

Arizona Public Service
PALO VERDE NUCLEAR GENERATING STATION
5801 S WINTERSBURG ROAD TONOPAH ARIZONA 85354-7829

WILLIAM L STEWART
EXECUTIVE VICE PRESIDENT
NUCLEAR

102-03566-WLS/AKK/DLK
December 12, 1995

Mr. L. J. Callan
Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

Dear Mr. Callan:

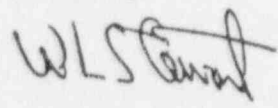
**Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket Nos. STN 50-528/529/530
Proposed Self-Assessment**

In accordance with the guidance provided in NRC Inspection Procedure (IP) 40501, "Licensee Self-Assessments Related to Area-of Emphasis Inspections," Arizona Public Service Company (APS) proposes to conduct a self-assessment modeled after NRC IP 37550, "Engineering" and NRC IP 40500, "Effectiveness of Licensee Control in Identifying, Resolving, and Preventing Problems," as an alternative to the full scope NRC inspection scheduled for April 1996. The objective of the self-assessment is to examine engineering activities and the programs and controls established for the identification, resolution, and prevention of problems at Palo Verde Nuclear Generating Station (PVNGS). The self-assessment overview, detailed plan, and team member qualifications are included as enclosures to this submittal for your review and approval.

Enclosure 1 outlines the objectives, scope, method, schedule, resources, and team composition. Enclosure 2 details the self-assessment plan. Enclosure 3 contains the resumes of the self-assessment team members.

If you have any questions, please contact Burton A. Grabo, Section Leader, Nuclear Regulatory Affairs, at (602) 393-6492.

Sincerely,



WLS/AKK/DLK

Enclosures:

H005

030008
9605030159 951212
PDR ADOCK 05000528
P PDR

Mr. L. J. Callan
U. S. Nuclear Regulatory Commission
Page 2

cc: Document Control Center
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K. E. Johnston
T. P. Gwynn
C. Vandenburg

Mr. L. J. Callan
U. S. Nuclear Regulatory Commission
Page 3

bcc: J. M. Levine (7602)
J. A. Bailey (7605)
G. R. Overbeck (7616)
C. K. Seaman (7992)
J. H. Hesser (7669)
W. E. Ide (7294)
C. D. Mauldin (7299)
D. M. Smith (7299)
J. L. Terry (7712)
G. T. Shanker (7965)
R. E. Younger (OSRC) (7997)

ENCLOSURE 1

SELF-ASSESSMENT OVERVIEW

SELF-ASSESSMENT OVERVIEW

Objectives:

The self-assessment is being conducted to evaluate the effectiveness of engineering activities and the programs and controls established for identifying, resolving, and preventing technical issues and problems at Palo Verde Nuclear Generating Station (PVNGS).

Scope:

The guidelines provided in NRC Inspection Procedure (IP) 37550, "Engineering" and NRC IP 40500, "Effectiveness of Licensee Control in Identifying, Resolving, and Preventing Problems," were used to develop the details of the assessment plan provided in enclosure 2.

The self-assessment will include an evaluation of the following:

- engineering programs, organizations, and procedures
- design engineering and configuration control
- engineering backlog control
- controls for problem identification, resolution, and corrective action effectiveness

The self-assessment team will evaluate the Engineering interface with Operations and Maintenance during the performance of routine and reactive activities such as developing plant modifications, maintaining the design basis, completing root cause analysis, and resolving emergent technical issues. The team will also evaluate the ability of the line and oversight organizations at PVNGS to recognize, assess, and resolve issues that develop at the plant or are obtained from other industry sources.

Method:

The self-assessment objectives will be accomplished using the vertical slice approach on selected design modifications, safety systems, and current plant issues. The PVNGS Individual Plant Evaluation (IPE) and Sensitive Issues Manual will be used during the selection process. As much as practical, the effectiveness of Engineering and oversight organization activities will be evaluated by in-process observation, supplemented by interviews and plant documentation reviews. Findings (i.e., recognized problems) identified during the course of the self-assessment will be subjected to an operability determination if required, documented on Condition Reports/Disposition Requests (CRDRs), and resolved in accordance with the PVNGS corrective action program.

Schedule:

The self-assessment is scheduled to be conducted during the weeks of February 5 through 9, February 12 through 16, and March 4 through March 8, 1996. A report of the completed self-assessment will be provided to the USNRC Regional Administrator no later than April 5, 1996.

Resources:

The self-assessment team will be composed of at least ten team members (including the team leader). A total of approximately 1,200 man-hours of actual inspection will be needed to complete the self-assessment.

Team Composition:

The executive sponsor for the self-assessment will be the Vice President, Nuclear Engineering. The team will consist of technically experienced personnel - three from Engineering, three from Nuclear Assurance, a team leader, an assistant team leader, and two external consultants.

The two external consultants, who have not yet been designated, will provide an independent perspective to the self-assessment. The scope assigned to one of the consultants will be to evaluate the effectiveness of the Onsite and Offsite Safety Review Committees, Independent Safety Engineering functions, Nuclear Assurance audits, and Nuclear Engineering self-assessments. Arizona Public Service Company (APS) is targeting individuals with a Bachelors degree in engineering or related science and a minimum of 5 years experience in senior level nuclear management position. The scope assigned to the other consultant will be to evaluate the effectiveness of communications between engineering groups and other organizations, resolution of plant nonconformances and industry issues, engineering inputs into operability and reportability determinations, and analysis of equipment performance. APS is targeting individuals with a Bachelors degree in engineering or related science and a minimum of 15 years nuclear engineering experience in the design, operation, and maintenance of equipment important to plant safety.

The APS team member resumes are included in enclosure 3. The resumes for the two consultants will be forwarded to the USNRC Regional Administration no later than January 19, 1996.

ENCLOSURE 2

DETAILED SELF-ASSESSMENT PLAN

DETAILED SELF-ASSESSMENT PLAN

1.0 PURPOSE

The purpose of this assessment is to evaluate the effectiveness of engineering activities, particularly the effectiveness of the engineering organization to perform routine and reactive site activities. It includes assessment of the engineering organization on the identification and resolution of technical issues and problems, and the effectiveness of engineering in identifying, resolving, and preventing issues that degrade the quality of plant operations or safety.

2.0 SCOPE

The scope of this assessment includes the design control processes associated with plant modifications and temporary plant modifications from the design phase through installation and testing. Also included in the scope of this assessment are the corrective action processes (including corrective action program, operating experience program, safety committee results and self assessment activities). The assessment scope includes the following:

Program, Organization, and Procedures

Design Engineering Process

- Modification Process
- Transition Modifications
- Partially completed modifications
- Maintenance/Design dispositioned Deficiency Work Orders (DFWOs)
- Temporary plant modifications

Configuration Management

- Previously completed modifications

Corrective Action Effectiveness

- Safety Review Committees
- Root cause analysis program
- Self-assessment program
- Operating Experience (internal and external)

Canceled Modifications

3.0 Assessment Objectives

The assessment of the Palo Verde Nuclear Generating Station (PVNGS) engineering activities, and controls for identifying, resolving, and preventing problems, will be performed using a combination of programmatic horizontal and vertical slice evaluation methods. Greater emphasis will be placed on the vertical-slice assessment than on the horizontal-slice review. Assessment techniques will include interview of cognizant personnel, review of documentation, field inspections, and performance based observations. Samples will be selected from systems noted in the PVNGS sensitive issues manual and the individual plant examination (IPE). Application of the assessment techniques to the selected samples will fulfill the following objectives:

- Determine whether PVNGS has appropriate programmatic controls for accomplishing changes, modifications and repairs;
- Determine the effectiveness of engineering activities, particularly the effectiveness of the engineering organization to perform routine and reactive site activities, including the identification and resolution of technical issues and problems.
- Determine the effectiveness of PVNGS' controls in identifying, resolving, and preventing issues that degrade the quality of plant operations or safety. Controls include: safety review committees, root cause analysis programs, corrective action programs, self-assessment programs, and other processes that provide for the incorporation of operating experience.

