RAS 4456

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Morgan Lewis
COUNSELORS AT LAW

May 17, 2002

The Honorable Thomas S. Moore, Chairman
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Re: MOX Fuel Fabrication Facility Construction Authorization Request Proceeding, Docket No. 70-3098-ML

Dear Judge Moore:

Provided below, in accordance with paragraph 10 of the Atomic Safety and Licensing Board's April 30, 2002 Memorandum and Order, is a list of those experts who Duke Cogema Stone & Webster expects will provide testimony in the above-captioned proceeding. Relevant biographical information for each is attached as well.

1. GANE Contention 1 "Lack of Consideration of Safeguards in Facility Design"

A. Gary Bell
Lead Electrical Engineer
Duke Cogema Stone & Webster
128 South Tryon Street
Mail Code FC-12A
Charlotte, NC 28202

B. Kenneth D. Bristol
MC&A Operations Manager
Nuclear Fuel Services
1205 Banner Hill Road
Erwin, TN 37650

SECY 02

C. Donald Joy
JAI Corporation
215 Candlewood Drive
Conway, SC 29526-8982

2. GANE Contention 2 "Lack of Physical Protection in Facility Design"

A. Gary Bell
Lead Electrical Engineer
Duke Cogema Stone & Webster
128 South Tryon Street
Mail Code FC-12A
Charlotte, NC 28202

B. Scott Johnson
Nuclear Fuel Services
1205 Banner Hill Road
Erwin, TN 37650

C. Mike Golden
Principal Safeguards and Security Engineer
Westinghouse Safety Management Solutions, LLC
2131 South Centennial Avenue
Aiken, SC 29804-5388

3. GANE Contention 3 "Inadequate Seismic Design"

A. John M. McConaghy, Jr., P.E.
Engineering Supervisor
Duke Cogema Stone & Webster
128 South Tryon Street
Mail Code FC-12A
Charlotte, NC 28202

B. Lawrence Salomone
WSRC Site Chief Geotechnical Engineer
Savannah River Site, 730-B, Rm. 304
Aiken, SC 29808

4. GANE Contention 5 "Incorrect Designation of Controlled Area"[1]

A. Peter S. Hastings
Licensing Manager
Duke Cogema Stone & Webster
128 South Tryon Street
Mail Code FC-12A
Charlotte, NC 28202

B. Kenneth A. Boucher
Manager, Emergency Operations
Westinghouse Savannah River Company
P.O. Box 616
Aiken, SC 29802

5. GANE Contention 6 "Inadequate Safety Analysis"

A. Gary H. Kaplan
Engineering Supervisor
Duke Cogema Stone & Webster
128 South Tryon Street
Mail Code FC-12A
Charlotte, NC 28202

B. Thomas N. St. Louis
Senior Lead Engineer
Duke Cogema Stone & Webster
128 South Tryon Street
Mail Code FC-12A
Charlotte, NC 28202

C. Werner Bergman, Ph.D.
6260 Stoneridge Mall Road
No. A213
Pleasanton, CA 94588

1 These witnesses will also address GANE Contention 8 and BREDL Contention 9A.

6. GANE Contention 9 "Inadequate Cost Comparison"

A. Peter S. Hastings
Licensing Manager
Duke Cogema Stone & Webster
128 South Tryon Street
Mail Code FC-12A
Charlotte, NC 28202

B. Mary L. Birch
Manager, Environment Safety and Health
Duke Cogema Stone & Webster
128 South Tryon Street
Mail Code FC-12A
Charlotte, NC 28202

C. Theodore J. Bowling
Consulting Scientist
Duke Cogema Stone & Webster
128 South Tryon Street
Mail Code FC-12A
Charlotte, NC 28202

7. GANE Contention 11 "ER Fails to Address the Waste Stream from Aqueous Polishing"[2]

A. Peter S. Hastings
Licensing Manager
Duke Cogema Stone & Webster
128 South Tryon Street
Mail Code FC-12A
Charlotte, NC 28202

B. Mary L. Birch
Manager, Environment Safety and Health
Duke Cogema Stone & Webster
128 South Tryon Street
Mail Code FC-12A
Charlotte, NC 28202

---

[2] These witnesses will also address BREDL Contention 1E.

C. Theodore J. Bowling
Consulting Scientist
Duke Cogema Stone & Webster
128 South Tryon Street
Mail Code FC-12A
Charlotte, NC 28202

Respectfully submitted,

DUKE COGEMA STONE & WEBSTER

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Alex S. Polonsky
Marjan Mashhadi
Morgan Lewis & Bockius LLP
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CERTIFICATE OF SERVICE

I hereby certify that copies of the May 17, 2002 Letter to the Honorable Thomas S. Moore, Chairman, were served this day upon the persons listed below, by both e-mail and United States Postal Service, first class mail.

Secretary of the Commission*
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
Attn: Rulemakings and Adjudications Staff
(E-mail: HEARINGDOCKET@nrc.gov)

Administrative Judge
Thomas S. Moore, Chairman
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
(E-mail: tsm2@nrc.gov)

Administrative Judge Charles N. Kelber
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
(E-mail: cnk@nrc.gov)

Glenn Carroll
Georgians Against Nuclear Energy
P.O. Box 8574
Atlanta, GA 30306
(E-mail: atom.girl@mindspring.com)

Office of Commission Appellate Adjudication
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
(E-mail: hrb@nrc.gov)

Louis Zeller
Blue Ridge Environmental Defense League
PO Box 88
Glendale Springs, N.C. 28629
(E-mail: BREDL@skybest.com)

* Original and 2 copies

Administrative Judge Peter S. Lam
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Washington, D.C. 20555-0001
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Donald J. Moniak
Blue Ridge Environmental Defense League
P.O. Box 3487
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Mitzi A. Young, Esq.
Office of the General Counsel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
(E-mail: may@nrc.gov)

5/17/02

Marjan Mashhadi Date

Gary Bell

Duke Cogema Stone & Webster (DCS)
Software Design Group Manager
B.S., Electrical Engineering

24 Years Experience

DUKE COGEMA
STONE & WEBSTER

Summary

24 years of technical experience in electrical engineering and engineering management in both commercial nuclear power and U.S. Department of Energy projects. Most recent experience as the lead electrical engineer for the DOE Actinide Processing and Storage Facility which was designed stabilize, repackage and store special nuclear materials, primarily plutonium metal and oxide powder.

Lead Electrical Engineer, Duke Cogema Stone & Webster 03/99 to Present

- Design of the electrical distribution system for the MOX Fuel Fabrication Facility.
- Design of the Instrument and Controls for the mechanical and electrical utilities.
- Development of the construction specifications for the MOX process and the mechanical and electrical facilities.
- Design of the physical security systems for the MOX Fuel Fabrication Facility and the preparation of the security program documents
- Development of the Measurement Control and Accounting program for the MOX Fuel Fabrication Facility and design of the required instrument systems.
- Incorporation of the surveillance equipment of the IAEA into the design of the MOX Fuel Fabrication Facility process.
- Preparation of the licensing documents of Electrical systems, I&C systems, physical security systems, MC&A program, human factors design, and protection of classified material.

Professional Development

- Professional Engineer, Colorado
- Professional Engineer, South Carolina

Clearances

Active DOE L clearance

Work Experience

Lead Electrical Engineer, Actinide Packaging and Storage Facility, 2 years

- Responsible for the electrical system design.
- Responsible for the security system design.

Project Manager, Electrical Engineering Support Contract, Hanford Site (Westinghouse Hanford Company), 3 years

- Manager of a number of electrical engineering and software tasks for the Hanford tank farms and Hanford utility systems

Project Manager, Continuing Engineering Services to Omaha Public Power District Fort Calhoun Station,3 years

- Manager of a various upgrade tasks, electrical, mechanical, and structural.

Lead Electrical Engineer and Project Engineer, Continuing Engineering Services to Omaha Public Power District Fort Calhoun Station,5 years

- Design Radiation Monitor Upgrade
- Electrical and controls design for post accident sampling system.
- Electrical and controls design for control room habitability upgrades.

Lead Electrical and Controls Engineer, N-Reactor Control Room Habitability Upgrades, 2 years

- Electrical design of new standby power to new control room ventilation system.
- I&C design for control room habitability upgrade

a. **Name & Title:** **Kenneth D. Bristol, MC&A Operations Manager** b. **Project Assignment:** **MC&A,** Lead c. **Name of Firm with which Associated:** **Nuclear Fuel Services** **Office Location:** Erwin, TN d. **Years Experience:** **With this Firm** 26 **With Other Firms** 0	e. **Education:** BS/1966/Chemistry/Eaast Tennessee State University MBA/1973/Business Administration/East Tennessee State University f. **Active Registrations:** Clearance: DOE L Clearance Clearance: NRC U Clearance

g. **Other Experience and Qualifications Relevant to the Proposed Project:**

Summary of Management & Technical Experience Relating to and Required by this Position	
• Currently serving as MC&A lead manager for the development of the Fundamental Nuclear Material Control Plan (FNMCP) licensing document for the MOX Fuel Fabrication Facility to be located at the Savannah River Site. Plan to be prepared per 10 CFR § 74 Subpart E (Category I material quantities). Position duties also include providing MC&A input to facility design, developing position papers concerning MC&A issues that arise, coordinating MC&A licensing document preparation with associated security requirements including DOE requirements and negotiating MC&A licensing issues with the NRC Nuclear Material Safeguards and Security Licensing group. • Served as member of a four person team to develop Nuclear Fuel Services, Inc. 10 CFR § 74 Subpart E FNMCP. Responsible for maintenance of Category I FNMCP for fourteen years including a major revision for a new technology Naval Fuel Process. • Developed and maintained procedures implementing MC&A program requirements for twenty years.	• Developed procedures for the safe conduct of waste packaging, waste storage area operation and waste shipping operations at the Fernald Environmental Management Project. Duties required interpretation of DOE orders and understanding of Nevada Test Site waste burial criteria. • Managed the day to day performance of MC&A activities in a facility processing Category I quantities of material. Position involved the supervision of professional personnel. • Has twenty-six years of experience in the MC&A of special nuclear material including plutonium and highly enriched uranium. Fifteen years of this experience have been involved with implementation of the 10 CFR § 74 Subpart E Strategic Special Nuclear Material MC&A rule.

Chronological Summary of Experience:	
1999-Present MC&A Operations Manager Nuclear Fuel Services, Inc. Staff supervised: 2	Has the lead responsibility for the generation of the MOX Fuel Fabrication Facility (MFFF) Fundamental Nuclear Material Control Plan (FNMCP) NRC licensing document. This assignment also includes providing input to the facility design process to ensure the ability to comply to the requirements of 10 CFR § 74 Subpart E. Production of the FNMCP includes the integration of the MFFF MC&A program with the NRC security requirements given in 10 CFR § 73 and DOE security requirements given in DOE Order 470.1. The duties of this position include managing the activities of NFS and contract MC&A expert personnel.
1996-1999 MC&A Specialist Nuclear Fuel Services, Inc. Staff supervised: None	Responsible for the maintenance of NFS's FNMCP and associated implementing procedures. In addition to FNMCP and procedure maintenance, duties included supervising performance of physical inventories, maintenance of computerized item control system database and participating in the design of NFS's new Naval Fuel Process. During this time period, NFS was performing small recovery operations for various customers including DOE facilities. Each job involved a unique material type which required a change in the FNMCP and revision of implementing procedures.
1994-1996 Temporary Assignments Nuclear Fuel Services, Inc. Staff supervised: None	Performed a number of temporary assignments during a period of MC&A program inactivity due to loss of NFS's Naval Fuel contract. One assignment was the remediation of mixed waste generated at the Fernald Environmental Management Project (FEMP), Fernald, Ohio. This activity was performed at the NFS, Erwin Facility. The mixed waste included low level radioactive wastes contaminated with metallic mercury, lead, chromium, barium, cadmium, etc. and organic materials such as oils and volatiles. A second assignment was located at the FEMP facility at Fernald, Ohio. This assignment involved the development of procedures for the safe packaging and management of waste materials generated at the FEMP. The procedures implemented the requirements of DOE Orders and the Waste Acceptance Criteria of the Nevada Test Site, NVO-325.

1990-1993 Safeguards & Measurements Manager Nuclear Fuel Services, Inc. Staff supervised: 15	Managed the day to day MC&A activities at NFS. The duties of the position included the definition, establishment and maintenance of systems, procedures and practices for the control and accounting of nuclear materials. The functions managed included the maintenance of the MC&A computer data bases, the physical inventory process, the measurement control program, strategic special nuclear material process and item monitoring for diversion detection, and an internal MC&A auditing program. The MC&A computer data bases included the nuclear material/item measurement information, the item control data base, the material/item transfer transactions data base, the physical inventory data base, and the measurement control data base. The physical inventory process included issuing of instructions for the performance of and inventory, listing of inventory in process and vault areas, control of vault areas during listing, compilation and data entry of material measurement information and reconciliation of inventory accounts. The measurement control program is a measurement statistical quality control program which controlled all nuclear material accountability measurements including plutonium NDA measurements. The process monitoring program monitored nuclear material within each unit operation of the manufacturing process to provide near real time material control and detect a diversion of a strategic quantity of material. The item monitoring program monitored the presence of nuclear material in item form to detect the diversion of a strategic quantity of material. The internal MC&A auditing program provided oversight of NFS's compliance to MC&A requirements. This position included the management of 15 professional personnel including the Safeguards & Measurements Supervisor and the Nuclear Material Measurements Statistician. During this period, served as a primary contact for NRC regulatory personnel during licensing and inspection activities. Successfully managed the implementation of the requirements of the NFS 10 CFR 74 Subpart E Strategic Special Nuclear Material Fundamental Nuclear Material Control Plan (FNMCP). The FNMCP was implemented with minimal impact to NFS's operations.
1983-1990 Safeguards & Measurements Supervisor Nuclear Fuel Services, Inc. Staff supervised: 7	Supervised the physical inventory process and an internal MC&A auditing program. Responsibilities included supervising, reconciling and investigating inventory differences, supervising and monitoring measurement control functions, developing and maintaining MC&A procedures. Served as member of a four person team during the development of the NFS 10 CFR 74 Subpart E FNMCP. Developed the procedures for the process and item monitoring activities required by the NFS 10 CFR 74 Subpart E FNMCP. During this period, inventory difference performance improved steadily. The MC&A auditing program received compliments from NFS contracted and regulatory auditing personnel.

1980-1983 Material Control Superintendent Nuclear Fuel Services, Inc. Staff supervised: None	Advised upper management personnel of activities that adversely affected MC&A. These duties required day to day observation of NFS nuclear manufacturing and MC&A activities. During this period, gained a thorough knowledge of the NFS fuel manufacturing and uranium recovery processes. The knowledge of these processes proved to be invaluable in the development of plans and procedures to implement 10 CFR 74 Subpart E MC&A requirements within NFS operations.
1978-1980 SNM Auditor Nuclear Fuel Services, Inc. Staff supervised: None	Performed audits of the NFS MC&A programs. The performance of these audits was instrumental in the implementation of the 10 CFR 70:57 measurement control requirements at NFS. Wrote the procedures that directed the auditing program.
1969-1971 Laboratory Supervisor Nuclear Fuel Services, Inc. Staff supervised 5	Supervised all quality control and accountability analyses of plutonium products and feed materials. During this period two shipper/receiver differences with the feed material supplier (Hanford) were settled in NFS's favor.

RESUME OF DONALD R. JOY

HOME ADDRESS: 215 Candlewood Drive, Conway, SC 29526-8982

HOME PHONE: (843) 347-9235 **E-MAIL ADDRESS:** donjoy@sccoast.net

SOCIAL SECURITY # **DATE OF BIRTH:** Jan. 13, 1934

EDUCATIONAL BACKGROUND High School: Punahou School *
Honolulu, Hawaii

College: Oregon State University **
Corvallis, Oregon

Post graduate courses in research chemistry, reactor physics, and reactor engineering.

