SALP BOARD REPORT

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

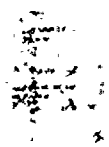
SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

50-528/88-38, 529/88-36, 530/88-36

ARIZONA NUCLEAR POWER PROJECT

PALO VERDE NUCLEAR GENERATING STATION

NOVEMBER 1, 1987 THROUGH OCTOBER 31, 1988



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I. INTRODUCTION

The Systematic Assessment of Licensee Performance (SALP) is an NRC staff integrated effort to collect available observations and data on a periodic basis and evaluate licensee's performance based on this information. The program is supplemental to normal regulatory processes used to ensure compliance with NRC rules and regulations. It is intended to be sufficiently diagnostic to provide a rational basis for allocating NRC resources and to provide meaningful feedback to the licensee's management regarding the NRC's assessment of their facility's performance in each functional area.

An NRC SALP Board, composed of the members listed below, met in the Region V office on December 6, 1988, to review observations and data on the licensee's performance in accordance with NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance," dated June 6, 1988. The Board's findings and recommendations were forwarded to the NRC Regional Administrator for approval and issuance.

This report is the NRC's assessment of the licensee's safety performance at Palo Verde for the period November 1, 1987 through October 31, 1988.

The SALP Board for Palo Verde was composed of:

**D. F. Kirsch, Director, Division of Reactor Safety and Projects, Region V (Board Chairman)
**G. W. Knighton, Director, Project Directorate V, NRR
*S. A. Richards, Acting Chief, Reactor Safety Branch
**G. P. Yuhas, Chief, Emergency Preparedness and Radiological Protection Branch
*R. F. Fish, Chief, Emergency Preparedness Section
*H. S. North, Acting Chief, Facilities Radiological Protection Section
*M. D. Schuster, Chief, Safeguards Section
**T. L. Chan, Units 1 and 2 NRR Project Manager
**M. J. Davis, Unit 3 NRR Project Manager
**T. J. Polich, Senior Resident Inspector
**J. F. Burdoin, Project Inspector
*M. Cillis, Senior Radiation Specialist
*L. R. Norderhaug, Safeguards Inspector

*Denotes voting member in functional area of cognizance.
**Denotes voting member in all functional areas.

A. Licensee Activities

In general, all three units operated satisfactorily during the assessment period. Units 2 and 3 were relatively free of problems; however, the number and type of events which occurred at Unit 1 set that Unit apart from Units 2 and 3. Specific operational events were as follows:

Unit 1

Unit 1 was in its first refueling cycle at the beginning of this assessment period. Startup following refueling was delayed until March 8 because of reactor coolant pump shaft cracking problems and the binding of Control Element Assembly (CEA) 56 during rod drop testing. A ball bearing was found in the CEA 56 Guide Tube. On May 14 following a reactor trip, the reactor experienced an early criticality and a subsequent reactor trip while returning the unit to service. The reactor was again returned to service May 16. On July 6, a 13.8KV bus fault resulted in a major electrical failure in the unit auxiliary transformer, which kept the unit down until August 18. The unit returned to power and operated at essentially 100% power through the end of the assessment period.

Unit 2

Unit 2 entered the assessment period at 100% power and operated essentially at 100% throughout the period until February 20, when the unit was shutdown to commence its first refueling outage. Startup initially scheduled for May 12 was delayed until early June to complete outage maintenance work and surveillance testing. The reactor went critical on June 18 and operated essentially at 100% power during the balance of the assessment period.

Unit 3

Unit 3 was shutdown on the first day of the assessment period after having completed low power physics testing associated with the issuance of the initial low power license. The unit was restarted November 23 in anticipation of receiving a full power license, which was issued November 25. Power was increased to above 5% for the first time on November 26. Power ascension testing continued with some minor problems until January 1, when the unit was operated at 100% power for the first time. The unit operated at essentially full power until July 31, when the "B" phase of the main transformer faulted due to a lightning strike, and the unit was placed in Mode 3. The unit was returned to service on August 18 following repairs to the main transformer and the completion of other short notice outage work. The unit operated at essentially 100% until the end of the assessment period except for a reduction to 50% on August 25 because of a "B" main feedwater pump problem and a reduction to 20% on September 22 to repair a main condenser tube leak.

