfits and modifications. (1986 to present)

Provided radiological safety support for hydrogen injection system, including preliminary radiological procedure for

- controlling access to newly created high radiation areas. (1987 to 1991)

- **Public Service Electric and Gas Company**

- Salem 1 and 2, nuclear, 1106 MW each.
Served as advanced technology and health physics specialist for development of a project plan for replacement of the radiation monitoring system. (1992 - 1996)
- Hope Creek, nuclear, 1031 MW.
Performed radiological portion of independent design review program. (1985)

- **Illinois Power**

- Clinton 1, nuclear, 990 MW.
Supervised shielding and radiological safety activities. Wrote and presented ALARA training to engineering staff. (1983 to 1991)

- **Omaha Public Power District**

- Fort Calhoun, nuclear, 502 MW.
Supervised shielding and radiological safety activities. (1986 to 1990)

- **Niagara Mohawk Power Corporation**

- Nine Mile Point 1, nuclear, 642 MW.
Recalculated setpoints for radiation monitors. (1989)

- **Virginia Power**

- North Anna 1 and 2, nuclear, 941 MW each.
Studied radiation monitoring system and recommended improvements to system performance. (1989)

- **Carolina Power & Light Company**

- Brunswick 1 and 2, nuclear, 815 MW each;
- H. B. Robinson 2, nuclear, 700 MW.

RESUME 21

[REDACTED]
Nuclear Technologies and Regulations Division
Senior Principal Engineer

Supervised shielding and radiological safety activities. (1983 to 1988)

- **Pennsylvania Power & Light Company**

- Susquehanna 1 and 2, nuclear, 1152 MW each.

Wrote and presented ALARA design training course for engineers. (1986)

"An Assessment of Engineering Techniques for Reducing Occupational Radiation Exposure at Operating Nuclear Power Plants" (coauthor), Atomic Industrial Forum, Inc., February 1980

PRIOR TO JOINING SARGENT & LUNDY

Prior to joining Sargent & Lundy, [REDACTED] was employed at Westinghouse Bettis Atomic Power Laboratory in the advanced core group. His work there included generating nuclear cross-sections for multigroup core analyses, core analyses, and preparing summary reports.

MEMBERSHIPS

American Nuclear Society
Health Physics Society

PUBLICATIONS

"Reflection of Gamma Radiation in a Spherical Concrete-Walled Room" (coauthor), Winter Meeting, American Nuclear Society, November 1986

"High-Range Containment Radiation Monitor Response to Postaccident Fission Product Releases" (coauthor), American Nuclear Society, San Francisco, California, November 1985

"Radiological Aspects of Injecting Hydrogen into Feedwater for Control of Intergranular Stress Corrosion Cracking at Boiling Water Reactors" (coauthor), American Nuclear Society/European Nuclear Society 1984 International Conference, Washington, D.C., November 1984

RESUME 22

Operations & Maintenance Project Engineer

EDUCATION

M.S., Nuclear Engineering, University of Illinois,
1977

Master of Business Administration, Illinois State
University, 1983

B.S., Electrical Engineering, Iowa State University,
1960

Registered Professional Engineer in Illinois

PROFICIENCIES

Thirty-six years of electric and gas utility experience related to long range planning (electric and gas), computer science, and nuclear power plant design and operation functions. Fourteen years of part-time consulting experience in economic analysis of utility rates. Extensive technical review and computer programming background.

EXPERIENCE

ComEd, LaSalle Nuclear Power Station

Supporting the ISEG in the area of human performance assessments of operating and maintenance activities through observation of individual and crew activities in the Control Room and in the field. Emphasis is placed on documenting activities where self-checking (STAR) and peer review were used by the observed personnel. The results of the observations are discussed with the Control Room Supervisors and the Shift Manager and documented on Field Monitoring Reports. NRC and INPO industry event reports are reviewed to identify events related to human performance and make the appropriate plant personnel aware of the events. (8/96-Present)

Supporting the ISEG in the area of industry experience awareness by identifying and distributing NRC information reports and INPO Operating Experience reports to appropriate personnel. Observations of Control Room operations were documented on Field Monitoring Reports and informal briefings of the Control Room Supervisors and the Shift Managers. (5/96-7/96)

ISEG Engineer in support of the ISEG during the Unit 1 refuel outage. Involved in assessments of outage shutdown safety and related industry events. Assessment of corrective actions related to License Event Reports (LER's).

Illinois Power Company

Supervisor - Independent Safety Engineering Group and the Engineering Assurance groups. In addition to the supervision of the ISEG discussed below, re-engineering of the site assessment activities, resulted in combining ISEG and EA under one supervisor. The EA group is involved in independent assessment of engineering processes and products with the goal of improving the engineering product. (4/93-1/96)

Served on the CPS Nuclear Review and Audit Group Safety Evaluation Review Subcommittee (12/86-1/96)

Supervisor - Independent Safety Engineering Group involved with Tech. Spec. required technical oversight of operating and maintenance activities at Clinton Power Station. Work involved the supervision of four engineers in performing independent technical reviews of industry experience reports for applicability to CPS as well as reviews of plant operating and maintenance activities. Reviews resulted in recommendations to management for improvements to plant design, processes and procedures. Emphasis was placed on technical

RESUME 22

Operations & Maintenance Project Engineer

content and organization of review reports to management. There was significant interface with management, plant staff and regulatory personnel and with other nuclear plants. Particular attention was given to shut down safety issues. (5/91-4/93)

Technical Advisor engaged in project management of various tasks including identifying design changes needed to update the simulator from a 1982 design to the current plant design, development of plant modifications to update the permanent tags and legend plates installed throughout the plant, identification and coordination of design changes necessary to clear nuisance Control Room alarms, development of operational schematic drawings, and re-establishing the basis for the radiation monitor calibration. Coordination of responses to NRC Bulletins dealing with traceability and falsification of component documentation. (8/85-5/91)

Supervisor of Control and Instrumentation engaged in the design of controls and instrumentation for the Clinton Station. Supervised up to 12 engineers in overseeing the design, procurement, installation and testing support of instrumentation and controls for one of the more advanced BWR nuclear reactor plants. Served on the BWR/6 Owner's Group Control Room Design Committee. (6/76-8/85)

Supervisor of Systems and Programming - Engineering supervision of six programmers engaged in computer programming of engineering and scientific applications. Work involved the programming and installation of the company's first on-line data processing installation used in connection with the generation dispatching and the development of a corporate financial model. Programming was done on IBM 360 equipment in FORTRAN, COBAL, Basic and RPG. (11/68-6/76)

Senior Engineering Systems Programmer engaged in computer program development of an engineering or scientific nature. Programs were developed for the Engineering, Personnel, Rate Service Area and Power Supply Departments. (2/67-11/68)

Electrical Engineer - Computer involved in computer program development, installation and processing for the Engineering Department. Programs were developed for the Bendix G15, IBM 1410, IBM 1130 and IBM 7094. (11/64-2/67)

Engineer involved in long range system planning of generation and transmission. Work involved load flow, transient stability and short circuit studies using analog and digital computers. Planning of the high voltage transmission plan for Wood River 5, Baldwin 1 and Coffeen 1. (6/60-11/64)

2/75-7/94 - Engaged in part-time consulting and computer programming in the area of economic analysis of electric and gas rates for U.S. and Canadian companies.

**Operations & Maintenance
Project Engineer**

EDUCATION

Courses towards B.S., Columbia Pacific University

EXPERIENCE

Comanche Peak Steam Electric Station, Senior Engineer (1996-Present) - Assigned to review the complete 10CFR50.65 (Maintenance Rule) implementation package as an independent reviewer for the utility client. This includes decision making logic, implementation procedures, training, documentation and the implementation of the project. Corrections are defined and presented to the utility and on approval are implemented.

Boston Edison Company, Pilgrim Nuclear Power Station (1989-1995) - Managed the division responsible for tracking federal, state and local legal requirements and completion of all commitments. Developed and implemented improvements to procedural and database portions of the management tracking system. Oversaw electronic tracking and recurring requirements for the Master Surveillance Tracking Program. Led reporting, prioritizing and tracking to completion of all levels of deficiencies for the Problem Reporting Program. Managed evaluation for applicability of experience gained at other facilities and tracking to completion of implementation of this experience for the Operating Experience Review Program. Coordinated evaluation of technical information for applicability, inclusion and tracking to completion for the Vendor Manual Review Program. Led development of the electronic database used for tracking and recording the above programs for the Integrated Action Data Base.

Project Manager (1991-1995) - Managed major projects, generating decision making and configuration management tools. Developed

the process to determine correct repetitive maintenance for critical equipment. Implemented the selected preventive and predictive activities to components in each system for Reliability Centered Maintenance. Developed and implemented the response to the Code of Federal Regulations required performance monitoring requirements, creating an industry model and using the EPRI-tailored collaboration process for the Nuclear Regulatory Commission Maintenance Rule. Managed the project to define, design and develop the implementation plant for the database for the Master Equipment List.

Deputy Maintenance Manager/Program Manager (1989-1991) - Performed all maintenance management functions. Led improvements and developed solutions to equipment and staff issues. Improved corrective/preventive equipment maintenance services and upgraded equipment. Enhanced the instrument calibration program to ensure compliance with regulatory requirements. Increased use and depth of equipment trending techniques employed in predictive maintenance.

Washington Nuclear Power 2, Principal Maintenance Engineer (1985-1989) - Delivered broad technical expertise for maintenance of industrial equipment. Planned, scheduled and supervised work for 65 technicians, completing outage on schedule and under budget. Disassembled, overhauled and tested a 1160 MWE generator while instructing inexperienced crews. Operational testing indicated no post-overhaul adjustments were required.

