

APPLICANT'S EXH. 1

ENERCON SERVICES, INC.*Julien D. Abramovici, P.E.***U.S. NUCLEAR REGULATORY COMMISSION**In the Matter of AMERGEN ENERGY CO., LLCDocket No. 50-0249-LR Official Exhibit No. 1OFFERED by Applicant/Licensee Intervenor _____

NRC Staff _____ Other _____

IDENTIFIED on 9/10/07 Witness/Panel N/AAction Taken: ADMITTED REJECTED WITHDRAWNReporter/Clerk DW**Experience Summary**

- Degreed Mechanical Engineer with over 33 years of experience
- Significant experience with ASME and ANSI codes with an emphasis on ASME Sections III, VIII, and XI, and ANSI B31.1 and 31.7
- Registered Professional Engineer, New Jersey
- Multi-discipline Root Cause Evaluator
- License Renewal
- Third party reviews
- Former member of the EPRI-MRP who has dealt with the Alloy 600 Head Penetrations
- Reactor vessel internals (BWR and PWR)
- Steam Generator support
- Performed Alloy 600 Assessments for Three Mile Island and Fort Calhoun
- New plant operating license support

DOCKETED
USNRC

October 1, 2007 (10:45am)

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF**Experience Description**

Since joining Enercon Services in 2000, Mr. Abramovici has been assigned to the Mt. Arlington, New Jersey office where he has worked on a multitude of diversified tasks, which included: ISI relief requests for Grand Gulf, Oyster Creek Reactor Vessel Internals and Reactor Vessel weld inspections outage support, Oyster Creek CRD leakage evaluation and repair, Fort Calhoun CRDM venting investigation, Cooper ISI and IST Programs audits, Fort Calhoun Inconel 600 assessment, Pickering Travelling Screens problems investigations, Indian Point 2 projects assessment, Three Mile Island (TMI) Steam Generator evaluation and repairs, TMI CRD head penetration repairs, GSI 191 resolutions including support to French and Spanish utilities, Oyster Creek License Renewal and many others.

Over the year, Mr. Abramovici has been involved in developing operational programs (ISI, IST, RVMS, CLRT, etc.) for new plant applications, for NuStart utility consortium. Additionally, Mr. Abramovici has provided technical input for heavy loads, steam generator, leak before break, MOV reactor head inspections and many other programs as well as subject matter expertise.

Mr. Abramovici was employed as a Senior Engineer/Consulting Engineer at GPU Nuclear's Corporate Headquarters for four years and was responsible for major plant equipment such as the reactor vessel and internals (BWR) and steam generators (PWR). He provided technical expertise on various component and system issues as well as ASME and ANSI codes, with emphasis on ASME Section III, VIII and XI, and ANSI B31.1 and 31.7. He acted as responsible or independent reviewer for 50.59 type evaluations and performed third party design verifications on multi-discipline modifications. He additionally evaluated "as found" conditions for acceptability for continued operation "as is" with minimal schedule or financial impact.

Prior to this, Mr. Abramovici held the position of Mechanical Components Manager at GPU Nuclear for two years. He was responsible for analytical support of the GPU Nuclear plant mechanical components. This activity included evaluation of component degradation mechanisms such as fatigue, corrosion, and cracking, ASME code pressure boundary calculations and heat exchanger, and rotating equipment performance. He was responsible for preparation of inspection plans and specifications for major components such as reactor internals. He reviewed inspection

data and dispositioned associated material nonconformance reports. He evaluated component failure events and performed associated root cause evaluations. He provided management and guidance to the staff in the identification of problems with the design or operation of the plant systems and components by technical expertise and knowledge of regulatory requirements. He provided management and guidance to the staff for the evaluation of engineering alternatives as well as life assurance and life extension. This included cost/benefit analysis, development of design criteria, and the establishment of work scope and schedules. He provided management and guidance for the design and/or procurement of mechanical components and review of plant operations, maintenance, surveillance practices and standards relative to these components. Large programs included underground piping, reactor vessel internals, steam generator related issues, and motor operated valves. He additionally chaired numerous design and constructability reviews.

Mr. Abramovici was part of a Plant Optimization and License Renewal (POLR) group that evaluated the adequacy of the GPUN plants for continued operation as well as license renewal. While part of this group, he participated in and reviewed the products of various industry-related groups, such as EPRI, and GE and B&W Owners Groups. His group was responsible for the plants thermal cycle monitoring and calculations revisions that may be necessary to assure continued licensing requirements compliance. After GPUN set up a License Renewal group, Mr. Abramovici and his group continued to provide support in this arena.

As Heat Exchanger and Pressure Vessel Manager with GPU Nuclear for nine years, Mr. Abramovici's responsibilities were the same as above, but limited to heat exchangers, feedwater heaters, pressure vessels, steam generators, pressurizers, reheaters, moisture separator pump, turbines, and material handling equipment.

Mr. Abramovici held similar responsibilities as Piping Engineering Manager with GPU Nuclear for one year, but these were limited to valves, piping, piping support, and material handling equipment.

While with GPU Nuclear, Mr. Abramovici additionally held various staff positions for six years. He was responsible for the nuclear steam supply system design and modifications. As System Engineer, he was responsible for the reactor coolant (primary) systems such as reactor coolant, make-up and purification, and building spray and decay heat system problem identification and resolution. He was responsible for programs related to sulfur removal from the primary loop, especially the pressurizer. He implemented the intergranular stress, corrosion, and cracking (IGSCC) at Three Mile Island Unit 1 Nuclear Generating Station. He additionally generated piping, heat exchangers, and piping supports procurement specifications.

Prior to this, Mr. Abramovici worked as Mechanical Engineer at General Dynamics Corporation's Electric Boat Division. In this position, he was responsible for design and evaluation of submarine components and systems.

Education and Training

B.S., Mechanical Engineering, City College of New York, 1973

M.S., Systems Management, University of Southern California, 1975

GPU Professional and Management Development Training Courses:

Principle Centered Leadership

Seven Habits of Highly Effective People

Time Management

Deming Management Methods

Teamwork and Leadership

Kepner-Tregoe Problem Solving and Decision Making

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ASME Section XI Training

Professional Affiliations and Licenses

Electric Power Research Institute (EPRI):

Steam Generator Reliability Project – Technical Advisory Group

Reactor Vessel Internal Project – Repair Committee

PWR Materials Reliability Project

Registered Professional Engineer, State of New Jersey, License 24GE2674500

JON R. CAVALLO, PE, PCS

Born:

Education:

Pomona College
U.S. Naval Nuclear Power School
Northeastern University, Bachelor of Science in Engineering Technology, Cum Laude
University of Washington, Cold Regions Engineering
University of Colorado, Engineering Project Management
NACE, Corrosion Prevention in Oil and Gas Production
University of New Hampshire, Finance for the Non-Financial Manager
Fairleigh Dickinson University, Inspection, Evaluation and Rehabilitation of Highway Bridges
The Hartford Graduate Center, Value Engineering

Professional Activities:

Registered Professional Engineer:

Alaska, ME-5161 Connecticut, 14797
Maine, 5549 Massachusetts, 30114
New Hampshire, 8993 New Jersey, GE32609

Certifications:

SSPC Protective Coatings Specialist No. 170-35-0235
NBR Certified Nuclear Coatings Engineer No. 137

Organizational Affiliations:

Member, American Society of Mechanical Engineers
Member, American Society for Testing and Materials
Chairman Committee D-33 (2004-2008)
Member, National Association of Corrosion Engineers
Director and President (2006-2007), Maine Society of Professional Engineers
Member, Order of the Engineer
Member, Steel Structures Painting Council
Chairman, Northern New England Chapter (1991-1998)
Chairman, New England Chapter (2000 - Present)
Member, National Strategic Planning Committee (1995-1996)
Member, Northeastern University Sigma Epsilon Rho Honor Society

Work Experience

Corrosion Control Consultants & Labs, Inc. 1998 - Present (Consulting Engineering Firm)
Vice-President
Independent Professional Engineer 1991 - 1998
Corrosion Engineering Consulting Services
Sponge-Jet, Inc. 1991 - Present (Surface Cleaning Systems)
Vice-Chairman
S.G. Pinney & Associates, Inc. 1986-1991 (Consulting Engineering Firm)
Northern U.S. Regional Manager (1986-1991)
Metalweld, Inc. 1983-1986 (Industrial Coating and Lining Contractor)
Manager, New England Division
Project Manager, Seabrook Nuclear Power Station
Stone & Webster Engineering Corporation, 1971-1983
Materials Engineering Division Coordinator
United States Navy, 1965-1971
Viet Nam Veteran, 1965-1966
Naval Nuclear Power Program, 1967-1971

Scott R. Erickson
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Education: 1983 Graduate of Hutchinson Vo-Tech Institute NDE Program

Training: **EPRI Courses, Charlotte, NC:** 9/91 Level II VT1-4; 6/92: Manual Weld Overlay UT Inspection; 8/92: Manual UT Thru-Wall Sizing; 7/94 Manual UT Inspection Testing Qualification (Performance Demonstration Initiative; 12/04 Manual UT Reactor Pressure Vessel Detection Qualification;

General Electric (GE) Course: 1/07 Level III VT-1

Experience: **3/2004 to Present – Sonic Systems International.** Certified Level III in Magnetic Particle Testing (MT), Liquid Penetrant Testing (PT), Ultrasonic Testing (UT), Visual Testing (VT1-3). Job duties include Project Level III. Inservice Inspection (ISI) Coordinator, Manual PDI Piping/RPV examinations, BOP examinations (MT, PT, VT1 inspections of surfaces, VT-3 inspections of Supports, Hangers, and Snubbers (Hydraulic and Mechanical))

5/2002 to 2/2004 – Alstom Power. Certified Level II in MT, PT, UT. Job duties included performing NDE exams on refurbished/modified turbine components.