* A private college preparatory school (regarded as one of the best in the nation).

** Graduated June 1958 with a BS degree in chemistry (with emphasis in analytical and metallurgical chemistry).

EMPLOYMENT HISTORY

1996 to Present --- Semi-retired, part-time nuclear consultant employed by JAI Corp (Fairfax, VA) --- Have performed work relative to (1) writing a Fundamental Nuclear Material Control Plan for a proposed Atomic Vapor Laser Isotopic Separation uranium enrichment plant; (2) reviewing and making changes and additions to a safeguards program for the proposed High Level Waste Repository at Yucca Mountain; and (3) writing (authoring) a text book titled "An Introduction to the Nuclear Fuel Cycle and Nuclear Safeguards".

1976 to 1996 --- U.S. Nuclear Regulatory Commission (Division of Fuel Cycle Safety & Safeguards) --- Started as "MC&A Specialist" (GG-13/1). Last position title was "Sr. Safeguards Technical Analyst" (GG-15/10). --- Duties included (1) reviewing license applications, plans and various proposals relative to nuclear material safeguards; (2) developing appropriate regulatory requirements in the area of Material Control & Accounting (MC&A); (3) developing new and revised MC&A licensing criteria, standards, and guides; (4) serving as technical consultant and/or as technical project manager for various contracts for the NRC; and (5) monitoring and assisting with the NRC's MC&A inspection program. --- Duties also included considerable analyses and technical writing relative to both domestic and international safeguards issues.

1974 to 1976 --- Westinghouse Electric Corporation, Plutonium Fuel Development Laboratory (Cheswick, PA) --- Senior Engineer. Primary duties included (1) supervision of chemical and radiochemical analyses performed in support of (and for accountability of) $U(Pu)O_2$ fuel fabrication; (2) development work pertaining to non-destructive assay measurements of plutonium product and waste materials by gamma spectroscopy and neutron counting techniques; (3) providing design engineering criteria for a waste solidification project; and (4) revising analytical chemical measurement procedures.

1970 to 1974 --- General Electric Company, Spent Fuel Reprocessing Plant (Morris, Illinois) --- Senior Chemist. Supervised laboratory technicians and served as Radiochemist and Accountability Chemist. Primary duties included (1) purchasing laboratory equipment and setting up laboratory; (2) writing various laboratory manuals (Analytical Methods Manual, Counting Room Manual, etc.); (3) supervising counting room activities; (4) training laboratory technicians to perform accountability analyses and product specification analyses; and (5) acting as Laboratory Manager in said manger's absence.

1965 to 1970 --- Nuclear Fuel Services, Inc., Spent Fuel Reprocessing Plant (West Valley, NY) --- Hired in as Analytical Shift Supervisor --- supervised three laboratory technicians and assisted in analytical work (radiochemical analyses, hot cell work, etc.). Promoted to Analytical Process Control Supervisor in 1967 --- supervised four Analytical Shift Supervisors and 12 shift technicians; developed new analytical procedures; handled special technical projects and various administrative duties. Promoted to Analytical Accountability Supervisor in 1969 --- supervised accountability chemists and technicians, and acted as Laboratory Manager in said manager's absence.

1960 to 1965 --- Phillips Petroleum Company (Atomic Energy Division), Idaho National Engineering Laboratory (Idaho Falls, ID) --- Reactor Engineer. Employed at the Engineering Test Reactor (ETR). Primary duties and responsibilities were the operation of the ETR and operation of the various engineering experiments inserted into the ETR. Obtained a very extensive background in reactor physics and reactor operation.

1958 to 1960 --- Homestake-Sapin Partners, Uranium Mill (Grants, NM) --- Hired in as a Laboratory Technician; promoted to Chemist after six months --- performed various chemical analyses on uranium ores, mill solutions, and uranium concentrate (yellowcake). After one year promoted to Assistant Chief Chemist --- supervised laboratory technicians and chemists, and performed some research.

RESUME OF DONALD R. JOY [Continued]

SUMMARY OF QUALIFICATION

- Extensive knowledge and familiarity of the nuclear fuel cycle, particularly with regards to spent fuel reprocessing, fuel fabrication, and uranium enrichment.

- Considerable experience and knowledge relative to uranium and plutonium measurement methods --- including analytical chemistry, radiochemistry, and non-destructive assay methods.

- Broad knowledge of measurement control systems and methodologies, and of measurement control program requirements.

- Detailed knowledge of MC&A regulatory requirements, and extensive experience in developing regulatory requirements and developing acceptance criteria for satisfying NRC requirements.

- Well-rounded knowledge of process chemistry and processing techniques associated with the nuclear fuel cycle.

- Extensive experience in performing both qualitative and quantitative evaluations relative to (1) the performance of measurement systems; (2) inventory difference performance; (3) process monitoring capabilities and performance; (4) overall MC&A system effectiveness; and (5) adequacy of facility procedures.

- Considerable experience in the regulatory process, including (1) safeguards licensing; (2) reviewing the MC&A portion of license applications and submittal of revised MC&A plans; (3) developing and reviewing proposed rules (regulations); (4) developing and reviewing licensing acceptance criteria; and (5) developing and reviewing standards and guidance documents.

- Author of nuclear textbook titled *An Introduction to the Nuclear Fuel Cycle and Nuclear Safeguards*.

Scott C. Johnson

2902 Woodhill Drive
Johnson City, TN 37604

423-929-8649 Home
423-743-9141 X1684 Work

Summary of Experience:

Twenty-three years experience in industrial security operations and management at a government regulated and licensed nuclear fuel processing facility operating as a DOE prime contractor. Since April 1999, I have been involved with design, development and assessment of security program requirements for a new Mixed Oxide Fuel Fabrication Facility, which will be built on a DOE Site in South Carolina.

Education: East Tennessee State University, Johnson City, TN
BS; 1975 (Criminal Justice)

Employment History:

March 1977 to August 1996:

Nuclear Fuel Services, (NFS) Inc.
1205 Banner Hill Road
Erwin, TN 37650

1977 - Hired as a Security Operations Supervisor: Responsible for supervising physical security shift operations for the plant facility.

1981 - Director of Security: Responsible for planning, developing, organizing and implementing security programs in a highly regulated manufacturing environment which included a staff of approximately twenty-five (25) administrative and management support personnel and a security force of one-hundred forty-five (145) personnel (armed and unarmed). Job duties:

- Administer computerized security monitoring system
- Security system maintenance and audits
- Plan and procedure development
- Long range/short range planning & budgeting
- Physical security operations
- Regulatory compliance & licensing
- Security clearance program
- Computer security program
- Security training programs
- Internal and external investigations

1994 - Institute of Security Services (Div. of NFS): Directed training and marketing activities for a highly technical school specializing in tactical operations and executive protection training.

- Developed and implemented marketing plans and programs
- Contacted and presented proposals to prospective customers
- Developed and conducted training courses
- Maintained accounting records
- Planned and developed annual operating and capital budgets

Due to budget constraints, training school operations were suspended in August 1996.

October 1997 to March 1999:

SPRINT
112 6th Street
Bristol, TN 37620-3100

Business Advisor Support Rep with SPRINT Marketing: Job duties:

- Conducting analysis on billing and payment activity in the SPRINT computerized systems.
- Preparing and submitting reports and letters on account aging activity to management.
- Maintain written and verbal contact with customers on invoicing & payment activity.
- Work with Business Service Managers, Sales People and other SPRINT employees to resolve customer issues.
- Serve as a customer contact for answering and resolving billing questions and conflicts.
- Initiate credit, debit and customer refund activity for the SPRINT billing systems.
- Refer bad debt customers for Collections.

April 1999 to present:

Nuclear Fuel Services, (NFS) Incorporated
1205 Banner Hill Road
Erwin, TN 37650

Serve as the DOE Facility Security Officer for the MOX project office at Erwin, Tennessee.

Security Operations Manager - Responsible for design and development of: (1) Facility protective strategy to meet government security program requirements, (2) Facility Vulnerability Analysis (VA) and (3) Security Program licenses submittal to the NRC, for the operation of a Mixed Oxide Fuel Fabrication Facility.

Military: Served with U. S. Army from 1963 to 1966, Viet Nam Veteran.
Honorable Discharge.

MIKE GOLDEN

KEY AREAS:

Safeguards and Security Planning
Total Quality Process Management
Safeguard and Security Project Design
Vulnerability Assessment Modeling
Customer Needs Analysis
Operational Readiness Reviews

PROFESSIONAL SUMMARY:

Mr. Golden has over 17 years experience in Safeguards and Security, including Site Safeguards and Security Planning (SSSP), Vulnerability Assessment Modeling, Protective Force Operations, and Special Operations and Training. He has experience in computer-based facility models for SSSP analysis and protective force training. He is actively participates on DOE-HQ sponsored Safeguard and Security Quality Panels and national committees for Safeguard and Security process development, improvement and implementation. His certifications include Emergency Medical Technician, South Carolina and Georgia Law Enforcement instructor for Firearms and Special Operations Training and Special Response Team Instructor for the DOE.

EDUCATION:

MBA Brenau University, Gainesville, GA, 1995
BS, Criminal Justice, Brenau University, Gainesville, GA, 1992
AA, Criminal Justice, Georgia Military College, Fort Golden, GA, 1990

TRAINING/SKILLS:

Certified Instructor, Department of Energy
Facilitator for Total Quality Process, and Problem Solving
Negotiator for Crisis Situations
Hewlett Packard Unix Administrator

CLEARANCE:

Active DOE "Q"

PROFESSIONAL EXPERIENCE:

Westinghouse Safety Management Solutions LLC **5/00 to present**
Principal Safeguard and Security Engineer: Provide Safeguard and Security (S&S) planning process development, review and implementation products. Conduct Vulnerability Assessments utilizing modeling tools such as ASSESS, VISA, JTS and JCATS to provide qualitative or quantitative results for the formulation of facility conditional risk. Provide subject expertise for Safeguard and Security Project design to provide a systematic, efficient and cost-effective project design to meet order and conditional risk requirements. Actively participate on DOE committees for the development, review and implementation of S&S procedures, orders, and guidance. Serve as the project lead for the Savannah River Site Joint Conflict and Tactical Simulations (JCATS) platform and system administrator. Support customer needs by providing professional development training for total quality management, vulnerability assessments, protective force contingency planning, customer needs analysis, team building, JCATS and Integrated Safeguard and Security Management (ISSM). Conduct S&S pre-inspection reviews, operational readiness reviews and post inspection corrective action reviews.

WACKENHUT SERVICES INCORPORATED (WSI-SRS) **12/83 to 04/00**
Various Positions with increased levels of scope and responsibility
Team Leader, Site Safeguard and Security Planning: Mr. Golden managed 6 professional staff members for participation in the Site Safeguards and Security Planning (SSSP) process. The team participated in the development of Vulnerability Assessments and reports, Safeguard and Security Management Reports, Facility Security Plans, S&S Projects, S&S PF staffing projections, Operational Readiness Reviews, Performance Test criteria development and customer relations. As the Simulations Program Manager, he developed a high-resolution, multi-sided facility models for SSSP analysis and the conduct of protective force training (JTS/JCATS). He was the senior management representative for customer relations with DOE-HQ, DOE Labs, DOE sites and DOD entities.

Mr. Golden conducted computer-based facility modeling utilizing (ASSESS) and Delphi analysis (VISA/tabletop tools). He developed and maintained customer relations with DOE-SR (S&ED, ISD), WSRC (EP&SD), DOE-HQ (EM, SO, AND DP) and DOE sites for SSSP activities. Additionally, he maintained a close alliance with these elements to foster a win-win-teaming environment.

Mr. Golden was the Adjunct Faculty Instructor to DOE, Nonproliferation and Nuclear Security Institute for: Fundamentals of Vulnerability Assessment and Safeguard and Security Surveys. He developed, coordinated, and implemented the Site Security Contingency Plans.

Mr. Golden provided budget and strategic plan development and was the Total Quality Management Instructor and Facilitator. He was a member of the DOE-HQ sponsored Safeguard and Security Vulnerability Quality Panel (SSVQP) and the Physical Security Systems Quality Panel (PSSQP).

Principal Special Operations and Systems Instructor: Mr. Golden provided instruction for a 900 plus person organization in Physical Security Systems, Operations, Special Weapons, and Tactics. He was a member of the Special Response Team program development and implementation, served as point of contact for external LLEAs and provided customer relations for special needs training. Mr. Golden was also a member of the Adjunct Faculty to DOE, Nonproliferation and Nuclear Security Institute, for Special Weapons and Tactics and High Risk Courses. He was the Site Certified Lead Instructor for Special Response Team training levels I, II and III. Additionally, Mr. Golden provided Job Task Analysis and Lesson Plan development.

Team Leader Special Response Team: Mr. Golden directly supervised, managed and trained a Special Weapons and Tactics Team to a high degree of readiness. This role required development, coordination, and implementation of training courses and preparing a shift of 21 personnel to respond to high-risk situations. Mr. Golden is a Certified South Carolina Emergency Medical Technician. He is also South Carolina and Georgia LE certified to conduct Special Operations Training. He is a member of the Aiken County, Sheriff's SWAT team and served as a Trainer and operations team leader for the conduct of high-risk operations.

MIKE'S LANDSCAPING (Owner) **1982 to 1983**
Provide customer services for residential landscaping and landscaping maintenance.

UNITED STATES NAVY **1978 to 1982**
Department Manager, Operations Specialist Division:
Mr. Golden managed the operations information division, with responsibility for 26 personnel.

JOHN M. MCCONAGHY, JR., P.E.
DUKE ENGINEERING & SERVICES

Title/Position: Engineering Supervisor **Years of Experience: 30**

SUMMARY

Mr. McConaghy is highly experienced in developing nuclear facility design criteria and in translating such criteria into facility designs. He manages a team of architects, engineers and designers developing design criteria and facility designs for the Department of Energy (DOE) Mixed Oxide (MOX) Fuel Fabrication Facility. Mr. McConaghy's areas of expertise include spent nuclear fuel transfer and storage, design project integration and seismic structural design.

EDUCATION/TRAINING

ME, Civil Engineering, Virginia Polytechnic Institute and State University, 1978
BS, Applied Science and Engineering, U.S. Military Academy, 1971

PROFESSIONAL AFFILIATIONS/CERTIFICATIONS

Registered Professional Engineer: N.C. #9391, S.C. #7865, Va. #10025
American Society of Civil Engineers (ASCE)

EXPERIENCE

Engineering Supervisor 05/99-Present
Duke Engineering & Services

Serves as a Lead Structural Engineer responsible for site and facility design for the DOE's Mixed Oxide Fuel Fabrication Facility. Manages a group of architects, engineers and designers developing design criteria and designs for the facility. Duties include overseeing site investigation activities, development and documentation of facility structural design bases and facility design details. Products include analyses, technical documents, specifications and drawings.

Engineering Supervisor 05/96-04/99
Duke Engineering & Services

Served as a Lead Discipline Engineer responsible for site and facility design to develop a Topical Safety Analysis Report (TSAR) for the DOE's Spent Nuclear Fuel Centralized Interim Storage Facility. Duties included overseeing the development and documentation of facility design bases and design implementation details, including analyses, studies, technical documents and drawings. Supported evaluations of facility operation for operability, maintainability and radiation exposure considerations.

Engineering Supervisor 01/91-04/96
Duke Engineering & Services

Worked on the DOE Monitored Retrievable Storage (MRS) Facility and Multipurpose Canister (MPC) projects. Managed a group of 10 architects, engineers and designers developing design criteria and conceptual designs for a DOE spent fuel storage facility. Also, responsible for evaluating spent fuel storage technologies, implementing regulatory requirements, and comparing capital and life cycle costs for different facility options. Served as a contributing member of the DOE's Research Reactor Task Team, responsible for evaluating treatment options for aluminum-based research reactor fuel from foreign and domestic programs.