Washington Nuclear Power 3, Mechanical Supervisor (1980-1985) - Delivered broad technical expertise and management for the Mechanical Maintenance Division. Developed a startup plan and supporting capital and resource budgets. Coordinated return of invested capital against funds requirements to continue startup.

RESUME 23

**Operations & Maintenance
Project Engineer**

Built a startup/operational mechanical maintenance department with an initial staff of 15 employees for a large industrial facility.

Florida Power & Light, Turkey Point Nuclear Facility, Special Crew Supervisor; Electrical Maintenance Supervisor (1973-1980)

U.S. Navy, Naval Prototype Instructor; Engineering Watch Supervisor; Leading Petty Officer, Electrical (1965-1973)

**Operations & Maintenance
Project Engineer**

EDUCATION

SRO Certification
Operator Training Program

EXPERIENCE

His experience includes:

Browns Ferry, Modification Engineer (2/93-Present) - Perform final review and approval of modifications and work plans for outages and restart. Perform review of documentation for Environmental Qualification and Post Accident Monitoring (PAM) equipment and components. Also, evaluation and final sign-off of component input into the Equipment Management Systems (EMS) database.

Comanche Peak, Work Control Supervisor/Procedure Reviewer (8/91-2/93) - Perform duties as Work Control Supervisor, controlling maintenance, construction, and start-up work packages, and supervising the Safety Tagging Group which researches and places safety tags. Provide the technical review, 50/59 review, and approval of work and safety tags on the unit. Also provide review of start-up, and testing procedures for the Operations Department.

Arkansas Nuclear One, Operations Specialist Engineer (7/90-7/91) - Assigned to the operations standards group to provide evaluation for 50/59, write changes and revisions for operations procedures and provide review of same. Presented procedures to the approval committee for final approval.

Palo Verde Nuclear Generation Station, Operations/Maintenance Coordinator (4/90-7/90) - Provide technical and operations support for developing and implementing a program that categorizes plant equipment as to what unit conditions must exist to perform maintenance on this equipment and place this information in a

usable computerized format so long range maintenance schedules can be developed and produced by computer.

Savannah River Project, Operations Procedure Writer (1/90-3/90) - Assigned to the Operations procedure group to provide a rewrite of all operations procedures.

South Texas Project, Operations Advisor/Work Control and Outage Supervisor (4/88-10/89) - Performed duties as Outage Supervisor providing the schedule and implementation of the outage activities during refueling, scheduled and nonscheduled outages. Assigned to the integrated Planning and Scheduling Group as WCC Supervisor providing coordination and control over work packages for normal scheduled work as well as emergency and high priority work. Also produced the daily and weekly schedules. Performed as Ops Advisor to Unit 1 and 2 during Initial Start-Up and Power escalation.

Davis Besse, Shift Supervisor/Procedure Writer (10/88-4/88)

Palo Verde Nuclear Station, Shift Supervisor/Level 3 Start-Up Engineer (7/84-9/86)


Asco, Spain, Shift Supervisor/Operations Supervisor (9/82-1/84)


Bellefonte Nuclear Plant, Shift Engineer/Instructor (1/79-9/82)

Hartford Steam Boiler, Combination Inspector (9/75-4/76)

Cumberland City Power Plant, Jim Bridger Power Station, FMC, Green River Plant, and Other Fossil Plants, Shift Supervisor/Operator (5/70-1/79)

U.S. Marine Corps, Jet Engine Mechanic (8/65-8/69)

 Sargent & Lundy


Mechanical Project Engineering Division
Senior Mechanical Project Engineer

EDUCATION

Boston University - M.S. Mechanical Engineering - 1984

University of Michigan - B.S. Nuclear Engineering - 1979

REGISTRATION

Professional Engineer - Illinois



PROFICIENCIES


System design bases
Mechanical and systems engineering
Nuclear operations

RESPONSIBILITIES

As a senior mechanical project engineer, Mr. Marsh supervises the engineering and design of specific mechanical portions of nuclear projects including the design documents and drawings.

EXPERIENCE

 is currently involved with the documentation of design criteria and the preparation of analysis for several projects at Consumers Power Company's Palisades Nuclear Plant. In his previous assignments,  has worked on design basis documents, design changes, and special studies for a number of nuclear utilities.

Prior to this,  worked on shift as a licensed senior reactor operator at ComEd's Zion Station. He began his career as a technical staff engineer at Zion in 1979.

His experience includes:

SYSTEM DESIGN BASES

• Wisconsin Electric

- Point Beach 1 and 2, nuclear, 524 MW each.
Team leader of design basis validation of reactor coolant system and auxiliary feedwater system design basis documents (1993-1994)

• Commonwealth Edison Company

- Zion 1 and 2, nuclear, 1098 MW each.
Independent reviewer of station design basis documents. (1992-1993)
- Dresden 2 and 3, nuclear, 810 MW each;
- Quad Cities 1 and 2, nuclear, 828 MW each.
Independent reviewer of accident analysis and engineered safety features sections of two final safety analysis reports. (1991 to 1992)

Coordinated documentation collection for re-baseline and update of same. (1990)

• Northern States Power Company

- Prairie Island 1 and 2, nuclear, 593 MW each.
Supervised engineering team that performed design basis verification of the plant compressed air system. (1990)

RESUME 25

 **Sergeant & Lundy**

Mechanical Project Engineering Division Senior Mechanical Project Engineer

- **Wisconsin Public Service Corporation**
 - Kewaunee, nuclear, 560 MW.
Responsible for data collection, data review, and re-establishment of appropriate design basis information. (1987 to 1988)

MECHANICAL AND SYSTEMS ENGINEERING

- **Consumers Power Company**
 - Palisades Nuclear Plant, 812 MW.
Responsible engineer for containment air cooler replacement project. (1993-1995)
- **Commonwealth Edison Company**
 - LaSalle 1 and 2, nuclear, 1132 MW each.
Involved in radwaste modification and motor-operated valve upgrade. (1991)
 - Dresden 3, nuclear, 810 MW.
Responsible for mechanical engineering and design of hydrogen injection system. (1990)
 - Zion 1 and 2, nuclear, 1098 MW each.
Technical staff engineer responsible for design changes, operations, and maintenance support on various balance-of-plant equipment, including boiler feed pumps, compressors, and miscellaneous piping and valves. (1979 to 1985)
- **Wisconsin Public Service Corporation**
 - Kewaunee, nuclear, 560 MW.
Mechanical engineer for new condenser hot well level control system. (1988)

NUCLEAR OPERATIONS

- **Consumers Power Company**
 - Palisades, nuclear, 812 MW.
Performed independent review of radwaste system to recommend design improvements. (1996)
 - Prepared/reviewed analyses to support diesel fuel oil storage tank replacement. (1996)
 - Authorized study of service water system that provided recommendations on restoring design margin to system, (1994)
 - Conducted procedure review to develop required operations data for use in determining temperature rise of MOV operators. (1994)
 - Assisted in response to diagnostic evaluation team (DET) by reviewing auxiliary feedwater system licensing basis. (1994)
 - Developed thermal mode analysis for all safety-related piping for 79-14 reconciliation. (1992)
- **Wisconsin Electric**
 - Point Beach 1 and 2, nuclear, 524 MW each.
Developed thermal mode analysis for all safety-related piping for 79-14 reconciliation. (1991 to 1992)



Mechanical Project Engineering Division
Senior Mechanical Project Engineer

- **Northern States Power Company**
 - Prairie Island 1 and 2, nuclear, 593 MW each.
Analyzed proposed changes to diesel generator sequence loading in support of new diesel installation. (1990)

- **Rochester Gas & Electric Corporation**
 - Ginna, nuclear, 517 MW.
Principal researcher assessing effects of instrument bus failure on plant instrumentation and control circuits. (1989)

Evaluated effects of proposed additional load to diesel generators. (1989)

- **Wisconsin Public Service Corporation**
 - Kewaunee, nuclear, 510 MW.
Developed thermal mode analysis for various piping systems in support of 79-14 effort. (1989)

Developed diesel generator loading for input to station blackout analysis. (1988)

- **Commonwealth Edison Company**
 - Zion 1 and 2, nuclear, 1098 MW each.
Licensed Senior Reactor Operator/Shift Foreman/Shift Control Room Engineer.
Responsible for activities of control room operators and plant equipment operators during plant operations. (1986 to 1987)

MEMBERSHIPS

American Nuclear Society
American Society of Mechanical Engineers

Senior Engineer**AREAS OF EXPERTISE**

- Maintenance Rule Implementation
- Reliability Centered Maintenance
- Licensing
- System Engineering
- Design Engineering
- Personnel Training

EDUCATION

B.S. University of California at Berkeley

WORK EXPERIENCE SUMMARY

is a Senior Engineer responsible for providing support in the areas of licensing, design engineering, procurement engineering, design basis review, operations, and maintenance engineering.