4.0 Assessment Methodology

Selected items will be assessed for effectiveness and implementation as identified below:

Audit Objective 1 Program/Organizations/Procedures

1. Procedures utilized by PVNGS for plant modifications, temporary plant modifications and design changes will be evaluated to ensure they identify authorities, responsibilities, interfacing organizations, processes, controls, approvals, and required records.

Audit Objective 2 Effectiveness of Engineering Activities

1. Evaluate several safety-significant design changes and plant modifications to verify conformance with the applicable installation and testing.
2. Evaluate several safety-significant temporary plant modifications to verify conformance with applicable requirements.
3. Evaluate the extent and quality of engineering involvement in site activities.
 - Evaluate the extent and effectiveness of the site engineering communications with other departments such as maintenance, operations, as well as other engineering teams.

- Evaluate engineering involvement with the resolution of technical issues selected from recent plant events or routine work documents.
 - Evaluate the extent of backlogged engineering work.
4. Determine the degree to which the engineering organization maintains the plant's design bases current for selected significant safety systems, and verify that the regulatory requirements and licensee commitments are properly implemented in the performance of engineering activities.
 5. If performance problems are identified, evaluate the relative capabilities of the engineering organizations with regard to staffing levels, experience, clearly delineated responsibility, training, and procedures.
 6. Evaluate the effectiveness of PVNGS' controls and self-assessment programs related to engineering activities.
 - Evaluate the appropriateness and timeliness of PVNGS' controls in identifying, resolving, and preventing problems by reviewing such areas as corrective action systems, root cause analysis, safety committees, and self assessment in the area of engineering.
 - Evaluate the effectiveness of PVNGS' controls by reviewing pertinent issues, events, or problems identified during the assessment in the area of engineering.
 - Determine whether there are strengths or weaknesses in PVNGS' controls for the identification and resolution of the reviewed issues that could enhance or degrade plant operations or safety.
 7. Evaluate the overall effectiveness of the independent safety engineering group (ISEG or equivalent) by reviewing various ISEG reports and the implementation of corrective actions. Review the following items:
 - Selected ISEG reports for the last year to identify areas for additional review and assess the licensee's root cause and corrective action processes.
 - Selected reports to evaluate whether thorough, in depth reviews of known weak areas were performed and assess the adequacy of the reviews.
 - Corrective action recommendations made by ISEG and determine if the associated recommendations were implemented effectively and in a timely manner.
 - Discuss with ISEG members the day-to-day functions of their organization, the effectiveness of reports produced, and the quality of issues identified and make an assessment of the organization's effectiveness.
 8. When design changes and modifications have been made to the systems installed as part of the NRC regulations 10 CFR 50.62, 10 CFR 50.63, and Supplement 1 to NUREG-0737 for RG 1.97 instruments and SPDS, evaluate these changes and modifications to ensure that the original design bases and margins for the applicable system/components have not been compromised, by performing the following:

- Verify that PVNGS has implemented appropriate software control and post-modification testing.
- Determine if design requirements are translated correctly into vendor/design specifications and verified during post modification testing. Also, verify that PVNGS design, as endorsed through the SER, is being properly implemented and the design requirements as implemented are easily traceable.
- Verify that the required qualified isolation devices are installed for systems such as RG 1.97 instruments, SPDS, SBO, and ATWS that interface with the safety systems. Also, confirm that the diversity requirements of 10 CFR 50.62 are still met with the change/modification in place.
- Verify that the capacity of air, fluid and electrical systems support the modification of alternate AC source for station blackout.
- Verify that the procurement specifications for station blackout coping equipment conform with the guidance provided in Regulatory Guide 1.155.
- Determine how PVNGS ensures the operability of equipment for systems such as ATWS, SBO, SPDS, and RG 1.97 instrumentation which are not covered by TS, but are installed in accordance with commitments and are important to the safe operation of the plant.

Audit Objective 3 Identifying, Resolving, and Preventing Problems

Assessment Preparation

1. Review the strengths and weaknesses of PVNGS' controls identified within each systematic assessment of licensee performance (SALP) functional area during implementation of NRC inspection procedures (IPs).
2. Review the results of PVNGS' self-assessments, placing special emphasis on the conclusions and corrective actions.
3. Review systematic assessment of licensee performance (SALP) reports, plant performance reviews (PPRs), enforcement history, performance indicators, licensee event reports (LERs), operating activities, NRC management trip reports, and management meeting reports to determine any current areas of strengths or weaknesses.
4. Obtain, through discussion, the resident inspector's assessment of PVNGS' strengths and weaknesses.
5. Review PVNGS' administrative procedures that control the identification, evaluation, and resolution of problems. Also review PVNGS' procedures and practices for self-assessment.

Resolution of Problems

1. Select a sample of issues or problems from the list below for detailed analysis to assess the PVNGS' ability to identify and correct problems. Select problems which involve equipment or activities with a relatively high risk significance based on the individual plant examination (IPE) or risk-based inspection guides.
 - Operational events, testing, or maintenance activities (such as temporary repairs or troubleshooting activities).
 - Deficiencies or modifications requiring safety evaluations or operability determinations.
 - Procedural adherence deficiencies and procedure change backlog.
 - QA audits and self-assessments.
 - Repetitive equipment deficiencies.
 - Other events or issues that may indicate weaknesses.
2. Analyze in detail the problems selected above to determine PVNGS' effectiveness in performing the following:
 - Initial identification and characterization of the problem.
 - Elevation of problems to proper level of management for resolution (internal communications and procedures).
 - Root-cause analysis.
 - Disposition of any operability/reportability issues.
 - Implementation of corrective actions including evaluation of repetitive conditions.
 - Expansion of the scope of corrective actions to include applicable related systems, equipment, procedures, and personnel actions.
3. Identify any strengths and determine the root causes of any weaknesses or slow response identified during the detailed analysis above. Possible root causes might include understaffing, lack of training, lack of funding, lack of accountability, unclear responsibility, procedure inadequacy, undue schedule pressure, or inaccuracy in design-basis documents.

Corrective Action Programs

1. Review the deficiencies tracked in PVNGS' corrective action programs, including the evaluation of deferred items, or interim resolutions.
2. Review the results of PVNGS' audits that evaluated the effectiveness of the associated corrective action programs.
3. Interview selected individuals involved with PVNGS' problem identification process to determine the extent of the individual's understanding of the process and willingness to report problems.

4. Evaluate the PVNGS corrective action program(s) to verify that PVNGS is appropriately identifying significant issues and implementing timely corrective actions which achieve lasting results. Determine the adequacy of root-cause analyses.
5. If applicable, evaluate PVNGS' use of the IPE to prioritize corrective actions as a strength or weakness.

Operating Experience Feedback

1. Evaluate the adequacy of PVNGS' programs that implement operational experience feedback. Focus on PVNGS' effectiveness to assess, to inform appropriate personnel of the results, and to initiate corrective actions for information obtained both within and outside PVNGS' organization. The following sources will be considered:
 - Operational experience information reports (such as significant event reports (SERs), significant operating event reports (SOERs), and significant event notifications (SENs) generated by the Institute of Nuclear Power Operations (INPO).
 - CFR Part 21 notifications.
 - NRC bulletins, generic letters, and information notices.
 - Reports issued by NSSS vendors.
 - Reports from other facilities under PVNGS' control or from similar facilities (with respect to design and vintage).
 - EPRI reports.
2. Identify any strengths or contributing conditions which reflect a lack of responsiveness in PVNGS' programs that implement operational experience feedback.

