

PALO VERDE NUCLEAR GENERATING STATION  
 SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE  
 Report 50-528/96-99; 50-529/96-99; 50-530/96-99

I. BACKGROUND

The SALP Board convened on June 5, 1996, to assess the nuclear safety performance of the Palo Verde Nuclear Generating Station for the period December 1, 1994, through June 1, 1996. The Board was conducted in accordance with NRC Management Directive 8.6, "Systematic Assessment of Licensee Performance." The SALP Board members were:

- K. E. Brockman      Board Chairman  
                                  Deputy Director, Division of Reactor Safety
- K. E. Perkins      Board Member  
                                  Director, Walnut Creek Field Office
- W. H. Bateman      Board Member  
                                  Director, Project Directorate IV-2  
                                  Office of Nuclear Reactor Regulation.

This assessment was reviewed and approved by the Regional Administrator.

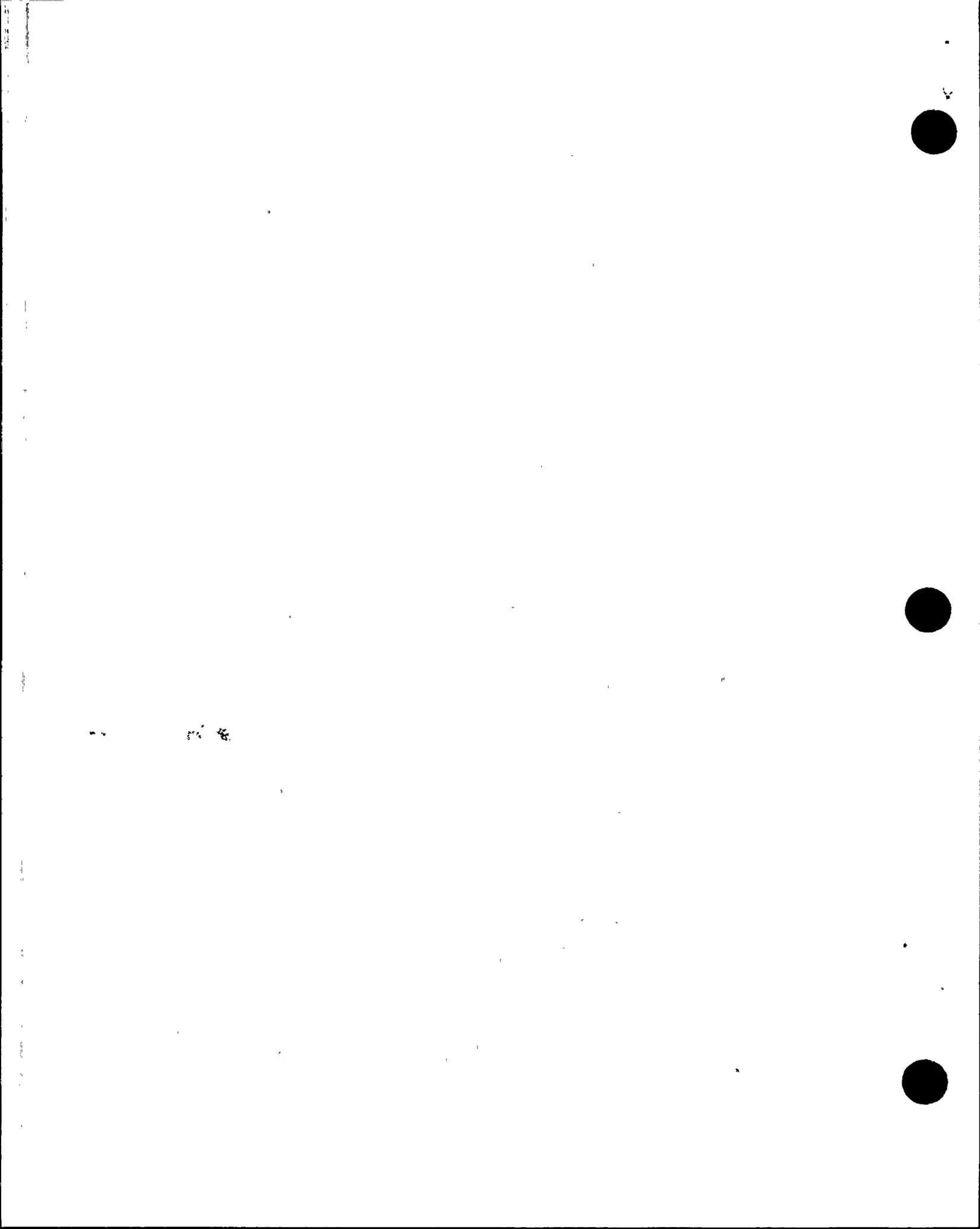
Functional Areas and Ratings:

	<u>Current</u>	<u>Previous</u>
Operations	1	2
Maintenance	1	2
Engineering	1	2
Plant Support	2	2

II. OPERATIONS

Performance in the operations area improved during this assessment period. Management oversight and involvement were strong and significant contributors to the improvement, and the programs necessary to provide consistent and predictable superior performance were instituted. In spite of occasional lapses in consistency and individual attention-to-detail, the operations staff set the direction for the overall conduct of plant operations. The result was improved steady-state and transient response activities. A strong self-assessment capability also contributed to this achievement of superior performance.