Palo Verde ended the evaluation period on a more positive note with all three units operating at full power. Unit 1 ended the period in its 61st continuous day on line, Unit 2 with 131 continuous days, and Unit 3 with 74 continuous days.

B. Direct Inspection and Review Activities

Approximately 5935 on-site inspection hours were spent in performing a total of 49 inspections by resident, region-based, headquarters,

and contract personnel. Inspection activity in each functional area is summarized in Table 1.

II. Summary of Results

A. Effectiveness of Licensee Management

Overall site performance during this SALP period has been declining. Since the major reorganization of the site in November 1987, that separated the single site organization into three separate unit organizations, several key managers have left the organization. The former plant manager left the licensee after the reorganization and resulted in the loss of a strong central directing force for the site. Other departures from the licensee management team included the site radiation protection manager, central chemistry and radiation protection manager, emergency planning manager, and the site maintenance manager. In the latter part of the SALP period the former Executive Vice President, Mr. E. E. Van Brunt, announced his retirement. The experience level of licensee upper management has been a major NRC concern for several years. The experience level has not improved significantly as the individual units came on line; and these recent departures have caused increased concern. The reorganization into three separate unit organizations has placed additional demands on the senior management.

There appears to be a growing gap between the site's problems and the licensee's capability to deal with them. In response to NRC's concerns, the licensee has announced plans to add five senior management positions to the site organization. The search for qualified personnel to fill these positions is currently in progress.

B. Results of Board Assessment

Overall, the SALP Board found the performance of NRC licensed activities by the licensee to be acceptable and directed toward safe operation of Palo Verde. The SALP Board has made specific recommendations in most functional areas for licensee management consideration. The results of the Board's assessment of the licensee's performance in each functional area, including the previous assessments, are as follows:

	Functional Area	Rating Last Period	Rating This Period	Trend
A.	Plant Operations	2	3	Improving
B.	Radiological Controls	2	3	
C.	Maintenance/Surveillance	2	2	
D.	Emergency Preparedness	1	2	
E.	Security	2	2	
F.	Engineering/Technical Support	2	2	
G.	Safety Assessment/Quality Verification	2	3	

An improving trend is defined as: Licensee performance was determined to be improving near the close of the assessment period.

C. Changes in SALP Ratings

The licensee's performance in the plant operations area declined from a Category 2 to a Category 3. It is recognized that Unit 3 performance during the assessment period was good and several significant records were set during power ascension testing and commercial operation. Unit 2 performance was noted to have improved and unit management's involvement in plant operations increased during the evaluation period. The decline in performance is primarily due to events at Unit 1 and senior management's inability to establish a working atmosphere which encourages critical assessment during the conduct of operations and is reflective of a divergence between management expectations and staff performance. Unit 1 operators willingness to conduct safety significant evolutions without a questioning and cautious attitude overshadows the acceptable performance of operators at the other two units.

The licensee's performance in the areas of radiological controls and safety assessment/quality verification declined from Category 2 to Category 3 during this period. The decline in the radiological controls area is perceived to be due to inadequate technician staffing levels, untimely replacement of a permanent site radiation protection manager position, and weak training of technicians.

The licensee performance in the emergency preparedness area declined from Category 1 to Category 2. The cause of this is perceived to be a reduction in upper management's attention to the problems in the emergency preparedness program, which contributed to a failure to understand work requirements and the necessity for adherence to procedures in the EP area.

The licensee's performance in the Safety Assessment/Quality Verification area declined from Category 2 to Category 3. While the title of this section changed from the previous SALP period the items involved in the assessment of this area are essentially the same with the addition of licensing activities. The decline is due to several failures of management oversight and direction, some of which resulted in escalated enforcement actions in the areas of plant operation, radiological controls and engineering/technical support. In general, management failures have combined to produce situations which permit working level errors to continue to go unchecked until the errors are self-revealed by events.

III. CRITERIA

Licensee performance is assessed in selected functional areas, depending on whether the facility is in a construction or operational phase.

Functional areas normally represent areas significant to nuclear safety and the environment. Some functional areas may not be assessed because

of little or no licensee activities or lack of meaningful observations. Special areas may be added to highlight significant observations.