Self-Assessment Activities

1. Evaluate the effectiveness of PVNGS' self-assessment capability by reviewing self-assessment reports, audits (excluding safety committee audits), and evaluations. Compare this assessment's results to the results of the previous assessments performed.
2. Evaluate the significance of a sample of self assessment findings to determine the effectiveness of the self-assessment effort. If relatively few significant findings are identified, review the scope of the self-assessment and the qualification of the plant staff involved in the self assessment. Determine if the self-assessment findings are consistent with previous inspection findings, plant performance, and third-party audits.
3. Determine if PVNGS is aggressive in following up on self-assessment findings and determine whether PVNGS' corrective actions are adequate, timely, and properly prioritized. Determine if individuals at all levels in the self-assessment and corrective action process are held sufficiently accountable to ensure that corrective

actions are technically adequate and timely. Determine if PVNGS has a meaningful trending program with sufficient information available for identifying recurring problems.

4. Evaluate the overall self-assessment program to ensure that the major functional areas (e.g., corrective actions, Appendix B, security, fire protection, emergency planning, operations, engineering, radiation control, maintenance) are reviewed as required by the PVNGS' quality assurance audit program.
5. Interview selected individuals involved with the oversight function, as well as the audited organization, to gain their insight on the effectiveness of their effort and the responsiveness of utility management and staff to issues raised. Review PVNGS' performance data and discuss anomalies and trends with management to obtain their insights on the effectiveness of these activities.

Onsite and Offsite Safety Review Committee Activities (or equivalent)

1. Evaluate the effectiveness of the safety committees by reviewing committee minutes, audits, or other actions initiated by the committees as follows:
 - Identify what issues are reviewed by the safety committees and review the actions initiated by the safety committees to identify, assess, and correct areas of weakness.
 - Review safety committee activities and discuss specific activities with selected safety committee members or safety committee support staff to gain insights and to assess the committee's effectiveness, work load, ability, and utility support for committee initiatives.
 - Select audits conducted under the cognizance of the safety committee and determine if the audit findings were consistent with such external assessments as NRC, INPO, and consultants.
 - Evaluate PVNGS' follow-up to items identified by the safety committees, including committee initiated audit findings and any recurring problems.

5.0 REFERENCES

ANSI N45.2.11-1974, "Quality Assurance Requirements for the Design of Nuclear Power Plants"

ANSI N45.2.13-1976, "Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants"

ANSI N18.7-1976, "Administrative Controls and Quality Assurance for the Operations Phase of Nuclear Power Plants"

ANSI N45.2.9, "Requirements for Collection, Storage, and Maintenance of Quality Assurance Records for Nuclear Power Plants"

Regulatory Guide 1.28, Quality Assurance Program Requirements (Design and Construction)

NRC Policy Statement, "Availability and Adequacy of Design Bases Information at Nuclear Power Plants," August 10, 1992

NUREG-1397, "An Assessment of Design Control Practices and Design Reconstitution Programs in the Nuclear Power Industry"

NUREG-0800, Standard Review Plan, Section 13.4, "Operational Review"

NUREG-1499, "Reassessment of the NRC's Program for Protecting Allegers Against Retaliation"

SECY-91-364, "Design Document Reconstitution"

SECY-92-193, "Design Bases Reconstitution"

10 CFR Part 50, Appendix A, Criterion I, "Quality Standards and Records"

10 CFR Part 50, Appendix B, Criterion III, "Design Control", Criterion XVII, "Quality Assurance Records"

10 CFR 50.59, "Changes, Tests, and Experiments"

10 CFR 50.2, "Design Bases"

Standard Technical Specifications, Section 6.0

ANSI/ANS 3.2-1982, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants"

Regulatory Guide 1.33, Revision 2, "Quality Assurance Program Requirements (Operational)," February 1978.

Memorandum of February 14, 1986, from J. M. Taylor to regional administrators entitled "NRC Use of Evaluation Reports" (DCS 68289/200)

NRC Inspection Procedure 37550, "Engineering"

NRC Inspection Procedure 40500, "Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems"

ENCLOSURE 3

TEAM MEMBER QUALIFICATIONS

ENGINEERING TEAM ASSESSMENT

TEAM COMPOSITION

1. Dale R. Leech - Team Leader
Current Position: Section Leader, Nuclear Assurance Engineering
2. Ali Fakhar - Assistant Team Leader
Current Position: Section Leader, System Engineering - BOP Section
3. George O. Wilkinson, P.E.
Current Position: Senior Consulting Engineer - I&C Design
4. Charles A. Lewis
Current Position: Senior Engineer - I&C and Electrical Systems Engineering
5. R. Steve Smith
Current Position: Engineer III - Nuclear Assurance Engineering
6. Ram N. Prabhakar
Current Position: Senior Engineer - Nuclear Assurance Maintenance
7. Mark Brutcher
Current Position: Senior Engineer - Mechanical Maintenance Engineering
8. Daniel G. Marks
Current Position: Section Leader - Nuclear Assurance Operations
9. CONSULTANT TBD
Current Position:
10. CONSULTANT TBD
Current Position:

DALE R. LEECH
TEAM LEADER

EDUCATION & TRAINING

- Emporia State University 100 Credit Hours (3 Years)
Emporia, Kansas Courses included Calculus I and II,
Differential Equations,
- Lead Auditor Training, Gilbert Commonwealth
- Software Quality Assurance, Babcock & Wilcox
- Westinghouse PWR Systems Training, TU Electric
- Root Cause Analysis, Quality Services International
- Incident Investigation, EG & G Intertech Inc.
- Nuclear Plant Reliability Data System (NPRDS) Training, APS
- Maintaining Equipment Qualification, APS
- Root Cause Analysis, APS (Failure Prevention Inc.)

PROFESSIONAL REGISTRATIONS AND CERTIFICATIONS

- Certified ANSI N45.2.23 Audit Team Leader

EXPERIENCE

8/90 to Present Arizona Public Service Company
Palo Verde Nuclear Generating Station

Section Leader, Nuclear Assurance Engineering

Responsible for nuclear oversight activities of the procurement, equipment qualification, document control, and material control functional areas. Additional responsibilities include offsite vendor audits/surveillances and functioning as the Nuclear Utilities Procurement Issues Committee (NUPIC) site representative.

Supervisor, QA Corrective Actions

Responsible for the corrective action process as it relates to the identification, control, documentation, evaluation, reporting, and correcting of deficiencies identified by Quality Assurance. This includes evaluating QA deficiency documents for significant adverse conditions which may require a Corrective Action Report. Also responsible for reviewing/approving QA department evaluations and verifications for QA deficiency documents and Condition Report/Disposition Requests (CRDRs).

Senior Quality Audits Engineer

Certified Quality Assurance Lead Auditor responsible for conducting performance based audits. Performed as Team Leader for audits of Maintenance, Material Control, Procurement, Design Control, Software QA, and Corrective Actions.

**DALE R. LEECH
TEAM LEADER**

6/86 to 8/90

**Texas Utilities Electric Company
Comanche Peak Steam Electric Station**

Quality Assurance Staff Auditor

Certified Quality Assurance Lead Auditor responsible for conducting performance based audits. Also responsible for performing Quality Surveillances and procedure reviews as necessary to support and monitor plant operations activities. Special assignments performed during employment with TU Electric included:

QA Technical Audit Program (TAP)

Performed Technical Audits to verify adequacy of engineering activities associated with the Corrective Action Program. Specialized in the performance aspects of the design configuration aspects of this program.