The reorganization, which consolidated the three unit operations departments under a single director, proved to be very effective, although occasional lapses in consistency were observed. The establishment of the site shift manager position provided continuous support and oversight of the three units. Management expectations for the conduct of operations were clearly communicated. Communication and coordination across the units and with other site organizations improved and resulted in more formal communications between individual operators, improved command and control practices within each crew, and a more formal approach to performance across the entire operations staff. These improvements also helped reduce control room distractions, correct control room discrepancies, and attain, essentially, "black board" operations.



The overall conduct of operations improved during the assessment period. Control room operators displayed a high degree of professionalism. Auxiliary operators became significantly involved in shift turnovers and demonstrated improved plant ownership. Operator performance during both routine operations and transient operations was strong. However, these improvements were not consistently demonstrated throughout the assessment period. Instances of not being aware of and attentive to plant conditions and system configuration, and lapses in the use of and compliance with procedures, were observed. These weaknesses resulted in significant Board discussion and a less than unanimous vote for the rating of this functional area. Continued strong oversight is needed to reinforce and sustain high performance.

The programs and procedures instituted to support operations were excellent. Specialty task groups, such as the crews dedicated to control mid-loop operations, were established and proved to be effective. Notable improvements were achieved in emergency operating procedure format and quality. A work authorization center was established outside of the control room which allowed control room supervisors to increase their attentiveness in monitoring operator activities. A formal operability determination process, which generally resulted in improved quality and timeliness of operability determinations, was implemented early in the assessment period. However, both the NRC and the Palo Verde staff identified instances where enhanced inter-organizational communications were needed to ensure that the timeliness of operability determinations and the effects of equipment degradation were fully understood by the operations organization.

The operator training program was well implemented. Initial and requalification training programs resulted in strong individual systems knowledge and effective command and control techniques. Senior department management was actively involved in the training program and used it as a venue to monitor the understanding of and compliance with its expectations.

Operations department self-assessment and corrective action programs were strong. The corrective action program was effective in encouraging the identification and resolution of problems, particularly in the last half of the assessment period. The dedication of considerable Nuclear Assurance resources to the assessment of operations activities was a notable strength.

The performance rating in this functional area is Category 1.

### III. MAINTENANCE

Safety performance in the maintenance area continued the improvement noted in the previous SALP period. Strong management oversight and support resulted in improved equipment performance, few maintenance-related unit trips, and improved material condition. The conduct of maintenance and craft skills were strong.



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Senior management support was strong. The organizational consolidation of maintenance resulted in the crafts being specialized in technical areas of responsibility across the units. This resulted in improved standardization and consistency in the planning, documentation, and performance of work activities. The line oversight of work in the mechanical, electrical, and instrumentation and control disciplines was also strong and included involvement in day-to-day activities and development of long-range plans and programs.

The programs associated with maintenance and surveillance activities were very effective. A well defined inservice inspection program was implemented; the efforts to address valve packing leaks, especially the implementation of the comprehensive valve packing program, were evident; and, actions to control work activities from outside the control room resulted in improved scheduling, coordination and oversight. The overall quality of maintenance procedures was good, although there were occasional instances where maintenance technicians compensated for weaknesses in individual work instructions without initiating change requests.

Individual performance was strong, as evidenced by an absence of problems induced by the maintenance staff. The training and qualification program for maintenance and surveillance craft personnel was innovative and effective. Maintenance and non-destructive examination technicians were, specifically, noted as having demonstrated good knowledge of their job, equipment, and procedural requirements. The surveillance program was effectively executed

Plant material condition, especially primary plant systems, was improved. Progress was made in correcting longstanding deficiencies, such as oil and valve packing leaks. However, balance-of-plant equipment failures caused some operational challenges, and is an area warranting additional management attention. Material condition within the radiologically controlled areas also improved, although isolated problems were identified.

Safety assessment activities within the maintenance area was strong and based on problem potential and safety significance. Effective assessments were conducted to evaluate the installation of strainers in the containment spray system and the conduct of the work planning process.

The performance rating in this functional area is Category 1.