WORK EXPERIENCE

is an mechanical engineer with extensive design and analysis experience in the nuclear power industry. As a system engineer supporting the design and startup of Limerick Generating Station Unit 2, his responsibilities included all design activities associated with the Control Rod Drive hydraulics, Standby Liquid Control, Reactor Core Isolation Cooling, High Pressure Coolant Injection, Core Spray, Containment Atmospheric Control, Primary Containment Leak Testing, and Post Accident Sampling System. Other work activities included design specifications for the installation of Reactor Pressure Vessel internals, the Traversing Incore Probe system, the Reactor Building crane, and the Primary Containment Vacuum Relief Valve assemblies. He performed a comprehensive study of HPCI/RCIC suction transfer time delays and pump discharge pressures and worked on the procurement of components, the environmental qualification of equipment, the review of design change documents, revisions of specifications and material requisitions, and licensing change notices, which involved the preparation of safety evaluation reports. He performed extensive work in Limerick Unit 1 operation/Unit 2 construction separation review and coordinated the upgrading of the piping and instrumentation drawings between Philadelphia Electric and Bechtel, the primary architect/engineer for Limerick.

assisted the Diablo Canyon Power Plant (DCPP) in implementing the Maintenance Rule. He completed the Reliability Centered Maintenance analyses on all safety related plant systems to support the Maintenance Rule effort. As project engineer, he was responsible for the establishment of DCPP performance criteria, maintenance procedures, project instructions, and maintenance systems.

served as the project engineer on the main feedwater system analyses at Commonwealth Edison's Byron and Braidwood Units 1 and 2 and on the ECCS, Main Steam and Instrument Air RCM studies for Comanche Peak Steam Electric Station Unit 1. Prior to this project, led the analysis of the Main Feedwater System at Comanche Peak, at Peach Bottom Atomic Power Station Unit 2, and at Baltimore Gas & Electric's Calvert Cliffs Nuclear Power Plant. In all of the feedwater systems analyzed, the General Electric steam turbine control system was a significant part of the study. In addition, he recently performed the RCM study of the Emergency Diesel Generator System at Southern California Edison's SONGS Units 2 and 3, and completed the Emergency Diesel Generator Controls Subsystem Study at Consumers Power Palisades facility. These analyses include development of functional failure analysis, failure modes and effects analysis, fault tree modeling, PM task selection and implementation planning.

As licensing engineer participated in a complete rewrite of the Final Safety Analysis Report for the San Onofre Nuclear Generating Station Unit 1 (SONGS 1). He continued his licensing support at SONGS 1 by assisting in recent revisions to the Updated Final Safety Analysis Report. This task required

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SECURITY CLEARANCE

U.S. Citizen

LICENSES/REGISTRATIONS/
PROFESSIONAL SOCIETIES

American Nuclear Society

the review, verification and incorporation of various design change documents provided by Southern California Edison. He modified the B&W Owner Group Improved Technical Specifications on various plant systems for the Sacramento Municipal Utility District (SMUD) to comply with Rancho Seco specific system design and was responsible for providing technical direction and revising portions of the Rancho Seco Updated Safety Analysis Report.

worked as a procurement engineer for the Arizona Nuclear Power Project, where he performed commercial dedication of spare parts and resolved Warehouse Deficiency Notices and Supplier Deviation Documentation Requests.

has participated in projects regarding Regulatory Guide 1.97 compliance evaluations and Class I-S Seismic Piping System reviews at the Nebraska Public Power District's Cooper Nuclear Station. He was involved in the decontamination of the Peach Bottom reactor water clean-up system and the review of the Peach Bottom Fire Protection Analysis.

Previously worked as a system design engineer for Bechtel Western Power. His responsibilities included design activities associated with the design and startup issues with plants under construction and design modifications for operating plants. Other experience at Bechtel includes the preparation of system design specifications, environmental qualification of equipment, the review of design change documents, revisions of specifications and material requisitions, and licensing change notices.

Senior Engineer, Systems Engineering

AREAS OF EXPERTISE

- AC & DC Power Systems
- Transmission and Distribution
- Energy Conversion
- Control Systems and Design
- GL 89-10 MOV Program Support
- Fire Risk Assessment
- Equipment Qualification
- 10 CFR 50, Appendix R
- System Engineering
- FMEA

WORK EXPERIENCE SUMMARY

██████████ is an Electrical Engineer responsible for providing support in the areas of design, design review, design basis review, MOV programs, fire risk assessment, operations and licensing. ██████████ has over ten years of practical engineering experience in the nuclear and other industries with special expertise in power systems, transmission and distribution, energy conversion, and control systems and design.

WORK EXPERIENCE

As a Senior Electrical Engineer in the Systems Engineering division at ERIN Engineering and Research, Inc., ██████████ is responsible for electrical engineering activities for many clients. ██████████ has developed unique methodologies for performing design analyses of both AC and DC electric power and control systems, including the evaluation of the effects of degraded voltage on DC motor speed and torque capability. ██████████ has participated in many design basis reconstitution and independent design review efforts and has an excellent knowledge of both electrical and mechanical discipline design and analysis techniques.

██████████ provided expert consultation to Entergy Operations Inc. in evaluating and resolving electrical separation issues at Arkansas Nuclear One Units 1 and 2 (ANO 1&2). ANO 1&2 were designed, constructed, and licensed prior to the issuance of industry standards for electrical separation. As such, this project required the evaluation of each specific requirement in IEEE 384 as modified by R.G. 1.75 and its objectives against the in-situ plant configuration. It also involved the development of plant specific review and acceptance criteria. The general scope of the project included the detailed review of the cable routing and power supply connections for all safety-related and associated circuits, and the resolution of unacceptable configurations.

██████████ also has design basis reconstitution experience with the Nebraska Public Power District, and is an Electrical Team Engineer on a project involving the engineering evaluation of as-built drawing discrepancies at Cooper Nuclear Station (CNS). In this capacity, George was responsible for investigation into the origin of discrepancies including the review of Design Change packages and Drawing Change Notices, coordinating with site engineering staff to rectify field wiring and component problems, and writing Engineering Evaluation Reports.

At CNS, ██████████ was also involved in the calculation of the Diesel Generator Transient Voltage Analysis. This calculation determined the maximum expected DG voltage drop during the load sequencing interval, and verified that the voltage available at the DG terminals for each major sequenced load step was sufficient to ensure proper acceleration and operation of the major plant equipment loaded onto the generator. This project provided the minimum expected voltage dip at the generator terminals for each major sequenced load step and the time that it occurred relative to load addition. Prior to this project, ██████████ was the lead

██████████
 Page 2

EDUCATION

B.S. Electrical Engineering,
 University of Toledo

engineer on an essential core cooling system (ECCS) single failure analysis project for NPPD. This project entailed reviewing all the flow diagrams and control schematics for all ECCS systems at CNS and evaluating the impact of possible propagated failures.

██████████ performed a review of CNS Diesel Generator Surveillance Procedures which verified the consistency of the initial in-service test conditions with the normal standby conditions of the DG and the requirements of the Technical Specifications. He then verified the test comprehensiveness and the acceptance criteria and checked the calibration procedures.

██████████ supported the Fire Analysis Project for the Duane Arnold Electric Company (DAEC). The project required the performance of Safe Shutdown analysis, reviews for cable routing, and system dependency reviews. This project entailed the evaluation of the impact of a postulated fire on the function and the availability of the supporting systems that had not been addressed by Appendix R analysis. ██████████ supported this project by analyzing the Plant PRA Fault Trees and identifying the control and power cables associated with the equipment in credited non-Appendix R systems.

██████████ has also participated in Generic Letter 89-10 MOV programs at CNS, Waterford 3 Steam Electric Station, Limerick Generating Station (LGS), Peach Bottom Atomic Power Station (PBAPS), Fort Calhoun Station, Monticello Nuclear Plant, Duane Arnold, Fermi, Arkansas Nuclear One, and Washington Nuclear Project No. 2. As a lead electrical engineer for ERIN, ██████████ evaluated degraded voltage conditions with respect to MOV operability, reviewed plant load and voltage studies, and evaluated cable and thermal overload heater sizing adequacy.

██████████ recently completed an on-site assignment at CNS where he was responsible for engineering analysis of MOVs in support of GL 89-10 testing during Refueling Outage No. 16. He prepared and checked work packages prior to testing and was involved in preparing Engineering Justifications for several minor modifications. He also witnessed numerous diagnostic tests, and was participated in pre-test briefings.

██████████ supported the closure of the PBAPS GL 89-10 MOV program, including the performance of the deterministic evaluation, review of the untestability justification, determination of valve prioritization, and ranking for periodic testing.

At LGS, PBAPS, and CNS, ██████████ was lead engineer and developer of the methodology used to calculate the stroke time of compound wound DC powered MOVs for both running load and full load conditions. The calculated MOV stroke times were based on degraded buss voltage and differential pressure conditions. The calculated stroke time values were then compared to the required values.

██████████ was the ERIN lead electrical engineer on MOV Program efforts for Entergy Operations' Waterford 3 Steam Electric Station and the Omaha Public Power District's Fort Calhoun Station. At Waterford, he determined minimum design basis voltage conditions from a review of design documentation for each MOV and evaluated the degraded voltage effects on

██████████
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LICENSES/REGISTRATIONS/
PROFESSIONAL SOCIETIES

*Professional Engineer,
State of Texas*

*Member, The National
Professional Engineers
Association*

MOV capability. ██████████ performed a control circuit review for all safety-related MOVs for both Waterford and Fort Calhoun. This review described the control circuit functional logic and developed the basis for thermal over load current protection application.

██████████ participated in the MOV Prioritization Project at Arkansas Nuclear One. This project established priorities for GL 89-10 MOV program completion by evaluating the safety significance of MOVs based on the plant-specific probabilistic safety assessment (PSA) coupled with a deterministic evaluation. ██████████ supported this project by identifying ANO GL 89-10 MOV critical safety functions, assessing safety significance of these critical safety functions, and calculating MOV design margin based on as-left thrust at control switch trip (CST) settings.

Prior to joining ERIN, ██████████ was with a large engineering consultant firm where he was assigned to TVA's Watts Bar nuclear plant to interpret vendor testing and environmental parameters to provide NUREG-0588 compliance of EQ components, and to upgrade or downgrade components and material to meet the appropriate QA level. This required contacting vendors, purchasing required updated components and coordinating receipt inspection/ANSI storage facilities, and writing Purchase and Transfer Requisitions.