The following evaluation criteria were used, as applicable, to assess each functional area:

1. Assurance of quality, including management involvement and control.

2. Approach to resolution of technical issues from a safety standpoint.

3. Responsiveness to NRC initiatives.

4. Enforcement history.

5. Operational events (including response to, analysis of, reporting of, and corrective actions for events).

6. Staffing (including management).

7. Effectiveness of the training and qualification program.

However, the NRC is not limited to these criteria and others may have been used where appropriate.

On the basis of the NRC assessment, each functional area evaluated was rated according to three performance categories. The definitions of these performance categories are as follows:

Category 1: Licensee management attention and involvement are readily evident and place emphasis on superior performance of nuclear safety or safeguards activities, with the resulting performance substantially exceeding regulatory requirements. Licensee resources are ample and effectively used so that a high level of plant and personnel performance is being achieved. Reduced NRC attention may be appropriate.

Category 2: Licensee management attention to and involvement in the performance of nuclear safety or safeguards activities are good. The licensee has attained a level of performance above that needed to meet regulatory requirements. Licensee resources are adequate and reasonably allocated so that good plant and personnel performance is being achieved. NRC attention may be maintained at normal levels.

Category 3: Licensee management attention to and involvement in the performance of nuclear safety or safeguards activities are not sufficient. The licensee's performance does not significantly exceed that needed to meet minimal regulatory requirements. Licensee resources appear to be strained or not effectively used. NRC attention should be increased above normal levels.

IV. PERFORMANCE ANALYSIS

The following is the Board's assessment of the licensee's performance in each of the functional areas, plus the Board's conclusions for each area

and its recommendations with respect to licensee actions and management emphasis.

A. Plant Operations

1. Analysis

In spite of several significant operational accomplishments at Units 2 and 3, plant operations has declined from the previous assessment period. This decline is primarily due to events at Unit 1 and the lack of prompt and decisive efforts by corporate senior management to establish a working atmosphere which encourages critical assessment during the conduct of operations. This low level of self critical assessment and direction allowed individual unit performance to diverge to the point where Unit 1 performance was clearly poor several times during this evaluation period. Management also failed in their responsibility to demand consistency and accountability of overall site activities, and failed to take adequate corrective measures when such actions were clearly warranted. Only in the last month of the assessment period were management changes made at Unit 1 and a clear set of management expectations established.

During the assessment period, the licensee's plant operations activities were observed routinely by both the resident and the regional staff. A total of 2945 hours of inspection effort were devoted to this functional area. The licensee achieved several accomplishments in the operations area during this SALP period. These included 214 days of continuous operation at Unit 3 following a successful power ascension test program as well as a second continuous operating run of 74 days following only one reactor shutdown during the commercial operation portion of the SALP period. Unit 2 had 131 days of continuous operation following its first refueling outage. Other positive operational experiences were the problem free core reloads at both Units 1 and 2; the core unloading, inspection and fuel reconstitution at Unit 2; and the chemical decontaminations of the primary coolant systems at Units 1 and 2. In spite of these accomplishments, events did occur at Units 1 and 2 which contributed negatively to the plant operating history. These events were due in part to the lack of procedural compliance, personnel errors, and a willingness on the part of staff to proceed with plant evolutions prior to having a full understanding of the conditions relating to the evolution.

The licensee's responsiveness to NRC initiatives was maintained at about the same level as during the previous report. The licensee accepted NRC initiatives in a positive spirit. While resolution of some of the matters are still in progress, their correction has proceeded slower than expected. Some of these efforts include the need for correcting bogus annunciators; increasing management staffing; reducing personnel errors; and, in one significant case involving an earlier than expected

criticality at Unit 1, thoroughly identifying the root cause of the event.

In several of the meetings held between the NRC and ANPP management, during which plant operations were discussed, the licensee expressed a determination to complete actions related to initiatives which would result in improved operations. However, the repeated failure of managers to devote significant time to direct observation of plant activities is not consistent with ANPP management's desire to improve activity performance.

The licensee's self-initiating approach to the technical resolution of plant problems resulting from operational events has shown little improvement during the assessment period. Some examples of where licensee management resolutions were timely and technically sound were related to the auxiliary transformer fire (Unit 1) and the replacement of the reactor coolant pump shafts (Units 1 and 2). However, both of these issues received a high level of NRC attention, and it is not clear whether, left to their own initiative, the licensee would have arrived at the same position.