Technical Audit Program ISAP Supervisor

Supervised the TAP verification of project commitment implementation associated with the Comanche Peak Response Team's Issue Specific Action Plan (ISAP) and Design Specific Action Plan (DSAP) efforts. Responsibilities also included the technical review of TAP deficiency closure correspondence to assure that all corrective actions were properly performed by the Technical Specialists and were properly documented.

12/79 to 6/86

**Brown & Root, Inc.
Comanche Peak Steam Electric Station**

Nuclear Engineering Quality Assurance Engineer

Prepared engineering procedures to meet the QA requirements specified in ANSI N45.2.11. Responsibilities also included QA procedural compliance document reviews and internal surveillances to assure engineering compliance with QA requirements.

Pipe Support Engineering Design Control Supervisor

Prepared and maintained technical data in the form of Engineering Guidelines. The guidelines were required to incorporate the design requirements imposed by the ASME Section III Code and other industry standards (e.g., AWS, AISC, Reg. Guides, etc.). Responsibilities also included preparation of engineering procedures and internal surveillances to assure compliance with procedural and regulatory guidance.

During employment with Brown & Root other positions included:

Offsite Vendor Coordinator

Pipe Installation Tracking System Supervisor

System Planning/Completions Engineering Technician

Pipe Support Mechanical Draftsman

ALI FAKHAR
ASSISTANT TEAM LEADER

EDUCATION & TRAINING

- Mechanical Engineering, University of Idaho
- Mechanical Engineering, University of Washington: 30% of Master program credits completed through Joint Center for Graduate Studies

PROFESSIONAL REGISTRATIONS AND CERTIFICATION

- Project Engineer and Author of EPRI Guideline "Technical Evaluation of Replacement Items.
- SRO, Senior Reactor Operator Certification, Palo Verde Nuclear Generating, PVNGS

9/89 to Present

Arizona Public Service Company
Palo Verde Nuclear Generating Station

Section Leader, System Engineering - BOP Section

Responsible for activities in Balance of Plant systems for all the units at PVNGS including all the System Engineering activities and performance monitoring and trending program activities. In addition, Program Manager of the System Engineering at PVNGS.

Manager, Site Mechanical Engineering Department

Responsible for activities in Mechanical System and Equipment for Design and System Performance Monitoring and Trending program for PVNGS. Direct reports include the supervisors of NSSS, BOP, Mechanical Design and ISI/IST sections. Responsible for the O&M department budget of more than \$9 million dollars and staff of more than 90 APS direct engineers. In addition, responsible for contractors for activities related to our above job functions.

Supervisor, Site Mechanical/Chemical Design & System Section

Responsible for all activities related to Mechanical Systems and Equipment in the area of Design and, as Project Manager, the System Performance Monitoring and Trending program for Nuclear Engineering and Project. During the five years, acted as Manager of Procurement Engineering, Manager of Nuclear Engineering Mechanical/Civil, and held positions of Supervisor of Procurement Engineering, Supervisor of Nuclear Engineering Mechanical Discipline.

**ALI FAKHAR
ASSISTANT TEAM LEADER**

5/88 to 9/89

Cygn Energy Services

Manager, Technical Procurement Services

Responsible for administrative, marketing and technical work being performed by individuals within this division. Developed new technologies to support client needs in the areas of Component Classification, Parts Classification, Procurement, Database Management, Equipment Failure Analyses and Equipment Qualification. Project Engineer for EPRI/NCIG Task Group on the development of a Guideline for Technical Evaluation of Replacement Items in the Nuclear Industry. Acted as Project Manager and Project Engineer to establish a Material Management Program for various nuclear utilities. Supported projects for Public Service Electric and Gas Company, Toledo Edison Company, Union Electric Company, Maine Yankee Atomic Power Company, Baltimore Gas and Electric Company and Northern States Power Company. Responsible for development and training of commercial grade items for use in safety-related applications for Union Electric, Toledo Edison and Detroit Edison Companies.

7/84 to 5/88

**Arizona Public Service Company
Palo Verde Nuclear Generating Station**

Project Engineer

Responsible for managing activities related to component classification (Q-List), spare parts classification and procurement requirements. Responsible for developing, managing and implementing a \$4 million program for Arizona Nuclear Power Project which encompasses classification of components, parts and procurement specifications. This project included the development of methodologies and procedures for determining the component classification and safety significance of parts used in safety-related equipment as well as determining procurement requirements, commercial grade dedication, and acceptance related to the suitability of items for their application.

Senior Equipment Qualification Engineer

Responsible for Seismic and Environmental qualification of safety equipment which is done to demonstrate that the equipment will perform its safety function before, during and after an accident. Specifically responsible for Kaman radiation monitoring equipment. Work in these areas has provided knowledge of applicable Codes and Standards including 10CFR 21, 10CFR50.49, 10CFR50, Appendix B, IEEE Std 323-1974 and 344-1975, NUREG 0588, USNRC Regulatory Guides 1.29, 1.48, 1.61, 1.70, 1.89, 1.92, 1.95, 1.97 and 1.143. In addition, am familiar with the ASME - B&PV and ANSI/ASME NQA-1.

**ALI FAKHAR
ASSISTANT TEAM LEADER**

Operations Responsible Engineer

Responsible for processing of jurisdictional acceptance of a system/subsystem from Start-Up or Construction to Operations. Maintaining knowledge of the assigned plant system, including appropriate design details, modifications, licensing aspects, construction and installation status. Initiated the conversion of Start-Up and Construction documents to the Operations documents. Participated in the Acceptance walkdown and identified items that prohibited a system from performing its intended design function, meeting licensing requirements or affecting configuration control. Verified completion of Phase I testing and identification of the "carry over" tests. Review licensing commitments, Test Result Report and N-5 data packages. Reviewed all the items contained on the subsystem presented to Operations for acceptance and recommend acceptance or rejection.

1/83 To 5/84

Ebasco Services, Inc.
Louisiana Power And Light Waterford III, Taft, LA

Lead Engineer

Responsible for preparation of work packages to support construction for all supports, providing technical assistance to supervision and craft personnel. Final review of supports prior to transfer to Q A Identification and resolution of non-conformance items. Reviewed and interpreted design documents to determine adequacy of design information for Work Package preparation. Coordinated with Staff Discipline Engineers and Startup personnel to resolve design discrepancies or problems. Initiating computer system for tracking all supports.

Startup Lead Engineer

Represented the department in status meetings, control and documentation of release and turnover of pipe, I&C, cable tray and conduit supports from Construction through Construction Management to the Owner Start-Up Group. Control of punchlist items on supports and the necessary disposition and/or corrective actions required to resolve deficiencies identified during the performance, design construction and final inspection. Resolved MTS and ATS open items by performing physical walkdown of the system. Verified the installation and documentation of each phase of work and assured compliance with design drawing, specification and procedures.

**ALI FAKHAR
ASSISTANT TEAM LEADER**

8/81 to 1/83

**Bechtel Power Corporation
WPPSS, Unit II, Hanford, WA**

System Engineer

Responsible for production of Work Package to support Construction for Large Bore Pipe Supports in accordance with ASME III, Subsection NF code requirements and ASME Section II. Performed physical walkdowns of System Installation and Completion status. Initiated punch lists of to-go work items, provided MWL input to system schedules and participated in status schedules and coordinating meetings. Coordinated system activities with other system and discipline engineers and interfaced with client startup engineers.