██████████ participated in a Grand Gulf Nuclear Station Equipment Qualification update project. This project entailed the revision of Environmental Qualification Data Packages, incorporating Design Document Changes, Design Changes, Material Non-Conformance Reports, update calculations and upgrade of some equipment from NUREG-0588 Category II to Category I requirements. ██████████ was also assigned to Houston Lighting and Power, South Texas Project to determine the Equipment Qualification requirements for Class 1E components such as radiation, temperature, relative humidity, aging and cycling per IEEE 323, 10CFR50.49, NUREG-0588 requirements and researching vendor recommended maintenance requirements and incorporate the information in both mild and harsh environments. ██████████ is conversant with current industry procurement issues which includes EPRJ Guidelines, 10CFR50.49 Appendix B, and ANSI standards.

Prior to his TVA experience, ██████████ was with MTS Corporation where he was a Quality Control Engineer in charge of computer setpoint modifications of machinery and inspection of MTS products to assure quality production. In this role, he also did computer programming and reviewed the Company's Daily Quality Report.

As the Production Coordinator for Hamzo Electrical Company, ██████████ maintained high quality production output. He managed wiring production and performed maintenance and troubleshooting on control panels (generators and motors) and various types of electrical equipment.

RESUME 28

Sargent & Lundy

QUALITY ASSURANCE SENIOR QUALITY ASSURANCE ENGINEER

EDUCATION

University of Notre Dame - M.S. Physics - 1973

Iona College - B.S. Physics - 1969

PROFICIENCIES

Quality assurance/quality control (QA/QC)
Specification and procedure review and development
Codes and standards
Inservice inspection/testing (ISI/IST)
10 CFR 50.59 safety evaluations
Procurement
Decommissioning

RESPONSIBILITIES

As a senior quality assurance engineer, [REDACTED] is responsible for maintaining the Sargent & Lundy (S&L) QA program and certain general quality assurance procedures. He is also a qualified audit team leader.

EXPERIENCE

[REDACTED] has more than 20 years of experience in the nuclear power industry. His experience encompasses component manufacturing, engineering, and plant operations. [REDACTED] has also assisted in the development of ISI and IST programs.

His specific experience includes:

- **Sargent & Lundy (S&L)**
 - Senior Quality Assurance Engineer. Rewrote S&L QA program so that its primary focus is on supporting plants in the operating phase vs. construction phase. Also, involved in revising

procedures to support this change. (Program revision was approved by NRC). (1995)


- Senior Materials Engineer
Duties included technical support for LaSalle 1 and 2, Second Interval ISI program update which included the review of licensing and code commitments, and bases document data. (1993 to 1994)
- Byron 1 and 2/Braidwood 1 and 2, nuclear, 1175 MW each.
Quality Control Coordinator. Reviewed vendor procedures and resolved vendor exceptions to QA/QC requirements. (1977 to 1980)

- **Portland General Electric**
 - Trojan 1, nuclear, 1216 MW.
Decommissioning Engineer. Member of Decommissioning Team and responsible for QA portion of the decommissioning plan. (1993)

Quality Control Engineer. Reviewed various types of plant and support procedures for quality and technical requirements. This was part of general effort to upgrade the quality of plant procedures. Assisted in the licensing submittals for the Second Interval ISI and IST programs. (1988 to 1993)

Quality Assurance Engineer. Reviewed various types of offsite procedures for quality and technical requirements. Also, reviewed procurement documents including design specifications for correctness in quality and technical requirements. (1980 to 1988)

 Sargent & Lundy


QUALITY ASSURANCE
SENIOR QUALITY ASSURANCE ENGINEER

- Crane Company
 - Quality Assurance Specialist
Responsible for quality requirements of
commercial nuclear valves. (1973 to
1977)

RESUME 29

Electrical Project Engineering Division **Senior Electrical Project Engineer**

EDUCATION

Valparaiso University - B.S. Electrical
Engineering - 1968

REGISTRATION

Professional Engineer - Illinois

PROFICIENCIES

Electrical engineering
Plant betterment
Substations

RESPONSIBILITIES

directs electrical engineers, analysts and draftsmen in development of the conceptual design, design of individual system components, and preparation of bid procurement specifications. evaluates the proposals of manufacturers, makes purchase recommendations, and monitors the activities of manufacturers to ensure that manufacturers' drawings and finished components are received on schedule. He works with the client and with manufacturer and contractor representatives to ensure that the electrical design, engineering, and construction of the power plant incorporate the latest techniques. He coordinates the electrical engineering work with that of other Sargent & Lundy departments. reviews specifications and drawings to ensure that all electrical work is correctly done. After plant construction begins, he makes periodic visits to the site to check on progress of the electrical work.

EXPERIENCE

has considerable experience in the electrical design and engineering of major steam-electric generating stations. He has been

a senior electrical project engineer for nuclear-fueled stations and an electrical project engineer both for nuclear- and fossil-fueled stations.

directs electrical engineers, analysts, and designers in the development of design layouts, controls design for protection and operation, engineering procurement activities, including the determination of equipment sizes and ratings, and drawings. Special areas of responsibility include auxiliary power distribution, cabling, security, fire protection, and project monitoring.

Additional experience includes assignments to substations located in Indiana, Iowa, Ohio, and Indonesia. He directed the interface of substation designs and was responsible for licensing and related engineering work required to integrate the substation into the overall power plant site, including the project in Korea.

Also, has been assigned to work within the utility's organization in Korea to assist in the utility's liaison with, and review of, the architect/engineer's design and vendor procurement submittals both for the plant and the substation. In addition, preliminary conceptual design for substation additions for new plants were developed for internal utility discussions.

Before this, was an electrical engineer responsible for electrical engineering associated with power plants, including system design, engineering procurement activities, detail layout, circuit breaker coordination, control board layout, and substation interfacing. He joined Sargent & Lundy in 1968. His specific experience includes:

DESIGN AND CONSTRUCTION

- Commonwealth Edison Company (ComEd)
 - Dresden 2 and 3 and Quad Cities 1 and 2, nuclear, 850 MW each.

RESUME 29

Electrical Project Engineering Division Senior Electrical Project Engineer

Senior Electrical Project Engineer. (1992 to present)

- **Korea Electric Power Corporation**
 - Yonggwang 3 and 4, nuclear, 1000 MW each.
Senior Electrical Project Engineer. (1990 to 1992)
- **Northern Indiana Public Service Company**
 - Schahfer 18, coal, 393 MW.
Electrical Project Engineer. (1985 to 1986)
 - Schahfer 14, coal, 521 MW.
Electrical Engineer. (1972)
 - Bailly N-1, nuclear, 684 MW (cancelled).
Electrical Engineer. (1969, 1971 to 1972)
 - Michigan City 12, coal and gas, 521 MW.
Electrical Engineer. (1970 to 1971)
 - Mitchell 11, coal, 115 MW.
Electrical Engineer. (1968 to 1970)
- **Illinois Power**
 - Clinton 1, nuclear, 990 MW.
Electrical Project Engineer. (1976 to 1984)

BETTERMENT

- **Northern Indiana Public Service Company**
 - Schahfer 14, coal, 521 MW.
Electrical design for superheater header monitoring. (1986 to present)
 - Schahfer 14-17, coal, oil turbine, 1426 MW total.
Electrical design for gas ignition/fuel addition. (1985 to 1986)

SUBSTATIONS

- **Perusahaan Umum Listrik Negara (Indonesia)**
 - Paiton SPP 1 and 2, 500/150/20 kV.
Project Engineer - Substations. (1984 to 1985)
- **The Cincinnati Gas & Electric Company**
 - Miami Fort 7 and 8, 345 kV;
 - Zimmer 1 (SF₆ insulated), 345 kV.
Electrical Project Engineer. (1973 to 1975)
 - Todhunter, 345/138/69 kV.
Substation Engineer. (1972 to 1973)
 - Willey, 138/34.5 kV.
Substation Engineer. (1972)
- **Interstate Power Company**
 - Lansing 4, 161/69 kV.
Electrical Project Engineer. (1973 to 1975)
- **Northern Indiana Public Service Company**
 - Schahfer 14, 345/138 kV.
Electrical Project Engineer. (1973 to 1975)
 - Michigan City 12, 345 kV.
Substation Engineer. (1972 to 1973)

STUDIES

- **ComEd**
 - Assessed Appendix R fire protection analysis on the ac and dc electrical distribution systems of Dresden 2 and 3 and Quad Cities 1 and 2. Developed relay and breaker/overload coordination studies to evaluate effects of fires in order to successfully trip affected services and retain bus' operation for other critical services using coordination

Electrical Project Engineering Division
Senior Electrical Project Engineer

and cable impedances for fault reduction. (1988)

Western Society of Engineers

- **Cook County Hospital**

- Analyzed existing 480V power distribution network throughout the hospital complex from the utility interface, and conceptually developed a new 12 kv distribution network for long-range hospital facility improvements. (1987 to 1988)

- **Tennessee Valley Authority**

- Assessed design calculations and developed generic calculation lists to evaluate client's calculation lists for completion. (1986 to 1987)

- **Interstate Power Company**

- Precipitator addition. Developed electrical distribution for estimating project costs. (1970)

OWNER'S SUPPORT/LIASON

- **Korea Electric Power Corporation**

- Assisted in reviewing architect/engineer plant and substation design and vendor procurement submittals including design comment interface within the utility departments, security design interface, and conceptual substation design layout assistance for multiple plants. (1988 to 1990)

MEMBERSHIPS

Institute of Electrical and Electronics Engineers
Chicago Section - Conference Chairman
(1979 to 1980)

Power Engineering Society - Chicago Chapter

- Chairman (1979 to 1980)
- Vice-Chairman (1978 to 1979)
- Secretary-Treasurer (1976 to 1977)
- Program Chairman (1975 to 1976)

RESUME 30

Sargent & Lundy

Nuclear Technology & Regulations Division
Regulatory Compliance and Plant Systems
Senior Project Engineer

EDUCATION

University of Chicago - MBA - 1988

University of Virginia - M.E. Nuclear
Engineering - 1980

University of Virginia - B.S. Nuclear Engineering -
1978

REGISTRATION

Professional Engineer - Illinois

PROFICIENCIES

Licensing
Shielding
Radiological safety
Final safety analysis reports
Fire protection
Seismic Qualification Utility Group (SQUG)

RESPONSIBILITIES

[REDACTED] supervises the regulatory compliance and plant systems group. He has the responsibility of coordinating the preparation and licensing review of design change packages for various modifications on nuclear-fueled generating stations. He also performs liaison with governmental agencies, vendors, clients, and other divisions within Sargent & Lundy.