Examples where unconservative actions were taken or problem identification was weak included the early criticality at Unit 1 where significant root causes were not identified, and the failure of diesel generator intercooler drain plugs on Unit 2, three months after the same event occurred on Unit 3. In several of the meetings held between the ANPP and NRC management the licensee was informed that many of the problems involving technical issue resolutions were related to management's failure to perform penetrating self-critical assessments of events, and demand that level of performance from subordinates.

Escalated enforcement was taken in this functional area at Units 1 and 2. One such action dealt with a series of violations which were related to operating with an insufficient number of auxiliary feedwater pumps, due to an improper valve alignment (Unit 2), failing to bypass low pressurizer pressure protection according to procedures which resulted in an engineered safety feature actuation (Unit 2), and entering into Mode 4 without an operable high pressure safety injection pump (Unit 1). A second escalated enforcement action dealt with both trains of essential chilled water inoperable due to an incorrect valving alignment (Unit 1). A third enforcement action, which is pending, involved an earlier than expected condition of criticality (Unit 1).

In addition, two other violations were identified in this functional area. These dealt with valving errors at Units 1 and 3. The number of LERs (25) submitted to the NRC remained the same as the number submitted during the previous SALP period. Nine were caused by personnel error. However, of the

operations related LERs, 60% (15) of the total and 78% (7) of those caused by personnel error were attributable to Unit 1.

During the SALP period unplanned reactor trips were generally associated with Unit 1. Four of the six trips which occurred at Unit 1 were associated with personnel error or control problems. Units 2 and 3 experienced only one unplanned reactor trip each during the period. The Unit 3 trip occurred during power ascension testing and the Unit 2 trip was caused by control problems during startup from the refueling outage. Four emergency diesel actuations occurred during the period. One was related to an equipment malfunction, the other three were due to personnel or procedure causes. None of these actuations involved an interruption in plant operation. One safety injection/main steam isolation/containment isolation actuation occurred at Unit 2 due to personnel error.

During this SALP period the regional licensing examiners conducted one replacement examination and one licensed operator requalification program evaluation. The operator replacement examination results indicate that the training provided to initial and upgrade license candidates is satisfactory. However, the pass/fail ratio has decreased during this SALP period from 19/1 to 18/3. The licensed operator requalification program evaluation indicates that the facility training examination material, questions, scenarios and job performance measures, appear to be objective with evaluation standards that adequately evaluate an operators depth of plant and operating knowledge. From the program evaluation and operating exams administered the overall evaluation of the licensed operator requalification program appears to be satisfactory.

The licensee is involved in a long term upgrade program to increase simulator capability and fidelity to better reflect actual plant responses. The licensee has been implementing these upgrades slower than expected due to debugging problems with the more complex models and the increased licensed operator simulator training time. Licensed operator simulator training time increased from an average 24 hours per year reported in the previous SALP period to a projected 60 hours per year. The narrowed window to implement the more complex upgrades, which require longer debugging and testing times, has resulted in licensee management frequently having to delay simulator training or extend upgrade schedules, both of which negatively impact effective training.

The licensee's fire protection program has remained at a high level of performance. Two major fires involving the Unit 1 auxiliary transformer and the 525 KV switchyard transformer were quickly extinguished by the on-site fire department. Two ongoing unresolved matters still have not closed. These are related to inadequate fire door design and ongoing work related to sealing of penetrations.

Overall, operations personnel are knowledgeable of plant system performance and generally responded properly to significant and complicated operational transient events even though some of the events were self initiated. Plant shift crews generally conduct thorough shift turnovers/briefings which include discussions not only with the operation staff but also include other unit departments such as chemistry and radiation protection. Also, there have been several events during the SALP period which led to improper isolation of equipment due to the failure of operating personnel to properly implement the clearance procedure.

2. Performance Rating

Performance Assessment - Category 3, Improving

3. Board Recommendations

The licensee must strive to ensure that operations are conducted in a formal, conservative manner at all units. Licensee management should continue actions initiated to assure that there is both sufficient management staffing and appropriate management involvement in problem evaluations and resolution, particularly at unit 1. Priority attention should be given to conducting thorough evaluations of problems and establishing a working atmosphere which encourages thoughtfully critical assessments of all phases of plant operations.