10/1997 to 4/2002 – SSI. Certified Level II in MT, PT, UT, VT1-3. Job duties included performing Inservice Inspections (ISI) / Balance of Plant (BOP) / Flow Accelerated Corrosion (FAC) examinations.

9/1992 to 10/1997 – LMT. Certified Level III in MT, PT, UT, VT1-3. Job duties included supervising and performing ISI and System Pressure Tests.

2/1992 to 2/1994 – Virginia Corporation of Richmond (VCR) (Contract Employee). Certified Level III in MT, PT, UT, Level II in VT1-3. Job duties included supervising and Performing ISI, BOP, FAC, and NSS examinations.

10/1985 to 2/1992 – VCR. Certified Level III in MT, PT, UT, Level II in VT1-3. Job duties included supervising outage work, writing and reviewing procedures, training and testing of employees, and performing ISI, BOP, FAC, and NSS examinations.

4/1985 – BESTCO (for LMT). Certified Level II in MT, PT, Level I in UT. Performed ISI examinations.

10/1984 to 4/1985 – Branch Radiographic Labs. Certified Level II in MT, PT, Level I in UT. Job duties included performing construction NDE examinations at Hope Creek.

7/1984 to 10/1984 – LeHigh Testing Labs. Certified Level II in Radiographic testing (RT), MT, PT, UT. Job duties included performing manufacturing NDE Examinations.

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Michael P. Gallagher

	1981-present	Exelon	
Professional History	VP License Renewal Projects		2006 to present
	Nuclear Review Board- PSEG		2004 to 2007
	VP Engineering & Technical Support- PSEG		2004 to 2005
	Director Licensing & Regulatory Affairs- Mid Atlantic		2001 to 2004
	BWROG Prime Representative		2001 to 2004
	Nuclear Safety Review Board Member-Exelon		2000 to 2004
	Director Operations Support- Mid Atlantic Region		2000 to 2001
	Plant Manager- Limerick		1998 to 2000
	Director of Work Management- Peach Bottom		1996 to 1998
	Director of Engineering - Limerick		1995 to 1996
	Plant Engineering Manager- Limerick		1993 to 1995
	Operations Support Manager- Limerick		1992 to 1993
	Mechanical Design Manager- Nuclear Group		1989 to 1992
	Reactor Engineering Manager- Limerick		1986 to 1989
	Startup Test Engineer- Limerick		1982 to 1986
	Engineer- Peach Bottom		1981 to 1982
Education	1997	INPO Senior Nuclear Plant Managers Course	
	1988	Masters in Business Administration, Saint Joseph's University	
	1981	Bachelor of Chemical Engineering, Georgia Tech	
Licenses	1984-1989	Senior Licensed Operator Limerick Units 1&2	
	1987	Registered Professional Engineer- Pennsylvania	



Michael P. Gallagher, PE

Position

Vice President License Renewal Projects

Profile

Gallagher, 48, is responsible for the overall implementation of the license renewal projects for Exelon Nuclear.

Professional History

Gallagher has 26 years experience in the nuclear industry and has held key leadership positions within Exelon Nuclear. Prior to his current position, Gallagher was Vice President Engineering and Technical Support at the PSEG Salem and Hope Creek stations responsible for performance improvements under the Exelon/PSEG Operating Services Agreement. From 2001 to 2004 Gallagher was the Director of Licensing and Regulatory Affairs responsible for compliance with Nuclear Regulatory Commission requirements. From 1998 to 2000 Gallagher was Plant Manager of the Limerick Generating Station. Gallagher also attained a USNRC Senior Reactor Operator license while at Limerick.

Civic Involvement

Gallagher is a member of Good Works, a Christian nonprofit organization that exists to improve the living conditions for low-income families in Chester County, PA. Since 2000, Gallagher has also participated in Habitat for Humanity blitz builds internationally and in the United States.

Education

Gallagher received his Bachelor in Chemical Engineering from Georgia Tech and Master in Business Administration from Saint Joseph's University. Gallagher is a registered professional engineer in Pennsylvania.

Family

Gallagher and his wife, Gina, have five children, Erin, Claire, Kevin, Brian and Molly.

Barry M. Gordon, P. E.

Associate

Education

MS, Metallurgy and Material Science, Carnegie Mellon University
BS, Metallurgy and Material Science, Carnegie Mellon University (First in Department)
Additional courses from MIT, University of Pittsburgh and NACE in Corrosion Science

Professional Associations and Awards

Registered Professional Engineer, State of California – Corrosion Engineering
Registered Corrosion Specialist – National Association of Corrosion Engineers (NACE), International
Member – International Cooperative Group on Environmentally Assisted Cracking (ICG-EAC)
Adjunct Professor, Colorado School of Mines
Instructor Credential, California Community Colleges
Instructor, International Atomic Energy Agency (IAEA)
Patent No. 4,950,449 – Inhibition of Radioactive Cobalt Deposition in Water-Cooled Nuclear Reactors
Patent No. 5,577,083 – Method and Apparatus for Electro-Protection of Piping Systems and Reactor
Internals from Stress Corrosion Cracking
Patent No. 5,590,162 – Beta Battery
R&D Magazine's 100 award (most significant new technical products of the year) for zinc injection

Professional Experience

1998 to Present	Structural Integrity Associates, Inc., San José, CA Associate
1975 to 1998	GE Nuclear Energy, San José, CA Technical Expert – Corrosion Engineering Project Manager – Corrosion Technology Program Manager – Stress Corrosion Cracking
1969 to 1975	Westinghouse Electric – Bettis Atomic Power Laboratory, West Mifflin, PA Materials Engineer

Summary

Mr. Gordon has consulted on various LWR corrosion and material issues for over three decades with special emphasis on stress corrosion cracking (SCC). He has addressed numerous materials and corrosion problems in the LWR industry over a wide range of subjects including reactor internals, piping, fuel hardware, water chemistry transient and core flow issues, weld overlays and repairs, crack growth rate modeling, alloy selection, failure analysis, license renewal, NRC inspection relief, dry fuel storage, welding of irradiated materials, decontamination, etc.

Mr. Gordon has been the SI program manager and/or co-author of over 18 EPRI sponsored programs and reports including the landmark documents:

1. "Effects of Marine Environments on Stress Corrosion Cracking of Austenitic Stainless Steels – An Evaluation of the NISA and CRIEPI Spent Fuel Storage Canister Project"
2. "Effect of PWR Water Chemistry on PWSCC"
3. "BWR Water Chemistry Guideline – 2004 Revision"
4. "Technical Basis for Guidelines for Performing Weld Repairs to Irradiated BWR Internals.
5. "Guidelines for Performing Weld Repairs to Irradiated BWR Internals
6. "Interim Welding Guidelines for BWR Internals
7. "BWR Water Chemistry Guideline – 2000 Revision
8. "Technical Justification for the Extension of the Interval between Inspections for Weld Overlay Repairs"
9. "Technical Basis for Inspection Relief for BWR Internal Components with Hydrogen Injection"
10. "Full-System Decontamination of a BWR Using the LOMI Process,"

Mr. Gordon is also the SI project manager for the Yucca Mountain Project for both Bechtel SAIC and EPRI. He has conducted evaluations on the qualification of the waste package (WP) relative to long-term materials corrosion performance, weld residual stresses and long-term corrosion monitoring.

While at GE Nuclear Energy (GENE), Mr. Gordon was responsible for consultation, problem analysis and management of programs on BWR materials/environmental interactions. He developed and qualified the environmental BWR IGSCC mitigation technique, hydrogen water chemistry, prepared the EPRI decontamination guidelines for BWRs and qualified a process for BWR full-system decontamination. Mr. Gordon also co-patented a revolutionary method (GEZIP) of inhibiting radioactivity and mitigating IGSCC in nuclear reactors, a process that won *R&D Magazine's* 100 award as one of the most significant new technical products of the year.

Mr. Gordon managed multi-million dollar development programs on corrosion testing, field surveillance, failure analysis and design qualifications at GENE. He has lectured throughout the U.S., Mexico, Canada, Japan and Europe on corrosion phenomena to technical societies, regulatory agencies, utilities and vendors. He authored the highly acclaimed college accredited course (SUNY), "Corrosion and Corrosion Control in BWRs" and teaches an updated and greatly expanded "Corrosion and Corrosion Control in LWRs." Thirty US NRC personnel attended this class 2004.

Mr. Gordon has supervised senior level materials engineers and has consulted on a broad range of materials problems for other GE businesses. He also managed the materials technical exchange programs among GE, ABB, Hitachi and Toshiba. He has provided extensive litigation support to GE.

Mr. Gordon directed corrosion programs on steam generator materials and nuclear fuel cladding while at Westinghouse. He performed fieldwork on the nuclear aircraft carriers Enterprise and Nimitz and devised and qualified a new surface treatment for zirconium and hafnium alloys for corrosion and hydriding mitigation.