EXPERIENCE

[REDACTED] has experience in both nuclear licensing activities and shielding design and radiological safety analyses. His nuclear licensing activities include the preparation and

issuance of amendments to final safety analysis reports; analysis for and preparation of 10 CFR 50 Appendix R safe shutdown reports; performance of an internal missile study; coordination of the responses to significant operating experience reports; training of client personnel on the Appendix R safe shutdown analysis and review checklists; preparation of criteria to identify fire protection-Q boundaries and equipment for several nuclear power stations; review of heavy loads concerns; development of SQUG safe shutdown equipment lists; and review of preoperation and startup test results.

[REDACTED] shielding design and radiological safety analysis activities have included performing and reviewing a wide variety of shielding design calculations. These calculations require knowledge in the use of various computer codes that use point kernel integration techniques and account for radioisotope buildup and decay. He has been involved in the preparation of postaccident zone maps, the shield wall design review, and the Institute of Nuclear Power Operations (INPO) management self-evaluation review of a major utility's radiological safety program.

Currently, **[REDACTED]** is serving on the Nuclear Energy Institute's Fire Protection Working Group, which is addressing Thermo-Lag and revised Appendix R issues.

[REDACTED] joined Sargent & Lundy in 1980. His relevant experience includes:

Sargent & Lundy

Nuclear Technology & Regulations Division
Regulatory Compliance and Plant System
Senior Project Engineer

NUCLEAR PLANT PROJECTS

- **Wisconsin Electric**
 - Point Beach 1 and 2, nuclear, 524 MW each.
Reviewed Appendix R shutdown procedures and safe shutdown analysis. (1994)
Revision of Fire Protection Reports (1995)
- **Houston Lighting & Power Company**
 - South Texas Project 1 and 2
Reviewed Thermo-Lag inside containment used as a radiant-energy shield for combustibility and effect on safe shutdown. (1993)
- **Northern State Power**
 - Prairie Island 1 and 2, nuclear, 500 MW each.
Developed program to resolve Thermo-Lag issue. (1993 to present)
- **Commonwealth Edison Company**
 - Dresden 2 and 3, nuclear, 1545 MW total.
 - Quad Cities 1 and 2, nuclear, 769 MW each.
Resolved safety system functional inspection findings; developed the SQUG preliminary safe shutdown equipment list; 10 CFR 50 performed Appendix R safe shutdown analysis; trained client personnel in reviewing the impact of modifications of station fire protection programs; revised station Appendix R safe shutdown procedures; performed 10 CFR 50.59 safety review; reviewed SRP BTP 9.51 Appendix A commitments to determine those made redundant by Appendix R analysis; involved in systematic evaluation program and NRC Appendix R inspections; developed system reference documents; reviewed rebaselined UFSAR; developed justifications for relief from commitments, updated pre-fire plans. (1984 to present)
- Reviewed modifications for heavy load concerns, including Dresden reactor recirculation pump replacement modifications and review of problems with cranes at both stations. (1988 to 1991)
- Byron 1 and 2, nuclear, 1120 MW each. Braidwood 1 and 2, nuclear, 1120 MW each.
Developed program to resolve Thermo-Lag issue. (1993)
- Radiation dose calculations for equipment qualification. (1982)
- Dresden 2 and 3, nuclear, 1545 MW total.
Internal missile study. (1982)
- LaSalle 1 and 2, 1122 MW each.
Resolved safety system functional inspection findings; 10 CFR 50 Appendix R safe shutdown analysis and fire hazards analysis. (1988 to 1991)
- Byron 1 and 2, 1120 MW each.
Supervised the review of preoperation and startup tests and test results. (1986 to 1988)

RESUME 30

Sargent & Lundy

Nuclear Technology & Regulations Division
Regulatory Compliance and Plant Systems
Senior Project Engineer

- **TU Electric**

- Comanche Peak 1 and 2, 1150 MW each.

Updated design basis documents. (1991)

Updated fire protection report and calculations. (1990)

INPO management self-evaluation review. (1983)

- **Omaha Public Power District**

- Fort Calhoun 1, nuclear, 478 MW. Developed criteria for review of fire protection system modifications and missile protection. (1987 to 1988)

- **Carolina Power & Light Company**

- Brunswick 1 and 2, 790 MW each. Prepared fire protection Q-list criteria and fire protection Q-parts list. (1984)

- **Virginia Power**

- Surry 1 and 2, 775 MW each. Coordination and licensing review of design change packages. (1984)

- **Illinois Power**

- Clinton 1, 985 MW. Developed program to resolve Thermo-Lag issue. (1993)

Coordinated FSAR amendment preparation and 10 CFR 50 Appendix R safe shutdown analysis including supervision of onsite team performing the analysis. (1980 to 1984)

- **PSI Energy**

- Marble Hill 1 and 2, 1175 MW each (cancelled).

Coordinated FSAR amendment preparation and coordinate responses to significant operating experience reports. (1983)

- **The Cincinnati Gas & Electric Company**

- Zimmer 1, 839 MW (cancelled). Shield wall design review and shield wall design calculations. (1982 to 1983)

Analysis for and preparation of post-accident radiation zone maps. (1980)

STUDY

- Plant Betterment Project. Generic design of a dry cask storage facility. (1983)

MEMBERSHIPS

American Nuclear Society

Illinois Society of Professional Engineers

National Society of Professional Engineers

**General Manager,
Systems Safety and
Reliability**

AREAS OF EXPERTISE

- Regulatory Compliance
- Shutdown Risk Analyses
- PSA Analyses
- ORAM Studies
- Control Room HVAC Design Basis
- Tornado Hazard Risk
- FMECA Studies
- System Analyses

WORK EXPERIENCE SUMMARY

██████████ is a Registered Engineer with over 16 years of experience in the nuclear and process industries. ██████████ has experience in the areas of probabilistic safety assessment, nuclear, licensing, design engineering, design basis review, operations and engineering. ██████████ has directed projects regarding many issues including evaluations to support IPE development, shutdown risk assessment, unreviewed safety questions, interpretation of design bases, independent design reviews, dispersion analysis, hazard characterization, and radiological dose consequence analysis.

WORK EXPERIENCE

██████████ is the General Manager, Systems Safety and Reliability, responsible for providing support in the areas of probabilistic safety assessment (PSA) in support of client efforts in the areas of design issue resolution, at-power on-line maintenance assessment, shutdown risk analyses, JCO support, Technical Specification optimization, safety hazard assessment, system reliability studies and other safety issues.

██████████ is currently supporting Omaha Public Power District (OPPD) and Nebraska Public Power District (NPPD) in the implementation of on-line maintenance (OLM) evaluations at their Fort Calhoun Station (FCS) and Cooper Nuclear Station (CNS), respectively. The FCS project includes development of a risk matrix for evaluation of work activities involving equipment out-of-service and development of a SENTINEL model. The activities at CNS consist largely of the development of an OLM program from the ground up. Both of the projects involve development of associated implementation procedures and training.

██████████ has a technical oversight role in the Cooper Nuclear Station IPEEE closeout efforts. This includes responsibility for acceptance of all Tier 2 documentation and development of the Tier 1 documentation for NRC submittal. ██████████ is also the technical consultant to a separate ERIN project to perform all technical activities necessary to complete the Fire IPEEE scope for Cooper.

██████████ is also in an oversight role on an on-call PSA assistance project to provide assistance for CNS in 1996. The planned tasks are severe accident management consulting, support of CNS' improved technical specification program, update of the PSA and other emergent PSA issues.

██████████ recently supported the Nebraska Public Power District in the role of the lead technical support for all PSA related activities performed at CNS. Activities included project management of a complete of a PSA update and development of risk-based evaluation of on-line work activities. ██████████ performed a complete revision to the reliability group procedures and assisted NPPD in the oversight of input to the Maintenance Rule, initiation of activities to develop the CNS on-line maintenance program and coordination of IPEEE close-out. The PSA update included the benchmarking of the existing CAFTA model results, development of revised HRA values and the restructuring of the ATWS event trees. The

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EDUCATION

B.S. Chemical Engineering,
 University of Nebraska

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updated PSA will be an instrumental tool in the performance of PSA Applications at CNS.

██████████ has been functioning in a PSSA technical oversight role for recently supported ERIN's applications of ORAM in the U.S. and international nuclear industry. He has also supported many ERIN PSA-related technical training on the use of ORAM. Currently, he is a technical contributor to the SENTINEL code for safety evaluation of at-power configurations at nuclear power plants. SENTINEL is a joint project between ERIN and EPRI.

██████████ provided extensive support to Nebraska Public Power District's efforts to restart their Cooper Nuclear Station. Assistance included resolution of IST program discrepancies, support of NRC audits, development of restart action plans, development of procedural upgrades, limited PSA applications for JCO development, contribution to NRC RALS related to license amendment requests and many other tasks. Mr. Bennett also assisted in a peer review of NPPD's fire IPEEE technical evaluation.

