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SUBJECT: Proposes to conduct self-assessment modeled after NRC IP 37550, "Engineering" & NRC IP 93801 "Safety Sys Functional Insp.

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February 16, 1997

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

Dear Mr. Dyer:

**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 93801, "Safety System Functional Inspection (SSFI)," as an alternative to the NRC Engineering Team Inspection scheduled for May 1997. The objective of the self-assessment is to examine engineering activities (including the identification and resolution of engineering problems) at Palo Verde Nuclear Generating Station (PVNGS) and to determine the operational readiness of selected systems important to safety. 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 Daniel G. Marks, Section Leader, Nuclear Regulatory Affairs, at (602) 393-6492.

Sincerely,

James M. Levine

250034

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Enclosures:

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# ENCLOSURE 1

# SELF-ASSESSMENT OVERVIEW

# SELF-ASSESSMENT OVERVIEW

Objectives:

The objective of the self-assessment is to examine engineering activities (including the identification and resolution of engineering problems) at Palo Verde Nuclear Generating Station (PVNGS) and to determine the operational readiness of selected systems important to safety.

Scope:

The guidelines provided in NRC Inspection Procedure (IP) 37550, "Engineering" and NRC IP 93801, "Safety System Functional Inspection (SSFI)," 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 engineering 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 April 22 through May 2, 1997. A report of the completed self-assessment will be provided to the USNRC Regional Administrator no later than June 20, 1997.

Resources:

The self-assessment team will be composed of at least twelve team members (including the team leader). A total of approximately 960 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 - four from Engineering, three from Nuclear Assurance, one from Operations, a team leader, an assistant team leader, and two external consultants.

The two external consultants 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 self-assessment team member resumes are included in enclosure 3.

# ENCLOSURE 2

# DETAILED SELF-ASSESSMENT PLAN

# DETAILED SELF-ASSESSMENT PLAN

## 1.0 PURPOSE

The purpose of this assessment is to perform a safety system functional inspection (SSFI) of the Essential Spray Pond (SP) and Low Pressure Safety Injection (LPSI) systems and the Spent Fuel Pool (SFP). The SSFI will encompass a system-specific inspection to assess that system's operational readiness. Additionally, this assessment will include an engineering team inspection (ETI) to evaluate the effectiveness of engineering activities, particularly the effectiveness of the engineering organization to perform routine and reactive site activities. This assessment will be performed and documented as an audit to satisfy the requirements of Technical Specification 6.5.3.5.d, audit the performance of activities required by the Operational Quality Assurance Program to meet the criteria of Appendix B, 10CFR50, at least once per 24 months.

## 2.0 SAMPLE SELECTION

Based on a review of the PVNGS CRDR database, 1995 and 1996 NRC Inspection Reports, the PVNGS Individual Plant Examination (IPE), the Engineering Issues List, and known system problems, a vertical-slice assessment will be performed on the following plant systems:

<u>Essential Spray Pond (SP)</u>

Loss of steam generator cooling is the dominant safety function contributor to CDF (85%) resulting from various initiating events, such as reactor trips. The SP system is the ultimate heat sink at PVNGS. Maintaining an ultimate heat sink allows plant cooling systems to cool down the reactor and maintain a stable, cold condition.

Currently, PVNGS is attempting to resolve problems with corrosion of the underground piping lining and its effects (i.e., impeding flow in the small Emergency Diesel Generator coolers). Additionally, there have been a number of past problems concerning the sizing of the orifice in the return header, the minimum required amount of flow, and the occasional inability of a pump to meet the surveillance test acceptance criteria for flow rate. There are seven open engineering issues for this system.

<u>Safety Injection (SI)</u>

By function, the SI system contributes 14.4% to CDF (includes HPSI, LPSI, hot leg recirculation, recirculation cooling, and interfacing system LOCA). Loss of this system impacts the ability to maintain pressure and inventory control in the reactor vessel, ultimately impacting the ability to keep the fuel cool.

PVNGS has performed a number of modifications on the SI system and the system has not been inspected since 1990. Currently, there are 25 open engineering issues for this system. This audit will focus on the Low Pressure Safety Injection function (LPSI) of the SI system, including Shutdown Cooling.