Resume: DAVID GARY HARLOW

Personal:

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Lehigh University
19 Memorial Drive West
Bethlehem, PA 18015
(610) 758-4127 (office)
(610) 758-6224 (fax)
dgh0@lehigh.edu

Education: B.A.: 1973 - Western Kentucky University; Mathematics and Physics
M.S.: 1976 - Cornell University; Applied Mathematics
Ph.D.: 1977 - Cornell University; Applied Probability and Stochastic Processes

Research Interests: Probability and statistical modeling of failure processes in materials, aluminum alloys, steels, and composites; Stochastic fracture mechanics; Stochastic differential equations and their numerical solutions; Mechanical and system reliability; Applications of stochastic processes; Applied probability modeling

Awards: 1973 Sigma Xi - First place; for original research at Western Kentucky University
1973 Highest honors in Mathematics
1973 Pi Mu Epsilon - National Mathematics Honorary Fraternity
1973 Sigma Pi Sigma - National Physics Honor Society
1973 Summa Cum Laude
1985 Lehigh University Award for teaching
1985 ASEE Summer Faculty Research Fellow - Naval Research Laboratory
1988 NRC Research Fellowship - Naval Postgraduate School
1992 Tau Beta Pi Teacher of the Year - Lehigh University
2006 Pi Tau Sigma Professor of the Year - Lehigh University

Professional Experience:

1992- Professor; Mechanical Engineering and Mechanics; Lehigh University
1985-1992 Associate Professor; Mechanical Engineering and Mechanics; Lehigh University
1982-1985 Assistant Professor; Mechanical Engineering and Mechanics; Lehigh University
1979-1982 Assistant Professor; Mechanical Engineering and Mechanics; Drexel University, Philadelphia, PA
1977-1979 Research Associate; Sibley School of Mechanical and Aerospace Engineering; Cornell University, Ithaca, NY
1974-1979 Adjunct Professor; Mathematical Sciences; Tompkins-Cortland Community College, Dryden, NY

Publications:

Refereed Articles:

1. D.G. Harlow and S.L. Phoenix, The Chain-of-Bundles Probability Model for the Strength of Fibrous Materials I: Analysis and Conjectures, *Journal of Composite Materials* 12 (1978) 195-214.
2. D.G. Harlow and S.L. Phoenix, The Chain-of-Bundles Probability Model for the Strength of Fibrous Materials II: A Numerical Study of Convergence, *Journal of Composite Materials* 12 (1978) 314-334.
3. D.G. Harlow and S.L. Phoenix, Bounds on the Probability of Failure of Composite Materials, *International Journal of Fracture* 15 (1979) 321-336.
4. D.G. Harlow, Properties of the Strength Distribution for Composite Materials, *Composite Materials: Testing and Design (Fifth Conference)*, ASTM STP 674, S.W. Tsai, Ed., American Society for Testing and Materials (1979) 484-501.
5. D.G. Harlow and S.L. Phoenix, Probability Distributions for the Strength of Composite Materials I: Two-Level Bounds, *International Journal of Fracture* 17 (1981) 347-372.
6. D.G. Harlow and S.L. Phoenix, Probability Distributions for the Strength of Composite Materials II: A Convergent Sequence of Tight Bounds, *International Journal of Fracture* 17 (1981) 601-630.
7. D.G. Harlow and S.L. Phoenix, Probability Distributions for the Strength of Fibrous Materials Under Local Load Sharing I: Two-Level Failure and Edge Effects, *Advances in Applied Probability* 14 (1982) 68-94.
8. D.G. Harlow, R.L. Smith, and H.M. Taylor, Lower Tail Analysis of the Distribution of the Strength of Load-Sharing Systems, *Journal of Applied Probability* 20 (1983) 358-367.
9. D.G. Harlow, Statistical Properties of Hybrid Composites I: Recursion Analysis, *Proceedings of the Royal Society of London A* 389 (1983) 67-100.
10. S.J. Fariborz, D.G. Harlow, and T.J. Delph, The Effects of Nonperiodic Void Spacing upon Intergranular Creep Cavitation, *Acta Metallurgica* 33 (1985) 1-9.
11. D.G. Harlow, The Pure Flaw Model for Chopped Fibre Composites, *Proceedings of the Royal Society of London A* 397 (1985) 211-232.
12. S.J. Fariborz, C.-L. Yang, and D.G. Harlow, The Tensile Behavior of Intraply Hybrid Composites I: Model and Simulation, *Journal of Composite Materials* 19 (1985) 334-354.
13. T.-S. Liu, R.J. Fields, D.G. Harlow, and T.J. Delph, Statistical Observations of Creep Cavitation in AISI Type 304 Stainless Steel, *Scripta Metallurgica* 19 (1985) 299-304.
14. S.J. Fariborz, D.G. Harlow, and T.J. Delph, Intergranular Creep Cavitation with Time-Discrete Stochastic Nucleation, *Acta Metallurgica* 34 (1986) 1433-1441.
15. S.H. Johnson, D.G. Harlow, and J.S. Yoon, Time Optimal Multistage Controllers for Nonlinear Continuous Processes, *Journal of Dynamic Systems and Measurement Control Transactions ASME* 108 (1986) 240-247.
16. S.J. Fariborz and D.G. Harlow, The Tensile Behavior of Intraply Hybrid Composites II: Micromechanical Model, *Journal of Composite Materials* 21 (1987) 856-875.

17. T.-S. Liu, D.G. Harlow, and T.J. Delph, Stereological Analysis of Creep Cavities on Polished Surfaces, *Metallography* **21** (1988) 55-76.
18. T.-S. Liu, R.J. Fields, S.J. Fariborz, D.G. Harlow, and T.J. Delph, Experimental Observations and Analysis of Creep Cavitation in AISI 304 Stainless Steel, *Acta Metallurgica* **36** (1988) 2481-2491.
19. D.G. Harlow, The Effect of Proof-Testing on the Weibull Distribution, *Journal of Materials Science* **24** (1989) 1467-1473.
20. R.C. Dobbyn, J. Farris, D.G. Harlow, T.J. Delph, and R.J. Fields, Insitu Imaging of Creep Cavities by Synchrotron Microradiography, *Scripta Metallurgica* **23** (1989) 623-625.
21. J.P. Farris, J.D. Lee, D.G. Harlow, and T.J. Delph, On the Scatter in Creep Rupture Times, *Metallurgical Transactions A* **21A** (1990) 345-352.
22. D.G. Harlow and S.L. Phoenix, Approximations for the Strength Distribution and Size Effect in an Idealized Lattice Model of Material Breakdown, *Journal of the Mechanics and Physics of Solids* **39** (1991) 173-200.
23. D. Xiao, D.G. Harlow, and T.J. Delph, Numerical Solutions of the Random Paris-Erdogan Equation, *Engineering Fracture Mechanics* **40** (1991) 227-231.
24. D.G. Harlow and T.J. Delph, The Numerical Solution of Random Initial-Value Problems, *Mathematics and Computers in Simulation* **33** (1991) 243-258.
25. D. Xiao, J.E. Yukich, D.G. Harlow, and T.J. Delph, A Simplified Probabilistic Model of the Growth of Creep Cavitation, *Philosophical Magazine A* **65** (1992) 71-84.
26. D.G. Harlow and T.J. Delph, Solutions of Random Initial Value Problems, *Proceedings of the International Union of Theoretical and Applied Mechanics: Symposium on Nonlinear Stochastic Mechanics* (July 1-5, 1991) Eds. Bellomo, N. and Cascatti, F., Springer-Verlag, (1992) 273-283.
27. D.G. Harlow and J.E. Yukich, Empirical Process Methods for Classical Fiber Bundles, *Stochastic Processes and Their Applications* **44** (1993) 141-158.
28. R.P. Wei and D.G. Harlow, Materials Considerations in Service Life Prediction, *Applied Mechanics Reviews* **46** (1993) 190-193; Part of *Aging of Energy Production and Distribution Systems*, edited by M.M. Carroll and P.D. Spanos, ASME Book AMR128, 1992.
29. D.G. Harlow and R.P. Wei, A Mechanistically Based Approach to Probability Modeling for Corrosion Fatigue Crack Growth, *Engineering Fracture Mechanics* **45** (1993) 79-88.
30. D.G. Harlow and R.P. Wei, Probability Approach for Prediction of Corrosion and Corrosion Fatigue Life, *AIAA Journal* **32** (1994) 2073-2079.
31. R.P. Wei, D. Masser, H. Liu, and D.G. Harlow, Probabilistic Considerations of Creep Crack Growth, *Materials Science and Engineering A* **189** (1994) 69-76.
32. J.R. Cockman, R.J. Fields, T.J. Delph, and D.G. Harlow, Spatial Statistics of Creep Cavities, *Modelling and Simulation in Materials Science and Engineering* **3** (1995) 187-200.
33. D.G. Harlow and T.J. Delph, A Computational Probabilistic Model for Creep-Damaging Solids, *Computers and Structures* **54** (1995) 161-166.