Engineering Supervisor 02/88-12/90
Duke Power

Served as Engineering Supervisor of the Civil and Architectural Commercial Facilities Group, Commercial Facilities Section. Supervised 17 architects, engineers and designers providing lead design, engineering and cost management functions for major conventional construction projects at Duke Power generating stations.

Design Engineer 06/85-02/88
Duke Power

Worked in the advanced light water reactor (ALWR) programs. Developed structural design requirements for new generating plants. Also, evaluated nuclear containment vessel design features and plant constructability issues.

Design Engineer 01/82-06/85
Duke Power

As a member of the Civil Engineering Section, served as work leader for four engineers performing as-built analyses of containment structures at McGuire and Catawba nuclear stations. Coordinated analyses, design report and licensing document activities. Resolved field problems, and also supported seismic equipment qualification activities.

Design Engineer 08/79-01/82
Duke Power

As a member of the Civil Engineering Section, served as a work leader for 15 engineers providing a re-analysis of masonry walls at Oconee Nuclear Station. Established qualification criteria and techniques, and coordinated analysis efforts. Prepared licensing submittals and coordinated station modifications. Performed reinforced concrete structure analyses and designs for Cherokee Nuclear Station. Also resolved field construction problems.

Researcher 09/78-08/79
Battelle Columbus Laboratories

Worked in the Solid Mechanics Section. Performed finite element analyses of machine components and railroad tracks. Provided analytical assessments of residual stresses due to welding processes for welded piping connections.

Captain 06/71-11/76
U.S. Army Corps of Engineers

Planned and managed troop construction projects and civilian construction contracts in the Federal Republic of Germany. Managed $6.2 million in construction and renovation performed by German contractors, conducting business in the German language. Established a newly formed engineering company supporting an infantry brigade. Set up administrative and operational functions, and trained the unit for overseas deployment eight months after activation.

LAWRENCE A. SALOMONE
WSRC Site Chief Geotechnical Engineer
Savannah River Site, 730-B, Rm. 304
Aiken, SC 29808
Phone: (803) 952-6854

SUMMARY

Registered professional engineer with over 32 years of experience in the geotechnical and environmental engineering fields. Directed a 70-person multi-disciplinary group while managing major multi-disciplinary environmental and civil engineering projects. Worked with the U.S. Congress on environmental legislation, the U.S. Environmental Protection Agency on the development of technical guidance documents, and served as an expert witness for nuclear and environmentally-sensitive projects. Developed an international reputation in the field of thermal soil mechanics and heat transfer. Results from this work are applicable for oil recovery from heavy oil reservoirs; systems for storing and recovering heat; energy conservation in buildings; underground pipelines and transmission lines; and nuclear waste management. Have authored over 35 articles, including archival publications, that are published in magazines and technical journals. Topics are in the areas of earthquake engineering, thermal soil mechanics and environmental engineering.

MAJOR ACCOMPLISHMENTS

- Successfully integrated geotechnical and geo-environmental work for operating divisions at the Savannah River Site.
- Provided environmental services for Fortune 500 companies involved with RCRA/CERCLA compliance issues.
- Provided expert testimony for utilities that were involved in the licensing of nuclear and coal-fired electric generating stations and underground gas storage reservoirs.
- Participated in and directed studies that involved site selection, design and construction of nuclear power plants in the United States. This included studies that involved the evaluation of the stability of foundation soils under design earthquake conditions.
- Directed site preparation and foundation operations for the Hope Creek Generating Station in Salem, New Jersey.
- Participated in the U.S. Earthquake Hazards Reduction Program by assisting in the preparation of a manual of standard practice for the evaluation of site hazards for structures and by reviewing and refining seismic provisions developed by the Applied Technology Council (ATC).
- Represented the Savannah River Site at the Second National Earthquake Ground-Motion Mapping Workshop held in San Francisco on May 10-11, 2001. The United States Geological Survey (USGS) and ATC solicited input from structural engineering, geoscience and geotechnical engineering professionals on issues that affect the preparation and use of the second edition of national earthquake ground-motion maps.
- Obtained consensus from industry and government representatives regarding the development of new trenching and shoring standards for OSHA.
- Crossed disciplinary boundaries in developing an understanding of the factors that affect the thermal conductivity of soils by working with professionals from a variety of technical fields: geotechnical, mechanical, electrical and structural engineering; agronomy; and meteorology.

- Conducted research on deep repository nuclear waste disposal.

- Provided consultation to the Federal Energy Regulatory Commission (FERC), U. S. Department of Energy (DOE), Nuclear Regulatory Commission (NRC), the Tennessee Valley Authority (TVA), and the Department of Housing and Urban Development (HUD) regarding Liquefied Natural Gas (LNG) facilities, synthetic fuels, hazardous waste, nuclear power, heat transfer in soils, and housing construction in mine subsidence areas.

- Provided Expert Testimony to House Subcommittee on Water Resources for Clean Water Act legislation.

WORK EXPERIENCE

Westinghouse Savannah River Company **1992 – Present**

Site Chief Geotechnical Engineer & Manager of the Site Geotechnical Services (SGS) Department at DOE's Savannah River Site (SRS) (1992-2000). Managing a staff of up to 70, with responsibility for the SRS geological, seismological, and geotechnical (GSG) activities, and integrating GSG activities of all WSRC Divisions at the SRS. Site Chief Geotechnical Engineer (2000 - Present). Provide specialized, high visibility advisory services to the Site Chief Engineer and other Site Management. Solve high visibility/high impact geological, seismological and geotechnical (GSG) problems for SRS operating divisions. Authoritatively represent SRS geotechnical positions to the Defense Nuclear Facilities Safety Board (DNFSB), Department of Energy (DOE), National Nuclear Security Administration (NNSA), Nuclear Regulatory Commission (NRC), local and state regulatory agencies and ex-officio civil activist/oversight bodies.

Professional Services Industries, Inc. (PSI) **1990 – 1992**

Division Manager. Technical oversight of environmental activities in 24 PSI offices in the Northeast region.

Electric Power Research Institute **1988 –1990**

Private Consultant. Research for ground-coupled heat pump systems.

STS Consultants, Ltd. **1985 –1988**

Manager, Geo-Environmental Group. Created and managed environmental department.

Woodward-Clyde Consultants **1985**

Senior Project Engineer. Provided geotechnical and environmental support on major multi-disciplinary projects.

Tensar Corporation **1984 –1985**

Regional Manager. Managed Washington, D.C. office and the sale of geogrids/geotextiles for engineering solutions for sites with soil stabilization problems.

National Bureau of Standards **1979 –1984**

Research Civil Engineer. Performed research to advance geotechnical engineering technology.

Dames and Moore **1970 –1979**

Field Engineer to Associate. Participated in and managed multi-disciplinary geotechnical engineering projects. Provided safety documentation for nuclear power plants and technical expert for utilities in the site selection, design and construction of nuclear power plants.

EDUCATION

21 Grad Credits	University of Maryland, 1981
Major:	Earth Science
M.S.	Univ. of California at Los Angeles, 1971
Major:	Geotechnical Engineering
B.C.E.	Manhattan College, 1970
Major:	Civil Engineering

PROFESSIONAL LICENSES

- Professional Engineering Licenses: New York and New Jersey

PUBLICATIONS

- Authored over 35 articles, including archival publications, that are published in magazines and technical journals. Topics are in the areas of earthquake engineering, thermal soil mechanics, and environmental engineering.

- Served as a company spokesman and expert in geotechnical field. Have given numerous interviews to print and broadcast journalists and served as a moderator, panel member, speaker and participant in numerous national and international symposiums and workshops.

AWARDS / HONORS

- National Bureau of Standards Sustained Superior Performance Award for April 1, 1981 through March 30, 1982.

- Nominated by the National Capitol Section of the American Society of Civil Engineers for the Walter L. Huber Civil Engineering Research Prize for work in the area of thermal soil mechanics.

- Received Engineering-Construction Achievement Award from Public Service Electric and Gas Company of New Jersey and Bechtel Power Corporation for work performed at the Hope Creek Generating Station.

- Requested to serve as a host for an international workshop on deep repository nuclear waste disposal at the National Bureau of Standards.

- Selected chief executive officer by executives in training at the Center for Creative Leadership, Greensboro, NC.

LIST OF PUBLICATIONS

1. Fischer, J. A., Watson, I. and Salomone, L. A., "Considerations of the Geotechnical Engineer in Planning Transmission Lines to Offshore Nuclear Power Plants," Abstracts, American Nuclear Society/Marine Technology Society Conference, "The Ocean, Nuclear Energy and Man Transactions," Tansao 16, Supplement I; ANSMTS, Palm Beach, Florida (1973).

2. Watson, I., J. A. and Salomone, L. A., "Transmission Lines Probe a New Frontier, The Ocean," Electric Power and the Civil Engineer, American Society of Civil Engineers, New York, New York, 1974, pp. 557-8.

3. Salomone, L. A., Fischer, J. A. and Watson, I., "Procedures Used to Evaluate the Thermal Properties of Soils Adjacent to Buried Extra High Voltage Lines," Journal of Testing and Evaluation, American Society for Testing and Materials (ASTM), Philadelphia, Pennsylvania, November, 1974, pp. 496-502.

4. Fischer. J. A., Salomone, L. A. and Watson, I., 'Influence of Soils on Extra High Voltage Offshore Transmission Lines," Marine Geotechnology, Volume 1, Number 2, 1975, pp. 141-156.

5. Salomone, L. A., Singh, H., Fischer, J. A., "Cyclic Shear Strength of Variably Cemented Sands," Earthquake Engineering and Soil Dynamics, Volume II, American Society of Civil Engineers, New York, New York, June, 1978, pp. 819-835.

6. Salomone, L. A., Singh, H., Miller, V. G. and Fischer, J. A., "Improved Sampling Methods in Variably Cemented Sands," Symposium on Soil Sampling and Its Importance to Dynamic Laboratory Testing, American Society of Civil Engineers Annual Meeting, Chicago, Illinois; ASCE, New York, New York, October, 1978, pp. 320-324.

7. Salomone, L. A., Singh, H., and Fischer J. A., "Geotechnical Considerations for Designing Underground Transmission Lines," paper presented at the 1979 Transmission and Distribution Conference and Exposition, Institute of Electrical and Electronic Engineering, New York, New York, April, 1979.

8. Salomone, L. A. and Yokel, F. Y., "Proceedings, Federal Workshop on Excavation Safety, September 19 and 20, 1978," Interagency Report 79-1935, Center for Building Technology, National Bureau of Standards, Washington, D. C., July, 1979.

9. Salomone, L. A. and Yokel, F. Y., "An Analysis of the Responses from an Associated General Contractors of America (AGC) Survey of Trenching and Shoring Practices," Interagency Report 79-1936, Center for Building Technology, National Bureau of Standards, Washington, D. C., July 1979.

10. Fischer, J. A., Watson, I. and Salomone, L. A., "Undersea Transmission Lines," Encyclopedia of Earth Science Series, Volume XIII, "Applied Geology," New York, New York, 1980.

11. Salomone, L. A., "The Effects of Organization Culture on Managers," American Society of Civil Engineers Fall 1980 National Convention/Preprint, ASCE, New York, New York, October, 1980.

12. Salomone, L. A. and Kovacs, W. D., "Proposed Requirements and Format For the Siting of LNG Facilities, Draft," National Bureau of Standards Interagency Report, Washington, D. C., December, 1980, 97 pp.

13. Yokel, F. Y., Salomone, L. A. and Chung, R. A., "Construction of Housing in Mine Subsidence Areas," Interagency Report 81-2215, Center for Building Technology, National Bureau of Standards, Washington, D. C., January, 1981.

14. Salomone, L. A., "Improving Geotechnical Investigations for Underground Transmission Lines," Proceedings of the Symposium on Underground Cable Thermal Backfill, Toronto, Ontario, Canada; Pergamom Press, September 17 and 18, 1981, p. 57-71.

15. Kovacs, W. D., Salomone, L. A. and Yokel, F. Y., "Energy Measurement in the Standard Penetration Test," Building Science Series 135, Center for Building Technology, National Bureau of Standards, Washington, D. C., October, 1981, 103 pp.

16. Kovacs, W. D. and Salomone, L. A., "SPT Hammer Energy Measurement," Journal of the Geotechnical Engineering Division, Volume 108, Number GT4, April, 1982, p. 599-620.

17. Salomone, L. A. and Kovacs, W. D., "The Determination of Thermal Soil Properties for Energy Transfer Modeling of Buildings," Proceedings, "Energy Conservation in Building Design and Construction," University of Minnesota, Minneapolis, Minnesota, September, 1982.

18. Yokel, F. Y., Salomone, L. A. and Gray, R. E., "Housing Construction in Mine Subsidence Areas," Journal of the Geotechnical Division, American Society of Civil Engineers, Volume 108, Number GT9, September, 1982, pp. 1133-1149.

19. Salomone, L. A., Kovacs, W. D. and Wechsler, H., "Thermal Behavior of Fine-Grained Soils," Building Science Series 149, Center for Building Technology, National Bureau of Standards, Washington, D. C., November, 1982, 102 pp.

20. Salomone, L. A., and Kovacs, W. D., "The Thermal Performance of Fine-Grained Soils," Journal for Geotechnical Engineering, American Society of Civil Engineers, Volume 110, Number GT3, March, 1984, pp. 359-374.

21. Salomone, L. A. and Kovacs, W. D., "the Thermal Resistivity of Soils," Journal of Geotechnical Engineering, American Society of Civil Engineers, Volume 110, Number GT3, March, 1984, pp. 375-389.

22. Kovacs, W. D., Salomone, L. A. and Yokel, F. Y., "Comparison of Energy Measurements in the Standard Penetration Test Using the Cathead and Rope Method," National Bureau of Standards Interagency Report, prepared for the U. S. Nuclear Regulatory Commission, NUREG/CR-3545, Washington, D. C., 1983, 92 pp.

23. Salomone, L. A., "Procedures Used to Predict the Thermal Behavior of Soils," Proceedings of the 1983 International Conference on Earth-Sheltered Buildings, Sydney, Australia, August, 1983, pp. 49-53.

24. Salomone, L. A., "Selection of Thermal Properties for Earth-Coupled Buildings," Extended Abstract, Proceedings of the International Conference of the Solar Energy Society, Perth, Australia, August 14, 1983.

25. Salomone, L. A., "Selection of Thermal Properties for Mesoscale Numerical Models," Proceedings of the 13th Conference on Severe Weather, Tulsa, Oklahoma, October, 1983.

26. Salomone, L. A. and Kovacs, W. D., "The Use of Index Property Tests to Determine the Thermal Properties of Soils," Geotechnical Testing Journal, American Society for Testing and Materials, Volume 6, Number 4, December, 1983, pp. 173-180.

27. Kovacs, W. D., Salomone, L. A., Yokel, F. Y. and Holtz, R. D., "Liquefaction and the International SPT," Proceedings of the 8th World Conference on Earthquake Engineering; San Francisco, California, Volume 111, 1984, pp. 263-268.

28. Salomone, L. A. Yokel, F. Y. and Wechsler, H., "The Influence of Soil Type and Gradation on the Thermal Resistivity of Soils," Underground Space, Volume 8, University of Minnesota, Minneapolis, Minnesota, October, 1984, pp. 363-371.

29. Kovacs, W. D. and Salomone, L. A., "Field Evaluation of SPT Energy, Equipment and Methods in Japan Compared with the SPT in the United States," NBSIR-84-2910, National Bureau of Standards, Washington, D. C., August, 1984, 72 pp.

30. Salomone, L. A., "Monitoring Well Installation and Management," Proceedings of the Government Institutes Seminar, "Monitoring and Cleanup Techniques for Underground Storage Tanks", Washington, D. C., February 27 and 28, 1986.