Engineer, Technical Support Group

Responsible for identification and resolution of non-conformance items in support of N5 Certification during systems completion/startup phase of construction. Responsible for approving vendor construction, design verification of calculation and technical interpretation. Reviewed N.P.S.I. Large Bore Pipe Support documentation for compliance with ASME III, subsection NF code requirements and ASME Section II, in addition to the ASTM material specification. Reviewed General Electric Control Rod Drive documentation for compliance with contract specifications and ASME Code. Generated field drawings in response to Burns & Roe P.E.D.'s. Small Bore As-Built Isometrics and Instrumentation. Related duties included design of piping and instruments for various pumps, review of Rotor Meter design and drawings for code compliance with contract specification, system walkdown, punchlisting, training of new personnel, research and review of the documentation to be included in the Turnover Packages and comprehensive review and interpretation of the ASME, ASTM, and ANSI codes.

5/75 to 6/77

Army (Construction Duty Division)

Construction Supervisor

Public Service Projects. Construction supervision, implementation on engineering change reports, systems walkdown, identification of non-conformance and open items to complete construction projects. Responsible for coordination of systems priorities with craft personnel.

GEORGE O. WILKINSON

EDUCATION

- BA (Chemistry), Oklahoma State University
- MS (Computer Engineering), Kennedy-Western University
- Nuclear Power Plant Operator (Instrumentation Specialty)(US Army Engineer Reactors Group)

LICENSES/CERTIFICATIONS

- Registered Professional Engineer
Pennsylvania (No. 23029E)
Texas (No. 40346)
- Shift Supervisor (USAERG - PWR)
- Plant Superintendent (USAERG - PWR)

PROFESSIONAL AFFILIATIONS

- Member, Institute of Electrical and Electronics Engineers
- Member, Nuclear Power Engineering Committee and Secretary, SC-6
- Member, American Nuclear Society
- Member, Instrument Society of America
- Member, SP7.0 (Instrument Air)

EXPERIENCE

11/91 to Present

Arizona Public Service Company
Palo Verde Nuclear Generating Station

Consulting and Senior Consulting Engineer

Provided technical assistance for design engineering activities supporting the operations of PVNGS. Assisted instrumentation & control, mechanical, and electrical engineers by providing evaluation and analysis of complex technical issues using unconventional and novel approaches. Performed studies and calculations that substantiate the design bases for instrumentation and controls systems and mechanical systems. Provided significant design and operational understanding of major nuclear plant systems for design and systems support engineers. Member of the self-assessment team that assessed the 10CFR50.59 program. Authored papers for national symposiums concerning unique solutions of technical problems. Participated as a member of the IEEE committee for the development of electrical and instrumentation standards.

Senior Engineer

Performed setpoint calculations for quality related plant instrument channels. Assisted with the development of the instrumentation database and software for the support of the Setpoint Project. Responsible engineer for the radiation monitoring system. Designed plant changes for the radiation monitoring system.

GEORGE O. WILKINSON

12/82 to 11/91 Impell Corporation

Staff Engineer - November 1988 to November 1991

Arizona Public Service Co. - Palo Verde Nuclear Generating Station

Involved in the design basis review of motor operated valves and support of dynamic valve testing. Resolving engineering evaluation requests, preparing design change packages for complex plant changes, design change notices, supplier design change notices, initiating plant change requests for plant modification, and responding to NRC Information Notices. Primarily responsible for control valves, balance of plant fluid systems and the diesel generators. Performed technical reviews of engineering backlog work packages. Provided engineering support for the restart of Unit 2 and outages of Units 1 and 3.

Technical Specialist - August 1986 to November 1988

Louisiana Power & Light Company - Waterford 3 Nuclear Generating Station

Conducted a study for the reorganization of the Engineering Department procedures. Scope of the study included the evaluation of existing procedures used during plant construction and early commercial operation and recommendation for new procedures required for engineering support of plant operations.

Boston Edison Company - Pilgrim Nuclear Generating Station

Project Engineer responsible for the development of maintenance and startup procedures for the hydrogen water chemistry program. Scope of procedures included electrical, instrumentation, and chemistry procedures for the extended test, electrolytic, and crack arrest verification systems. Equipment included pressure, temperature, flow, and analysis sensors and transmitters, analog controllers, and programmable logic controllers. Developed control strategy for the integration of the operations of the hydrogen water chemistry systems.

Supervising Engineer - December 1982 to August 1986

Texas Utilities Generating Company - Comanche Peak Generating Station

Staff Engineer, I&C section, Nuclear Engineering Division. Wrote the design basis document for accident monitoring, revised and expanded the scaling manual, established design bases for instrument scaling, and performed the technical review of the scaling calculations. Prepared instrumentation FSAR changes and researched and wrote replies to third party deficiency reports.

Texas Utilities Generating Company - Comanche Peak Generating Station

Preoperational Startup Test Engineer responsible for analog instrumentation testing. Wrote test procedures, conducted testing of process instruments and fluid systems, supervised system checkout, instrument and control valve calibration, tested the meteorological instruments, NSSS safeguards test cabinet, and ESF load sequencers, evaluated test results, and prepared test reports.

GEORGE O. WILKINSON

8/75 to 8/82 Brown & Root, Inc.

Section Manager - July 1976 to August 1982

Administrative and engineering manager for the nuclear I&C design staff for the South Texas Project for Houston Lighting and Power Company. Provided technical review of the STP I&C design. Manager of staff involved with development of standard I&C specifications, design standards, and criteria. Supervised the I&C Department CAD section.

Senior Staff Engineer - August 1975 to August 1976

Designed turbine performance monitoring instrumentation for International Paper Corp. gas fired and Diamond Shamrock Oil Refining Company oil fired fossil power generating plants. Wrote standard specifications for instrumentation and control valves. Designed, wrote specifications, and developed control and monitoring programs for water chemistry, waste, and pollution control systems for five fossil electric generating plants for Oklahoma Gas and Electric Company.

1/73 to 8/75 United Engineers & Constructors, Inc.

Supervising Engineer - November 1973 to August 1975

Louisiana Power & Light Company - St. Rosalie Nuclear Power Plant

I&C design supervisor for a two-unit High Temperature Gas Cooled Reactor power generating plant. Supervised the preparation of the plant conceptual design description, specifications, and drawings. Developed the interface between the reactor control systems and balance-of-plant systems. Implemented direct digital control for balance-of-plant systems. Maintained the design budget and schedule. Performed the technical bid evaluation for major capital equipment.

Lead I&C Engineer - January 1973 to November 1973

Delmarva Power & Light Company - Summit HTGR Power Plant

Lead engineer for the design of balance-of-plant instrumentation and the control room design. Wrote the I&C sections of the PSAR. Prepared P&ID's and logic diagrams. Wrote specifications for normal and critical service control valves. Lead engineer for the evaluation and resolution of the Indian Point Unit #2 feedwater control valve problems. Initiated and participated as a member of a design team that implemented a supervisory control and data acquisition system for Philadelphia Electric Eddingstone Unit #3. Provided data transmission and control interface between the unit and the energy management center.

5/60 to 1/73 U.S. Army Corps of Engineers

Special Project Officer - February 1972 to January 1973

Planning manager for the decommissioning of the SM-1A nuclear power plant (PWR) located at Fort Greely, Alaska. Principle author of the Environmental Impact Statement. Designed special equipment removal tools and entombment structures. Supervised and coordinated spent fuel and radiological waste shipments from Alaska to the continental United States. Served as the Assistant Radiological Officer of the U.S. Army Corps of Engineers.

GEORGE O. WILKINSON

Project Officer - July 1969 to February 1972

Responsible for the technical, engineering, and logistic support of the SM-1 and SM-1A nuclear power plants (PWR). Planned and coordinated major maintenance and refueling outages. Supervised and participated as the technical consultant for turbine, circulating water and feedwater pumps overhaul, control valve overhaul and repair, and the chemical cleaning of plant fluid systems.