Spent Fuel Pool

Although not a contributor to core damage frequency, this system is a contributor to off-site dose releases. PVNGS desires to review selected modifications to ensure the system is in conformance with license and design bases.

### 3.0 SCOPE

The scope of this assessment includes a review of the SP and LPSI systems and the SFP relative to design basis assumptions, modifications, engineering calculations, and UFSAR documentation. Also included in the scope of this assessment are the design control processes associated with plant modifications and temporary plant modifications from the design phase through installation and testing. It is intended that the SP and LPSI system and SFP reviews will provide the needed modifications, changes, and/or temporary modifications to review for the engineering team inspection (ETI); if needed, additional components important to safety are to be selected such that the recommended number of engineering documents are reviewed. The assessment scope includes the following:

- **System-Specific Inspection**
  1. Design
  2. Design Change
  3. Operations
  4. Surveillance Testing
  5. Maintenance
  6. Training
  7. Quality Assurance
- **Program, Organization, and Procedures** (technically adequate and current)
- **Design Engineering Process**
  1. Modification Process
  2. Transition Modifications
  3. Partially-Completed modifications
  4. Maintenance/Design-Dispositioned Deficiency Work Orders (DFWOs)

5. Temporary Plant Modifications

- **Configuration Management** (previously completed modifications)
- **Corrective Action Effectiveness**
  1. Safety Review Committees
  2. Self-assessment program
  3. Operating Experience (internal and external)
- **Canceled Modifications**

## 4.0 ASSESSMENT OBJECTIVES

The SSFI assessment is intended to accomplish the following objectives:

- System Design. The primary objective of this review is to determine if the design basis is adequate, the existing configuration complies with the design basis, and the plant documents in which the design basis is described are consistent.
- Design Change. The purpose of this review is to determine if changes made to the system design could adversely affect the capability of the system to perform its safety-related functions.
- Operations. The purpose of this review is to determine if the plant operating procedures are adequate to assure satisfactory system performance for normal and accident conditions and to assess whether operations personnel can effectively execute the procedures.
- Surveillance Testing. The primary objective of this review is to determine if the tests performed on the system are adequate to verify the system is capable of performing its safety-related function as defined in the design basis.
- Maintenance. The purpose of this review is to determine if the maintenance on the system, or component of interest, is adequate to ensure the system would perform its desired safety function.
- Training. The primary objective is to determine if plant personnel have been trained adequately in the operations and maintenance of the system.
- Quality Assurance. The primary objective is to evaluate the effectiveness of the quality assurance program for the system.

The primary objective of the ETI is to assess the operational performance capability of these systems through an in-depth, multi-disciplinary engineering review to verify that the selected systems are capable of performing their intended safety functions. Generic safety significant findings will be pursued across the system boundaries on a plant-wide basis. Application of the assessment techniques will fulfill the following objectives:

- PVNGS has appropriate programmatic controls for accomplishing modifications, changes, and repairs;
- PVNGS' engineering activities are effective, particularly the effectiveness of the engineering organization to perform routine and reactive site activities, including the identification and resolution of technical issues and problems; and
- PVNGS' engineering organization effectively identifies, resolves, and prevents issues that degrade the quality of plant operations or safety. Included in this review will be offsite safety review committee activities, the engineering self-assessment program, and other processes that provide for the incorporation of operating experience.

## 5.0 ASSESSMENT METHODOLOGY

### General Approach

This audit will be performed using a "vertical-slice" technique. The term "vertical-slice" refers to the in-depth review of the selected safety systems in multiple functional areas. These areas include operations, maintenance, surveillance and testing, engineering design, design control, and quality assurance and self-assessment. The assessment will focus on engineering issues relative to the six functional areas. When a weakness in a functional area is identified, the assessment will be expanded to determine if a programmatic weakness exists. For example, if in one of the selected safety systems a weakness in motor operated valve torque switch settings is identified, then a preliminary review of programmatic controls for torque switches will be performed.