31. Salomone, L. A., "The Effect of Soil Properties and External Factors on the Thermal Resistivity of Soils," Proceedings of the Ground-Source Heat Pump Workshop, Albany, New York, October 27-31, 1986, 30 pp.

32. Salomone, L. A. and Lucas, H., "Real Estate Land Transfers - An Executive Overview," ACTION Magazine, North Virginia Building Industry Association, Vienna, Virginia, July/August, 1987, pp. 8-12.

33. Salomone, L. A., "Feasibility Study for Collecting Site Soil Characterization Thermal Property Data for Residential Construction," Oak Ridge National Laboratory, Oak Ridge, Tennessee, December, 1987.

34. Salomone, L. A. and Marlowe, J. I., "Soil and Rock Classification According to Thermal Conductivity, Design of Ground-Coupled Heat Pump Systems," EPRI CU-6482, Research Project 2892-3, Electric Power Research Institute, Palo Alto, California, August, 1989, 330 pp.

35. Salomone, L. A. and Marlowe, J. I., "Soil and Rock Classification for the Design of Ground-Coupled Heat Pump Systems Field Manual," EPRI CU-6600, Research Projects 2892-3 and 2892-5, Electric Power Research Institute, Palo Alto, California, distributed by International Ground Source Heat Pump Association, Stillwater, Oklahoma, November, 1989, 55 pp.

36. Salomone, Lawrence A., "The Clean Water Act and Its Impact on Towns," Proceedings of the Environment Virginia III Symposium, Virginia Military Institute, Lexington, Virginia, April 7 - 8, 1992.

37. Over forty (40) SRS Site Geotechnical Services Reports, 1993 – Present.

Peter S. Hastings

Duke Cogema Stone & Webster (DCS)
Licensing Manager
B.S. Nuclear Engineering

18 Years Experience

DUKE COGEMA
STONE & WEBSTER

Summary

Mr. Hastings has over 18 years of commercial and DOE engineering and management experience in the nuclear industry. As Licensing Manager for the Mixed Oxide Fuel Fabrication Facility, he has participated in the rulemaking and development of regulatory guidance for the recent change to 10 CFR Part 70 and oversees their implementation for the construction authorization and possession-and-use license for the facility and the Integrated Safety Assessment. Prior to his current assignment, he established and oversaw systems and processes required for licensing of the nation's first high-level radioactive waste repository, and managed nuclear safety analyses and long-term performance assessment (PA) for the repository. He established the NRC licensing and programmatic basis for the repository's pre-closure nuclear safety and accident analysis program, and established the DOE's program for assessing long-term performance impacts during site characterization to meet NRC requirements. He has coordinated aspects of the quality assurance of the repository PA program, process improvements to repository engineering and licensing systems, developed PA input to the repository license application, and handled resolution of NRC Key Technical Issues. In addition, prior to his repository work, he had several years of nuclear station operations, startup testing, and surveillance experience, and design engineering experience.

Licensing Manager, Duke Cogema Stone & Webster
Primary Responsibilities

- Coordinate and develop the license application and the Integrated Safety Assessment Summary for the MOX Fuel Fabrication Facility (MFFF).
- Manage regulatory processes associated with the MFFF and serve as interface with regulatory agencies regarding MFFF activities.
- Ensure that NRC submittals for the MFFF license are of high quality and are made in a timely manner.
- Establish a close working relationship with the NRC staff to facilitate timely technical review and issue of the license.

Professional Development

Registered Professional Engineer, NC #18204, SC #13891
DOE-STD-3009—Nonreactor Nuclear Facility Safety Analysis
Computational Methods in Reactor Analysis, Univ. of Tennessee
B&W Integrated Control System

Clearances

DOE L

Previous Work Experience

Deputy Operations Manager, Duke Engineering & Services, Inc., Las Vegas, 1997-1998

- Served as Assistant Manager for Performance Assessment as part of M&O contract for DOE's Office of Civilian Radioactive Waste Management (OCRWM).
- Managed the post-closure licensing basis for the high-level radioactive waste repository.

MGDS Safety Assurance Manager, Duke Engineering & Services, Inc., Las Vegas, NV, 1992-1997

- Coordinated definition and analysis of design-basis events, including accident analyses for the repository License Application.
- Responsible for compliance with NRC requirements for limiting impacts to the high-level radioactive waste repository during site characterization.

Design Engineer, Duke Engineering & Services, Inc., Charlotte, NC, 1991-1992

- Served as a key member of the monitored retrievable storage (MRS) design team for the OCRWM.

Reactor Engineer, Duke Power Co., Seneca, SC, 1984-1991

- Senior staff engineer and work leader in the Reactor Engineering Unit at Oconee Nuclear Station (900 Mwe B&W PWR). Primary duties included reactor and primary system surveillance and testing and fuel performance monitoring.

Kenneth A. Boucher
WSRC/SS&ES
Savannah River Site
Aiken, SC

Biography

Born 1947, Lowell, MA

BS in Plastic Engineering from Lowell Technological Institute (1969)
MS in Safety Management from Central Missouri State University (1974)

Served 20 years in the U.S. Air Force, 7 years as a Missile Launch Officer and 13 years as a Disaster Preparedness Officer and Squadron Commander.

I have been responsible for nuclear events and emergencies and training personnel in that response for the past 25 years. As a Disaster Preparedness Officer, my tasks included training and responding to military aircraft accidents, Nuclear, Chemical, and Biological attacks, and natural disasters. I was responsible for training special response forces, base populations and civilian community. I have worked with FEMA and other emergency response forces for the past 25 years. I was the Base Recovery Officer for Shaw AFB SC during Hurricane Hugo.

I arrived at SRS in 1990 and managed the site drill and exercise section, which developed the scenarios for all the site exercises including the successful K Reactor restart exercise (1991). In 1996, I became the manager of the Emergency Operations Section responsible for the Emergency Operations Center (EOC) and the Savannah River Site Operations Center (SRSOC), which is the 9-1-1 emergency response communications center.

GARY H. KAPLAN

DUKE ENGINEERING & SERVICES, INC.

Title: Engineering Supervisor II

Years: 19

SUMMARY
Mr. Kaplan has extensive nuclear engineering and safety analysis experience with the Department of Energy and commercial nuclear facilities. Mr. Kaplan has provided a wide range of services including management and development of Safety Analysis Reports, safety assessments, accident and hazard analyses, Technical Safety Requirements, and other risk-related studies. His projects have involved many types of facilities including the Mixed Oxide Fuel Fabrication Facility, DOE's Centralized Interim Storage Facility, several reactor and non-reactor facilities at the Savannah River Site, Lawrence Livermore National Laboratory, Brookhaven National Laboratory, and Hanford Site, and commercial reactors at Arkansas Nuclear One Units 1 and 2 and Palo Verde Nuclear Generating Station.

EDUCATION/TRAINING:
ME, Nuclear Engineering, University of Florida, 1982
BS, Nuclear Engineering, University of Florida, 1980

EXPERIENCE

Engineering Supervisor II 11/96-Present
Duke Engineering & Services

Currently responsible for the preparation of the Integrated Safety Analysis for the Mixed Oxide Fuel Fabrication Facility. Responsibilities include coordinating the effort of 15 safety analysts to develop the safety analysis for the facility. Responsibilities also include interfacing with the design and licensing organizations, ensuring the results of the safety analysis are accurately integrated into the design, demonstrating that the facility design and operation satisfies the requirements of 10CFR70.61, presenting information to the NRC and DOE, and developing the associated portions of the licensing submittal. Significant evaluations being performed to support the ISA include process hazards analyses and likelihood evaluations. Has gained extensive experience with 10CFR70.

Responsible for the preparation of the safety assessment in support of the construction authorization submittal for the Mixed Oxide Fuel Fabrication Facility. Key evaluations performed to support this effort include hazards analyses, radiological consequence analysis, and chemical analysis. Responsibilities also included interfacing with the NRC and resolving requests for additional information.

Responsible for the regulatory activities associated with the development of the Department of Energy's Topical Safety Analysis Report for the Centralized Interim Storage Facility. The TSAR was prepared in accordance with 10CFR72 and NUREG 1567, and was submitted to the NRC in May of 1997. Recent activities involve coordinating the resolution of the first round of RAIs and interfacing with DOE and the NRC during the resolution process. During preparation of the TSAR, provided overall technical guidance, prepared the TSAR Management Plan and SAR format guide, and prepared several TSAR chapters.

Managed the Safety Assessment of the High Flux Beam Reactor at the Brookhaven National Laboratory. The assessment comprehensively evaluated all areas of plant safety, operation, and maintenance to determine if the HFBR is safe to restart and operate. Developed the assessment plan and coordinated the activities of 14 individuals. Assessed implementation of the current SAR, Technical Safety Requirements, and USQ program.

Supported the National High Level Radioactive Waste Management Program for the Office of Civilian Radioactive Waste Management. Major tasks involved developing design options for the MGDS Surface Facilities and preparing a consequence analysis for Loss of Power at the MGDS.

Served as the nuclear safety director responsible for supporting the DOE's Hanford site transition from the Westinghouse Corporation to the Fluor Daniel Team.

Aiken Office Manager 1989-11/96
VECTRA GSI

Managed the VECTRA-GSI office in Aiken, S.C. for one year. Responsible for managing four separate contracts, developing new DOE and safety-related business and managing day-to-day office activities. Coordinated the activities of over 30 individuals.

Project Manager
Served as project manager for two SAR projects involving over 15 individuals. Prepared three SARs for the LLNL, including the Hazardous Waste Management Facilities, the Real-Time Radiography Facility and the Mixed Waste Management Facility. Prepared the SARs for the Hazard Category 3 facilities in accordance with DOE Orders 5480.22 and 5480.23 and DOE-STDs-1027-92, 3005-93 and 3009-93. Evaluated radiological, hazardous and mixed wastes.

Managed and prepared various SARs and hazards analyses in accordance with DOE Orders 5480.5, 5480.1B and 5480.23 for the Savannah River Site's (SRS) Technology Center. Tasks typically involved 3 to 7 engineers. Familiar with several SRS facilities, including the Uranium Solidification Facility, the Transuranic Waste Facility, H-Canyon (fuel reprocessing), Building 321-M (fuel handling), CIF (incineration facility), and the Saltstone Facility (low level waste processing). Also managed the

preparation of criticality analyses, explosion analyses, chemical hazards analyses, fault tree analyses, fire hazard and fire risk analyses, and design criteria compliance reviews.

Task Leader
Managed and prepared scoping studies, availability studies and design review studies using fault tree analysis techniques to support facility operations. Tasks typically involved 3 to 5 engineers. Prepared several sections of the CIF accident analysis, including the criticality analysis. Prepared a fault tree analysis of an explosion monitoring system at an SRS facility. Gained familiarity with the Fault Tree Analysis Program (CAFTA code). Supported various Savannah River Technology Center projects, including preparing several SAR chapters for various non-reactor nuclear facilities, identifying safety-class equipment and analyzing the ventilation requirements for the Uranium Solidification Facility Monitoring Addition based on contamination considerations. Also prepared hazard assessments for several DOE facilities. Gained familiarity with DOE Order 6430.1A and DOE/TIC-11603.

Senior Engineer
Supported the Reactor Procedure Improvement Program. While stationed in the C-Area, reviewed and revised several operating procedures. Supported the Technical Baseline Program. Participated in opening the ABB Combustion Engineering office in Aiken, S.C. Assisted with developing the initial task and management plans. Developed walkdown procedures, performed walkdowns and prepared a historical study of the emergency cooling system for K-Production Reactor.

Senior Engineer 1985-1989
ABB Combustion Engineering Nuclear Power

Senior Engineer, Operations Support, Nuclear Training Department
Participated in the severe accident analysis research and developed the accident training material. Participated in reanalyzing the main steam line break accident analysis for Omaha Public Power District.

Senior Engineer, Reload Test Support
Participated in the ANO-1, Unit 1 Cycle 8, St. Lucie Cycle 4 and ANO-1, Unit 2 Cycle 7 reload test programs on a consulting basis. Reviewed and updated test procedures, and performed a technical review of WPPSS03 post-core test guidelines.

Senior Engineer, Computer-Based Products for Nuclear Plants
Developed a portable computer-based reactivity data analysis system for low power physics testing. Coordinated a three-person effort to create software specifications, write the BASIC and dBase III software, integrate the necessary hardware, and write the users' manual. Evaluated and upgraded an NEFF 470 and IBM PC/AT-based transient recording system. Purchased and integrated new hardware, developed additional BASIC software and developed the operating procedure.

Senior Engineer, Simulator Validation Support at PVNGS 3

Developed a data archive from the Unit 1 initial start-up for use in validating the PVNGS 3 simulator. Duties included interfacing with operators, engineers and plant computers to organize and evaluate primary and secondary system data.

Nuclear Engineer 1982-1985
Middle South Services

Nuclear Engineer

Served as the unit reactor physicist for ANO-1. Developed a three-dimensional nodal physics model for ANO-1 Cycles 4, 5 and 6 using PDQ-7 and the ARMP system codes. Performed all core follow and core performance activities. Gained an in-depth familiarity with the plant monitoring and protection systems. Performed a technical evaluation of ANO reactivity balance procedures. Analyzed relevant reactivity parameters and integrated the results with operator comments and ANO procedures.

Reactor Engineer

Served as an on-site reactor engineer for ANO-1 Unit 2. Provided operations support, surveillance monitoring, procedure review and development, and related outage functions. Initiated informal operator question and answer sessions. Participated in an ANO-2 technical specification accountability review, wrote abnormal operating procedures and supported the ANO-1 Cycles 6 and 7 core off-load, shuffle and reload. Participated in four physics test programs as shift test director and as an assistant shift test director. Duties included coordinating and directing tests, analyzing data and reviewing and rewriting procedures for low power and power ascension testing following refueling outages.

Graduate Assistant 1981-1982
Nuclear Engineering Department - University of Florida

Thesis work involved the disposal of low-level radioactive waste.

Thomas N. St. Louis

Supplemental HVAC experience

Shoreham Nuclear Power Station Unit 1 (Jan 1971 to Aug 1971)
Long Island Lighting Company (LILCO)

Design of the Reactor Building Ventilation System. Analyzing the effect of evaporation from the fuel storage pool on the ability of the HVAC system to maintain the building under negative pressure during an accident event.

Fulton Generating Station Units 1 and 2 (Sept 1972 to Nov 1975)
Philadelphia Electric Company (PECO)

As Principal Facilities Engineer, Mr. St. Louis' services at this twin 1150 MW high temperature gas-cooled reactor plant included design of the HVAC system including the safety related ventilation systems.

North Anna Power Station Units 3 and 4 (Jan 1978 to Feb 1980)
Virginia Power (formerly VEPCO), Mineral, VA

Responsibilities included the design of the HVAC systems

Modular High-Temperature Gas Reactor (MHTGR) (Mar 1984 to Dec 1985)
Gas-Cooled Reactor Associates

Responsibilities included the design of the HVAC systems.

Variable-Volume Process Exhaust (Sept 1987 to May 1988)
Northrop, Norwood, M

Designed a new variable-volume process exhaust system for the facility. He also directed the modifications that were made to the existing HVAC system to accommodate the operation of the new exhaust system.

Consulting Services (Nov 1991 to May 1993)
Serono Laboratories Inc., Randolph, MA

Project included the design of renovation to the clean room gowning rooms.

Improved Plastics Facility (Sept 1992 to July 1996)
The Gillette Company, Boston, MA

Project included the design of an industrial ventilation system for the new injection molding facility and renovation of existing HVAC systems.