34. P.J. Laumakis and D.G. Harlow, Probability Failure Modeling of Woven Fiber Networks, *Textile Research Journal* **65** (1995) 254-264.
35. H. Liu, M. Gao, D.G. Harlow, and R.P. Wei, Grain Boundary Character, and Carbide Size and Spatial Distribution in a Ternary Nickel Alloy, *Scripta Metallurgica et Materialia* **32** (1995) 1807-1812.
36. D.G. Harlow and R.P. Wei, Probability Modeling for the Growth of Corrosion Pits, *Structural Integrity in Aging Aircraft AD-47* ASME (1995) 185-194.
37. P.J. Laumakis and D.G. Harlow, Asymptotic Approximations Used in Probabilistic Failure Modeling of Woven Fiber Networks, *Textile Research Journal* **65** (1995) 731-738.
38. D.G. Harlow, Reliability Modeling Based on Fatigue Crack Growth, *International Journal of Mathematical Education in Science and Technology* **27** (1996) 447-454.
39. D.G. Harlow, H.-M. Lu, J.A. Hittinger, T.J. Delph, and R.P. Wei, A Three Dimensional Model for the Probabilistic Intergranular Failure of Polycrystalline Arrays, *Modelling and Simulation in Materials Science and Engineering* **4** (1996) 261-279.
40. N.R. Cawley and D.G. Harlow, Spatial Statistics of Particles and Corrosion Pits in 2024-T3 Aluminum Alloy, *Journal of Materials Science* **31** (1996) 5127-5134.
41. M. Gao, S. Chen, D.G. Harlow, and R.P. Wei, Preferential Coarsening of γ'' Precipitates in Inconel 718 During Creep, *Metallurgical and Materials Transactions* **27A** (1996) 3391-3398.
42. P.J. Laumakis and D.G. Harlow, Designing a Model of a Platform Crane, *The Journal of Undergraduate Mathematics and Its Applications* **17** (1996) 397-414.
43. D.G. Harlow and T.J. Delph, A Probabilistic Model for Creep-Fatigue Failure, *Journal of Pressure Vessel Technology* **119** (1997) 45-51.
44. D.G. Harlow, Statistical Properties of Hybrid Composites: Asymptotic Distributions for Strain, *Reliability Engineering and System Safety* **56** (1997) 197-208.
45. J.T. Gliniak, D.G. Harlow, and T.J. Delph, A Probabilistic Model for the Growth of Creep Cracks, *Engineering Fracture Mechanics* **57** (1997) 25-40.
46. D.G. Harlow and R.P. Wei, A Probability Model for the Growth of Corrosion Pits in Aluminum Alloys Induced by Constituent Particles, *Engineering Fracture Mechanics* **59** (1998) 305-325.
47. J. Park and D.G. Harlow, Statistical Modeling of Interfacial Damage of Polymer Encapsulated Microelectronic Devices, *International Journal of Microcircuits and Electronic Packaging* **21** (1998) 171-176.
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45. D.G. Harlow, P.K. Liaw, W. Peter, G. Wang, and R.A. Buchanan, An Approach to Modeling the S-N Behavior of Bulk-Metallic Glasses, *2005 TMS Annual Meeting & Exhibition; Symposium on Bulk Metallic Glasses*, San Francisco, February 13 – 17, 2005.

46. R.P. Wei, D.G. Harlow, M.Z. Wang, R.G. Buchheit, and N. Birbilis, Modeling of Localized Corrosion and Corrosion Fatigue Damage Accumulation, *DARPA Prognosis Meeting*, Sedona, AZ, February 8 – 11, 2005.
47. D.G. Harlow, Spatial Statistics Of Particle Clusters And Modeling Of Pitting Corrosion, *Eighth U.S. National Congress on Computational Mechanics (USNCCM8)*, Austin, TX, July 25 – 27, 2005 (invited).
48. N. Birbilis, R.G. Buchheit, R.P. Wei, D.G. Harlow, and M. Wang, Predicting Corrosion and Corrosion Fatigue in AA7075-T651 used in Airframes, NACE, 2005.
49. R.P. Wei, D.G. Harlow, M.Z. Wang, R. Buchheit, and N. Birbilis, On the Need for Mechanistically Based Modeling in Life Prediction and Reliability Analysis, *EUROCORR 2005*, Lisboa, Portugal, September 4 – 8, 2005 (invited, plenary).
50. R.P. Wei, D.G. Harlow, and R. Buchheit, Mechanistically Based Probability (MBP) Modeling In Design, Fleet Management and Sustainment, *AF Aging Aircraft Technical Interchange Meeting (TIM)*, Tinker AFB, OK, October 18 – 19, 2005 (invited).
51. D.G. Harlow, Mechanics Based Probability Modeling for Minimum Life Estimation of S-N Data, *TMS 2006 135th Annual Meeting & Exhibition; A Symposium in Honor of Art McEvily's 80th Birthday*, San Antonio, March 12 – 16, 2006.
52. D.G. Harlow, Modeling Pitting Corrosion Induced by Clusters of Particles, *15th U.S. National Congress of Theoretical and Applied Mechanics*, Boulder, CO, June 25-30, 2006 (invited).
53. D.G. Harlow, M.-Z. Wang, and R.P. Wei, Probability Modeling to Reflect The Influence of Microstructure, *Materials Damage Prognosis and Life Cycle Engineering*, Snowmass, CO, July 24-28, 2006 (invited).

Technical Reports:

1. D.G. Harlow, R.L. Smith, and H.M. Taylor, The Asymptotic Distribution of Certain Long Composite Cables, Technical Report No. 384, School of Operations Research and Industrial Engineering, Cornell University, Ithaca, NY, Aug. 1978.
2. D.G. Harlow, D. Wei, and J. Keverian, Development of a Reliability, Availability, and Maintainability (RAM) System for the Narrow Strip Production (NSP) Process (proprietary), Kennecott/Chase Brass and Copper, Aug. 1982.
3. D.G. Harlow, Reliability Analysis for the F-18 Main Landing Gear (proprietary), McDonnell Douglas Technical Report, Fall 1985.
4. D.G. Harlow and E.M. Wu, Antenna Wire Reliability (proprietary), NADC Technical Report, Fall 1987.
5. D.G. Harlow, Separation of Three Populations of White Blood Cells from a Histogram (proprietary), Baker Instruments, Spring 1988.
6. D.G. Harlow, Statistical Sampling Plan for the Oyster Creek Drywell Vessel (proprietary), GPU Nuclear, Fall 1990.
7. D.G. Harlow, Reliability Functions for Composite Materials Models, USN/NPS, Report N62271-90-M-2999, Spring 1991.
8. D.G. Harlow and R.P. Wei, A Probability Approach for Prediction of Corrosion and Corrosion Fatigue Life, *Airworthiness Assurance R&D Branch - 1995 Research Accomplishments*, FAA, Atlantic City, 1995, 45-46.

9. D.G. Harlow, N.R. Cawley, and R.P. Wei, Spatial Statistics of Particles and Corrosion Pits in 2024-T3 Aluminum Alloy, *Airworthiness Assurance R&D Branch - 1995 Research Accomplishments*, FAA, Atlantic City, 1995, 47.
10. R.P. Wei and D.G. Harlow, Corrosion and Corrosion Fatigue of Airframe Materials, U.S. Department of Transportation, Federal Aviation Administration, DOT/FAA/AR-95/76, February, 1996.
11. R.P. Wei and D.G. Harlow, Corrosion and Corrosion Fatigue of Airframe Materials: Final Report, U.S. Department of Transportation, Federal Aviation Administration, DOT/FAA/AR-00/22, July, 2000.

Contracts and Grants:

Principal or Co-principal Investigator:

Water Quality of the Barren River, NSF, 1972.

A Probabilistic Model for Fibrous Materials, NSF, 1980 - 1982.

Structural Reliability Characterization of Short Fiber Reinforced Plastics, General Motors Technology Center, (with A. Wang) 1981.

Development of a Reliability, Availability, and Maintainability System for Narrow Strip Processing, Chase Brass Company, (with J. Keverian) 1981 -1982.

Practical Robot Control Laws from the Theory of Dynamical Cell-to-Cell Mappings, NSF, (with S.H. Johnson) 1984 - 1986.

Fundamentals of Automated Inference, ONR/ASEE - NRL, (with P. Mast) 1985.

Reliability of the F18 Landing Gear, McDonnell Douglas Corporation - MDRL, 1985.

Investigations of Creep Cavitation in Type 304 Stainless Steel, DOE, (with T.J. Delph) 1985 - 1986.

An Experimental and Analytical Investigation into the Statistics of Creep Rupture, NSF, (with T.J. Delph) 1986 - 1988.

Antenna Wire Reliability, NADC, (with E.M. Wu) 1987.

Reliability and Durability Analysis of Cables, NRC/ONR - NPS, (with E.M. Wu) 1988 - 1989.

Reliability without Hermeticity: Task 4.4.3 Develop Models for Reliability Predictions, MCC/USAF, (with R. Jaccodine, D. Jaffe, and many others) 1991 - 1993.

Environmental and Stochastic Aspects of Creep Crack Growth, NSF (with R.P. Wei, T.J. Delph, M. Gao, and D. Dwyer) 1991 - 1995.

Corrosion and Corrosion Fatigue of Airframe Materials, FAA (with R.P. Wei, M. Gao, and R.D. Granata) 1992 - 1999.

Corrosion and Fatigue of Aluminum Alloys: Chemistry, Micromechanics and Reliability, AFOSR (with R.P. Wei and M. Gao), 1993 - 1996.

Mechanistically Based Temperature and Relative Humidity Reliability Model, MCC, 1993 - 1994.

Study of Fundamentals of Adhesion, Manufacturing, and Reliability of Organic Chip Attachment Adhesives and Process, SRC (with R.A. Pearson and others), 1994 - 1996.