The team will use a combination of interviews, vertical-slice techniques, field inspections, performance-based observations, and document reviews during the self-assessment. This approach will provide the objective evidence necessary to determine the overall effectiveness of the engineering organization. Detailed checklists will be used as guidance during the self-assessment and will provide documentation of the objective evidence collected.

The assessment team will meet daily to share results and compare findings. Through the synergism of the team meetings, observations in one functional area may lead to the discovery of problems in other functional areas.

- **Assessment Preparation**

1. Review the strengths and weaknesses of PVNGS' controls identified for the engineering 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 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.

- **Interviews**

Interviews will be used to obtain information related to the selected systems' operating, engineering, and maintenance performance. Additional interviews will be used to determine the effectiveness of internal and external engineering interfaces, engineering personnel's understanding of their various roles and responsibilities, and engineering responsiveness as an organization to plant operations. Standardized questions will be developed and used during the interviews in order to assure continuity between interviewees and to facilitate analyzing the information obtained. The interviews will also provide a means to identify strengths, weaknesses, and areas that require additional attention during the self-assessment.

- **Vertical-Slice Methodology**

Vertical-slice investigation techniques will be used extensively during the self-assessment. This will enable the team to use an integrated approach to assess the overall results of engineering activities as they relate to maintaining the design basis and improving performance of the SP and LPSI systems and the SFP. For example, the team will assess multiple engineering activities associated with the systems, including:

1. Modifications (about five significant plant changes/modifications and five temporary modifications will be selected for each system)

2. Industry information evaluations

3. Evaluation of component failure data

4. Response to corrective action documents

5. Input to system testing requirements

6. Operability and reportability determinations

The team will determine if there are any program-related root causes for identified performance deficiencies and analyze the implications of these deficiencies for potential adverse affects on other safety significant systems.

- **Document Reviews**

  The team will review documentation to assess areas of interest that may not be observable using other investigation techniques or may not be applicable to the SP and LPSI systems and the SFP such as:

  1. Management of engineering backlogs
  2. Definition of engineering organization responsibilities
  3. Adequacy of engineering procedures
  4. Effectiveness of onsite and offsite plant review committees
  5. Effectiveness of the Independent Safety Engineering (ISE) function

  This will involve a review of procedures, committee meeting minutes, ISE reports, and other documents necessary to assess these areas. The purpose of reviewing documentation is to provide additional insight and supplement the information obtained using the vertical-slice investigation techniques.

**Specific Approach**

The team will use the following performance objectives to review the SP and LPSI systems and the SFP to assess overall engineering effectiveness. These objectives will be applied to the selected systems using the vertical slice approach to the extent possible.

**Audit Objective 1 Safety System Functional Inspection (SSFI)**

- Selected design basis and resulting functional requirements will be reviewed for the SP and LPSI systems and SFP. A vertical-slice audit approach will be used such that operations, maintenance, surveillance and testing, engineering design, design control, and quality assurance and self-assessment are reviewed. The licensing basis requirements and design basis requirements will be reviewed to determine whether they were consistently and accurately translated.

- When a weakness in a functional area is identified, the inspection is expanded to determine if a programmatic weakness exists.
- Review all modifications made to the original system that could have potentially changed the design basis. Determine if an unreviewed safety question has been introduced.
- Selected components of the SP and LPSI systems and the SFP will be walked down in the field to assess material condition and system configuration. The current system configuration will be compared to both the design and licensing basis to determine whether the actual plant condition is per the design condition. Ensure all changes to support elements (maintenance requirements, software, operating procedures, testing requirements, training programs, etc.) have been made.
- The current surveillance and testing requirements of each system will be reviewed to assure that they satisfy the licensing basis and the systems will perform their safety function. Included in this review will be operability determinations related to the selected systems.
- While reviewing the functional adequacy of the selected systems, the following questions should be asked and reviewed:

  1. <u>For valves:</u> What permissive interlocks are involved? What differential pressures will exist when the valve strokes? Will the valve be repositioned during the course of the event? What is the source of control and indication power? What control logic is involved? What manual actions are required to backup and restore a degraded function?
  2. <u>For pumps:</u> What are the flow paths the pump will experience during accident scenarios? Do the flow paths change? What permissive interlock and control logic applies? How is the pump controlled during accident conditions? What manual actions are required to back up and restore a degraded function? what suction and discharge pressures can the pump be expected to experience during accident conditions? What is the motive power for the pump during all conditions? Does vendor data and specifications support sustained operations at low flows?
  3. <u>For instrumentation and sensors:</u> What plant parameters are used as inputs to the initiation and control system? Is operator intervention required in certain scenarios? Are the range and accuracy of instrumentation adequate? What is the extent of surveillance and calibrations of such instrumentation?