Current Corporate Title

Senior Lead Engineer

Functional Title

Lead Mechanical Engineer MOX Fuel Project

Years Experience (as of January 2002)

At Stone & Webster: 33 With other Firms: 1

Department/Division/Location

Mechanical Department (046)/Power Division/Stoughton

Current Status within Company

Full Time Employee

Professional History

Stone & Webster Engineering Corporation, Stoughton, Massachusetts - 1981 to Present and 1968 to 1980
Cleverdon, Varney & Pike Consulting Engineers, Boston, Massachusetts - 1980 to 1981

Areas of Expertise

- Management of Design and Construction of Industrial Facilities.
- Design of thermal power systems.

Security Clearances

Department of Energy (DOE), L - 2001, Active
DISCO, Top Secret - 1990, Inactive

Experience Summary

As Lead Mechanical Engineer, Mr. St. Louis is currently managing the design activities on the Mixed Oxide Fuel Fabrication (MOX) Facility, which is an element in the Department Of Energy's Plutonium Disposition Program. The MOX facility consists of a chemical processing unit, which removes impurities from the plutonium feed stock, and a dry process unit, which manufactures fuel pellets and reactor fuel assemblies. In his position as Lead mechanical Engineer, he is responsible for the design development and specification of all chemical processing operations based on process engineering documents developed by the process licensor. He is also responsible for the development of designs and construction specifications for Plant Utilities Systems, HVAC Systems, Fire Protection Systems.

As Project Engineer, Mr. St. Louis completed the design and construction activities on The Gillette Company's Facilities Relocation Project. The Facilities Relocation Project was a nine-year multiphase project to relocate a seawater intake and pump house, a fuel oil storage facility, a raw material silo farm and other miscellaneous site utilities. These relocations were undertaken to permit construction of the Massachusetts Central Artery/Tunnel Project's Seaport Access Road

Mr. St. Louis completed an assignment as Acting Mechanical Engineering Manager at the Lungmen Project office in Taipei, Taiwan, ROC. He was also assigned as Task Manager for the development of a Thermal Performance Monitoring and Diagnostic System.

Mr. St. Louis completed an assignment to develop a Project Systemization Plan and Schedule for the operation of chemical demilitarization facilities at Aberdeen, MD and Newport, IN. Systemization is the development of a complete operation facility, including operating departments, staffing, training, construction acceptance, equipment start-up and proof of performance testing.

He completed an assignment as Project Engineer on The Gillette Company's Air Compressor Project. The Air Compressor Project installed a 1000 hp steam turbine drive air compressor in the existing Power House.

Mr. St. Louis also managed a project to design, and prepare construction documents for a 165,000 square-foot injection molding facility for The Gillette Company. The project involved new construction and renovation of existing space to house injection molding operations, technical services, administrative services and utilities. It provided for utility and raw material distribution in a utility space below the injection molding machines. This permitted the design of a standard "camp site" for installation of the injection molding machines and allowed for easy change-out of machines as machine technology changed. It also freed up the production floor for material handling equipment.

He has supervised the design of thermal and steam electric power plants, designed numerous industrial facilities for manufacturing and processing industries, and prepared procurement specifications and air permit applications. Mr. St. Louis has led or participated in the design of a wide range of industrial and processing facilities, each with their own distinctive design requirements. For example, he has managed and executed projects related to plastic injection-molding operations, gowning rooms for clean rooms, liquid propane facilities, and bulk-hydrogen storage centers.

Mr. St. Louis has directly participated in designing thermal power systems. His projects have ranged in size and complexity from a 10 MW ocean thermal energy plant to a 1000 MWe high-temperature gas reactor, and have included solar thermal, coal, oil, and gas-fired units.

Mr. St. Louis has conducted studies for clients to evaluate the use of incineration systems for waste disposal. In this role, he has prepared conceptual designs and procurement documents for rotary-kiln incineration systems.

Education

M.S., Engineering Management - Northeastern University, Boston, Massachusetts - 1975
B.S., Mechanical Engineering - University of Wisconsin, Madison, Wisconsin - 1969

Training

Becoming A More Powerful Project Manager. American Consulting Engineers Council - 1998

Waste Incineration Systems, Permitting, Trial Burns, and Design & Operation. Air & Waste Management Association – 1989

Licenses, Registrations, and Certifications

Professional Engineer, Mechanical - Pennsylvania - 1972, Active
Professional Engineer, Mechanical - Massachusetts - 1976, Active
Professional Engineer, Mechanical - Virginia - 1980, Inactive
Professional Engineer, Mechanical - Rhode Island - 1991, Inactive
Professional Engineer, Mechanical – New Hampshire - 1980, Inactive

Professional Affiliations

American Chemical Society (ACS), Member, Active
American Society of Mechanical Engineers (ASME), Member, Active
Air & Waste Management Association (A&WMA), Member, Active
American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), Inactive
American Nuclear Society (ANS), Inactive
High-Temperature Gas-Cooled Reactor (HTGR) Spent Fuel Storage Standard Work Group

Publications

St. Louis, T.N., "Station Arrangement Considerations for Coal Conversions." Paper presented at the ASME - Joint Power Generation Conference, 1983.

St. Louis, T.N., "Water Treatment Equipment Layout - This Month's Problem." Article published in *Power Magazine*, 1986.

Experience History

STONE & WEBSTER, STOUGHTON, MASSACHUSETTS - 1981 TO PRESENT AND 1968 TO 1980

Mixed Oxide Fuel Fabrication Facility (Apr 1999 to Present)
Duke Cogema Stone & Webster, LLC
Department of Energy

As Lead Mechanical Engineer, Mr. St. Louis is currently managing the design activities on the Mixed Oxide Fuel Fabrication (MOX) Facility, which is an element in the Department Of Energy's Plutonium Disposition Program. The MOX facility consists of a chemical processing unit that removes impurities from the plutonium feed stock, and a dry process unit, which manufactures fuel pellets and reactor fuel assemblies. In his position as Lead mechanical Engineer, he is responsible for the design development and specification of all chemical processing operations (a modified PUREX process), based on process engineering documents developed by the process licensor. He is also responsible for the development of designs and construction specifications for Plant Utilities Systems, HVAC Systems, Fire protection Systems. In the position of Lead Mechanical Engineer Mr. St. Louis is responsible for technical adequacy of the process/mechanical, utilities, HVAC and fire protection system in the MOX Facility. He is also responsible for the budgeting and planning of the engineering effort to develop this work.

Lungmen Nuclear Power Project (May 1998 to Feb 1999)
Taiwan Power Corporation, Taipei, Taiwan, ROC

As Acting Mechanical Engineering Manager, Mr. St. Louis was responsible for the all mechanical work performed in the Lungmen Project Office, in Taipei, Taiwan. Mr. St. Louis was also Task Manager for the development of a Thermal Performance Monitoring and Diagnostic System for the Lungmen Power Station. Mr. St. Louis prepared the design and specifications for an ice thermal storage system for the Administration Complex.

Facilities Relocation Project (Apr 1992 to Apr 1999)
The Gillette Company, Boston, MA

Mr. St. Louis was the Project Engineer on a 9 year, multi-phase project to relocate process equipment and site utilities to make way for construction of the Interstate-90 Seaport Access Road through the Gillette Company's property. This engineer, procure, construct project involved the relocation of bulk storage silos for plastic resins, the design and construction of a 45,000 gpm circulating seawater system with a new intake located on Boston's Fort Point Channel and the design and construction of a 260,000 gallon underground oil storage facility, relocation of plant fire mains and diesel fire pump, and the installation of seawater supply piping on a 350 ft. bridge spanning the construction site. The final phase consisted of installing the permanent sections of the seawater supply piping over the highway. Estimated cost of the project was $50 million.

10 MW Ocean Thermal Energy Plant (Apr 1998 to Aug 1998)
Sea Solar Power Inc., York, PA

Mr. St. Louis prepared a Technical Assessment Report on a 10 MW Ocean Thermal Energy Plant. The report included preparation of cycle mass and energy balances, conceptual design of process equipment and plant structures. This information was used to prepare an estimate of plant cost and the development of a project execution schedule.

CHEM DEMIL Project (Sept 1997 to Apr 1998)

U. S. Army, Aberdeen, MD

Mr. St. Louis developed a Project Systemization Plan and Schedule for the operation of chemical demilitarization facilities at Aberdeen, MD and Newport, IN.. Systemization is the development of a complete operation facility, including operating departments, staffing, training, construction acceptance, equipment start-up and proof of performance testing. These facilities use a neutralization process developed by PMCD to destroy chemical agents.

Air Compressor Project (July 1996 to Apr 1998)
The Gillette Company, Boston, MA

As Project Engineer, Mr. St. Louis prepared design and construction documents for the installation of a 1000 hp steam turbine driven air compressor and 15,000 scfm refrigerated air dryer in the existing power house.

Improved Plastics Facility (Sept 1992 to July 1996)
The Gillette Company, Boston, MA

Mr. St. Louis managed a project to design and prepared construction documents for a 165,000 square-foot injection molding facility for Gillette. The project involved new construction and renovation of existing space to house injection molding operations, technical services, administrative services and utilities. It provided for utility and raw material distribution in a utility space below the injection molding machines. This permitted the design of a standard "camp site" for installation of the injection molding machines and allowed for easy change-out of machines as machine technology changed. It also freed up the production floor for material handling equipment and maintenance operations. Cost of the project was $17 million.

Consulting Services (Nov 1991 to May 1993)
Serono Laboratories Inc., Randolph, MA

As Project Manager, Mr. St. Louis provided a wide range of consulting services including preparation of SOPs for instrument calibration and providing instrument calibration services; building and site evaluation; geotechnical investigation for new construction; and air, water and noise permitting for multi-product facility.

Solar/Thermal Power Plant (Jan 1992 to Mar 1992)
Harper Lake Company, Lockhart, CA

As Project Engineer, Mr. St. Louis prepared a recovery plan to determine the work required and the costs associated with the bankruptcy (LUZ) recovery of the Solar Electric Generating Station (SEGS) VIII and XI. He led a team of engineers in assessing the quality of completed work and he calculated the extent of the remaining construction work. In this capacity, he and his colleagues developed a cost estimate for upgrading deficient work and for finishing construction on this plant, which uses parabolic tracking mirrors.

Waste Incinerator Project (June 1991 to Feb 1992)
Monadnock Paper Mills, Bennington, NH

As Project Engineer, Mr. St. Louis provided consulting services to support the preparation of a technical specification for a 2000 lb./hr rotary kiln incinerator. He also evaluated alternative incinerator technologies for disposal of manufacturing wastes. After the client received proposal bids for this incinerator, Mr. St. Louis prepared a technical analysis of each bid. He also prepared the New Hampshire Department of Environmental Services Air Permit Application required to build and operate the incinerator.

Gowning Room Renovations (Nov 1991 to Dec 1991)
Serono Laboratories, Randolph, MA

As Project Engineer, Mr. St. Louis prepared construction documents to expand and modernize the gowning room facilities for a Class 10,000 clean room at Serono's laboratory.

Design/Due Diligence Reviews

As Engineer, Mr. St. Louis provided independent technical reviews of electric and steam generation plant designs and construction.

Pump Seal Test Facility (Nov 1990 to Oct 1991)
EG&G Sealol, Cranston, RI

As Project Engineer, Mr. St. Louis provided consulting services to design and prepared construction documents for a facility that circulated high-temperature liquid propane in a closed-loop circuit. This facility tested pump seals suitable for hydrocarbon service.

Medical Waste Disposal Evaluation (Mar 1990 to Sept 1990)
Huntsville Division - United States Army Corps of Engineers (USACE)

As Project Engineer, Mr. St. Louis drafted an analysis of a third-party contracting opportunity related to energy recovery from medical waste. He analyzed waste generation and energy consumption at Army facilities in the national Capitol, evaluated alternative medical waste disposal technologies, and identified capital and operating costs. Using this data, Mr. St. Louis developed an economic model of the waste disposal facility.

New Paper Coating Facility (Jan 1989 to Aug 1989)
James River Graphics, Johnstown, RI

As Mechanical Engineer, Mr. St. Louis designed a new automated coating production area. His services included documenting the existing coating processes, preparing material balances, selecting equipment, and preparing operating optimization studies. Mr. St. Louis concluded his effort by providing the client with a specification for a 3,500 lb./hr automated colorant dispensing system.

Gas Vaporizer Study (Jan 1989 to Mar 1989)
Distrigas, Everett, MA

As Mechanical Engineer, Mr. St. Louis conducted an energy balance and vaporizer output optimization study for a liquefied natural gas (LNG) vaporizer system.

Waste Incinerator Study (Jan 1989 to Mar 1989)
Fulflex, Incorporated, Brattleboro, VT

As Project Engineer, Mr. St. Louis studied the use of onsite incineration of scrap rubber and other plant trash with heat recovery. He prepared mass and energy balances, developed preliminary equipment size projections, prepared a conceptual cost estimate, and performed a discounted cash flow analysis of the project to determine its technical and economic feasibility.

Bulk Hydrogen Storage System (Oct 1988 to Dec 1988)
Schott Fiber Optics, Southbridge, MA

As Project Engineer, Mr. St. Louis designed the bulk gaseous hydrogen system and prepared the construction documents needed to install the system. He also drafted the necessary permitting documents and testified at the public hearing required to obtain an H_2 storage license.

Consulting Services - Food Processing Plant (Mar 1988 to Aug 1988)
Weymouth Plant - Brady Enterprises

As Project Engineer, Mr. St. Louis designed an automated bulk sugar batching system for a food line. As part of this task, he specified the feeders, elevators, screw conveyors, and the weight belt equipment. To support another activity at the plant, Mr. St. Louis prepared the Massachusetts Air Permit Application for two spray dryers.

Consulting Services (Nov 1987 to Apr 1992)
Biopure, Incorporated, Boston, MA

As Project Manager, Mr. St. Louis has managed a wide range of consulting services and tasks for Biopure. His support has included selecting and applying process instruments, conceptually designing the conversion of an existing building into a pharmaceutical production plant, and preparing Standard Operating Procedures (SOPs). He has directed or participated in acoustical surveys, waste disposal studies, materials evaluations, water reuse studies, and HVAC design reviews for several facilities. Additionally, he has provided startup support services, process modeling, and validation services to the client.

South Station Steam Line Relocation (Oct 1987 to July 1989)
Boston Thermal Energy, Boston, MA

As Project Engineer, Mr. St. Louis headed a project to relocate large, high-pressure steam and condensate distribution piping in the vicinity of Boston's South Station railroad terminal. This relocation effort allowed the completion of extensive modifications to an adjacent subway station. Mr. St. Louis and his colleagues prepared construction documents and supplied a wide range of field engineering services throughout construction.

Variable-Volume Process Exhaust (Sept 1987 to May 1988)
Northrop, Norwood, M

As Project Engineer, Mr. St. Louis designed a new variable-volume process exhaust system for the town. He also directed the modifications that were made to the existing HVAC system to accommodate the operation of the new exhaust system. Additionally, he prepared several Massachusetts Department of Environmental Quality Engineering (DEQE) Air Quality permit applications.

Battery Manufacturing Plant (June 1987 to Oct 1987)
Chloride Silent Power, Runkorn, England

As Lead Mechanical Engineer, Mr. St. Louis prepared a preliminary manufacturing facility layout and a cost estimate for a 250,000 sq. ft. plant that would manufacture sodium/sulfur batteries.

Environmental Improvement Project (Oct 1986 to Apr 1987)
Spears Associates, Norwood, MA

As Lead Mechanical Engineer, Mr. St. Louis designed a process exhaust system to control dust and fugitive emissions generated by the fabrication of fiberglass housings for electronics components.

As Plant Layout Engineer, Mr. St. Louis prepared site plans, equipment arrangements, and building layouts for a wide variety of power production and industrial facilities.

Condensate Line Replacement (Nov 1986 to Dec 1986)
Christian Science Center, First Church of Christ, Scientist, Boston, MA

As Project Engineer, Mr. St. Louis prepared construction plans and specifications for the installation of stainless-steel condensate return piping in the 26-story Administration Building.