Plant Superintendent - June 1966 to July 1969

Supervised the SM-1A power plant operations and maintenance. Supervised reactor pressure vessel annealing and steam generator replacement projects. Designed a closed loop, cooling water system and reactor protection system backfit to meet new redundancy and separation criteria (IEEE Std 271-1968). Developed the emergency response and environmental monitoring programs. Established the secondary standards calibration laboratory.

Student - September 1965 to June 1966

Attending Oklahoma State University under the U.S. Army degree completion program.

Training Supervisor - February 1963 to September 1965

Supervised power plant operator, I&C technician training, and vendor training programs. Supervised the plant simulator section and developed specifications for a PWR and gas cooled reactor simulators. Developed emergency response management training program for senior managers (Department of the Army), advanced training program for instrumentation technicians, and a training program for the certification of code welders.

Plant Operator/Shift Supervisor - May 1960 to February 1963

Supervised installation, calibration, and testing of the NSSS and BOP instrumentation and controls systems for the SM-1A nuclear power plant. Participated in the testing, startup, and operation of the power plant. Qualified as a plant operator and shift supervisor.

CHARLES A. (CHUCK) LEWIS

EDUCATION & TRAINING

- University of the State of New York BS, Nuclear Technology 1991
- University of the State of New York Associate of Science, 1984

Continuing Education & Technical Training

- 1995 System-80 Plant Protection System Course
- 1994 ISA Control System Reliability Course
- 1994 Tektronics Oscilloscope Technology Seminar
- 1992 University of Michigan, Human Factors Engineering Course
- 1991 APS - PVNGS: Shift Technical Advisor (STA) Applied Theory Courses
- 1991 Arizona State University Engineer-in-Training
- 1991 ASME Seismic Qualification of Nuclear Equipment
- 1990 TRIPLEX Fault Tolerant PLC Applications Course
- 1990 Fisher Valves Course
- 1990 ISA PLC Applications Course
- 1989 A-B PLC SLC-100 Course
- 1986 Arizona State University Fiber Optic Communications
- 1985 ASME Qualifications of Safety Equipment
- 1985 University of Missouri-Rolla Grounding and Shielding Electronic Instrumentation Course 1985 CE Plant Protection System Setpoint Calculations
- 1984 General Electric Engineering Design ALARA
- 1984 NUS/Climet/APS Quality Assurance Program
- 1982 Kepner-Tregoe Analytic Trouble Shooting Program
- 1982 General Physics Corporation Digital Electronics Fundamentals 1982 Foxboro Spec 200 System
- 1982 CE Supplementary Protection Logic Assembly 1982 CE Pressurizer Pressure and Level Control Systems
- 1982 CE RCP Shaft Speed Sensing System
- 1982 CE Boronometer System 1982 CE Control Element Drive Mechanism and Control Systems
- 1981 Westinghouse M70 Turbine Supervisory Instruments 1975 U.S. Navy Electronics Technician - Communications

Other Technical Training

- US Navy Nuclear Power School (MINSY - Vallejo, CA): Extensive study in nuclear power reactors, atomic physics and theory, heat transfer, fluids, thermodynamics, chemistry and mathematics.
- US Navy Nuclear Power Prototype S1W (Idaho Falls, ID): Comprehensive personnel qualification program for reactor operators at an operating nuclear propulsion plant - initial reactor operator qualification. US Navy Electronics

CHARLES A. (CHUCK) LEWIS

PROFESSIONAL REGISTRATIONS AND CERTIFICATIONS

- Registered Engineer-In-Training Arizona #05116 Arizona State Board of Technical Registration Nuclear Technology
- PVNGS Security Site Access (Current)
- PVNGS Radiological Controls Area Access (Current)
- DOD Secret Clearance
- 50.59 Screener, Evaluator and Reviewer for Engineering Products
- Procedure Technical Reviewer
- I&C Area Field Engineer
- ALARA Engineering
- Setpoints Evaluations / Physical Changes
- Engineering Evaluations
- Document Changes
- Physical Changes
- Engineering and Project Orientation
- Human Factors Engineering Reviewer
- US Navy Reactor Operator
- Electric Power Research Institute V&V Handbook Collaborator (EPRI)
- Instrument Society of America (ISA) - member
- American Nuclear Society (ANS) member
- US Navy Electronics: Electronics Technician - Communications Equipment Ratings.

EXPERIENCE

1/82 to Present

Arizona Public Service Company
Palo Verde Nuclear Generating Station

Senior Nuclear I&C Engineer - I&C and Electrical Systems Engineering July 1995 - present
Protection Systems Engineer focused on performance monitoring and continuous system improvement. Involved with Maintenance Rule implementation, Equipment Root Cause of Failure program enhancement, Technical Review Committee Member, 50.59 Review Committee Delegate.

Senior Nuclear I&C Engineer, Nuclear Engineering Dept. - January 1983 - July 1995
Designed and installed complex engineered safety features systems using innovative PLC technology. Lead Responsible Engineer and Project Manager, with direct technical responsibility as well as cost & schedule accountability on major capital improvement projects such as ATWS systems, Diverse Scram System, Diverse Auxiliary Feedwater Actuation System, ESFAS and RPS design enhancements, Post Accident Monitoring Instrumentation design changes in support of R.G. 1.97, and other NSSS control system instrumentation design changes.

CHARLES A. (CHUCK) LEWIS

Strong analytical skills contributed significantly to successful meteorological system upgrade, security system vital island implementation and the start-up of a site-wide distributed control system. Won engineering excellence awards for consistent attention-to-detail, interpersonal skills and being an effective team player; nominated by peers, middle and executive management. Provided I&C expertise for the Engineering Excellence Program Analytical Skills Task Force. Provided expertise to the management team as acting I&C Design Engineering Supervisor. Completed Shift Technical Advisor applied theory training program. Knowledge and responsibilities on all NSSS protection and control systems. This experience includes Design Change Packages, Design Bases Development, Design Criteria, Engineering Evaluations and Setpoint Calculations. Performed Part 21, 50.59, IEB and IEN evaluations, Appendix-R reviews, FMEAs and Safety Analyses.

I & C Technician - I&C Maintenance Department, January 1982 - January 1983

Initial PVNGS construction and system start-up activities; gained hands-on experience through successfully completed commission testing on many I&C systems. Performed duties of acting I&C Maintenance Supervisor.

1/80 to 12/81

Maine Yankee Atomic Power Company
Wiscasset, Maine

I&C Technician - I&C Maintenance Department

Gained valuable refueling and operating experience at this commercial CE PWR while performing I&C surveillance test procedures and gained extensive hands on instrument calibration experience.

1974 - 1979

US Navy Nuclear Power Program
USS Silversides (SSN-679), and S1W Prototype Reactor

Qualified Reactor Operator, Submarines, Reactor Controls Technician and Electronics Technician while serving at S1W and aboard a fast attack submarine. Served through an overhaul, numerous deployments and special operations.

ADMINISTRATIVE & CORPORATE CULTURE TRAINING

APS Supervisor Academy Graduate, Fred Pryor Seminar on Self Directed Work Teams, APS-Focus International Training, Project Management, Time Management, Management to Objectives, Building an Effective Team, Communications, Effective Negotiations, Technical Writing and Technical Presentations.