B. Radiological Controls

1. Analysis

A total of eleven routine inspections related to radiological controls were performed by the regional and resident inspection staff during this assessment period. Over 860 hours were expended in the areas of:

Organization and Management
Occupational Radiation Safety
Transportation of Radioactive Materials
Radiological Effluent Control and Monitoring
Radioactive Waste Management
Training and Qualifications
LWR Water Chemistry Control
Licensee Event and Special Reports

During the previous SALP period, a total of three Severity Level IV and one Severity Level V violations were identified in Unit 1, one Severity Level IV violation was identified in Unit 2 and no violations were identified in Unit 3. These violations did not represent a programmatic breakdown. For the last assessment period, the licensee was assigned a Category 2 rating and the board recommended that the licensee improve performance with respect to the reduction of the numbers of

license event reports attributable to personnel error, posting requirements and radiological controls.

During the last half of this assessment period there have been several examples where the level of management involvement has not been sufficient to assure a high level of quality performance. Specific examples include: key management positions resulting from the November 1987 reorganization remained unfilled for extended periods, the ALARA Committee failed to meet for over a year, quality assurance and other internal audit findings were not resolved in a timely manner, significant numbers of workers were unfamiliar with required controls for entry into high radiation areas and some workers perceived a lack of commitment to good radiation protection practices on the part of ANPP management.

Following an unplanned exposure event in May 1988, NRC identified violations involving control, posting and access to high radiation areas in July, August and September 1988. An Enforcement Conference was held on August 17, 1988 to discuss the unplanned exposure and other concerns. The licensee's presentation of their assessment of the radiation protection program problems, as highlighted by the unplanned exposure event, was narrow and not adequate to convince NRC that additional enforcement actions would not be necessary. A second more thorough review of the unplanned exposure event was presented to NRC on September 14, 1988. This second evaluation was broader in scope and indicated that the licensee needed to expand the investigative process in the area of problem identification, develop supervisory/management skills and increase management's awareness of deficient conditions. Subsequent events involving the prying open of a locked high radiation area gate at Unit 3, starting work prior to completion of required ALARA reviews at Unit 2 and leaving a high radiation door open at Unit 1 indicated that initial management actions were not fully effective. Following the events noted above, the licensee initiated more aggressive corrective actions including appointment of a temporary site Radiation Protection Manager and replacement of the Unit 2 Radiation Protection Manager.

The licensee's resolution of a technical issue associated with the decontamination of the Unit 2 refueling cavity was ineffective. The planning and schedule for accomplishing the work was not thorough, poorly coordinated and appeared to place operational considerations ahead of good radiation protection practices. Several opportunities to decontaminate the cavity in accordance with the nuclear industry standards, such as performing a thorough vacuuming and/or hydrolazing of the cavity, which could have prevented the unplanned exposure event, were missed during the refueling outage. It appears that additional effort is needed in assuring that critical work is thoroughly planned and scheduled.

The program established and implemented for controlling hot particles was observed to contain weaknesses reflecting on the resolution of technical issues. The licensee's initial program for controlling hot particles did not take into full account requirements for extremity monitoring of personnel sorting hot particle trash, training of personnel in hot particle detection and a reliable method for calibration of instruments used to monitor for hot particles.

During this SALP period the licensee has been generally responsive to NRC initiatives and concerns. These included management's continued support of the reactor coolant pump bearing and wear ring replacement program to remove the antimony and cobalt containing material in Unit 2 that had been conducted at Units 1 and 3 during the previous SALP period. The licensee was effective in carrying forward to Unit 2 the lessons learned during the Units 1 and 3 antimony removal process. Improved results were obtained during the Unit 2 antimony clean-up process over those achieved in Unit 1. Additional strengths included an INPO accredited training program and an effective dosimetry program. Housekeeping was effective in minimizing contaminated areas. As a result of the licensee's efforts, discussed above, ANPP was well below the 1987 national average collective dose of 371 person-rem per reactor. The licensee's average collective dose was 230 person-rem per reactor, despite having a partial refueling outage in Unit 1 and an initial refueling outage in Unit 2. The collective dose of 7.8 person-rem in Unit 3, a plant that is scheduled to undergo its first refueling outage shortly, indicates effective personnel exposure control consistent with the ALARA concept. This is considered to be a significant accomplishment. Another improvement noted during this SALP period was the licensee's construction and activation of a permanent respiratory protection facility with state of the art equipment for processing respiratory equipment.