Site Selection Studies (1986)
Boston Edison

As Project Engineer, Mr. St. Louis conducted studies to identify and evaluate eastern Massachusetts sites that would be suitable for the construction of two 400 MW coal-fired electrical generating plants and for a 440 MW combined-cycle gas turbine electric generating plant. He evaluated and ranked each potential site according to environmental and cost criteria.

Modular High-Temperature Gas Reactor (MHTGR) (Mar 1984 to Dec 1985)
Gas-Cooled Reactor Associates

As Lead Power Engineer, Mr. St. Louis led the development and conceptual design of the power conversion cycle for an advanced MHTGR power plant. This plant featured 2,400 psi, 1,000°F initial steam conditions, supplying four 125 MWe non-reheat turbines.

Clinch River Breeder Reactor Project (July 1983 to Oct 1983)
Department of Energy (DOE), Oak Ridge, TN

As Assistant Resident Engineer, Mr. St. Louis arranged engineering staffing and directed mechanical engineering to support construction activities. He also managed balance-of-plant (BOP) equipment procurement and prepared several specifications for non-engineered permanent plant materials.

Magnetohydrodynamic (MHD) Retrofit (Oct 1982 to Mar 1983)
Etiwanda Steam Station - Southern California Edison

As Lead Power Engineer, Mr. St. Louis participated in a Definition Program for a 125 MW oil-fired unit's conversion to coal firing and repowering with a 60 MW magnetohydrodynamic topping cycle. He directed all phases of power engineering on this project, including the preparation of cycle mass and energy balances, the development of the equipment design basis, and the selection of preliminary components. Mr. St. Louis assessed the development requirements that were necessary to manufacture cycle components and prepared a conceptual plant definition and capital cost estimate.

North Anna Power Station Units 3 and 4 (Jan 1978 to Feb 1980)
Virginia Power (formerly VEPCO), Mineral, VA

As Lead Power Engineer, Mr. St. Louis managed the engineering and design of the reactor and turbine systems at a 950 MWe pressurized water (PWR) nuclear power plant. He supervised the preparation of construction drawings, system descriptions, piping and instrumentation diagrams, and equipment specifications by engineers and designers. He also determined staffing levels that would comply with the authorized budget. Additionally, Mr. St. Louis prepared schedules and served as a liaison between client and vendor personnel.

North Anna Power Station (May 1977 to Jan 1978)

Virginia Power (formerly VEPCO), Mineral, VA

As Principal Mechanical Engineer, Mr. St. Louis directed the engineering and design of the turbine plant. His services on this assignment included taking technical responsibility for the station fluid power systems and system components. Mr. St. Louis also determined the staffing requirements to complete the engineering work within the overall project schedule.

High-Temperature Gas-Cooled Reactor (HTGR) Study (Nov 1975 to Jan 1976)
General Atomic Company

As Lead Power Engineer, Mr. St. Louis compared the overall costs of pressurized water reactors and high-temperature gas-cooled reactors. His cost comparison featured engineering studies that examined new ways of optimizing HTGR system cost-effectiveness.

Fulton Generating Station Units 1 and 2 (Sept 1972 to Nov 1975)
Philadelphia Electric Company (PECO)

As Principal Facilities Engineer, Mr. St. Louis' services at this twin 1150 MW high temperature gas-cooled reactor plant included identifying manpower requirements and developing and implementing task and purchase order schedules to meet the overall project schedule. He also coordinated the completion of the engineering and design studies that were required for the development of detailed building arrangement drawings. Mr. St. Louis technically managed the fuel storage and handling systems — he supervised engineering studies, prepared flow diagrams, system descriptions, equipment specifications, and the safety analysis report (SAR), he evaluated bids, prepared construction drawings, and coordinated system designs with client engineering staff.

Fulton Generating Station (Nov 1971 to Sept 1972)
Philadelphia Electric Company

As Engineer, Mr. St. Louis was selected to join the Facilities Engineering Group on this project. He developed conceptual designs and conducted the engineering studies that were necessary to prepare the plant's Preliminary Safety Analysis Report (PSAR).

Shoreham Nuclear Power Station Unit 1 (Jan 1971 to Aug 1971)
Long Island Lighting Company (LILCO)

As Engineer, Mr. St. Louis assisted in the engineering of the reactor building ventilation system. His work included preparing design calculations and developing performance specifications for system equipment.

James A. Fitzpatrick Nuclear Power Plant (May 1970 to Jan 1971)
Power Authority of the State of New York (PASNY)

As Engineer, Mr. St. Louis was selected by the client to engineer a 125,000 lb./hr, Number 6 fuel oil auxiliary boiler system and to prepare related drawings and equipment specifications for the 850 MW BWR plant.

Cheswick Power Station (Mar 1969 to May 1970)
Duquesne Light Company (DLC), Cheswick, PA

As Field Engineer, Mr. St. Louis provided his engineering and design services to the effort to complete field changes in the plant's power piping. He helped supervise and inspect all piping subcontractors and assisted in the start-up and preliminary operation of the 550 MW coal-fired plant.

CLEVERDON, VARNEY & PIKE CONSULTING ENGINEERS, BOSTON, MASSACHUSETTS - 1980 TO 1981

Chief Mechanical Engineer

As Chief Mechanical Engineer, was responsible for the mechanical engineering projects. Principal projects included commercial and industrial HVAC system, boiler and steam distribution systems, and chilled water distribution systems

Advanced Propulsion Test Facility (June 1980 to Oct 1980)
General Electric Company (GE), Lynn, MA

As Project Manager, Mr. St. Louis managed the mechanical, electrical, and control engineering associated with the preparation of a conceptual design and capital cost estimate for a stationary test facility. This facility was designed to test 30,000 hp gas turbine/electric marine drive trains.

Curriculum Vitae
for
WERNER BERGMAN, Ph.D.
P.O. Box 451
Pleasanton, CA 94566

SUMMARY:

Experienced in promoting, planning, managing and executing engineering and scientific projects dealing with aerosol physics, aerosol and gas filtration, chemical protective clothing, and combustion research.

EXPERIENCE:

LAWRENCE LIVERMORE NATIONAL LABORATORY (925) 422-5227
7000 East Avenue L-379, Livermore, CA 94550 bergman2@llnl.gov
Hazard Control Department (September 1976 to Present)

Project Manager of Aerosol and Filter Technology: Chem Bio Section(June 1999 to Present) Designed a large scale biological aerosol test facility including a 10,000 cfm wind tunnel, room size chamber, and several glove boxes. The facility has 3 levels of containment and meets the requirements for bio-safety level 3. Developed theoretical model of aerosol generation from fermentors . Designed and developed an aerosol and vapor monitoring system consisting of 200 sample sites to measure the cleanliness level in the laser optical system of the National Ignition Facility (NIF) . Provided design and specification guidance on the NIF air purification system. Provided guidance and information on nuclear air cleaning to LLNL, Department of Energy, and Defense Nuclear Facilities Safety Board officials. Established a fundamental dose-response relationship between electromagentic field exposure and biological response.

Project Manager of Filter Development and Fire Research: Special Projects Division (October 1995 to June 1999) Developed and demonstrated a portable bio-aerosol collector based on a proprietary virtual impactor that has low pressure drop. Developed and implemented an off-gas treatment system involving gas and particle removal for U.S. nuclear weapons dismantlement program. Conducted spark ignition studies of flammable liquid sprays. Directed large-scale fire tests in storage areas for flammable liquids. Developed filter test method using laser particle counters for determining in-place HEPA filter efficiencies. Conducted various studies to determine the effect of age and accident conditions on HEPA filter performance. Completed cost/benefit study of cleanable steel HEPA filters and comparison with competing technologies. Set up a HEPA filter test facility at LLNL. Provided consultation and research services for various LLNL programs and Department of Energy. Directed a staff of 8 scientists, engineers, and technicians with an average annual budget of $1.5 million

Project Manager of Filter Test and Development: Special Projects Division (August 1988 to September 1995) Established the feasibility of an all steel HEPA filter and developed engineering prototypes and conducted field evaluations. Developed the technology for making 0.5 μm steel fibers using the wire bundling and drawing method. Made sintered fiber media from the new steel fibers. Developed an automated filter tester which can measure maximum filter penetrations as low as 10^{-10} within 15 minutes. Conducted a review of a proposed radioactive waste incinerator at LLNL and received the Director's Distinguished Service Award for this work. Developed 3-D computer simulation models for gas and liquid filtration. Conducted various studies on performance of chemical protective clothing. Developed new instruments for the military to evaluate chemical protective clothing. Consulted on various LLNL and national projects involving gas and aerosol filtration. Chairman of a national review panel for the Undersecretary of the Army to assess military protective clothing in support of Operation Desert Storm. Directed a staff of 18 scientists, engineers and technicians with an average annual budget of $2.5 million.

Project Manager of Filter Test and Development, and Chemical Protective Clothing:
Special Projects Division (October 1983 to July 1988)
Developed a cermet (ceramic-metal) HEPA filter having high strength and temperature resistance. Developed a vent filter for the TRUPACT transportainer that is used for transporting TRU wastes to the WIPP burial site. Also developed a sample bag test method for the TRUPACT filter that could measure filter penetration as low as 10^{-9}. Conducted theoretical and experimental study of aerosol and gas penetration through chemical protective suits for the U.S. Army. Conducted preliminary evaluation of large scale fires to study the nuclear winter effect. Consulted on various LLNL and national projects involving gas and aerosol filtration. Directed a staff of 10 scientists, engineers and technicians with an average annual budget of $1 million.

Project Manager of Enhanced Filtration: Special Projects Division (September 1976 to September 1983) Managed a project to develop electric filters for the nuclear industry. Developed the theory of electric filters, designed prototype filters and conducted field evaluations in radioactive environments. Developed new instrumentation for measuring particle size and charge simultaneously. Served as consultant for LLNL and the Department of Energy on a number of gas and aerosol filtration problems. Directed a staff of 5 scientists, engineers and technicians with an average annual budget of $0.5 million.

BERGMAN & ASSOCIATES (925) 469-6922
Pleasanton, CA wernerbergman@attbi.com
(1980 to present)

Provided consultation services and research and development services to filter manufacturers, instrument manufacturers, computer companies and the U.S. Army. Typical services would include assessment of filter or aerosol instrument performance and recommendations for improved designs. Designed a test apparatus for evaluating chemical protective clothing for the Army. Assisted in patent preparation and litigation in several cases. Served as expert witness in an international trade commission trial and US patent infringement cases.

WAYNE STATE UNIVERSITY
Detroit, MI (February 1974 to August 1976)

Research Assistant in Physical Chemistry Department
Developed the theory and practice for measuring particle size distributions using a new rapid light scattering method.

FORD MOTOR COMPANY
Dearborn, MI (June 1969 to January 1974)

Research Engineer in Induction, Emissions, and Combustion Research and Emissions Test Departments
Conducted research and development on automotive catalysts and automotive exhaust emissions.

EDUCATION:

Lawrence Livermore National Laboratory, Livermore, CA

Management training classes, 1980-2001

Wayne State University, Detroit, MI

Bachelor of Science in Chemistry, June 1969
Minor in Math and Physics

Ph.D. in Physical Chemistry, June 1978
Minor in Combustion Engineering

PUBLICATIONS:

BOOKS

W. Bergman and W. Heller, "Mie Scattering Maxima and Minima in Heterodisperse Systems," WSU Press, Detroit, MI, 1977.

W. Bergman, "Determination of Size Distributions in Heterodisperse Systems of Homogeneous, Non-Absorbing Spheres From Angular Light Scattering Extrema," Ph.D. Dissertation, WSU, Detroit, MI, 1977.

PAPERS

J.S. Ninomiya, W. Bergman and B.H. Simpson, "Automotive Particulate Emissions," in Proceedings 2nd International Clean Air Congress, Academic Press, NY, 1971.

W. Bergman, "Characterizing and Measuring Automotive Particulate Emissions with Two Improved Sampling Techniques," paper presented at Central States Section of the Combustion Institute, Ann Arbor, MI, March 1971.

G.O. Nelson, W. Bergman, H. Miller, R.D. Taylor, C.P. Richards, and A.H. Biermann, "Enhanced Filtration Progress Report," LLNL, Report UCID-16949-76-3, March 1977.

G.O. Nelson, W. Bergman, H.H. Miller, R.D. Taylor, A.H. Biermann, and C.P. Richards, "Enhanced Filtration: Introduction," Hazards Control Progress Report No. 53, LLNL, Report UCRL-50007-76-2, pp. 26-30, 1977.

W. Bergman, G.O. Nelson, H.H. Miller, R.D. Taylor, and C.P. Richards, "Enhanced Filtration: Theory of Electric Field on Filter Media." Hazards Control Progress Report No. 53, LLNL, Report UCRL-50007-76-2, pp. 30-34, 1977.

G.O. Nelson, W. Bergman, H.H. Miller, R.D. Taylor, C.P. Richards, and A.H. Biermann, "Enhancement of Air Filtration Using Electric Fields," American Industrial Hygiene Association Journal, 39, 472 (1978).

W. Bergman, R.D. Taylor, H.H. Miller, A.H. Biermann, H.D. Hebard, R.A.
da Roza, and B.Y. Lum, "Enhanced Filtration Program at LLL-A Progress Report," in Proceedings of 15th DOE Air Cleaning Conference, Boston, MA,
August 1978, pp. 1058-1099 NTIS Springfield, VA Conference-780819, 1979. (Also in LLNL, Report UCRL-81512, 1978).

R.D. Taylor, W. Bergman, and H.D. Hebard, "Enhanced Filtration: Expansion of Enhanced Filtration Test Facility," in Hazards Control Progress Report No. 55, LLNL, Report UCRL-50007-77-2, pp. 1-4, 1978.

W. Bergman, A.H. Biermann, and H.H. Miller, "Effect of Fiber-Size Distribution in Filter Pressure Drop," in Hazards Control Progress Report No. 55, LLNL, Report UCRL-50007-77-2, pp. 8-15, 1978.

W. Bergman, H.H. Miller, A.H. Biermann, and R.D. Taylor, "Experimental and Theoretical Studies on Filter Loading," in Hazards Control Progress Report No. 55, LLNL, Report UCRL-50007-77-2, pp. 15-25, 1978.

W. Bergman, R. Kaifer, H. Hebard, R. Taylor, B. Lum, and R. Boling," Operating Manual for the Electrostatic Glove Box Prefilter Installed Inside the Filter Glove Box No. 046 at Rocky Flats, Building 776," LLNL Report, UCID-18180, May 1979.

W. Bergman, H. Hebard, R. Taylor, and B.Y. Lum, "Electro-static Filters Generated by Electric Fields," in Proceedings of 2nd World Filtration Congress, London, England, September 1979. (Also in LLNL Report, UCRL-81926, 1979).

W. Bergman, R.D. Taylor, H.D. Hebard, B.Y. Lum, and W.D. Kuhl, "Electrofibrous Prefilters for Use in the Nuclear Industry," in Proceedings of the 2nd U.S. DOE Environmental Control Symposium, Reston, VA, March 1980, pp. 334-371, NTIS, Springfield, VA, CONF-800334/2. (Also in LLNL Report, UCRL-83794, March 1980).

W. Bergman, A.H. Biermann, H.D. Hebard, B.Y. Lum, and W.D. Kuhl, "Electrostatic Air Filters Generated by Electric Fields," in Particulate Systems - Technology and Fundamentals, J.K. Beddow, Ed., Hemisphere Publishing Co, NY, pp. 57-93, 1983. (Presented at Fine Particle Society Full Meeting, Sept. 16-18, 1980, Also in LLNL Report, UCRL-84878, January 1981).

W. Bergman, W.D. Kuhl, W.L. Russell, H.D. Hebard, A.H. Biermann, N.J. Alvares, D.G. Beason, and B.Y. Lum, "Electrofibrous Prefilters for Use in Nuclear Ventilation Systems," in Proceedings of 16th DOE Nuclear Air Cleaning Conference, San Diego, CA, October 1980, pp. 807-836, NTIS, Springfield, VA, CONF-801038, 1981. (Also in LLNL Report, UCRL-84454, February 1981).