CHARLES A. (CHUCK) LEWIS

HONORS AND AWARDS

1992 Nuclear Excellence Program Award: Plant Modifications Department
1992 Nuclear Excellence Program Team Award: Support to NRC Augmented
Inspection Team 1991 Nuclear Excellence Program Award: Nuclear Engineering
Department 1990 Engineering Excellence Award: Engineering & Operating
Committee 1989 Nuclear Engineering Excellence Award: Instrumentation and
Controls Department 1979 Honorable Discharge from the US Navy; Good Conduct
and Battle "E" Medals. U.S. Navy Commendations for successful Reactor Controls
Division submarine overhaul effort resulting in completion ahead of schedule
and earning above average in post overhaul Naval Reactor Safeguards Exams for
two consecutive years. 1990 Certificate of Appreciation - Perfect Safety
Record Letters of Appreciation from E&O Committee, Unit 3 Plant Manager,
Executive VP-Nuclear.

PUBLICATIONS

Applications of the Verification and Validation Handbook for Upgrades to
Digital Systems. Co-authored and presented to the EPRI and NUMARC Workshop on
Licensing Digital Upgrades for Nuclear Power Plants, 1994, Baltimore, MD

Palo Verde's DAFAS PLC Design Process, dated 2/24/92, Presented to EPRI
Workshop on Licensing Issues for Digital I&C Upgrades for Nuclear Power
Plants, 1992, Baltimore, MD

Palo Verde's Safety Related PLC System, Presented to the Second Annual
ISA/EPRI Joint Controls and Instrumentation Conference; Instrumentation:
Meeting the Challenge, 1992, Kansas City, MO

ROBERT S. SMITH

EDUCATION & TRAINING

- 75% complete for Master of Business Administration, Keller Graduate School of Management, Phoenix, AZ
- BS in Nuclear Engineering Technology, Thomas Edison State College, Trenton, NJ
- AS in Nuclear and Mechanical Engineering Technology, Terra Technical College, Fremont, OH
- Software Quality Assurance, Babcock & Wilcox
- Root Cause Analysis, Failure Prevention, Inc.
- Engineering Support Personnel Training Program, APS
- 10CFR50.59 Safety Evaluation, APS
- Maintaining Equipment Qualification, Maintenance & Operations Support Services
- Basic Auditor Training, Quality Services International

PROFESSIONAL REGISTRATIONS AND CERTIFICATIONS

- Licensed Ohio Stationary Engineer
- Certified ANSI N45.2.23 Audit Team Leader
- Member Professional Reactor Operator's Society

EXPERIENCE

4/92 to Present Arizona Public Service Company
Palo Verde Nuclear Generating Station

Engineer III, Nuclear Assurance Engineering

Responsible for providing oversight of Nuclear Engineering activities to reduce human errors and detect potential nuclear safety hazards. As Audit Team Leader, responsible for directing audit team activities and preparing formal reports for APS management. Responsible for initiating corrective action documents and verifying corrective action effectiveness.

Engineer III, Nuclear Assurance Operations

Responsible for providing oversight of Operations activities to reduce human errors and detect potential nuclear safety hazards. As Audit Team Leader, directed audit team activities and prepared formal reports for Technical Specifications and Surveillance Testing. Initiated corrective action documents and verified corrective action effectiveness.

ROBERT S. SMITH

Senior Auditor, Quality Audits

Directed audit team activities and prepared formal reports for Operations, Nuclear Training, and Corrective Actions. Audited organizations such as Nuclear Engineering, Chemistry, Radiation Protection, and Fire Protection. Initiated corrective action documents and verified corrective action effectiveness.

12/85 to 4/92

Toledo Edison Company

Reactor Operator, Nuclear Operations

Responsible for safe operation of the nuclear plant during startup, shutdown, power generation, testing, and maintenance activities. Other duties included, Safe Shutdown Equipment Operator, Fire Captain, and First Aid Team Leader. Responsible for procedure maintenance and technical reviews of various plant operating and test procedures.

10/77 to 11/85

United States Navy

Engineering Department Petty Officer, USS Silversides

Developed and implemented a qualification program for the Engineering Department following an 18-month refueling.

Engineering Watch Supervisor and Leading Engineering Laboratory Technician, USS Georgia

Coordinated the activities of an 11-man watch section to safely operator the nuclear plant during evolutions, testing, and maintenance. As Leading Engineering Laboratory Technician, responsible for the chemistry and radiological controls program. During ship construction, ensured the Main Steam, Main Condensate, and Steam Generator systems were built in accordance with design documents. Supervised nuclear physics testing of the new reactor plant upon initial startup.

Mechanical Instructor, S8G Prototype

Trained and evaluated nuclear plant operators. During prototype construction, ensured various mechanical systems were built in accordance with design documents. Performed special nuclear physics testing during initial startup of the reactor plant. Performed acceptance testing of the Emergency Core Cooling System to verify performance in accordance with design specifications.

RAM N. PRABHAKAR

EDUCATION & TRAINING

- MS(E.E), Montana State University, Bozeman, Montana
- M.E.(E.E), M.S.University of Baroda, Baroda, India
- B.E.(E.E), University of Mysore, Mysore, India

PROFESSIONAL REGISTRATIONS AND CERTIFICATIONS

Professional Engineer (Electrical)

EXPERIENCE

6/89 to Present

Arizona Public Service Company
Palo Verde Nuclear Generating Station

August 1994 till present. Senior Engineer - Nuclear Assurance - Maintenance
Responsible for the performance of audits, assessments, evaluations and reviews of activities of the Palo Verde Nuclear Station Maintenance department including Maintenance Engineering. Also function as the designated Independent Safety Engineer (ISE) and coordinate ISE activities within NA-M.

April 1992 - July 1994. Manager. Independent Safety and Quality Engineering
Responsible for leading the Independent Safety and Quality Engineering department in the performance of ISE evaluations and assessments to satisfy the requirements of Technical specifications for ISE.

June 1989 - March 1992. Manager. Quality Engineering
Responsible for leading the Quality Engineering department regarding overviews of design, engineering and procurement activities. Responsible for the Vendor Evaluation program including vendor audits and surveillances. Also responsible for providing inspection planning support, including the preparation of Inspection Standards for use by the Quality Control department.

1/81 to 6/89

General Public Utilities Nuclear(GPUN) Corporation
Three Mile Island (TMI) Nuclear Station Units 1 and 2

August 1983 - June 1989. Quality Control Manager
Managed Quality Control inspection personnel in the performance of inspections of maintenance, modifications, receiving and inservice inspection activities at both TMI 1 and 2. Additional responsibilities included training and certification of inspection personnel, management of the Nonconformance and Corrective Action program. During this period, held certifications as Responsible Technical Reviewer, Independent Safety Reviewer and Lead Auditor.

RAM N. PRABHAKAR

January 1981 - July 1983, Quality Assurance Engineering Manager

December 1979 - December 1980, Quality Assurance Engineering Supervisor

Set up and managed a QA Engineering group at TMI after the Unit 2 accident to perform the review of design, procurement and installation documents in support of TMI-2 recovery projects (decontamination and defueling) and TMI-1 restart modifications, to ensure compliance with the requirements of the QA Program, codes, standards and NRC Regulatory Guides and to verify inspectability aspects.

1/74 to 11/89

Metropolitan Edison Company (GPU Subsidiary)
Reading Pa

January 1977 - November 1979, Quality Assurance Engineering Supervisor

Managed the Corporate QA Audit program, Vendor Evaluation program and QA Engineering staff involved in the review of design and procurement documents in support of TMI-1 and 2 activities.

January 1974 - December 1977, Electrical and Control Engineer, Generation

Engineering - Responsible for the performance of design and safety reviews of modifications to electrical/instrumentation systems at TMI - 1. Preparation of procurement documents, specifications for electrical/instrumentation systems and for the performance of special analyses and studies.

12/72 to 1/74

Ebasco Services
New York City

December 1972 - January 1974, Instrumentation and Control Engineer

Responsible for the preparation and checking of control wiring diagrams and associated logic diagrams for primary and secondary systems of nuclear plants (Shearon Harris).