The licensee's enforcement history during this SALP period included: one apparent Severity Level III violation at Unit 2 as a result of deficiencies identified during the unplanned exposure event of May 23 and one apparent Severity Level III violation at Units 2 and 3 as a result of the deficiencies related to the control, posting and access to high radiation areas which were identified during the third quarter of 1988. The principal root causes for these events were attributed to personnel proceeding in the face of uncertainty and personnel error. These violations resulted in an escalated enforcement action with imposition of civil penalties. Additionally, during this SALP period, there were three Severity Level IV violations and two Severity Level V violations identified at Unit 1, three Severity IV violations and one apparent Severity Level V violation identified at Unit 2 and one Severity Level IV violation identified at Unit 3. Corrective measures for the two apparent Severity Level III violations were neither timely or effective in that repeated violations in the areas of ALARA

program implementation and posting and control of high radiation areas were identified. Additional weaknesses identified during this SALP period include: (1) the use of "permissive" terms and lack of specificity in the radiation protection program implementing procedures, and (2) the failure to implement a coordinated, consistent radiation protection program for the site and each Unit. The declining performance in the radiation protection program was observed following the licensee's site wide reorganization of November 1987. Collectively, the above violations and weaknesses appear to indicate that there has been a significant breakdown in the radiation protection program.

The number of reportable events in this functional area included fourteen special reports involving radiation monitoring units which were reported to be inoperable for greater than a 72 hour period. Additionally, there were numerous licensee event reports (LERs) involving the failure to perform the sample analysis required by the RETS and the failure of process and effluent monitoring (PERM) equipment to function properly. Two of the reportable events were related to the apparent Severity Level III violations that are discussed above. Many of the LERs were attributable to personnel error. The number of reports attributable to personnel error was raised as a concern during the previous SALP period. In addition, of particular concern was the high incidence of reports involving the failure of PERMs to function properly. It appears that additional management effort with respect to improving the reliability of the PERMs and reducing the number of reportable events due to personnel error is needed.

Experienced technician staffing levels at each of the units appeared to be adequate to support normal plant operations. Technician staffing levels of the central radiation protection group technicians appeared to be marginal following the reorganization of November 1987. The licensee became aware of this problem and took immediate action to supplement the central radiation group with additional personnel during the last quarter of this SALP period. Managements efforts to secure a permanent replacement for the site Radiation Protection Manager position has not been effective or timely.

Weaknesses, apparently attributable to training, were also identified during this SALP period. These include the training of technicians in the methods for detecting hot particles and assuring that workers' knowledge concerning control and posting of high radiation areas is clearly understood.

2. Performance Rating

Performance Assessment - Category 3

Based on the serious nature of events and weaknesses identified the licensee's performance in this functional area has shown a significant decline from the rating assigned during the previous SALP period.

3. Board Recommendations

The licensee should focus their immediate attention on completion of the assessment of the radiation protection program and implementation of corrective actions to assure that basic occupational radiation protective measures are accomplished. The licensee is encouraged to create a working atmosphere in which workers clearly understand and discharge their responsibilities, are held accountable, do not proceed in the face of uncertainty, and feel comfortable when bringing concerns to licensee management and to the NRC's attention. Significant improvement is needed to reduce the number of events leading to licensee event reports attributable to personnel error, and to improving the reliability of PERM operation. The licensee is further encouraged to improve the scope and quality of the evaluation of events and in assuring that corrective actions are both timely and effective.

C. Maintenance/Surveillance

1. Analysis

This functional area was observed routinely during the assessment period by both the resident and regional inspection staff. Approximately 712 hours of inspection effort were devoted to this functional area. Strengths included the successful completion of several significant maintenance tasks such as the replacement of the Units 1 and 2 reactor coolant pump shafts, replacement of the Units 1 and 2 auxiliary feedwater pump impellers within the 3 day Technical Specification action time period and the restoration of the damaged auxiliary transformer and related electrical equipment at Unit 1.

Several events which reflect negatively on the maintenance functional area include the introduction of ball bearings into the Unit 1 Upper Guide Structure (UGS) preventing movement of a Control Element Assembly (CEA) (Unit 1), the bending of a CEA extension shaft (Unit 2) and the under torquing of the Reactor Coolant Pump shaft impeller nuts (Unit 2). All of these events were caused by inadequate controls and/or insufficient supervisory involvement. The first event also indicates a laxness on the part of maintenance personnel in the reporting of problems to management.