W. Bergman, W. D. Kuhl, A.H. Biermann, J.S. Johnson, and B.Y. Lum, "Evaluation of Prototype Electrofibrous Filters for Nuclear Ventilation Ducts", in Proceedings of 17th DOE Nuclear Air Cleaning Conference, Denver, CO, August 1982, pp. 548-575, NTIS, Springfield, VA, CONF-820833, 1983. (Also in LLNL Report, UCRL-88426, 1982).

A.H. Biermann, B.Y. Lum, and W. Bergman, "Evaluation of Permanently Charged Electrofibrous Filters", in Proceedings of 17th DOE Nuclear Air Cleaning Conference, Denver, CO, August 1982, pp. 523-547, NTIS, Springfield, VA, CONF-820833, 1983. (Also in LLNL Report, UCRL-87535, 1982).

A. Biermann and W. Bergman, "Measurement of Aerosol Concentration as a Function of Size and Charge," in Hazards Control Department Annual Technology Review, 1983, LLNL Report, UCRL-50007-83, pp. 61-67, 1984.

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W. Bergman and W. Kuhl, "High Temperature, High Efficiency Electric Air Filter Using a Stacked-Disk Design," in Hazards Control Department Annual Technology Review, 1984, LLNL Report, UCRL-50007-84, pp. 79-83, 1985.

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W. Bergman and W. Bergman, "Dose-Dependent, Oscillatory Biological Responses to Non-Ionizing Electric and Magnetic Fields: I. Single Cycle Responses, UCRL-JC-132365, November 5, 1998.

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G. Miller, G. Fulton, and W. Bergman, "HEPA filter and in-place leak testing standard." LLNL report UCRL-AR-133354 Rev 1, June 1999.

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W. Bergman and W. Bergman, "Empirical analysis of biological responses to EM fields show they are dose dependent" LLNL Report UCRL-JC-141194, October , 2000.

PATENTS:

W. Bergman, "Electric Filter with Moveable Belt Electrode", U.S. Patent
No. 4, 405,342, Sept. 20, 1983.

W. Bergman, "Disk Filter" U.S. Patent No. 4,581,046, April 8, 1986.

W. Bergman, "Recirculating Electric Air Filter," U.S. Patent No. 4,623,365, Nov. 18, 1986.

W. Bergman, "Sintered Composite Medium and Filter," U.S. Patent No. 4,687,579, August 18, 1987.

MOVIES:

Electric Air Filtration, R. Jaeger, Producer-Writer, J. L. Caywood, Director, and W. Bergman, Technical Advisor, LLNL film 1983.

PROFESSIONAL SOCIETIES:

American Association for Aerosol Research, American Filtration Society, Institute of Environmental Science, Society of Automotive Engineers, Bioelectromagnetic Society, Project Management Institute

COMMITTEE MEMBERSHIP:

U.S. Department of Energy Filter Test Facility Technical Review Committee: (1979-2000).

American Society for Test and Materials F21 Committee on Air Filtration:(1979-1981).

U.S. Department of Energy Review Committee on U.S. Policy for Krypton-85 Immobilization: (1980).

U.S. Department of Energy Review of Incinerators for Transuranic Waste Treatment Facility: (1980).

U.S. Army National Review Committees for Protective Clothing: Reviewed current test methods for measuring effectiveness of protective clothing and made recommendations as member of the "Red Team"(1987-1990). Chairman of Scientific Panel to review protective clothing test methodologies (1991).

Program Committee for DOE/NRC Nuclear Air Cleaning Conferences:(1987-2000).

Organizing Committee for Fine Particle Society Conferences (1982-1990).

Organizing Committee for 9th International Symposium on Contamination Control in Los Angeles, CA, September 1988.

International Atomic Energy Agency, Chairman of Committee on "Development of Particulate Filters for Nuclear Facilities," Vienna, Austria (1988).

American Filtration Society, Member of Board of Directors, 1990-1996, Chairman of Filter Test Committee, 1994-1996

Society of Automotive Engineers, Member of J726 Committee, Air Cleaner Test Code and J1669 Committee, Passenger Compartment Air Filter Test Code, (1992-1997)

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Offers 34 years environment, safety, and health experience. Managed radiation protection, environmental, emergency planning, industrial safety and hygiene programs, as well as nuclear assessments and audits for commercial nuclear facilities. Managed multi-tiered technical organizations and annual budgets up to $7 million. Successfully interfaced with regulatory agencies, held responsible committee positions in industry groups and served as an expert witness.

EXPERIENCE:

Manager, Environment, Safety and Health
Mixed Oxide Fuel Project
Duke Engineering and Services, Charlotte, NC (8/98 to present)

Develop and implement the environment, safety and health program for the mixed oxide fuel project. Serve as management liaison with regulatory agencies, including DOE, NRC, South Carolina Department of Health and Environmental Control, and OSHA on ES&H requirements. Establish MFFF ES&H policy; implement policy in an environmental protection program, industrial safety and hygiene program, radiation safety program, and emergency response program. Work closely with line management to ensure that ES&H requirements are consistently interpreted and integrated into activities across the project. **Major accomplishment:** Developed the MOX Fuel Fabrication Facility Environmental Report in less than 10 months.

Senior Licensing Consultant
Engineering Project Support, Federal Group
Duke Engineering & Services (08/98-4/00)

Provide licensing, engineering, and ES&H expertise to projects supported by the Federal Group. For Yucca Mountain Project, participated in performance self-assessment of the M&O technical management; developed a white paper on the level of detail for the License Application; rewrote the License Application Design Products List to provide guidance to engineers on the use of design products in the license application; supported implementation of a revised QA grading program with an implementing guidance document. For the Idaho Nuclear Technology and Engineering Center, developed white papers on the Status of INTEC Tank Farm Facility Contaminated Soils and an

Overview of Waste Classification, developed the grout certification portion of the NRC Licensing Support for INTEC Waste Treatment Facilities report and developed sections of the INTEC TFF Incidental Waste Study.

Manager, Safety Assurance
Catawba Nuclear Site
Duke Power Company (1/97 to 7/98)

Planned, scheduled and directed the activities of the Safety Review, Regulatory Compliance, Environmental Management, Safety Services, and Emergency Planning groups (37 personnel). Responsibilities included interface with NRC, EPA, OSHA, DOT, state and county government agencies, INPO, and nuclear insurers; regulatory interpretation; audits, assessments, safety oversight, and corrective action program; safe work practices, transportation; emergency plans, procedures, exercises, drills, and facilities; chemical control, spill prevention, recycling, hazardous material disposal, and landfill operations. **Major accomplishment:** Restructured Safety Assurance organization based on three-site study of work processes, skills to perform functions, and industry benchmarking.

Consultant
ATL International, Inc.
Germantown, MD (9/96 to 9/98)

Consulted part-time as part of a senior advisory body to DOE EM-30 as the office developed DOE Order 435.1 on waste disposal.

Engineering Supervisor, Instrument and Control Section
CERN Engineering, Catawba Nuclear Site,
Duke Power Company (4/96 to 1/97)

Planned, scheduled and directed the activities of site and contractor personnel who are technical experts for instrumentation and control equipment associated with mechanical systems such as reactor coolant, auxiliary building ventilation and containment spray. Responsibilities included resolving complex equipment problems, trending and evaluating component failures, and answering technical questions from craft, Mechanical System Engineering, and other site groups.

Project Manager/Engineering Supervisor
Maintenance Rule/Preventive Maintenance Optimization Special Project,
Mechanical and Civil Equipment Engineering, Catawba Nuclear Site,
Duke Power Company (4/94 to 12/31/95)

Started as Engineering Supervisor for Catawba site personnel assigned to Maintenance Rule/Preventive Maintenance Optimization Special Project and ended as Preventive Maintenance Optimization Project Manager. This project developed, implemented, and documented the methods of continuously assessing the condition and performance of critical systems, structures, and components and to standardize preventive maintenance practices for Maintenance Rule scope systems. Coordinated Duke participation in a technical collaboration with EPRI on the integration of predictive maintenance tasks into preventive maintenance programs. **Major accomplishment:** Maintenance Rule Project completed on schedule using 66% of budget.

Acting Manager,
Mechanical and Civil Equipment Engineering, Catawba Nuclear Site,
Duke Power Company (9/95 to 11/30/95)

While completing the Preventive Maintenance Project, acted as an interim or transition manager for four sections of the Mechanical and Civil Equipment Engineering Group at Catawba Nuclear Site; rotating equipment, mechanical equipment, valves, and civil equipment. Activities included preparation for and support for a refueling outage on one of the units, troubleshooting equipment problems, and performing root cause analyses. **Major Accomplishment:** Rewrote the cause analysis guidance to include equipment failure investigations.

Regulatory and Licensing Manager,
U. S. DOE Civilian Radioactive Waste Management System
Management and Operating Contractor (CRWMS M&O)
Duke Engineering and Services (2/91 to 4/94)

Planned, scheduled, and directed the activities of Regulatory and Licensing personnel within the M&O, a team of nine companies working together, in support of the Office of Civilian Radioactive Waste Management, DOE. **Major accomplishments:** Implemented the annotated outline process for the development of the repository and monitored retrievable storage facility license applications, used topical reports to resolve regulatory issues prior to license submittal, developed a training program on the licensing process, and developed a licensing strategy.

Technical System Manager, Radiation Protection
Duke Power Company (11/88 to 2/91)

Planned, scheduled, and directed the activities of the Radiation Protection Section (25 personnel) in defining, developing, implementing, and evaluating the effectiveness of health physics and radioactive waste management programs at three nuclear stations (seven reactors). **Significant efforts begun:** Developed an in-house vendor-supplied radiation protection technician program to supplement

permanent staff during outages, computerized radiation protection data and records (RM&C), and initiated a training program to prepare staff personnel to take the ABHP exam and improve credibility.

Technical System Manager, Radwaste Engineering
Duke Power Company (82 to 88)

Planned, scheduled, and directed the activities of the Radwaste Engineering Section (12-15 personnel, 60 for transportable volume reduction system project) in defining, developing, implementing, and evaluating the effectiveness of radioactive waste management programs at three nuclear stations. **Major accomplishments:** EPRI study was conducted to optimize the use of ion exchange media for liquid radioactive waste processing, a transportable volume reduction system was installed and tested for processing steam generator chemical cleaning waste, and radioactive waste processing and disposal costs were reduced by a factor of five while disposal costs increased 25% per year.

Health Physicist, Radioactive Waste Management Function
Duke Power Company (76 to 82)

Directed the activities of the function (5 personnel) in implementing and evaluating the effectiveness of radioactive waste management programs at two nuclear stations. **Major accomplishment:** Developed a post-accident gas sampling system which is used to determine the concentrations of reactor containment radio-iodines and noble gases.

Health Physicist, Programs and Procedures Function
Duke Power Company (74 to 76)

Directed the activities of the function (3 personnel) in implementing and evaluating the effectiveness of radiation protection support programs at one nuclear station.

Assistant Health Physicist
Duke Power Company (72 to 74)

Performed effluent release calculations, established environmental monitoring programs around nuclear power plants, established radio-analytical laboratories; duties included development of equipment specifications, vendor selection, and equipment startup and troubleshooting.

Chemist
Radiation Protection Section, State of Wisconsin (68-72)

Performed radiochemical analyses for the environmental monitoring programs for four nuclear stations.

EDUCATION: MS 1974 University of Wisconsin (Radiation Sciences)

BS 1968 University of Wisconsin (Chemistry Course)

ADDITIONAL TRAINING:

Various Duke Power Company Management Training Courses
ASME Course on Radioactive Waste Management
NCSU NE419 Introductory Nuclear Engineering Course
Duke Power Company 10 week training on nuclear power plant systems

CREDENTIALS: Certified by the American Board of Health Physics
Engineering Registration NC 10451

SECURITY CLEARANCE: Previously held Duke nuclear station security clearance
Previously held a DOE BAO Security Clearance
DOE Savannah River Site Access

PROFESSIONAL AFFILIATIONS:

Health Physics Society
- North Carolina Chapter
- Baltimore Washington Chapter

American Academy of Health Physics
American Nuclear Society
Society of Women Engineers

CURRENT AND PAST COMMITTEE ACTIVITIES:

National Council on Radiation Protection and Measurements,
- Standing Committee 46, Operational Radiation Safety

North Carolina Radiation Protection Commission
Advisory Committee to the North Carolina Members of the Low-Level Radioactive Waste Management Compact Commission
North Carolina Governor's Waste Management Board committees:
- Technical Advisory Committee on Low-Level Radioactive Waste
- Ad Hoc Committee on Waste Reduction

Chaired the Electric Power Research Institute Technical Advisory
- Committee on Below Regulatory Concern Waste (BRC)

Nuclear Utilities Management and Resources Council (NUMARC) committees:
- Operations, Maintenance, and Support Services Advisory Committee
- NUMARC Ad Hoc Committee on BRC

Edison Electric Institute -Utility Nuclear Waste Management Group

Low-Level Waste Working Group
Mecklenburg County Emergency Planning Citizens Advisory Committee
Program Chair for the Spring 1993 Southeast Regional Health Physics Meeting
American Board of Health Physics Part I Panel of Examiners, Vice-Chairman for 1995-1996, Chairman for 1997, Past-Chairman 1998
American Board of Health Physics, Parliamentarian 2002

PAPERS OR PRESENTATIONS:

Post-TMI Environmental Monitoring Requirements, Atomic Industrial Forum Conference on Environmental Regulation of the Nuclear Industry: A New Decade, May 1980.

Nuclear Station Post-Accident Sampling Systems, North Carolina Health Physics Society, May 1981.

Emphasis on the Management in Low-Level Radioactive Waste Management, American Nuclear Society (ANS) Tenth Biennial Conference on Reactor Operating Experience, August 1981.

NSAC 23, *Nuclear Station Post-Accident Liquid Sampling Systems*, developed by Duke Power Company, January 1981, Nuclear Safety Analysis Center, Electric Power Research Institute.

Nuclear Power Facility Implementation of 10 CFR 61, NUS Licensing Information Service 1983 Fall Conference, October 27, 1983.

Financial Implications of Implementing 10 CFR 61, A Conference on Incineration of Low-Level Radioactive Waste, Anaheim, CA, April 1984.

Radwaste Management Computer Programs, ANS 30th Annual Meeting, June 1984.

Low-Level Waste Generation by Utilities, The Clemson University Environmental Conference, 1985.

Low-Level Waste Generation by Utilities, WATTec Conference, Knoxville, TN, February 1986, Impacts of the Emerging LLW System.

Oconee Radwaste Facility Compliance, Incineration Conference, St. Charles, Illinois, April 1987.

Interactions with the Public on Very Low-Level Radioactive Waste Disposal, American Society of Mechanical Engineers Short Course on Radwaste Management, Alexandria, VA, May 1987.

Impacts of the Emerging Low-Level Waste Disposal System on Large Generators, 9th Annual DOE LLW Management Conference, August, 1987

Alternatives to Low-Level Radioactive Waste Handling, NC Health Physics Society Meeting, Boone, NC, October 1987.

Below *Regulatory Concern/Mixed Wastes*, US Council on Energy Awareness Fuel Cycle 89 Conference, Orlando, Florida, April 1989.

Nuclear Utility Low-Level Radioactive Waste Volume Reduction (co-authored with W. A. Haller) Professional Engineer NC, 1989.

Low-Level Waste Generation by Utilities (co-authored with R. Propst, M. Terrell, and D. Vaught) Harvard School of Public Health Course on Management and Disposal of Radioactive Wastes, July 1990 and July 1991.