- When comparing the as-built design with the current design basis and licensing requirements, the following questions should be considered:

  1. Are the original design assumptions adequate? Are the voltage studies accurate and will the equipment function with degraded voltage? Are fuses and thermal overloads properly sized?

2. Have modified structures surrounding safety equipment, components, or structures been evaluated for seismic 2-over-1 considerations, and have modified equipment components within the scope of 10 CFR 50.49 been thoroughly evaluated for environmental qualification considerations such as temperature, radiation, and humidity?
3. If the as-built documents have been marked for design changes on an interim basis, have additional measures been taken including document review, approval and safeguarding the marked documents (and related information) until the changes have been incorporated into the revised documents?

- As part of the detailed system walkdown, the auditor will analyze the adequacy of the system lineup, accessibility and indications relative to the most limiting design basis conditions. This walkdown should be a detailed, hand-over-hand verification to ensure the as-built configuration agrees with the system P&ID. Consider the following questions during the walkdown:

  1. Are component labels accurate and accessible?
  2. Are the motor-operated valves and check valves installed with the proper orientation?
  3. Is the system lineup consistent with design and licensing basis requirements?
  4. Can manually operated components be operated under accident conditions?

- The preventive maintenance requirements for selected components will be reviewed to determine if vendor requirements are satisfied, as determined applicable by the licensee. For that vendor-recommended maintenance not included in the maintenance tasks, the auditor will ensure a technically adequate justification has been performed. Additionally, the auditor will determine if the latest revision of all required vendor manuals are available and the latest revisions and bulletins have been reviewed and incorporated into maintenance requirements.
- The plant operating and maintenance history of selected components will be reviewed to assess reliability and Maintenance Rule activities, if applicable. Additionally, the team will look for repetitive problems and assess whether they have been thoroughly analyzed and corrected in a timely manner. The team will determine if the threshold for writing a CRDR is appropriate.
- Regarding testing, the auditor will answer the fundamental question of whether the safety system and all included components have been adequately tested to demonstrate they can accomplish their intended safety functions as defined by the design basis, under all accident conditions. If it is not possible to perform testing in the exact accident condition configuration, engineering analysis should have been performed. This review will include initial, periodic, and surveillance testing.

- The procedures used at 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.
- Additional specific guidance is provided as follows:

**Plant Modifications**

- Verify the technical adequacy of the quality classification and procurement specifications for components and parts including the determination of critical characteristics for commercial grade item dedication.
- Verify that plant modifications were reviewed and approved by the required plant review committees.
- Evaluate the impact notification process and verify completion of the associated revisions to plant operating procedures, operator and other training programs, preventive maintenance tasks, inservice inspection and testing procedures, and plant configuration drawings.
- Assess the technical adequacy of 10 CFR 50.59 screenings and evaluations, including the identification of required UFSAR revisions.
- Verify that appropriate post-modification testing requirements and acceptance criteria are specified.
- Verify that adequate 10 CFR 50.59 and operational impact reviews were performed on partially completed modifications.
- Verify that design calculations and output documents:
  1. were independently reviewed,
  2. referenced design basis information and were correctly used,
  3. clearly documented reasonable assumptions,
  4. satisfied regulatory requirements, PVNGS commitments, and industry practices,
  5. identified and tracked open items to resolution, and
  6. considered design requirements for equipment qualification, electrical separation criteria, and seismic criteria.

- Assure field changes were documented and reviewed in a timely manner.

- Verify that the as-built drawings match the plant configuration.

- Verify that temporary modifications received the necessary design and safety reviews, were correctly installed and tested, and were adequately evaluated for effects on plant operations.

- Verify that unauthorized modifications are not performed as maintenance activities without proper review.