#### IV. ENGINEERING

Demonstrated engineering performance improved significantly during this assessment period. Management worked to establish an organization with a strong safety focus, dedicated to supporting the site's operational and maintenance needs. Individual engineering products were of high quality and incorporated both risk insights and operational experience. Self-assessment became an integral part of the organizational culture and was key to the continual improvements noted in this area.

Performance in the engineering area reflected strong management involvement throughout the licensee organization. The effectiveness of this involvement was demonstrated by a reduction in the size of the engineering backlog, the age of condition report/disposition requests, and the number of temporary modifications and operator workarounds. The effort required to achieve this success reflected support for and commitment to management goals and expectations.

Numerous organizational and functional changes also contributed to the improvement in performance. The design engineering organization was relocated to the site. The maintenance engineering concept was effectively implemented. System, functional, and reactive teams, that integrated the activities of system, maintenance, and design engineers, were established. Better intra-team communication, especially between maintenance and system engineers, would improve the effectiveness of these teams.

Overall, engineering efforts focussed on supporting safe plant operations and effective predictive and corrective maintenance. When combined with strong management involvement and direction, this resulted in significantly improved problem identification, root cause evaluation, and corrective action implementation for a wide range of problems and issues. Additionally, risk insights were incorporated into several areas, such as graded quality assurance, graded inservice testing, and the plant-configuration risk indicator maintenance program.

Improvements in engineering quality were noticed in both licensing submittals and operational support activities, such as sponsorship of an industry group on round-cell batteries. Program strengths were noted, especially in the areas of steam generator tube degradation and predictive maintenance. The completion of the Design Basis Manual improved the efficiency and effectiveness of the impact review process. Similar efforts are needed to improve operability determinations.

The self-assessment program significantly improved. Particularly noteworthy was the self-critical attitude evident throughout the organization, and the emphasis on identifying and correcting problems. The conduct of self-assessments by line organizations, as well as the strong oversight provided by Nuclear Assurance, provided for both intrusive and broad-based reviews. The expansion of root-cause evaluations to consider related systems and components, and organizational areas, was demonstrated by your investigation of the implications of the Unit 2 control room fire.

The performance rating in this functional area is Category 1.



## V. PLANT SUPPORT

Performance in the plant support area was determined to be good during this rating period. Strong performance was noted in the fire protection and emergency preparedness areas. Good performance was identified in the radiological controls, security, and housekeeping areas. While effective programs were developed in response to the findings of the previous SALP, their implementation was not consistent. The integration of self-assessments into the operating philosophy of the organizations was evident and should help realize significant improvements in the future.

Fire Protection has become recognized as a superior program. The resolution of Thermolag concerns has been effective and innovative. Numerous improvements to the program were made by the fire protection personnel, and the response of the fire brigade and fire department to actual events was prompt and effective.

Emergency preparedness continued at the excellent level identified in the previous SALP. Program and plan changes were submitted in an effective and timely manner; emergency facilities were maintained in a proper state of operational readiness; and, emergency response organization members were properly trained and qualified. The relationships with state and local government officials were strong and supported public health and safety.

Overall, the performance of the radiological protection staff was good. Comprehensive programs were developed and management attention and oversight was initiated. Self-assessments became an integral part of the organization's operating philosophy. However, performance did not achieve the desired consistency or effectiveness. Instances of poor radiation worker practices were identified throughout the rating period. Examples included poor individual work habits, inappropriate control of contaminated tools, and failure to comply with procedures. More significant, however, was the failure of health physics technicians to exhibit a proper attention to detail. This was demonstrated when technicians observed non-compliance but allowed individual workers to perform work activities in a manner not in accordance with the associated radiation work permit; by the difficulties experienced in conducting proper air sampling activities; and by the numerous deficiencies identified in the surveying and posting of radiation areas and contamination zones.

Security program performance was evaluated as good. Management attention and commitment was evident and self-assessments were used to identify areas of strength and weakness. Early in the rating period, the security and operations organizations completed an Operational Safety Response Evaluation (OSRE) with superior results; however, subsequent performance was not consistent. While assessment aids were effective, problems were identified with detection equipment and compliance with compensatory measures procedures.



Additionally, the access authorization program displayed continual problems. The corrective actions developed for identified deficiencies were not effective and did not preclude the recurrence of authorizing access to unqualified personnel.

Mixed performance was noted in the housekeeping area. Early in the evaluation period, excessive debris from Unit 3 maintenance and cleaning activities was identified. And, while instances of boric acid buildup, packing leaks, and pump lube oil leaks were identified throughout the evaluation period, improved performance was noted during the last 6 months. During the Unit 2 refueling outage, improvements were identified as a result of the efforts to reduce drip catches, re-emphasize the Zone Improvement Program, and control transient combustible materials.

The performance rating in this functional area is Category 2.