The level of responsiveness to NRC initiatives was about the same as during the previous SALP. One concern which the NRC discussed with the licensee on several occasions was the reduction of maintenance backlog work items. The licensee

implemented actions to more closely monitor backlog. While the backlog has decreased, approximately half the site backlog is associated with Unit 1.

The control of work and the conduct of maintenance continued to be areas of concern that showed little improvement during the assessment period. The work control procedures were modified during the period. The action was prompted in part by the reorganization and by the recognition that changes were needed to improve work coordination, scheduling, operations involvement, retesting and the quality of instructions. Deficiencies in work controls resulted in several significant operational problems during the period. These included rendering auxiliary feedwater pumps inoperable (Units 1 and 2), the introduction of ball bearings into the UGS (Unit 1), the tripping of a startup transformer (Unit 3), and the bending of a CEA extension shaft (Unit 2). Instances of deficient post-maintenance retesting were still being observed during the latter part of assessment period.

The coordination with operations on the issuance of effective clearances continues to require management's attention as several cases of incomplete deactivation of equipment associated with work orders were experienced during the period.

There have been no plant shutdowns directly attributable to maintenance personnel errors, although in one instance a turbine trip occurred due to an incomplete troubleshooting effort (Unit 1) and a secondary plant transient (loss of a Main Feed pump) occurred due to poor job planning (Unit 2).

Two violations related to maintenance were issued during the SALP period. One was related to an incorrect restoration of an access door on a vital static inverter (Unit 1), the other was due to a failure to follow procedures (Unit 2).

The quality of implementation of the surveillance program has been equal to that of the previous assessment period. Of the nineteen LERs related to the functional area seven were due to exceeding the testing frequency time requirements. The ASME Section XI surveillance program requirements appear to be well coordinated. The licensee maintains a qualified staff dedicated to this effort.

The licensee has demonstrated good performance in chemistry surveillance and control to reduce degradation of the reactor coolant pressure boundary. Performance weaknesses were limited to the sensitivity of reactor coolant system fluoride analysis and control of condensate polisher sodium ingress to the secondary system. The Chemistry Standards Department has established an aggressive program for independent verification of analytical performance using spiked and replicate samples.

Expertise within the maintenance organization generally has been adequate to repair and maintain equipment in an operable condition except when multiple or extended outages occur. The licensee has contracted assistance from vendors on work requiring very specialized knowledge. An INPO accredited maintenance program for the crafts was developed and implemented during the period. In spite of this, several observations of inadequate documentation on work orders were made during the period. Planner/coordinators are key personnel in the proper implementation of the licensee's work control program; however, the experience and training of these individuals varies greatly and needs improvement. There is no real engineering capability in the maintenance organization, and the work planners only seek help from system engineers if they see fit. A decline in performance was observed due to the significant organizational and program changes during a period of extended workload (back to back refueling outages). In the later part of the assessment period, while all three units have operated at essentially full power, conduct of maintenance and the control of work have not shown signs of improvement.

2. Performance Rating

Performance Assessment - Category 2

3. Board Recommendations

Licensee management should strive to instill an inquisitive attitude in their maintenance personnel. Maintenance craft and work planners must think beyond the immediate work they do and assess how it affects equipment operability. Additionally, planner coordinators must be more aggressive in enlisting the system engineers support in the correction of non-routine equipment problems. Maintenance management must increase efforts to observe ongoing work and provide corrective feedback into the maintenance program.

D. Emergency Preparedness

1. Analysis

Approximately 313 hours of direct NRC inspection effort was spent in this functional area during this SALP period. The inspections included two annual emergency preparedness exercises and one routine preventive inspection.

While management has been effectively involved in the emergency preparedness (EP) program, the level of involvement appears to have diminished during this SALP period. For instance, a problem involving the delay of emergency response teams being processed through security was brought to management's attention several times through the licensee's own EP exercise critiques, NRC exit interviews and NRC inspection reports. It was also noted that firefighters responding to the Unit 1

auxiliary transformer fire in July 1988 were unnecessarily delayed 3-4 minutes while being processed through the security access control point. In another instance, congested radio traffic caused by routine use of an emergency radio channel was brought to management's attention during the licensee's critique of the December 1987 exercise. It has been noted that congested communications occurred during the response to the 1988 Unit 1 auxiliary transformer fire. Diminished management involvement from previous SALP periods was also indicated by the absence of management representatives at the licensee's latest (1988) annual exercise critique. The only management attendees were from the EP Department itself; no corporate management or representatives from other departments were present. (However, copies of the critique report were provided to the various managers, including those at the corporate level.)