**Engineering Issue Resolution**

- Verify that engineering used the Probabilistic Risk Assessment (PRA) in decision making where appropriate.

- Verify that material nonconformances were addressed in a timely manner and reviewed for operability and functionality.

- Verify that industry, vendor, and regulatory notifications (e.g., 10 CFR 21, Generic Letters, etc.) were reviewed in a technically correct and timely manner.

- Verify that engineering analysis of plant performance and equipment failure data results in appropriate corrective measures and plant equipment reliability improvements.

- Verify that engineering input for operability and reportability determinations provides a sound technical resolution with a clearly documented basis.

**Corrective Action Effectiveness**

- Verify the resolution of significant deficiencies identifies the extent of the condition, identifies root cause, and prevents recurrence of the condition.

- Review plant LERs and NOVs. Verify appropriate corrective actions were assigned, the actions were completed in a timely manner, and the problems have been adequately corrected.

The team will use the information collected during document reviews and interviews, in conjunction with the specific objectives noted above, to reach an overall conclusion regarding system readiness, engineering performance, and ISE effectiveness.

**Audit Objective 2 Program/Organizations/Procedures**

- Procedures utilized by PVNGS for plant modifications, temporary plant modifications and design changes will be evaluated to ensure they are current and accurate regarding the identification of authorities, responsibilities, interfacing organizations, processes, controls, approvals, and required records.
- Procedures used to perform periodic tests and maintenance of the selected system/components will be reviewed to ensure they have a technically accurate scope of maintenance and testing which provides assurance the system will perform its intended safety function. The test should not establish artificial initial conditions and should verify the necessary support systems also function per design.
- Normal, abnormal, and emergency operating procedures will be assessed for technical adequacy and whether the procedural steps achieve the required system performance for normal, abnormal, remote shutdown, and emergency conditions (including the most limiting design basis events). If it is not reasonable for procedures to provide detailed guidance, the applicable training program will be reviewed to ensure it provides the necessary information to plant personnel.
- The ability of the operations personnel to reference up-to-date and accurate copy of control room documents. Any marked-up changes to the control room documents shall be verified to be reflected in changes to the normal, abnormal, and emergency operating procedures.
- The engineering, maintenance, and operations organizations will be assessed to determine if adequate and appropriate interfaces are defined and effectively implemented.

**Audit Objective 3 Effectiveness of Engineering Activities**

- Evaluate several safety-significant design changes and plant modifications to verify conformance with the applicable installation and testing. These changes/modifications will be reviewed during the SSFI of the SP and LPSI systems and the SFP. If additional changes/modifications are needed for review, they should be selected from support systems necessary for the successful operation of the SP, LPSI, and/or SFP, or from interfacing systems served by the SP, LPSI, and/or SFP.
- Evaluate several safety-significant temporary plant modifications to verify conformance with applicable requirements. These changes/modifications should also be on the SP and LPSI systems and the SFP, if possible.
- Evaluate the extent and quality of engineering involvement in site activities.
    1. Evaluate the extent and effectiveness of the site engineering communications with other departments such as maintenance, operations, as well as other engineering teams.

2. Evaluate engineering involvement with the resolution of technical issues selected from recent plant events or routine work documents.

3. Evaluate the extent of backlogged engineering work.

- Determine the degree to which the engineering organization maintains the plant's design and licensing basis current for selected significant safety systems (SP and LPSI) and the SFP, and verify that the regulatory requirements and licensee commitments are properly implemented in the performance of engineering activities.

- If performance problems are identified, evaluate the relative capabilities of the engineering organization with regard to staffing levels, experience, clearly delineated responsibility, training, and procedures.

- Evaluate the effectiveness of PVNGS' controls and self-assessment programs related to engineering activities.

1. 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.

2. Evaluate the effectiveness of PVNGS' controls by reviewing pertinent issues, events, or problems identified during the assessment in the area of engineering.

3. 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.

- 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:

1. Selected ISEG reports for the last year to identify areas for additional review and assess the licensee's root cause and corrective action processes.

2. Selected reports to evaluate whether thorough, in depth reviews of known weak areas were performed and assess the adequacy of the reviews.