██████████ was the technical lead for analyses being performed to re-baseline the control room operator and offsite dose calculations at NPPD's Cooper Nuclear Station (CNS). This effort was performed to respond to as-found discrepant configurations discovered in Cooper's most recent outage. The scopes include development of the post-LOCA design basis dose calculations, development of a criteria for allowable ECCS leakage, and support of NRC questions for plant restart. Mr. Bennett had a consulting role in ERIN's recent project to establish the CNS radiological dose design basis for the control rod drop accident. This effort was necessary to establish the CNS design basis margin within the bounding analysis performed by GE in NEDO-31400 to justify removal of reactor trip on high steam line activity.

██████████ has lead ORAM shutdown safety efforts for Arkansas Nuclear One (ANO) Units 1 and 2, Clinton Power Station, Fort Calhoun Station, NPP Krško, San Onofre Units 2 and 3, and WNP-2. The ANO, NPP Krško, and WNP-2 scopes are development of detailed probabilistic shutdown safety assessment (PSSA) and risk management guidance (RMG) models in EPRI's ORAM software. These studies included detailed review of industry shutdown event data, development of plant-specific event sequence scenarios, development of plant-specific human recovery analyses, manipulation of the plants IPE models in support of ORAM's PSSA quantification, delivery of detailed work package and report documentation, and technology transfer. The models were developed to interface directly with the actual outage schedule data for plant configuration information and serve to enhance these utility's capability in meeting NRC, INPO and NUMARC initiatives in the area of shutdown risk management.

██████████ provided extensive support to OPPD in their development of an outage safety program to meet NUMARC 91-06 for their Fort Calhoun Station. He also contributed to the ORAM RMG model that complements their program. A similar effort was completed for NEK's NPP Krško WWR plant in Slovenia. ██████████ has supported numerous ORAM-related technology transfer training sessions for these and other clients.

██████████
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LICENSES/REGISTRATIONS/ PROFESSIONAL SOCIETIES

*Professional Mechanical
Engineer, State of California*

PUBLICATIONS

Available Upon Request

██████████ had lead responsibility in ERIN's IPE projects for the San Onofre Unit 1 and Trojan plants. He performed numerous system analyses and developed the Level 1 event sequence analyses and system success criteria for these two IPE's supported by ERIN. ██████████ had the project engineer responsibility for the Level 1 quantification effort for Trojan and developed the supporting insights, and he also performed system analyses for ERIN's efforts on the San Onofre Unit 2/3 Level 1 IPE.

██████████ assisted PGE personnel in the completion of the Trojan Level 2 analysis. ██████████ provided technical support for ERIN's project to perform Level 2 analyses for PECO's Limerick and Peach Bottom BWRs. ██████████ provided assistance in ERIN's peer review of the fault tree analyses for the Arkansas Nuclear One, Units 1 and 2, and Turkey Point IPE PRAs. Performed internal flood analyses in support of IPE projects for San Onofre Units 2/3, Trojan and Waterford 3. ██████████ was the lead for the IPEEE offsite hazards analysis for Fort Calhoun Station.

At Portland General Electric, ██████████ assisted in the resolution of environmental qualification issues related to the Trojan auxiliary feedwater pump rooms and the review of station blackout documentation. He also was involved in the resolution of identified external hazards issues for Trojan control and auxiliary building ventilation systems.

██████████ has lead or had lead participation in several efforts related to control room HVAC design and design basis. These efforts were completed for San Onofre Unit 1, Trojan Nuclear Plant, Fort Calhoun and Cooper Nuclear Station. The technical work performed includes the development of system design basis, review of plant design to the design basis, review of design options to meet the design, basis, performance of dose and toxic hazards calculations, and interface with the NRC to defend the existing design.

Efforts to quantify the tornado hazard risk at SONGS 1 and for a control room habitability system modification at PGE's Trojan plant were led by ██████████. These efforts used systems analysis and PRA techniques to determine the risk of damage from tornado wind and missile effects is acceptably low. He also was the technical lead on a similar scoping effort related to San Onofre 1 high energy line break (HELB) risk analysis, and performed a limited scope seismic PRA for a review of options being considered by the DOD to convert a commercial nuclear reactor to a DOD plutonium production facility.

██████████ served as the project engineer for an effort to assist Portland General Electric (PGE) in their response to Generic Letter 89-13 requirements by performance of an FMEA and fault tree based analysis for the Trojan component cooling and service water systems. The effort consisted of the definition of the systems' licensing basis, performance of fault tree analyses and FMEAs and evaluation of the adequacy of existing calculation and operational bases.

██████████ was the Project Engineer in a nine (9) month effort to evaluate the performance of Sacramento Municipal Utility District's operation and design activities at their Rancho Seco nuclear power plant. This effort was in technical support of an independent review committee set up to monitor plant performance of management, operations and technical activities.

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[REDACTED] participated in the 1986-1988 San Onofre Unit 1 USFSAR development project as a lead writer for Chapters 2.2, 3.3, 3.5, 6.2, 6.3, 6.4, all of Chapter 7, all of Chapter 10, and all of Chapter 11. This project was unique in that it was an upgrade of an early 1970s vintage FSAR format to an upgraded Reg. Guide 1.70 format, including update since the last revision in 1975.

As a licensing engineer for Southern California Edison, [REDACTED] was involved in activities in the areas of steam generator related matters, and development of plans to meet revised regulations regarding the use of plant simulators for training and examination of plant operators. [REDACTED] was lead engineer for the responses to SONGS 1 post TMI requirements, NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants", and on various Systematic Evaluation Program (SEP) topics, including Tornado Design, HVAC Systems Design, Reactivity Control Systems Design, and Control and Protection Interaction.

[REDACTED] was a systems design engineer for Omaha Public Power District, performing as lead design engineer for modifications to Fort Calhoun in response to post-TMI (NUREG-0737) requirements in the areas of containment hydrogen monitoring, isolation of containment purge and post-accident sampling. Other responsibilities included the design and implementation of alternate spent fuel pool cooling and pressurizer spray valve modifications.

[REDACTED] was an assistant Plant Engineer for Archer Daniels Midland (ADM) Company in Lincoln, Nebraska. Responsibilities consisted of engineering design, design review, and technical support for a large vegetable oil production facility (~ \$300M/year product output). He was project engineer for the construction of a major refining and component cooling system expansion, as well as modifications to existing systems.

Senior Engineer, Systems Engineering

AREAS OF EXPERTISE

- AC & DC System Design
- Design Reviews
- Design Basis Reconstitution
- Regulatory Compliance
- Appendix R
- FSAR Update
- Plant Modifications

WORK EXPERIENCE SUMMARY

[REDACTED] has experience in multiple engineering facets of commercial nuclear power and DOE facilities. His electrical engineering experience encompasses design, design analysis, and regulatory compliance aspects for both new and retrofit plant projects. He is familiar with PWR and BWR designs for both essential safety and BOP systems and their electrical system supporting requirements.

WORK EXPERIENCE

[REDACTED] has extensive experience in the commercial nuclear power industry, including electrical distribution system design, battery systems, control schemes, Instrumentation and Controls, Appendix R reviews, equipment qualification, licensing/regulatory compliance, physical electrical layout, commodity tracking systems and program verification/validation. In addition to performing detailed engineering, [REDACTED] has performed many ancillary engineering tasks such as, procedure development, independent reviews/assessments, design basis reconstitution, and computer program verification/validation.

[REDACTED] was part of the Independent Assessment team investigating the design of the Comanche Peak Steam Electric Station, reviewing electrical calculations supporting the plant's design bases and compliance with licensing commitments. The types of calculations reviewed include: system voltages, short circuit, equipment sizing, coordination of protective devices, battery sizing, voltage drop, cable sizing, instrument scaling, instrument loop accuracies and instrument setpoint/calibration.

He also investigated allegations of inadequacy of design for the TVA's four nuclear plants. Major areas of review were diesel generator loading calculations and the existence of all calculations necessary to support the design bases of each plant. Separately, participated in the Program for Assurance of Completion and Assurance of Quality for the Watts Bars facility to document fulfillment of licensing commitments and readiness for operation.

[REDACTED] served as Project Engineer on three separate projects performing Independent Third Party Reviews of design change packages for SCE's SONGS 1,2&3 and Arkansas Nuclear One. Modifications reviewed include extensive control room changes to resolve Human Factors Engineering deficiencies, and electrical system reconfiguration to provide electrical train separation. Reviews included assessment of system's operation, instrumentation, and controls on overall plant safety.

[REDACTED] was the principal reviewer of several modification packages for NPPD's Cooper Nuclear Station (CNS) in connection with the resolution of a condition report questioning the technical adequacy of installed designs. The review involved the detailed verification of the as design documentation as well as the installed configuration and the adequacy of the post modification testing to detect inadequacies.

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EDUCATION

*B.S. Electrical Engineering,
San Jose State University*

*M.B.A., Management Science,
California State University at
Hayward*

SECURITY CLEARANCE

U.S. Citizen

**LICENSES/REGISTRATIONS/
PROFESSIONAL SOCIETIES**

*Professional Engineer, State of
California*

Member IEEE

Member ANS

PUBLICATIONS

Available Upon Request

provided complete independent verification of the Appendix R cable data set for the CNS Safe Shutdown analysis resulting in the identification of several missing cables as a result of plant modifications.

was Project Engineer for the development of Design Basis Document system licensing bases from original plant records (circa 1965) through current documentation for SCE's SONGS 1. He also assisted in the development of design bases documents for the AC and DC electrical systems at Trojan.