10/70 to 12/72

Glenn Brothers
Long Island City, New York

October 1970 - December 1972, Project Engineer - Lighting Control Systems

Project Engineer in charge of the design and engineering of lighting control systems using SCR dimmers, logic control consoles for theaters, TV Studios and commercial buildings.

MARK A. BRUTCHER

EDUCATION & TRAINING

- Bachelors of Science in Chemical Engineering, May 1983 University Nevada Reno

PROFESSIONAL REGISTRATIONS AND CERTIFICATIONS

- Engineer In Training, State of Arizona Certificate #04454, February 1990
- American Institute of Chemical Engineering - Member
- LSRO SRO Limited to Fuel Handling

EXPERIENCE

3/85 to Present Arizona Public Service Company
Palo Verde Nuclear Generating Station

Senior Mechanical System Engineer

Mechanical Maintenance Engineer for NSSS

Previous Systems Engineering experience included Diesel Generators, Condensate Polishing, and Auxiliary Steam System. Also provided consulting support for Service Air/Gases, Plant Coatings, and Flaring Systems.

Current responsibilities as a Maintenance Engineer include resolving associated engineering, maintenance, operations, and procurement problems. Activities include design change preparation, review and retest, root cause of failure analysis, Nuclear Safety Evaluation (10CFR 50.59), and identification/disposition of system non-conformance.

- Performed Diagnostic Engine Analyses for Emergency Diesel Generators (Cooper-Bessemer KSV-20T Engines, 7760 HP)
- Served as Utility Representative for Diesel Owners Group Technical Committee
- Developed/Maintained Performance Monitoring Program for Diesel Generator Systems

Previous Experience

- Worked as Process Engineer for 1.2 MGD Reverse Osmosis and Makeup Demineralizer Systems
- Provided Process Engineering support for 90 MGD Lime/Soda Tertiary Water Treatment Plant
- Served as Project Engineer for Startup and Environmental Licensing of 76 Ton/Day Recalcining Furnace
- Provided Process Engineering support for 30,000 GPD Sodium Hypochlorite Production Facility

DANIEL G. MARKS

EDUCATION & TRAINING

- Bachelor of Science Degree, University of the State of New York, 1984
- Fire Protection for Power Plants, HSB Professional Loss Control, Knoxville, TN, 1995
- Arizona Public Service Company Management Development Training, 1993
- Root Cause Analysis for Power Plants, Failure Prevention, Inc., Chong Chiu, Ph.D., 1992
- INPO Evaluator Training (complete course, not just peer evaluator), 1991
- Accident/Incident Investigation Workshop (MORT), EG&G Intertech, Inc., 1989
- Palo Verde Senior Reactor Operator (SRO) Training, 1983
- Navy Nuclear Power Training Unit (Prototype Training), 1973
- Navy Nuclear Power School, 1972
- Navy Electronics Technician Class "A" School, 1971
- University of Illinois (3 semesters), 1971

PROFESSIONAL REGISTRATIONS AND CERTIFICATIONS

- Certified ANSI N45.2.23 Auditor
- NRC Senior Reactor Operator License, PVNGS Unit 1, SOP 50039 (1983-89)
- Toastmasters International Advanced Communications & Leadership Program, Able Toastmaster-Silver, 1993

EXPERIENCE

5/78 to Present Arizona Public Service Company
Palo Verde Nuclear Generating Station

Section Leader, Nuclear Assurance Operations

Responsible for nuclear oversight of Operations activities at the Palo Verde Nuclear Generating Station, including Fire Protection, Shift Technical Advisors, and Operator Training.

Nuclear Oversight Consultant

Performed as a full-time standing member of the Operations Subcommittee of the Offsite Safety Review Committee, also commonly titled the Safety Audit Committee, Nuclear Oversight Committee, or Company Nuclear Review and Audit Group (Standard Technical Specification 6.5.2) at other nuclear plants. Areas of responsibility and expertise included power plant operations, maintenance, instrumentation and controls, emergency planning, and security. Acting Manager of Nuclear Safety Department from 2/91 to 10/91. Examples of activities and awards beyond the normal job assignment included:

DANIEL G. MARKS

- Performed ISLOCA assessment of Palo Verde, responsible for recognition of RCP seal cooler to NCW leak which exceeded 10CFR100 siting limits. JCO issued and plant change subsequently completed to eliminate leakage pathway.
- Identified error in inadvertent deboration analysis which assumed incorrect RCS volumes. Reanalysis identified that Technical Specification sampling frequencies were unconservative and subsequently revised, including CE Bulletin to other plants which were analyzed in the same manner.
- Identified plant operation with leakage from the ADV nitrogen accumulators as exceeding assumptions to support the loss of offsite power analyses. Leaks subsequently corrected and alarm response procedures updated to allow operators to recognize future leakage.
- Responsible for installation of backup nitrogen to spent fuel pool/transfer canal gate as well as administrative control of the transfer tube gate valve, reducing core melt probability.
- Extensive input to early generations of the Palo Verde PRA.
- Member of the Palo Verde Unit 2 steam generator tube rupture root cause of failure team.
- Member of the Palo Verde Emergency Planning Scenario Development Committee for exercise development.
- Member of the Palo Verde Unit 2 Sale/Leaseback team that renegotiated favorable terms.
- Increased station sensitivity to mobile equipment and crane operation.
- Participated on the team to create the Critical Systems/Sensitive Issues manual. Particularly responsible for the addition of instrument air to the critical systems list.
- Received "Can-Do" award from APS and the Arizona Coalition of Business & Government (9/13/92.)
- Corporate Emergency Center Technical Support Staff member to advise CEO.
- Arizona Public Service CSF (United Way) Campaign member (1992.)
- Received Palo Verde Nuclear Excellence award on two occasions (1987 & 1991.)

Senior Licensed Operator Training Instructor

Responsible for training of licensed operators in both Simulator and Classroom. Also participated in the construction and programming of the Simulator. Examples of activities beyond the normal job assignment included extensive input to early generations of control room alarm response procedures and I&C surveillance tests. Also provided extensive input to early generation of EOPs using CEN-152 (Owner's Group) guidelines. Also selected to participate in verification (V&V) of later revisions of EOPs.

DANIEL G. MARKS

2/71 to 2/78

U. S. Navy

Reactor Controls Division Leading Petty Officer

Senior qualified reactor operator, operated and maintained Reactor Instrumentation and Rod Control Systems on board USS Ray (SSN-653) from 1975 to 1978. Supervised four other reactor operators and four junior watchstanders, and maintained the exact and precise records and documentation necessary for reactor plant operation. Stood Engineering Duty Petty Officer and Shutdown Reactor Operator watches while in port, and also stood Engineering Watch Supervisor and Reactor Operator watches at sea. Engineering Watch Supervisor is the most senior nuclear enlisted watchstation.

Awarded Letter of Commendation by the Commander, Submarine Force, Atlantic Fleet, for superior technical abilities and contributions during a refueling overhaul.

Nuclear Reactor Operator & Instructor

Operator and Instructor at the S3G Prototype Nuclear Propulsion Plant, operated for the Energy Research and Development Administration by the General Electric Company from 1973 to 1975. The U. S. Navy supplied personnel to man the operating crew for the plant and to serve as instructors for Navy officer and enlisted personnel for duty aboard the nuclear powered ships. The crew worked with and for the Knolls Atomic Power Laboratory (KAPL) of the General Electric Company. Instructed personnel in theory, operation, and maintenance of complex steam propulsion and reactor plant Reactor Control systems. Advised and counseled students. Instructed officer students in their Engineering Officer of the Watch training programs. Operated and maintained the plant during training cycles and engineering