3. Corrective action recommendations made by ISEG and determine if the associated recommendations were implemented effectively and in a timely manner.

4. 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.

- 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:

1. Verify that PVNGS has implemented appropriate software control and post-modification testing.

2. 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.

3. 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.

4. Verify that the capacity of air, fluid and electrical systems support the modification of alternate AC source for station blackout.

5. Verify that the procurement specifications for station blackout coping equipment conform with the guidance provided in Regulatory Guide 1.155.

6. 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 Technical Specifications, but are installed in accordance with commitments and are important to the safe operation of the plant.

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)
   - 10 CFR 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 the PVNGS engineering organization's self-assessment capability by reviewing self-assessment reports, audits (excluding safety committee audits), and evaluations. Compare this assessment's results to the results of 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. 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.

Quality Assurance and Corrective Actions (or equivalent)

Evaluate the effectiveness of the safety committees by reviewing committee minutes (for the last six months), audits, or other actions initiated by the committees as follows:

1. 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.
2. 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.

3. 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.
4. Evaluate PVNGS' follow-up to items identified by the safety committees, including committee initiated audit findings and any recurring problems.
5. Review the status of corrective actions for the findings of applicable licensee SSFI reviews and technical audits (of the selected systems)

**Audit Objective 4 Corrective Action Effectiveness**

PVNGS performed an ETI in 1996 (Audit 96-002). The following corrective action documents will be reviewed to determine the adequacy and effectiveness of corrective actions:

- CRDRs 1-6-0026, 9-6-0185, 9-6-0204 - unsatisfactory material condition of system components and/or equipment spaces. During system walkdowns, ensure scaffolding and platforms are authorized.
- CRDRs 9-6-0155, 9-6-0177, 9-6-0184 - all plant documents were not revised for equipment removal. All plant documents will be reviewed for the selected design changes and modifications.
- CRDRs 9-6-0156, 9-6-0203, 9-6-0205, 9-6-0213, 9-6-0228 - deficient 50.59 screenings/evaluations. For the selected changes and modifications, 50.59 screenings/evaluations will be reviewed for technically accuracy, use of current forms, and appropriate use of Probabilistic Risk Assessment information.
- CRDR 9-6-0183 - inadequate work control program for non-technical specification R.G. 1.97 instruments.
- CRDRs 9-6-0191, 9-6-0300 - operability determination not written when required and technical problems were identified with some determinations. Selected systems will be reviewed to ensure documentation supports operability.
- CRDR 9-6-0197 - UFSAR wording regarding Shift Technical Advisors needs corrected.
- CRDR 9-6-0206 - conflict identified between actual condition and as-built drawings. For the selected systems/components, actual condition in the plant will be compared to current drawings.
- CRDRs 9-6-0212, 9-6-0257 - CRDRs not issued for adverse conditions. System walkdowns and document reviews will be performed to verify problems have been documented on CRDRs, as appropriate.
- CRDR 9-6-0243 - the trend process does not play an active role in identifying those conditions not apparent to the day-to-day observer. The trend process will be audited when determining engineering effectiveness during Audit Objective 3. For self-revealing

problems in the selected systems, the audit will determine if the station should have anticipated them.

- CRDR 9-6-0254 - Three concerns were identified relative to the ISE function. The ISE function will be audited.

## 6.0 REFERENCES

**Code of Federal Regulations**

10 CFR 50.2, Design Bases

10 CFR 50.34a, Design Objectives for Equipment to Control Releases of Radioactive Material in Effluents-Nuclear Power Reactors.

10 CFR 50.46, Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Reactors.

10 CFR 50.59, Changes, Tests, and Experiments

10 CFR 50.60, Acceptance Criteria for Fracture Prevention Measures for Lightwater Nuclear Power Reactors for Normal Operation.