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EDUCATION/TRAINING

BS, Chemistry, University of Illinois, 1971
Legal Research, Tort Law and Real Estate Law, North Virginia Community College, 1993-1994
Physical and Historical Geology, North Virginia Community College, 1992
National Environmental Policy Act Workshop, U.S. Department of Energy, Washington, D.C. 1994
Environmental Assessment for Commercial Real Estate Transactions, American Society for Testing and Materials (ASTM), Charlotte, N.C., 1996
AutoCAD R13 Fundamentals I, OMNIUM Training, Charlotte, N.C., 1996
Emergency Planning and Community Right-to-Know Reporting, U.S. EPA and S.C. DHEC, Columbia, S.C., 1999
Advanced RCRA Training, Environmental Resource Center, Charlotte, N.C., 2000

Department of Energy "L" Security Clearance September 1997 – present

SUMMARY OF EXPERIENCE

Mr. Bowling possesses more than 30 years of environmental evaluation experience, which has included providing National Environmental Policy Act (NEPA) compliance support to government and industries, conducting environmental monitoring studies, preparing environmental impact statements (EISs) and environmental compliance plans, and providing environmental regulations analyses. He currently work in the Environment, Safety and Health area for the Mixed Oxide Fuel Fabrication Facility project. He recently coordinated and completed the Environmental Report that was submitted to the Nuclear Regulatory Commission as part of the license application. Mr. Bowling recently served as interim Environmental Manager for the U.S. Enrichment Corporation's Atomic Vapor Laser Isotope Separation (AVLIS) Project; coordinating NEPA and other environmental compliance. He also spent several years advising the DOE Office of Civilian Radioactive Waste Management (OCRWM) program. This project included interpreting the environmental aspects of regulations dealing with Nuclear Waste Policy Act, NEPA, the Clean Water Act (CWA), the Clean Air Act (CAA), the Resource Conservation and Recovery Act (RCRA), and the Comprehensive Environmental Remediation, Compensation and Liabilities Act (CERCLA). He was prepared of positions on RCRA applicability to spent fuel and high level waste, the OCRWM NEPA strategy, and the regulatory and licensing implications of fissile material disposal in a geologic repository. During this time, He coordinated preparation of the Monitored Retrievable Storage (MRS) Regulatory Compliance Plan, which outlined the strategy to ensure compliance with environmental regulations including the Nuclear Waste Policy Act, NEPA, CWA, CAA, RCRA, and CERCLA. He also coordinated the

preparation of the annual OCRWM Environment, Safety and Health (ES&H) Management Plan.

In addition to work for Federal government projects, He prepared environmental documents for the utilities to meet the requirements of the Nuclear Regulatory Commission (NRC) and the Rural Utilities Service (RUS). Mr. Bowling also prepared site selection criteria for nuclear plant siting, and has performed nuclear facility and electric transmission facility site selection.

Prior to entering into project work with Duke Engineering and Services, Mr. Bowling managed the Duke Power Company environmental laboratory staff of 45 individuals for 16 years, utilizing an average annual $2.5 million budget.

Project Experience

Mixed Oxide Fuel Fabrication Facility, 1999 to Present – Coordinate preparation of the Environmental Report for submission to the Nuclear Regulatory Commission for license application. Coordinate the development of the Environmental Protection Manual. Assist in the development of project environmental protection programs.

Atomic Vapor Laser Isotope Separation (AVLIS) Facility, USEC, Inc., 1996 to 1999 - Coordinated Environmental Report (ER) preparation for submission to the Nuclear Regulatory Commission (NRC) for the licensing of the USEC, Inc. AVLIS facility. Coordinated team of technical specialists to assist USEC in selecting a site for the AVLIS facility. Served as interim Environmental Manager for the AVLIS Project 1998-1999.

Light Water Reactor (LWR) Project, Korean Peninsula Energy Development Organization (KEDO), 1996 - Coordinated site selection criteria development for a 2,000 MW light water reactor (LWR) in North Korea. Coordinated the site survey report review for the LWR project site in Sinpo, North Korea

U.S. Department of Energy (DOE), Idaho National Engineering and Environmental Laboratory (INEEL), Tank Farm Facility, 1999 – *2001.* Participated in development of waste classification process for Tank Farm Facility Wastes. Waste classification based on DOE, NRC, EPA and State of Idaho regulations. Prepared the Waste Incidental to Reprocessing (WIR) documentation for sodium-bearing waste.

Customer Service Call Center Site Selection, Southeastern Freight Lines, 1999 – Coordinated evaluation of several sites for the location of a customer service call center.

Transmission Facility Siting Study for Gold Hill 100 kV Transmission Line, Saluda River Electric Cooperative, Inc., 1996 – Coordinated evaluation of routes for a 100 kV electric transmission line. Effort utilized geographic information system and proprietary route selection process to select a route in compliance with the SC Site Selection regulations.

Prepared Borrower's Environmental Report (BER) required by the Rural Utilities Service (RUS) for NEPA evaluation.

Transmission Facility Siting Study for Mitsubishi 44 kV Transmission Line, Duke Power Company, 1997 – Coordinated evaluation of routes for a 44 kV electric transmission line. Effort utilized geographic information system and proprietary route selection process to select a route.

Abner Creek 100 kV Transmission Line, Saluda River Electric Cooperative, Inc., 1996 - Prepared Borrower's Environmental Report (BER) required by the Rural Utilities Service (RUS) for NEPA evaluation.

North Blacksburg 100 KV Tap Station, Transmission Line, and Substation. Prepared for Saluda River Electric Cooperative, Inc., 1996 - Prepared Borrower's Environmental Report (BER) required by the Rural Utilities Service (RUS) for NEPA evaluation.

Civilian Radioactive Waste Management System (CRWMS), Department of Energy (DOE), 1991 to 1995 – Multipurpose Canister (MPC) Preliminary Environmental Evaluation and provided input to *MPC Environmental Impact Statement* (EIS) development. These two documents evaluated the environmental impacts of deploying the MPC a system for storing, transporting, and disposing spent nuclear fuel.

Civilian Radioactive Waste Management System (CRWMS), Department of Energy (DOE), 1991 to 1995 – Monitored Retrievable Storage (MRS) Environmental Assessment Technical Guide – This document outlined the format, approach and resource needs to prepare the Environmental Assessment of a spent nuclear fuel storage facility in compliance with the Nuclear Waste Policy Act.

Civilian Radioactive Waste Management System (CRWMS), Department of Energy (DOE), 1991 to 1995 – Monitored Retrievable Storage (MRS) Regulatory Compliance Plan – This document outlined the strategy to ensure compliance with environmental regulations including the Nuclear Waste Policy Act, the National Environmental Policy Act (NEPA), the Clean Water Act (CWA), the Clean Air Act (CAA), the Resource Conservation and Recovery Act (RCRA), and the Comprehensive Environmental Remediation, Compensation and Liabilities Act (CERCLA).

Civilian Radioactive Waste Management System (CRWMS), Department of Energy (DOE), 1991 to 1995 –
Interpreted the environmental aspects of regulations dealing with the Department of Energy's (DOE's) Civilian Radioactive Waste Management System (CRWMS). Regulations included the Nuclear Waste Policy Act, the National Environmental Policy Act (NEPA), the Clean Water Act (CWA), the Clean Air Act (CAA), the Resource Conservation and Recovery Act (RCRA), and the Comprehensive Environmental Remediation, Compensation and Liabilities Act (CERCLA).

Prepared CRWMS positions on RCRA applicability to spent fuel and high level waste. Also, prepared the CRWMS NEPA strategy, and the regulatory and

licensing implications of fissile material disposal in a geologic repository.

Coordinated the preparation of the Office of Civilian Radioactive Waste Management's (OCRWM's) Environment, Safety and Health (ES&H) Management Plan.

Laboratory Quality Assurance Manual, Duke Power - Developed laboratory quality assurance (QA) guidelines for all nuclear station chemistry laboratories operated by Duke Power Company. Revised the Central Laboratory QA Program to enhance its flexibility. This program was used by the Electric Power Research Institute (EPRI) as a model to develop laboratory QA guidelines for the utility industry in 1987.

Oconee Nuclear Station, Operational Environmental Monitoring, Duke Power – This project assessed water quality during the operational period for Oconee Nuclear Station in South Carolina. This project resulted in the elimination of environmental monitoring from the Oconee Nuclear Station Technical Specifications.

McGuire Nuclear Station, Preoperational and Operational Environmental Monitoring, Duke Power – This project assessed water quality before and during the operation of the McGuire Nuclear Station in North Carolina. This project allowed McGuire Nuclear Station to Operate using once-through cooling instead of cooling towers.

Catawba Nuclear Station, Preoperational 316(a) Demonstration, Duke Power Company – This project evaluated the impacts of thermal discharge from the Catawba Nuclear Station cooling towers.

Bad Creek Pumped Storage Project, Environmental Baseline Study, Duke Power Company – This project documented baseline water quality conditions before construction of the pumped storage project.

Environmental Baseline Study, Wolf Creek Nuclear Station, Kansas Gas and Electric –This project documented baseline water quality conditions before the construction of John Redmond Reservoir. John Redmond Reservoir was constructed as a water source to Wolf Creek Nuclear Station in Kansas.

Environmental Baseline Study, Gerald Gentleman Power Station, Nebraska Public Power District – This project documented environmental conditions in Sutherland Reservoir, North Platte, Nebraska, prior to construction of the Gerald Gentleman Power Station.

Preoperational Environmental Study, Cooper Nuclear Station, Nebraska Public Power District. – This project provided water quality information during the construction of the Cooper Nuclear Station in Brownsville, Nebraska.

Operational Environmental Study, Quad Cities Nuclear Station, Commonwealth Edison - This study provided operational water quality data for the Quad Cities Nuclear Station near Moline, Illinois.

Chemical Plume Mapping, Green Bay Power Station, Wisconsin Public Services – This study mapped chemical plumes discharged from the Green Bay

Power Station condensor cooling system treatment into Green Bay, Wisconsin.

Operational Environmental Study, Zion Nuclear Station, Commonwealth Edison – This project documented water quality conditions associated with the operation of the Zion Nuclear Station.

Baseline Environmental Monitoring, Clinton Nuclear Station, Illinois Power – This project documented baseline water quality conditions before construction of the Clinton Nuclear Station in Illinois.

Work History

Consulting Scientist, Duke Engineering & Services, 1991-Present – Provide technical and project management expertise for a variety of nuclear, environmental and siting projects to customers in the energy industry.

Technical Systems Manager, Environmental Laboratory, Duke Power Company, 1982-1991 - Managed all central laboratory chemistry operations, including environmental studies, station analytical support and fuel analyses. Managed a staff of four supervisors and 38 chemists, engineers, biologists and laboratory technicians. Developed, planned and executed an average annual budget of $2.5 million.

Responsible for the Hazardous Materials Exposure Control Program for the Production Support Department, consisting of 510 employees. Also, responsible for Production Support Department hazardous waste evaluations, and storage and disposal activities.

Environmental Chemist, Duke Power Company, 1976-1982 - Supervised all air, water quality and solid waste monitoring programs. Supervised a staff of 24 chemists, engineers and technicians. Prepared and monitored an operating budget of $1,000,000.

Assistant Chemist, Nalco Environmental Sciences, 1972-1974 - Performed field collection, laboratory analyses and report preparation for environmental studies of construction and operating effects of electric generating stations.

Chemist, Tenco Hydro-Aero Sciences, 1971-1972 - Performed for laboratory analyses of water and wastes. Provided laboratory support for design of waste treatment systems for industrial clients.

Affiliations

American Chemical Society 1971-Present

American Society for Testing and Materials, Subcommittee D34.07 Radioactive Mixed Wastes, 1991 - 1995; C26.07 Nuclear Waste Materials, 1994 - 1995; E50 Environmental Assessment 1994 - 1999

Utility Water Act Group, Chemical Committee, Analytical Subcommittee 1976 - 1991

Electric Power Research Institute, Steering Committee for Project RP-1851 Evaluation of Analytical Methods for NPDES Compliance Monitoring 1986 - 1991

Edison Electric Institute, Laboratory Task Force 1986 - 1991; Chairman 1989 - 1991

Publications

Bowling, T.J., W.D. Sheehan, and J.J. Delfino. 1974. Quantitative recovery of trace amounts of cyanide in surface waters using a modified Serfass distillation procedure. Environmental Letters: 6(1), 25-28.

Bowling, T.J. 1975. Water quality evaluation. Pages 5-48 in The evaluation of thermal effects in the Missouri River near Cooper Nuclear Station (Operational Phase) Jan-Dec 1974. Report by Industrial Bio-Test Laboratories to Nebraska Public Power District. Columbus, Nebraska.

Bowling, T.J. and D.B. Ellis. 1975. Water quality study. Pages 67-110 in Preconstruction environmental monitoring program, Wolf Creek Generating Station, March 1974 - February 1975. Report by Industrial Bio-Test Laboratories to Kansas Gas and Electric Co. Wichita, Kansas.

Bowling, T.J. 1975. Water quality survey. in Preoperational environmental monitoring program at the proposed site of the Gerald Gentleman Station on Sutherland Reservoir. August 1974 - July 1975. Report by Nalco Environmental Science to Nebraska Public Power District. Columbus, Nebraska.

Clawson, P.A., C.W. Harden, R.N. Keener, and T.J. Bowling. 1984.
Evaluation of historical data on 12 reservoirs in the Piedmont Carolinas with respect to acid rain considerations. Research Report PES/84-21. Duke Power Company. Huntersville, North Carolina.

Publications Not Listing Authors

Duke Power Co. 1977. Oconee Nuclear Station, Environmental Summary Report, 1971-1976. Duke Power Co. Charlotte, NC

Duke Power Co. 1980. McGuire Nuclear Station, Consolidated Overview, Baseline Year 1978-1979. Duke Power Co. Charlotte, NC

Duke Power Co. 1981. Bad Creek Pumped Storage Project No. 2740 - South Carolina, Lake Jocassee Water Quality Monitoring, 1980. Duke Power Co. Charlotte, NC

Duke Power Co. 1984. Catawba Nuclear Station, Environmental Report. Duke Power Co. Charlotte, NC

Duke Power Co. 1985. Catawba Nuclear Station, 316(a) Demonstration Preoperational Report. Duke Power Co. Charlotte, NC

TRW Environmental Safety Systems, Inc. 1993. Environmental Assessment for a Monitored Retrievable Storage Facility Using Multi-Purpose Canisters: Technical Guide. Doc. No. C00000000AA-09-00001. Prepared under contract to the Office of Civilian Radioactive Waste Management, Department of Energy. Washington, DC

TRW Environmental Safety Systems, Inc. 1994. Preliminary Environmental Evaluation for the Multi-Purpose Canister System. Doc. No. A20000000-01717-2200-00003. Prepared under contract to the Office of Civilian Radioactive Waste Management, Department of Energy. Washington, DC

Duke Engineering & Services, Inc. 1996. Transmission Facility Siting Study for Laurens Delivery 29 (Abner Creek). Prepared for Duke Power Co. Charlotte, NC

Duke Engineering & Services, Inc. 1996. Borrower's Environmental Report for the Proposed North Blacksburg 100 KV Tap Station, Transmission Line, and Substation. Prepared for Saluda River Electric Cooperative, Inc. Laurens, SC

Duke Engineering & Services, Inc. 1996. Transmission Facility Siting Study for Gold Hill 100 kV Transmission Line. Prepared for Duke Power Co. Charlotte, NC

Duke Cogema Stone and Webster, LLC. 2000. Mixed Oxide Fuel Fabrication Facility – Environmental Report. Prepared for the National Nuclear Safety Administration, Department of Energy for submittal to the U.S. Nuclear Regulatory Commission.

U.S. Department of Energy, Idaho Operations Office, 2001. Idaho Nuclear Technology and Engineering Center Sodium-Bearing Waste – Waste Incidental to Reprocessing Determination Report, Draft A. DOE/ID-10780. Idaho Falls, ID. July, 2001