Moisture Induced Subcritical Crack Growth at Coating Interfaces, SRC (with H.F. Nied and R.A. Pearson), 1996 - 1999.

Corrosion and Fatigue of Aluminum Alloys: Chemistry, Micromechanics and Reliability, AFOSR (with R.P. Wei), 1998 - 2000.

Airworthiness Assurance Center of Excellence, FAA, participant as an affiliate member, 1997 - 1999.

Visteon – Reliability, PA Department of Community and Economic Development, (with H.F. Nied and others), 2000 – 2002.

IGERT Formal Proposal: Environmental/Mechanical Interactions and Effects on the Integrity of Structural Materials, NSF (partnership with University of Tennessee, Knoxville), 2000 - 2004.

Accelerated Insertion of Materials (AIM) – Rotor Components, DARPA/DSO (partnership with Pratt & Whitney, and others), 2001 - 2004.

Northrop Grumman Corporation, Modeling for Corrosion and Corrosion Fatigue, DARPA, 2003 – 2008.

Data Fusion and Scientifically Based Modeling, USAF, 2006.

Probability and Statistics Teaching:

Undergraduate:

- Statistics
- Probability
- Engineering Reliability
- Advanced Mechanical Design - Mechanical Reliability

Graduate:

- Applied Stochastic Processes
- Mechanical Reliability
- Random Vibrations
- Probability Models in Mechanics
- Stochastic Control
- System Identification
- Nondeterministic Models in Engineering

Jon C. Hawkins
Non-Destructive Examination Inspector
Peach Bottom Atomic Power Station

Current Certifications

- Level III Ultrasonic Testing (UT) – 15 years
- Level III Visual Testing (VT) – 15 years
- Level III Magnetic Particle Testing (MT)
- Level III Liquid Penetrant Testing (PT)
- NDE Instructor Certified
- PDI Ultrasonic Certified in RPV, Bolting & Overlay

Previous Certifications

- Level II Radiographic Film Interpretation (RTI)
- EPRI IGSCC Ultrasonic Certified

Experience

- 1978 to 1980: NDE Level I & Level II RT film Interpreter
 - International Union of Operating Engineers: Pipeline Radiography (several company's and locations)
- 1981 to 1986: Limerick Nuclear Generating Station Unit # 1,
 - Pre Service Inspection (PSI) Level II UT, VT, MT, PT
- 1986 to 1991: Limerick Nuclear Generating Station Unit # 2,
 - Pre Service Inspection (PSI) Lead L/II UT, VT, MT, PT
- 1991 to 1992: PECO Level II NDE Inspector
- 1992 to Present: PECO / Exelon NDE Level III NDE Inspection Specialist
 - Currently- Peach Bottom Atomic Power Station NDE Level III / Project Manager
 - PBAPS NDE Project Manager since 2001
- 2006 1R21 Oyster Creek Outage: Performed and Supervised Visual and Ultrasonic thickness readings of the drywell shell.

UT and VT Training

- EPRI, Level III Visual Inspection, 160 hrs
- PECO, VT-1. VT-2, VT-3 Visual Inspection, 40 hrs
- PECO, VT-1C. VT-3C Visual Inspection (IWE/IWL), 40 hrs
- EPRI, UT of High Energy Piping, 40 hrs
- EPRI, UT IGSCC Detection, 80 hrs

- EPRI, UT IGSCC Sizing, 40 hrs
- Sperry school for NDE, UT Weld Inspection, 40 hrs
- ASNT, UT Refresher course, 40 hrs
- PECO, NDE Instructor Training, 40 hrs

RESUME

EDWIN W. HOSTERMAN, P.E.
Mechanical/Nuclear Engineer

HOME ADDRESS

45 Clearview Drive
Mertztown, PA 19539
(610) 682-4256
e-mail address: ehosterman@ceinetworks.com

BUSINESS ADDRESS

Exelon Nuclear
200 Exelon Way
Kennett Square, PA
(610) 765-5947
e-mail address: edwin.hosterman@exeloncorp.com

REGISTRATION

Professional Engineer-Pennsylvania, Certificate No.
PE-031089-E

EDUCATION

Bachelor of Science, Nuclear Engineering, Pennsylvania State
University, 1977
Masters of Business Administration, Temple University, 1983

PRESENT EMPLOYMENT

Exelon Nuclear , December 2000 to present
Kennett Square

Position: Senior Staff Engineer

Responsibilities Include:

Corporate subject matter expert for heat exchangers, condensers and feedwater heaters as well as Corporate Program Owner for the Generic Letter 89-13 program. Developed Standard heat exchanger testing analysis methodology for Safety Related heat Exchangers. Responsible for formulating long term asset management strategies for condensers, feedwater heaters and buried piping. Has prepared corporate standards for the maintenance and testing of Balance of Plant heat exchangers, condenser air in-leakage testing and water in-leakage testing. Prepared Corporate standard specification for replacement feedwater heaters. Has also functioned as the Corporate Thermal Performance program manager. Prepared PEPSE model of the Limerick Generating station.

PREVIOUS EMPLOYMENT

Senentec Inc., and Hosterman Engineering, Inc. January 1999 to
December 2000

PECO Nuclear Co.
Limerick Generating Station

Position: Consulting Engineer

Responsibilities Include:

- Reviewed design Calculations as part of the Limerick Calculation Improvement Project
- Prepared design packages for the replacement of Service Water system valves during the 2RO5 refueling outage
- Provided installation support for the ECCS Suction Strainer modification

- Prepared room temperature analysis for various rooms at the Peach Bottom Atomic Power Station, in support of the Fire Safe Shutdown modifications
- Prepared blowdown and room pressurization analysis in support of the Limerick Reactor Water Cleanup pump replacement.

PREVIOUS EMPLOYMENT

Apollo Consulting
Pa. Power and Light Co. August 1998 to Jan. 1999

Position: Consulting Engineer

Responsibilities Included:

- Prepared calculations to provide the design basis for the process flow diagrams for the HPCI, RCIC, RWCU, Core Spray, RHR and Control Rod Drive systems as part of Licensing basis project.

PREVIOUS EMPLOYMENT

PECo Energy Company, March 1992 to August 1998

Position: Senior Engineer

Responsibilities Included:

- Lead Responsible Engineer for the Emergency Service Water (ESW) and Residual Heat Removal Service Water Systems (RHRSW).
- Program owner for the Generic Letter 89-13 program for both the Limerick and Peach Bottom Stations.
- Developed PECO's heat exchanger testing program and a methodology for statistically analyzing test data.
- Responsible for all hydraulic analysis to support system modifications and system flow balancing at both the Peach Bottom and Limerick Generating Stations.
- Developed transient temperature models for the ECCS pump rooms at both Limerick and Peach Bottom. These models have been used to reanalyze the effects of a DBA LOCA on room temperatures as well as evaluating the effects of pipe breaks on reactor building temperatures.
- Re-evaluated all heat loads served by the ESW and RHRSW systems and Ultimate Heat Sink for both Limerick and Peach Bottom. This re-evaluation reduced the need for testing and cleaning of heat exchangers at the stations and reduced the post accident UHS temperature at Limerick.
- Provided consulting services regarding heat exchanger repairs and maintenance instructions for both Limerick and Peach Bottom.
- Served as the Lead Engineer for several major modifications, in charge of conceptual and final designs, material procurement and installation support. Modifications included:
 - a) Install crosstie lines between the ESW and RHRSW systems at Limerick to facilitate on-line lining of approximately 3000 ft of buried piping.
 - b) Design and install corrosion monitoring racks to monitor the condition of the Service Water and ESW systems at Peach Bottom.
 - c) Install Radiation Monitors on the High Pressure Water System at Peach Bottom.
 - d) Designed and installed a heat exchanger simulator to monitor the condition of the RHR heat exchanger at Limerick. This system allowed the Limerick units to operate for a whole refueling cycle following the discovery of severe pitting in the RHR heat exchanger tube bundle. This allowed the planned replacement of the heat exchangers to be performed without requiring an extended refueling outage. The estimated savings to PECO for this modification were 85 - 87 million dollars.

Responsibilities Included:

- Lead System Engineer for HPCI and RCIC systems
- Lead Mechanical System Engineer for the plant fire protection and liquid and solid radioactive waste treatment systems.
- Lead Mechanical Engineer for programmatic concerns such as high energy line break analysis, several nuclear piping and system design reviews for compliance with the ASME III piping codes, modifications to mitigate the effects of an Anticipated Transient Without Scram and personnel radiation exposure minimization.

PREVIOUS EMPLOYMENT

Bechtel Power Corporation, May 1979 to April 1983

Major Assignment:

Senior Field Engineer
May 1979 to April 1983
1100 MW BWR, Limerick Generating Station
Pottstown, PA

PREVIOUS EMPLOYMENT

Burns & Roe, Inc., June 1977 to April 1979

Major Assignment:

Mechanical/ Nuclear Engineer
June 1977 to April 1979
Nuclear Analysis Group
Oradell, N.J.