10 CFR 50.61, Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events.

10 CFR 50, Appendix A, General Design Criteria for Nuclear Power Plants.

10 CFR 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants.

10 CFR 50, Appendix K, ECCS Evaluation Models

**Updated Final Safety Analysis Report (UFSAR)**

**PVNGS Unit 1/2/3 Operating License and Technical Specifications**

**NRC Regulatory Guides**

R.G. 1.1, 1970, Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal System Pumps

R.G. 1.2, 1970, Thermal Shock to Reactor Pressure Vessels

R.G. 1.4, 1974, Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Pressurized Water Reactors

R.G. 1.6, 1971, Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems

R.G. 1.7, 1978, Control of Combustible Gas Concentrations in Containment Following a Loss-Of-Coolant Accident

R.G. 1.13, 1971, Fuel Storage Facility Design Bases

R.G. 1.25, 1972, Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors

R.G. 1.27, 1976, Ultimate Heat Sink for Nuclear Power Plants

R.G. 1.28, 1972, Quality Assurance Program Requirements (Design and Construction)

R.G. 1.29, 1978, Seismic Design Classification

R.G. 1.33, 1978, Quality Assurance Program Requirements (Operational)

R.G. 1.54, 1973, Quality Assurance Requirements for Protective Coatings Applied to Water-Cooled Nuclear Power Plants

R.G. 1.64, 1976, Quality Assurance Requirements for the Design of Nuclear Power Plants

R.G. 1.68, 1973, Preoperational and Initial Startup Test Programs for Water-Cooled Power Reactors

R.G. 1.79, 1974, Preoperational Testing Of Emergency Core Cooling Systems For Pressurized Water Reactors

**Codes and Standards**

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

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

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 N18.2-1973, Nuclear Safety Criteria for the Design of Stationary PWR Plants

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

ANSI B1.1-1973, Power Piping Code

ASME Boiler & Pressure Vessel Code-1974, Section III, Nuclear Power Plant Components

**Additional NRC Documents**

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

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 37551, Onsite Engineering

NRC Inspection Procedure 93801, Safety System Functional Inspection (SSFI)

NRC Staff Evaluation of the Palo Verde Nuclear Generating Station Individual Plant Examination (IPE) for Internal Events - Unit Nos. 1, 2, and 3, July 1, 1994

NRC Inspection Report 50-528, -529, -530/96-01, May 29, 1996, (specifically, independent inspection of PVNGS' 1996 engineering team inspection)

**NSAC 121, Guidelines for Performing Safety System Functional Inspections, November 1988**

**PVNGS Individual Plant Examination, revision 0, April 7, 1992**

**Additional Information Reviewed to Determine Audit Scope:**

- PVNGS NRC Inspection Reports for 1995 and 1996
- PVNGS NRC SSFI Inspections
- PVNGS Engineering Issues Database
- PVNGS Commitment Action Tracking System (CATS) Database
- PVNGS Nuclear Assurance Division Audits for 1995 and 1996

# ENCLOSURE 3

# TEAM MEMBER QUALIFICATIONS

## ENGINEERING TEAM ASSESSMENT

### TEAM COMPOSITION

1. Robert Steve Smith, Audit Team Leader
   Current Position: Senior Engineer, Nuclear Assurance Engineering

2. Bryan Thiele, Assistant Team Leader
   Current Position: Section Leader, Reactor Engineering

3. Donato Visco, Auditor
   Current Position: Senior Engineer, Nuclear Assurance Engineering

4. Dan Wittas, Auditor
   Current Position: Senior Engineer, Nuclear Assurance Maintenance

5. Joe Harnden, Auditor
   Current Position: Senior Engineer, Nuclear Assurance Operations

6. Tom Albrigo, Technical Specialist
   Current Position: Senior Engineer, Electrical Distribution, Design Engineering

7. Kathleen Farley, Technical Specialist
   Current Position: Senior Engineer, Mechanical BOP, Design Engineering

8. Kenneth Schrecker, Technical Specialist
   Current Position: Senior Engineer, Civil, Maintenance and Design Engineering

9. Terry Price, Technical Specialist
   Current Position: Senior Engineer, NSSS Mechanical, System Engineering

10. Brad Eklund, Technical Specialist
    Current Position: Consultant, Operations

11. Harry Kister, Technical Specialist
    Outside Technical Consultant

12. Rodney Hamblen, Technical Specialist
    Supervising Engineer, Electrical Design, Calloway Nuclear Plant