His system design experience includes assignments as:

- Lead electrical engineer on the Reference Leg Injection for Cooper Nuclear Station design change project responsible for all electrical design drawings, calculations, specifications and criteria necessary to implement the modification including control room controls and instrumentation.
- Engineering support to Cooper Nuclear Station during an NRC SSFI by performing calculations to demonstrate the functionality of the DC system at CNS. Efforts included the development of a realistic load profile to be used in voltage drop calculations, the actual voltage drop calculations and analysis showing the adequacy of voltages at motor-operated valves for starting and the acceptability of operating times.
- Served as the Cognizant Engineer for the multi-discipline design change package for the addition of motor operators to the ADV block valves for Rancho Seco plant. Responsible for all design technical adequacy, analysis and implementing documentation.
- Performed an electrical coordination study for Philadelphia Electric Company's Peach Bottom Atomic Plant AC and DC electrical systems. Activities included performing short circuit analyses of both the AC and DC systems, time-current curve generation for all existing circuits, and recommendation development for system improvements.
- Electrical design engineering on the Hope Creek Generating Station Project, where he performed electrical calculations including: short circuit, voltage drop, load flow voltage studies, and station black-out analyses. Other duties included generation and review of specifications, vendor drawing review and coordination, Appendix R reviews (including high impedance faults analysis), and qualification testing of isolation devices (per R. G. 1.75). He also prepared and reviewed schematic diagrams and connection drawings utilizing vendor drawings, schematics, and control system logics.



**POWER SERVICES MANAGEMENT
SENIOR MANAGER**

EDUCATION

- B.S. Electrical Engineering, University of Missouri at Columbia
- Senior Licensed Operator for 10 years at Quad Cities.

PROFICIENCIES

- 24 years of experience with ComEd and 6 years of experience with the United States Navy Nuclear Program.

EXPERIENCE

- Plant Manager for Quad Cities for 7 years, and Plant Manager for Dresden for 1 1/2 years.
- Nuclear Operations Manager at the Downers Grove office working with Mr. Mike Wallace (Sr. Vice President and Chief Nuclear Officer) for 9 months.
- Production superintendent for Quad Cities for 1 year.
- Assistant Superintendent of Maintenance for 5 years, and oversaw all maintenance activities, including contract maintenance for the entire plant site.
- Operations Engineer on Unit 2 in charge of all operations of that unit.
- Shift Foreman for 18 months supervising personnel in the plant who reported to the shift engineers.
- Engineer in the Technical Staff Engineering Group.
- Nuclear Engineer on Unit 2 for 2 years and he was in the Electrical Group for 8 months.



**OPERATIONS & MAINTENANCE SUPPORT SERVICES
SENIOR PROJECT ENGINEER**

EDUCATION

- B.S. Electrical Engineer, Iowa State University, Ames, IA, 1964

PROFICIENCIES

- Worked at two fossil generating stations and two nuclear generating stations. Spent 24 years at Quad Cities Nuclear Power Station in various management positions.

LICENSE

- Senior Reactor Operator

EXPERIENCE

- **Nuclear Division, 7/92-11/95**
 - Coordinated operating support to six nuclear stations.
 - Nuclear Support Representative on the Business System Planning initiative.
 - Nuclear Support Representative on the Applied Resource Management computer application.
- **Quad Cities Nuclear Power Station, Manager of Engineering & Construction, 5/88-7/92**
 - Coordinated technical engineering requirements.
 - Supervised Construction Superintendent.
 - Coordinated station modifications.
 - Planned, organized and controlled activities of the various departments in the Engineering and Construction area.
- **Quad Cities Nuclear Power Station, Production Superintendent, 4/86-5/88**
 - Responsible for Operating Department, Electrical, Mechanical, Instrument Maintenance Departments and the Stores Department.
- **Quad Cities Nuclear Power Station, Services Superintendent, 3/85-4/86**
 - Responsible for station engineering, radiation/chemistry, quality control, security and clerical departments.
- **Quad Cities Nuclear Power Station, Assistant Superintendent, Operations, 7/79-3/85**
 - Supervised the Operating Department which was responsible for the day to day operations of two 832 MWe nuclear reactors, turbine/generators and all support equipment.
 - Maintained my Senior Reactor Operators license.
- **Quad Cities Nuclear Power Station, Operating Engineer, 12/72-7/79**
 - Responsible for one of the two 832 MWe nuclear reactors, turbine/generators and support equipment including the radioactive waste area.
 - Obtained my Senior Reactor's Operators license.
- **Quad Cities Nuclear Power Station, Instrument Engineer, 3/68-12/72**
 - Organized the Instrument Department during plant construction.
 - Performed initial startup testing of all instrumentation.
 - Created maintenance and surveillance procedures for plant instrumentation.



**OPERATIONS & MAINTENANCE SUPPORT SERVICES
SENIOR PROJECT ENGINEER**

- Operational Analysis Department, 6/65-3/68
 - Assigned to Joliet Station during construction of Units 7&8.
 - Assigned to Kincaid Station during construction of Units 1 & 2.
 - Installed and maintained process computer.

RESUME 35

Bergant & Lundy

Operations & Maintenance Support Services
Senior Project Engineer

EDUCATION

M.S. - University of Arizona - 1972

B.S. - University of Wyoming - 1965

Continuing Education in:

- Project Management
- Root Cause Analysis Corrective Actions
- Quality Team Training
- Leadership Training

PROFICIENCIES

Extensive engineering and operating management experience based on a successful 23 year career with the nation's leading nuclear utility. Authored and presented papers covering subjects including Shutdown Risk, Fuel Cycle Durations, Economics, and Outage Planning and Management. Actively participated in technology exchanges. Developed and implemented reengineered process. Expert in wide variety of PC software.

EXPERIENCE

His experience includes:

• ICC Regulatory Services

- Consulted in the reconciliation process of revenues collected under fuel adjustment charges with actual costs for ComEd. Researched and analyzed management of operations and outage performance. Provided input to the development of testimony, defense strategies and cross examinations. Consultant. (1996 - Present)

• Commonwealth Edison

Project Manager (1994 - 1995)

- Promoted the work control reengineering effort at six autonomous nuclear operating sites as defined by a interdisciplinary team to ensure a common approach, efficient utilization of resources and benefit from economy of scale.

Senior Analyst. (1993 - 1994)

- Instrumental in the reengineering and formation of the Independent Review of Group and the Safety Review Board Process. Qualified independent safety reviewer in the following disciplines: Nuclear Power Plant Technology, Power Plant Design, Reactor Safety Analysis, Utility Operations, Reactor Engineering, Instrumentation and Control.

Superintendent. (1984 - 1993)

- Provided functional direction on work control and outage management issues to the six autonomous site Work control Departments. Developed wide-ranging comprehensive organizational and process recommendations through comprehensive analysis and extensive benchmarking by a six-person interdisciplinary team including external management consultants.



Operations & Maintenance Support Services
Senior Project Engineer

On loan to Clinch River Breeder Reactor -
(1979 - 1984)

Deputy Branch Chief

- Senior level manager loaned to a consortium established to develop and build a Liquid Metal Fast Breeder (LMFBR) Reactor demonstration plant. Accomplished first of a kind engineering designs that could be applied to the demonstration plant. Accomplishments included: Maintenance and surveillance inspection technical exchange to Japan, Authored and presented papers on LMFBR maintenance and inspection techniques.

Maintenance Engineer. (1972 - 1984)

- Responsible for all electrical instrumentation and mechanical maintenance at the nuclear station. Supervised a staff of 125 crafts, technicians and engineers and administered a \$1,000,000 annual department budget.

- Johnson & Johnson

Maintenance Engineer (1970 - 1971)

- Supervised the crafts that modified & maintained the equipment that was being developed to manufacture disposable baby diapers.

- U.S. Air Force (1965 - 1970)

Captain

Honorable Discharge

RESUME 36

**Nuclear Plant Division
Project Engineer**

EDUCATION

University of Illinois at Chicago - M.S. Structural Engineering - 1981

Technical University (Belgrade) - B.S. Civil Engineering - 1975

REGISTRATIONS

Professional Engineer - Florida, Illinois

PROFICIENCIES

Structural engineering
Field engineering
Design basis documentation
Structural analyses

RESPONSIBILITIES

supervises and assigns work to a group of structural engineers performing design and analysis of various types of structural elements. He sees that designs follow project design criteria, Sargent & Lundy policy and procedures, and applicable codes and standards. He sees that comments from other Sargent & Lundy departments, as well as vendor and contractor information, are incorporated into the design.

EXPERIENCE

was the structural engineer responsible for the design of the Niagara Mohawk Power Corporation decay heat removal system at Nine Mile Point. He currently works in the Chicago office on various plant modifications and field problem resolution for Consumers Power Company's Palisades Nuclear Power Plant and Illinois Power Company's Clinton Nuclear Power Plant. Prior to this, he worked on Commonwealth Edison Company's Byron and Braidwood nuclear power stations on various plant modifications and field problem resolution.

Prior to this, he worked on the Nebraska Public Power District's Cooper nuclear station during an outage. He has been involved in on-the-spot resolution of design and installation problems during the reactor coolant pump removal/reinstallation.

was responsible for coordination of field and design activities at Illinois Power's Clinton nuclear power station associated with the snubber reduction program. He also issued several design change notice packages dealing with modifications in the containment and fuel handling building.

worked on Tennessee Valley Authority's Watts Bar nuclear power station, where he supervised a group of eight engineers responsible for the documentation review, walkdowns, and client interface to determine how to meet licensing requirements for the civil/structural calculations.

also worked on the Nebraska Public Power District's Cooper Nuclear Station heating, ventilating, and air conditioning (HVAC) modifications. He has been involved with the structural design since October 1988 and designed many of the HVAC duct support and chilled water pipe supports for DC 88-201 and DC 87-185. He also prepared calculations for DC 88-201A, the MG set exhaust stack modification.

was engaged on the design basis document program for Tennessee Valley Authority's Watts Bar Station. He evaluated the structural aspects of the station's licensing documents, including the updated final safety analysis report, safety evaluation reports, deviation reports, and responses to Nuclear Regulatory Commission bulletins and generic letters.