Martin McAllister
Oyster Creek Nuclear Generating Station
Route 9, Forked River, New Jersey 08731

Current Certifications

Level III Ultrasonic Testing (UT)
Level III Magnetic Particle Testing (MT)
Level III Liquid Penetrant Testing (PT)
Level III Visual Testing (VT)
NDE Instructor Certified
PDI Ultrasonic Certified

Previous Certifications

Level II Radiography Testing (RT)
AWS/CWI Visual Inspector
IGSCC Ultrasonics Certified

Experience

1978 to 1991

NDE Level II Inspector / Supervisor

Construction of Susquehanna Steam Electric Station and Limerick Generating Station

1991 to Present

Oyster Creek Nuclear Generating Station, Currently- Station NDE Level III

Specific drywell liner experience:

Performed ultrasonic thickness readings of the Drywell liner shell from 1991-1994 and supervised exams (both VT and UT) from 1994 to present.

Certified as Level III UT over 13 yrs.

Certified as Level III VT over 9 yrs.

Training - UT and VT only

A.W. Beattie Tech School – Nuclear / Metallurgy / NDE – Diploma 1978, 170 hrs NDE

AWS, CWI Visual Inspection, 40 hrs

EPRI, Level III Visual Inspection, 40 hrs

GPUN, VT-1, VT-2, VT-3 Visual Inspection, 56 hrs

EPRI, UT of High Energy Piping, 40 hrs

EPRI, UT IGSCC Detection, 40 hrs

EPRI, UT IGSCC Sizing, 40 hrs

Magnaflux, UT Weld Inspection, 40 hrs

ASNT, UT Inspection, 40 hrs

EPRI, NDE Instructor Training, 40 hrs

AHMED M. OUAOU, PE

1103 Shadow Wood Drive
Downingtown, PA 19935

(484) 947-3765

SUMMARY

Registered professional engineer with extensive, diversified experience in civil/structural design, stress analysis, plant and construction support, and licensing. Areas of expertise include:

<i>License Renewal</i>	<i>Civil/structural Design and Analysis</i>	<i>Design Basis Documents</i>
<i>Configuration control</i>	<i>Dynamic Qualification of Equipment</i>	<i>Design Review/Assessment</i>
<i>Project Management</i>	<i>Process and procedure development</i>	<i>Licensing Documents Update</i>

PROFESSIONAL EXPERIENCE

License Renewal Experience:

Three Mile Island Nuclear Station Unit 1

03/2007 – Present

- Developed ASME Section XI, Subsection IWE, IWL, IWF, and Structures Monitoring aging management programs. The documents provide technical basis for the adequacy of TMI-1 aging management activities to support the extended period of operation.
- Supported scoping of structures and development of aging management reviews on an advisory role.

Oyster Creek Generating Station License Renewal Application

11/2003 – 03/2007

- Civil/Structural lead for Oyster Creek (OC) license renewal application.
- Performed scoping, screening, and aging management reviews for OC structures
- Prepared aging management program (AMPs) basis documents and aging management review technical basis documents.
- Evaluated Oyster Creek AMPs for consistency with NUREG-1801 AMPs
- Developed Oyster Criteria for scoping of systems and structures to meet 10 CFR 54.4 (a)(2), and NRC Staff Interim Staff Guidance (ISG-09).
- Prepared civil/structural sections of the Oyster Creek license renewal application
- Prepared position papers and project level instructions for performing scoping, screening, and aging management review of systems and structures.
- Presented scoping and screening methodology of Oyster Creek structures and 10 CFR 54.4 (a)(2) scoping to the NRC scoping and screening methodology audit team.
- Supported the NRC AMP/AMR audit team and interfaced with the Staff and its consultants to resolve AMP and AMR questions and issues
- Prepared response to RAIs and interfaced with NRC Staff to resolve technical issues.
- Prepared presentation for, and supported the ACRS Subcommittee review of the OC drywell corrosion issue.
- Participated in industry review of the draft NUREG-1801 Rev. 1
- Member of NEI Civil/Structural Working Group team.
- Provided technical support to the drywell corrosion issue legal team.

Browns Ferry License Renewal Application

07/2003 – 11/2003

- Performed scoping and screening of Browns Ferry structures
- Review AMRs prepared by TVA consultants

Peach Bottom License Renewal Application

04/2001 – 06/2003

- Performed scoping, screening, and aging management reviews for Peach Bottom structures and selected mechanical systems.
- Wrote civil/structural sections of the application

- Prepared response to RAIs and interfaced with NRC Staff to resolve technical issues identified during its review of the LRA
- Participated in ACRS Subcommittee hearings and responded to ACRS member's questions related to structures.
- Reviewed and commented on NUREG-1801 Rev.0.
- Participated in industry peer review of Hatch, ANO-1, and Dresden/Quad LRAs.

Construction and Plant Support Experience

Limerick Generating Station

1998 -2001

Design and review the design of plant modifications for technical adequacy

Develop engineering strategy for resolving Thermo-Lag raceway encapsulation deficiencies identified in NRC Generic Letter 92-08

Maine Yankee Power Station

- Review open items for nuclear safety significance, equipment reliability, licensing commitments, and recommend their implementation strategy prior to restart from NRC Shutdown Order.
- Assess Maine Yankee's Corrective Action Program for compliance to 10 CFR 50 Appendix B requirements.

Peach Bottom Atomic Power Station.

Assess a pressure vessel for stress and fatigue Code requirements. Prepare a summary report for the client on the available design margin. Develop a specification to assess Motor Operated Valves for maximum thrust/torque. Design structural modifications for pump intake structures. Prepare procurement documents and installation work packages for modifications.

PECO ENERGY COMPANY, Philadelphia, PA

Site Support Engineer

1993 - 1996

Responsible for the design, procurement, and planning of plant modifications. Resolved Nonconformance Reports, and Engineering Change Requests. Resolved configuration control issues. Worked with plant operations and maintenance to improve plant equipment and systems performance.

- Designed modifications to structures, and equipment to enhance plant safety, performance, and improve productivity. These changes in conjunction with other plant initiatives reduced Power Plant refueling outage length from 120 days to 22.8 days. Set world record.
- Considered a subject matter expert on dynamic qualification and design of structures and equipment.
- Designed reactor cavity stair tower. The tower is considered a first in the US nuclear industry. Its use reduces refueling outage critical path time by 4 hours. The design was selected by the company for submittal as a candidate for 1995 Power Industry "Innovative Design Idea" Award.

Branch Manager, Processes and Procedures, Wayne, PA

1990 - 1993

Responsible for planning, developing, and implementing engineering processes, policies, directives, and procedures. Resolved configuration issues associated with Peach Bottom power plant shutdown. Managed work performed by consultants and contractors.

BECHTEL POWER CORPORATION, San Francisco, CA

Project Engineer

1989 - 1990

Responsible for scope, cost, and schedule of the \$8.4 million design turnover project from the Bechtel to the client. Managed multi-discipline group activities associated with the turnover.

Site Project Manager

1988 - 1989

Responsible for establishing and staffing site project manager's office that is recognized as the focal point for all engineering requests. Coordinated engineering activities to ensure prompt support of critical construction, maintenance, and operations activities. Managed design and installation of modifications.

Resident Project Engineer

1987 - 1988

- Managed a multi-discipline engineering team responsible for Limerick construction support.

Engineering Group Supervisor

1981 - 1987

- Directed and provided technical direction for up to 60 engineers responsible for civil/structural design and assessment of Susquehanna Steam Electric Station, and Limerick Generating Nuclear Station structures and commodities.

Structural Design Experience:

1977 - 1980

- Designed steel, reinforced concrete, and masonry wall structures for Susquehanna, Limerick, Peach Bottom, Trojan, and Midland nuclear power plants.
- Performed static and dynamic analysis using SAP, ANSYS, and STRUDL computer codes.
- Performed finite element analysis to evaluate Susquehanna Steam Electric Station, and Limerick Generating Nuclear Station Mark II containments for BWR Mark II containment hydrodynamic loads.
- Designed and evaluated structures and equipment for Design Basis Accident Loads.
- Developed test plans and evaluated dynamic testing of Category I equipment and structures.
- Developed Project Specification for assessing Seismic Category II/I Items.
- Developed masonry design criteria and standard details specific to nuclear plant structures.
- Developed response to NRC IE Bulletins 79-02, 79-14, and 80-11.

Engineer, Mining and Metals Division

1974 - 1977

Responsible for the design of concrete and steel structures for two \$100 million dollar projects. Designed tanks, hoppers, conveyor towers and pipe racks. Prepared conceptual designs and plant layout for industrial project. Prepared cost estimates, and bid packages that resulted in job awards to the company.

EDUCATION

B.S. - Civil Engineering, University of Nevada at Reno
Graduate courses in Civil Engineering, University of California, Long Beach
Registered Professional Engineer, PA, CA

Resume of John F. O'Rourke

Present Position

Senior Project Manager, License Renewal, Exelon Nuclear, Kennett Square

Previous Positions

June 11, 1973

Joined the Philadelphia Electric Company as an Assistant Engineer in the Power Plant Services Section of the Mechanical Engineering Division

November 4, 1974

Transferred to Power Plant Design Section, Mechanical Engineering Division

June 5, 1976

Engineer, Power Plant Design Section

April 20, 1981

Appointed as Group Leader, Piping and Pipe Supports, Power Plant Design Section

May 26, 1984

Senior Engineer, Power Plant Design Section

June 23, 1984

Appointed as Branch Head, Plant Design and Metallurgy (formerly Fossil Steam Supply) Branch, Power Plant Design Section

March 22, 1986

Appointed as Supervising Engineer and Branch Head, Nuclear Services Branch, Power Plant Services Section

October 31, 1987

Appointed as Manager, Corporate Nuclear Quality (formerly Quality Support) Division, Nuclear Quality Assurance

December 1, 1989

Appointed as Manager, Limerick Quality Division, Nuclear Quality Assurance

May 18, 1992

Appointed as Acting Projects Division Manager, Limerick Generating Station (until Dec. 31, 1992)

April 1, 1993

Appointed Senior Manager, Design Engineering, Site Engineering, Limerick Generating Station.

November 18, 1996

Appointed Manager, Procedures Branch, Nuclear Engineering Division,
Chesterbrook.

May 27, 1997

Appointed Manager, Engineering Assurance and Procedures Branch,
Nuclear Engineering Division, Chesterbrook.

October 18, 1999

Appointed Manager, Mechanical Branch, Nuclear Engineering Division,
Chesterbrook

October 20, 2000

Appointed Senior Manager, Mechanical Branch, Mid-Atlantic Regional
Operating Group, Engineering Division, Exelon Nuclear, Kennett Square

July 28, 2003

Appointed Assistant Site Engineering Director for the Oyster Creek
Generating Station

September 4, 2006

Assigned to License Renewal Project, Exelon Nuclear, Kennett Square as a
Senior Project Manager for Oyster Creek and Salem/Hope Creek activities

Work Assignments

2006 – Present

Assigned to License Renewal Project for Oyster Creek to assist with completion of Oyster Creek activities including NRC Safety Evaluation Report review/comments, ACRS Meetings preparation/execution including preparing and delivering presentations to the ACRS Subcommittee and Full Committee, Re-Analysis of Oyster Creek drywell (Project Manager) and the Evaluation of the Oyster Creek Refueling Cavity Liner leakage (Project Manager). Appointed as the Senior Project Manager to manage all aspects of the Salem/Hope Creek License Renewal Project under contract to PSEG.

2003 – 2006

Responsible, along with the Director, for the management and leadership of the Engineering Department at Oyster Creek. Acts as Director, when the Director is away from the site, and as Senior Manager, Design and Plant Engineering (positions combined into Asst. Director position under Single Site Staffing Initiative). Develops and manages the Engineering Department budget. Provides the site single point of contact for Configuration Management activities and leadership and management of design and modification related activities for the site, including capital and expense projects/checkbook. Chairs the Design SubCommittee of the Plant Health Committee and the Curriculum Review Committee. Provides the site management sponsorship, interface and oversight for License Renewal technical activities (application, program and technical basis documents, audits, training, site engineering support, etc.). Acting Director from April, 2006 thru June, 2006

1999 - 2003

Responsible for high-end technical support, consultation and mentoring to the site Design Engineering and Plant Engineering organizations in the areas of accident analysis, thermal-hydraulic analysis, diesels, heat exchangers and condensers, structural/dynamic qualification, finite element analysis, HVAC/compressors, turbines and pumps. Responsible for developing strategic plans for the Regional Operating Group in the Mechanical and Structural areas. Responsible for Program management for selected programs (e.g., Dynamic Qualification). Completed transitioning TMI and Oyster Creek support from Parsippany including training and qualification of personnel, staffing and software support. Provided outage support for Limerick as the MSRV Modification "Make-It-Happen" Manager. Continuing as the lead for the Design Change Process Team as the Engineering organizations develop a process ownership approach to Engineering processes. Also, continuing as the lead for the Configuration Management strategy and as the Custodial Team Leader for the PIMS ECR Module. Provided support for MWROG with their implementation of Passport and for the implementation of PIMS at TMI and Oyster Creek.

1996 - 1999

Responsible for the common procedure activities (Administrative, Engineering, Modifications) within the Nuclear Group. This includes

providing leadership for improvement initiatives and for the former Document Steering Committee. On May 27, 1997, the Engineering Assurance Branch was merged with the Procedures Branch providing the added responsibility for the technical assessment of engineering and configuration management activities throughout the Nuclear Group. This activity as well as the procedure activities directly support Nuclear Engineering Division's role as the PECON Design Authority. Outage support for the Limerick refueling outages provided via assignments as Engineering Duty Manager and MSIV and MSRV Modifications "Make-It-Happen" Manager. During the Nuclear Group Project to develop PassPort as a replacement for PIMS, acted as the Implementation Team Leader for the Engineering module which included working with British Energy counterparts to design a completely new module. Appointed as the lead for the Design Change Process Team and the lead for the Information Technology and Configuration Management strategies. Worked with TMI personnel to develop the appropriate application of technical assessment activities for TMI. Acted as a peer evaluator for an INPO Assistance visit to Fitzpatrick.

1993 - 1996

Responsible for ensuring timely, high quality, day-to-day station support for resolution of Design Engineering issues and for the design of engineering projects (small modifications, minor physical changes, design equivalent changes, etc.). Responsible for ensuring configuration control is maintained, facilitating the removal of organizational and cultural barriers impacting Design Engineering's performance, interfacing with on-site customers and Peach Bottom and Chesterbrook counterparts. Outage support for Limerick refueling outages provided via assignments as the Shift Outage Director, Engineering Duty Manager and MSIV Modification "Make-It-Happen" Manager.

1992

Responsible for managing activities within the Limerick Projects Division which included the Outage Section, Materials Management, Regulatory and the Modifications Group. Responsibilities included business planning and cost control (Both Projects Division and Limerick Quality Division under budget in 1992)

1989 - 1993

Responsible for the independent oversight (i.e. Single point accountability) of all Quality activities at Limerick Generating Station. Activities include auditing, inspections, surveillances, monitoring and reviews. Significant activities included reduction in contractor personnel, initiation of formal divisional self-assessment activities, budget compliance, and "customer" interface.

1987-1989

Responsible for the independent oversight of Corporate Nuclear Group organizations (i.e., Single point accountability for oversight of Nuclear Engineering and Nuclear Services Departments quality activities) for work performed under the PBAPS and LGS Operational Quality Assurance

Plans. Also responsible for all vendor audit/surveillance activities, security screening auditing, QATTS technical support, PBAPS/LGS FSAR (Chapter 17) and Quality Assurance Plans preparation/revision and NQA Procedure and Budget coordination. Served as the Acting PBAPS Quality Manager in 1989 during the absence for training purposes of the current Quality Manager. This assignment included heavy HR and OD interface as well as training in MARC, Interaction Management and Managing Organizational Change. Also, changing culture in the Nuclear Group and in NQA and downsizing of NQA required significant management attention.

1986-1987

Responsible for design activities associated with various systems that support nuclear plant operations, i.e., Diesel generators, Air and Nitrogen Systems, Gaseous Radwaste Systems, PASS, CAC, Containment, etc. This required interfacing with the plant staffs as the "customer" focal point for resolution of system operating problems. Also served as ERDP (Engineering & Research Department Procedures) Task Force Chairman during this period which required extensive interface with the Quality Assurance organizations.

1975-1986

Responsible for piping and pipe support design activities. This required working closely with plant staff personnel during the investigation and resolution of piping/pipe support problems. It also included reviewing operating data to identify plant conditions that might have caused the problems. Frequent plant inspections were made during this period.

Appointed as Group leader for all piping and pipe support design activities for nuclear and fossil plants in April, 1981. Appointed as Branch head, Plant Design and Metallurgy Branch (formerly Fossil Steam Supply Branch) in June, 1984 responsible for nuclear and fossil piping and pipe support design activities, nuclear and fossil valve design activities and fossil steam supply systems.

Significant activities performed during this period included:

- Project Manager, Peach Bottom Unit 2 Recirculation/RHR Piping Replacement. The majority of the management of the field activities was done via full time site presence working in close concert with the contractor and the plant technical/outage staff.
- Project Engineer, Eddystone Unit 1 main steam piping replacement.
- Project Engineer, Peach Bottom torus attached piping modifications associated with Mark I containment program. These activities required frequent on-site presence.
- Project Engineer, I.E. Bulletin 79-14 field inspections and modifications.

1974-1979

Responsible for the design of modifications related to the Offgas Systems at the Peach Bottom Atomic Power Station. This included the review/investigation of operating difficulties with the System which required plant staff interface and field inspections.

1973-1974

Responsible for various fossil plant projects, such as equipment replacements and preparation of waste water permits.