RESUME 36

Nuclear Plant Division Project Engineer

supervised 10 to 20 structural engineers onsite at Commonwealth Edison Company's Braidwood nuclear power station. Work involved the initial design as well as the resolution of field problems associated with the installation of structural components. also has two years of field experience working on the resolution of mechanical component support installation problems. He met with the client, contractors, and personnel in other Sargent & Lundy divisions, such as project management and mechanical and electrical departments, to resolve various design and field construction problems, including active involvement in coordinating activities of groups of structural, as well as mechanical engineers and designers, to ensure timely completion for small bore, large bore, and instrumentation support analysis. He ensured that design work complied with applicable AISC, ASME, and ACI code requirements.

In addition, was responsible for providing technical support for Commonwealth Edison Company's Braidwood construction assessment program. Specifically, he worked on structural evaluation of welded connection discrepancies.

He reviewed drawings for constructibility on Braidwood and provided support of the field activities by proposing alternative solutions, modifications of existing structures, walkdowns for structural assessment, etc.

He participated in work scheduling and interfacing activities, reviewed production reports and schedules, etc.

has trained engineers in linear, three-dimensional space frame beam, a finite element program, a finite element program for the incremental nonlinear analysis, and a finite element program for the concrete expansion anchor and embedded plate analysis.

Prior to joining Sargent & Lundy in 1982, worked at another engineering firm where he was responsible for the coordination of construction and design activities to assure that they were in conformance with ACI and AISC requirements; all field change requests were properly resolved; potential interference problems were eliminated and, if necessary, design modified; and that all requirements specified in project design documents involving various construction stages were followed; and that material used met applicable design specifications.

has also been responsible for the structural analysis of reinforced concrete walls, beams and slabs; steel plate girders; braces, connections; steel columns and foundation design; major modifications of industrial building involving both design and construction activities that involved pile foundation design and drilling new beams, columns, and crane runways; equipment foundation design and construction cost estimates and other related activities; flume and head-loss analysis; structural analysis of braced deep excavation cuts and tunnels; and the structural design of special purpose walls (designed for sudden impact-missile loads).

His experience includes:

- **Consumers Power Company**
 - Palisades, nuclear, 812 MW (1993 to present)
- **Commonwealth Edison Company**
 - Byron 1 and 2/Braidwood 1 and 2, nuclear, 1175 MW each.
Senior Structural Engineer. (1991 to 1993)
 - Braidwood 1 and 2, nuclear, 1175 MW each.

RESUME 36

Nuclear Plant Division Project Engineer

Senior Structural Engineer. (1985 to 1988)

Structural Engineer. (1982 to 1985)

- **Nebraska Public Power District**
 - Cooper, nuclear, 835 MW.
Senior Structural Engineer. (1988 to 1991)
- **Illinois Power**
 - Clinton, nuclear, 990 MW.
Senior Structural Engineer. (1990 to 1991)
- **Tennessee Valley Authority**
 - Watts Bar 1 and 2, nuclear, 1270 MW each.
Senior Structural Engineer. (1988 to 1990)

MEMBERSHIPS

Illinois Structural Engineers Association
Society of Professional Engineers - Illinois

RESUME 37

Instrumentation & Controls Project Engineering Division Project/System/Resident Engineer

EDUCATION

Mississippi State University - Course work completed toward M.S. Electrical Engineering

Sardar Patel University (India) - B.S. Electrical Engineering - 1969

REGISTRATION

Professional Engineer - Illinois

PROFICIENCIES

Instrumentation and control (I&C)
Modification design
Equipment specification and procurement

Working knowledge of Word and Excel

RESPONSIBILITIES

As an I&C project engineer, [REDACTED] has primary responsibility for the development of I&C systems for nuclear generating stations. He either performs or directly supervises the efforts of I&C engineers and designers towards the completion of all tasks on his project. These include preparation of design criteria and safety analysis reports; I&C diagrams; instrument portions of piping and instrumentation diagrams; preparation of instrument indexes, data sheets, logic diagrams, master diagrams, loop schematics, instrument location drawings, and installation details; control board layouts and arrangements; preparation of I&C specifications, evaluation of proposals, and purchase recommendations; monitoring of vendors' engineering and manufacturing schedules; and review of vendor drawings. He also trains I&C engineers in the performance of these tasks. [REDACTED] applies appropriate standards, procedures, and regulations to specific tasks assigned. He is knowledgeable in the Sargent & Lundy Quality Assurance Program.

EXPERIENCE

[REDACTED] has extensive experience in the design and engineering of major nuclear-fueled steam-electric generating stations. He was assigned to Houston Lighting & Power Company's South Texas Project units 1 & 2 to prepare studies for the vibration monitoring system and the turbine supervisory system upgrade. He was also part of the team which prepared the reactor vessel hot leg temperature reduction modification based on a Westinghouse conceptual study, as well as part of the NSSS and BOP plant modification team. Prior to these assignments, [REDACTED] was assigned to a Niagara Mohawk Power Corporation's Nine Mile Point station project in which he prepared an I&C design to resolve the nuisance alarm problem for generator/stator coolant inlet and outlet conductivity and service water flow valve hydraulic units trouble conditions.

Prior to his assignment with Niagara Mohawk Power Corporation, [REDACTED] completed a field assignment at Illinois Power's Clinton site as the lead engineer for all I&C modification design. He was responsible for preparing estimates and schedules, system engineering and design, equipment specification and procurement, modification packages, and support associated with installation processes. This work involved supervising other engineers. He also was chairman of the process radiation (safety-related) system design review group at Clinton.

Prior to that, [REDACTED] completed a field assignment at Carolina Power & Light Company's Brunswick station. His work included analysis and procedural techniques to determine safety-related functions of equipment, components, and instruments; establishing spare parts requirements; and developing requisition procedures. For PSI Energy's Marble Hill station,

RESUME 37

Instrumentation & Controls Project Engineering Division Project/System/Resident Engineer

██████████ prepared I&C design documents and reviewed the I&C design as applicable to government codes, regulations, and standards.

Prior to joining Sargent & Lundy in 1983, ██████████ was employed by another engineering firm. He prepared procurement specifications and evaluated bids, programmed a programmable controller, and engineered wastewater treatment I&C equipment.

His specific experience includes:

- **Hope Creek**
 - Preparation and review of instrumentation calibration cards and resolving problems.
 - Qualification of radiation monitor - testing guidelines (November 1995 to present)
- **Salem 1**
 - Backlog reduction-calibration related problems, system related problems (July 1994 to August 1995)
- **Fermi 1**
 - Vibration monitoring modification for the main turbine generation (1994)
- **Houston Lighting & Power Company**
 - South Texas 1 and 2, nuclear, 1312 MW each.
I&C Project Engineer. Preparation of conceptual study for the vibration monitoring system and the turbine supervisory system and the high & low totally dissolved solid tanks level monitoring. Preparation of Thot reduction modification. Auxiliary steam line radiation monitoring system modification review. Preparation of manhour estimates for various NSSS and BOP modifications. (1993)
- **Niagara Mohawk Power Corporation**
 - Nine Mile Point 2, nuclear, 1100 MW.
I&C Lead Project Engineer. Preparation of I&C design to resolve nuisance alarm problem for generator/stator coolant inlet and outlet conductivity and service water flow valve hydraulic units trouble conditions. Provide conceptual study for battery room HVAC flow switch nuisance alarm problem. Write I&C position of system design base document for the fire protection, instrument air, reactor, water cleanup, high-pressure core spray, circulating water, standby gas treatment, and control room HVAC systems. (1992)
- **Commonwealth Edison Company**
 - Zion 1 and 2, nuclear, 1098 MW each.
I&C Project Engineer. Resolve questions of component safety classification. (1991)
 - Dresden 2 and 3, nuclear, 810 MW each.
 - Quad Cities 1 and 2, nuclear, 828 MW each.
I&C Project Engineer. Participated in the NSSS and BOP systems component classification team. (1993)
 - LaSalle 1 and 2, nuclear, 1132 MW each.
Prepared EWRs and DCRs. (1994)
- **Illinois Power**
 - Clinton 1, nuclear, 990 MW.
I&C Lead Project Engineer. Conducted a study and provided recommendations of commercially available level instrumentation, and prepared modification packages to replace all existing radwaste tank level instrumentation. Performed reworking of instrumentation on auxiliary

RESUME 37

Instrumentation & Controls Project Engineering Division Project/System/Resident Engineer

boiler system to obtain a better representative sample for conductivity monitoring. Prepared reactor recirculation pump vibration monitoring modification. Participated in the neutron flux monitoring modification. Performed setpoint calculations for rod block monitoring system. Prepared studies for the reactor water level monitoring and suppression pool level monitoring systems. Responsible for preparing estimates and schedules, system engineering and design, equipment specification and procurement, modification packages, and support associated with installation processes at the site. (1987 to 1991)

I&C Engineer. Prepared I&C design documents and drawings for initial plant design including system engineering, design, equipment specification, instrument loop diagram preparation, and vendor drawing review in the home office. (1986 to 1987)

- **Carolina Power & Light Company**

- Brunswick 1 and 2, nuclear, 815 MW each.
I&C Engineer/I&C Project Engineer. Developed procedures and analysis techniques to determine relative nuclear safety-related functions of equipment, components, and instruments (Q-list). Developed requisition procedures for procurement of nuclear safety-related spare parts. (1984 to 1986)

- **PSI Energy**

- Marble Hill 1 and 2, nuclear, 1175 MW each (cancelled).
I&C Engineer. Member of the vibration monitoring system procurement team. Prepared I&C design documents and drawings for initial plant design including

system engineering, design, equipment specification, instrument loop diagram preparation, and vendor drawing review. (1983 to 1984)

MEMBERSHIPS

Institute of Electrical and Electronics Engineers
Instrument Society of America - Member, ISA/SP
67.01 and 67.02 Committee