Educational Background

Bachelor of Science in Mechanical Engineering, Drexel University, 1973, *cum laude*

Master of Science in Mechanical Engineering, Drexel University, 1975

Master of Science in Engineering Management, Drexel University, 1983

Professional Engineer, Commonwealth of Pennsylvania, 1976

Penn State Executive Management Program, 1989

PECO Quality Management Training, 1991, 1992, 1993

Senior Reactor Operators (SRO) Certification at Limerick, 1991

Three Mile Island Unit 1 Systems Training, 1999

Professional Activities

American Society of Mechanical Engineers, Philadelphia Section

Member 1974 to 1997, held various committee chairmanships and officer positions, Section Chairman 1983-1984

American Nuclear Society, Delaware valley Section

Member 1977 to 1993

American Society for Quality Control

Member 1988 to 1993

Delaware Valley Engineers' Week Committee

Vice-Chairman 1985-88, Secretary 1988-89, Chairman, Engineer of the Year Election Committee 1989

Edison Electric Institute Quality Assurance Committee

Alternate Philadelphia Electric representative for the NQA General Manager

and Vice-Chairman of the Nuclear Sub-Committee, 1988 to 1993

Institute of Nuclear Power Operations (INPO) Peer Evaluator, 1997

Updated 4/4/07

Fred Polaski
License Renewal Manager, Exelon Nuclear
200 Exelon Way
Kennett Square, Pennsylvania 19348

Experience

- Over 36 years experience in engineering and management with Philadelphia Electric, PECO and Exelon
- 1971-1996: Held various positions in nuclear engineering and management, mostly at Peach Bottom Atomic Power Station:
 - System Engineer
 - Maintenance Engineer
 - Lead Reactor Engineer
 - Outage Manager
 - Assistant Superintendent Operations during Peach Bottom restart
 - Senior Project Manager
 - Manager Independent Safety Engineering Group
- 1978: Earned Senior Reactor Operator's License on Peach Bottom Atomic Power Station
- 1996: PECO project manager for the NEI/NRC/Utility Demonstration Project on Implementation of NEI 95-10 and Part 54.
- 1996 to 2005: Member and Vice Chair of the Electric Power Research Institute (EPRI) LCM Subcommittee, Chair of BWROG License Renewal Committee
- 1996 to present: Member of NEI License Renewal Task Force and License Renewal Working Group
- 1998: Project Director for Peach Bottom License Renewal project
- 2000-present: Exelon License Renewal Manager responsible for
 - Peach Bottom License Renewal Project - new license issued, May 2003
 - Dresden – Quad Cities License Renewal Project – new license issued, October 2004
 - Oyster Creek License Renewal Project
 - TMI 1 License Renewal Project
 - Planning for future license renewal projects within Exelon
 - Participant in Peer Reviews for several license renewal applications
 - Member of the License Renewal Assessment Board for Beaver Valley Nuclear Power Station application.

- Member various other industry groups on license renewal and LCM: EPRI MRP committee on Environmentally Assisted Fatigue, Member of the License Renewal Assessment Board for the Beaver Valley License Renewal Application, NEI License Renewal Electrical and Mechanical Working Groups, Westinghouse Owner's Group License Renewal Committee.

Education

- University of Delaware 1971 Bachelor's of Mechanical Engineering, with High Honors

Francis H. Ray
Engineering Programs Manager

Oyster Creek Nuclear Generating Station
Route 9, Forked River, NJ 08731

Experience

Over 26 years of experience in the Nuclear Industry.

December 2006-Present: Oyster Creek Nuclear Generating Station: Manager,
Engineering Programs.

- Responsible for the day-day supervision of the program owners who implement the Regulatory driven Engineering Programs, which include the ASME In-Service Inspection (ISI) and drywell monitoring programs.
- Responsible for overseeing implementation of all license renewal commitments including those associated with the drywell shell integrity and inspection program.

January 2004 – December 2006: Oyster Creek Nuclear Generating Station: Manager,
Mechanical / Structural Design

- Responsible for the day-to-day supervision of the Mechanical / Structural Design Engineering Branch whose primary activities included support of plant operations, configuration control, margin management, proactively defend the plant design and licensing basis, modifications, and ownership of a number of Aging Management Programs associated with the Oyster Creek Nuclear Generating Station License Renewal Application, including the drywell shell and related inspections and commitments.
- Supported NRC license renewal audits and inspections at the Oyster Creek Nuclear Generating Station in 2006.

June 1999 – January 2004: PECO / Exelon Nuclear at the Limerick Generating Station:
Senior Mechanical / Structural Design Engineer

- Subject matter expert for piping and support design, structural bolting, ASME Code and Code Case interpretations associated with evaluations of ASME piping flaws due to corrosion.

September 1980 – June 1999: Stone and Webster Engineering Corporation (SWEC),
Cherry Hill, NJ

- Over 18 years of extensive design experience in the civil and mechanical engineering disciplines associated with numerous nuclear power plants under construction (e.g. Nine Mile Point 2, RiverBend, Comanche Peak, Fermi 2, and Shoreham) and several licensed Operating plants (e.g. Peach Bottom Atomic Power Station, Limerick Generating Station, Three Mile

Island, RiverBend, Nine Mile Point 2, and Browns Ferry Nuclear Plant - Unit 2).

- Received extensive training in all aspects of design in BWR and PWR power plant design, construction, and maintenance.

Publication

“Cost Effective In Situ Small Bore Piping Qualification for Vintage Power Plants”, ASME Pressure Vessel and Piping Division Conference, San Diego, Ca. (TP No. 91-50)

Education

Bachelor of Science, Civil Engineering, University of Pittsburgh, 1980

Peter Tamburro
Programs Engineer
Oyster Creek Nuclear Generating Station

Office Phone: (609) 971-4141

EXPERIENCE

2007 to present - Programs Engineer, AmerGen LLC, Oyster Creek Nuclear Generating Station, Forked River, NJ 08731. Maintain the following Oyster Creek Programs: Drywell Material Condition Program, Open Cycle Cooling Water Piping, and the Underground Piping Program. The purpose of these programs is to ensure that these systems will perform their function.

1999 to 2006 - Mechanical Design Engineer, AmerGen LLC, Oyster Creek Nuclear Generating Station, Forked River, NJ 08731

Responsibilities included: designing and managing modifications; resolving construction problems related to modifications; evaluating component failures; analyzing and correcting problems related to system and equipment degradation; and support engineering activities during scheduled and unscheduled outages.

Activities include developing: design criteria, installation and procurement specifications, construction sketches, and overseeing development of construction drawings. Examples of modification completed successfully are: installation of the 2004 DBT security systems, installation of various large piping systems such ESW, Service Water and Fuel Oil Transfer Lines.

Provided engineering support to troubleshoot and modify plant equipment, to avoid or recover from unscheduled outages. Performed and documented evaluations that support continued plant operation. Provided input to management with regard to economic justification for funding future projects and modifications.

Responsible to ensure that UT inspection were performed in the upper drywell regions and visual inspections were performed in the sandbed region per plant commitments.

1991 to 1999 - Mechanical Engineer, GPU Nuclear Corporation (GPUNC), Oyster Creek Nuclear Generating Station, Forked River, NJ 08731

Responsibilities included: to support engineering activities during scheduled and unscheduled outages and to serve as an interface between plant and corporate engineering.

Activities include developing: design criteria, installation and procurement specifications, construction sketches, and overseeing development of construction drawings. This also includes following successful modifications in the field and disposition of field changes: replacement of a 2000 GPM fire protection pumphouse; rerouting of large bore piping and valves; installing HVAC equipment and process chillers; excavations to repair leaking underground Service Water lines; and installing temperature, pressure, flow and radiation instrumentation.

Provided engineering support to trouble shoot and modify plant equipment, to avoid or recover from unscheduled outages. Performed and documented evaluations that support continued plant operation. Developed heat exchanger monitoring programs. Provided input to management with regard to economic justification for funding future projects and modifications.

Also involved in a cross-disciplinary committee which "re-engineered" the project management process at GPUNC. Key person in specifying software for the new process.

1986 to 1991 - Mechanical System Engineer, GPUNC, 100 Interpace Parkway, Parsippany, NJ 07054

Member of the corporate engineering staff: responsibilities for both the Oyster Creek and Three Mile Island Unit #1 Nuclear Power Plants included: evaluating system problems and component failures; monitoring system parameters; analyzing, defining, and correcting problems related to system degradation; and design of plant modifications.

Peter Tamburro

Performed and documented evaluations that supported regulatory Technical Specification revisions, and justifications for continued plant operation. This included calculations, technical reports, and responses to audits. Performed numerous studies and reviews related to system and component heat transfer capabilities and plant capacity improvements, including overall effects on plant heat rates. Member of the GPUNC Thermal Performance Committee whose purpose was to overview lost capacity issues and pursue corrective actions. Designed plant modifications for both plants and then followed construction in the field.

Major contributor to the Oyster Creek drywell corrosion abatement program. Responsibilities included defining requirements for an inspection program of the drywell pressure vessel. Coordinated inspection data reduction, performed and documented analysis, and reported results to upper management and the Nuclear Regulatory Commission.

1982 to 1988 - Plant Analysis Engineer, GPUNC, Parsippany, 100 Interpace Parkway, NJ 07054

Responsibilities involved developing and maintaining the Plant Thermal Performance and Availability Monitoring Programs for both the Oyster Creek and Three Mile Island Unit #1 Nuclear Power Plants. This involved developing and refining calculations, procedures, and methods for determining plant inefficiencies and loss generation. Developed thermal performance code models of both plants. These models have been a foundation for GPUNC thermal performance monitoring programs at both plants. Model outputs were used for the development of replica simulators of both plants.

Another responsibility was to review, for applicability to GPUNC plants, descriptions of adverse events which occurred in the nuclear industry. If applicable, it was my responsibility to implement action that would reduce the possibility for the events from occurring at GPUNC.

It was also my responsibility was to assist in the development of a SCRAM Frequency Reduction Program for GPUNC. The program established methods which reduced the number of unnecessary reactor trips at Oyster Creek. Participated for GPUNC on a nuclear industry committee which exchanged lessons learned.

1980 to 1982 - Mechanical Test Engineer, Newport News Shipbuilding & Drydock Company, Newport News, Virginia

Mechanical system testing of two A4W type nuclear power plants on the CVN-70 aircraft carrier.

EDUCATION

B.S. in Chemical Engineering from Clarkson University, Potsdam, NY (May 1980).

M.S. in Computer Science from Fairleigh Dickinson University, Teaneck, NJ (October 1986).

Professional Engineer, State of New Jersey, 1986.