Corrective actions are usually taken, but there were instances of ineffectiveness in correcting the root cause of the problem. As an example, several problems in identifying field monitoring team locations have been identified during previous annual exercises. Even after corrective actions were taken, similar problems were identified in the 1988 exercise. In another instance, the NRC identified a conflict between procedural protective action recommendations for the same conditions. After corrective actions were taken, the NRC identified an identical conflict in still another procedure. The licensee, however, has displayed an above-average capability of self-assessment of emergency events. The post trip report, PTRR 1-88-004, of the July 6, 1988 Unit 1 Auxiliary Transformer Fire and Reactor Trip is a good example of this capability. The occurrence was analyzed, cognizant individuals interviewed, conflicting information identified and resolved, and documentation provided to management in clear and objective reports.

The licensee's effort to resolve technical issues from a safety standpoint is generally sound, but resolutions are not always timely. For instance, a problem with providing reliable backup emergency communications was first identified by the NRC in 1986. The issue was included in the 1987 SALP report because the licensee still had no concrete plan of action to resolve the issue. It appeared that the licensee was attempting a more comprehensive resolution than was actually required to satisfy the concern. Their plan for resolution called for purchasing existing communications lines from Mountain Bell and rerouting them to a new facility constructed to house the backup communication system. The licensee now has installed a number of cellular portable phones as the backup emergency communications.

Implementation of NRC initiatives and policies has been timely and effective, and the licensee consistently meets expectations with regard to schedule or content.

There have been no NRC enforcement actions in this functional area.

The EP program staffing has undergone a major reorganization. During this period the licensee's executive vice president retired, the nuclear vice president was removed from the emergency preparedness chain of responsibility, and the emergency planning manager resigned. The result was a considerable aggregate loss of EP experience within a short period of time. Expertise, however, has been usually available within the staff and consultants have been appropriately used. There has been some concern about adequate staffing in the emergency response organization. The NRC had expressed in a report during the previous SALP period a concern that an adequate number of trained personnel may not be available to respond to emergencies. A licensee post trip report, No. PTRR 1-88-004, also indicated a lack of staffing to respond to that situation when the services of the Shift Technical Advisor was unavailable because he was occupied maintaining communications with the NRC.

For some time the emergency planning department has been joined with the fire department under a single manager. The merged departments, along with the security, nuclear training, material control, and administration departments now operate as service organizations under the Director of Site Services. Organizationally, these are not associated with the site reactor operations. It appears that the present organizational setup provides little opportunity for direct site operations interface with the emergency planning program.

The licensee's QA program continued to meet the NRC requirements to provide an independent annual review of the emergency preparedness program and evaluate the adequacy of interfaces with State and local governments. Audits were conducted in a timely manner and audit teams were composed of members who had no direct responsibilities within the emergency preparedness program.

The training and qualification program contributes to an adequate understanding of work and adherence to procedures. Several training problems, however, were manifested during the Unit 1 auxiliary transformer fire. For instance, it was necessary several times for firefighters to interrupt their efforts to ask bystanders to move back from the fire scene. In addition, as previously mentioned, unauthorized use of an emergency radio channel for routine operations disrupted emergency communications. Both instances are indicative of inadequacies in general employee emergency preparedness training.

2. Performance Rating

Performance Assessment - Category 2

3. Board Recommendations

The licensee is encouraged to evaluate the interface between the emergency planning and site operations departments. Additionally, emphasis on timely resolution of identified deficiencies seem critically important to improving performance in this area.

E. Security

1. Analysis

During the assessment period from November 1, 1987 through October 31, 1988, Region V conducted three physical security inspections. A total of approximately 285 hours of direct inspection effort was expended by regional inspectors. In addition, the resident inspectors provided continuing observations in this area. There were no material control and accounting inspections conducted during this assessment period.

With regard to management's involvement in assuring quality, corporate and plant management continued to review the operation of the overall security program. They have generally implemented remedial measures to correct deficiencies identified in the course of both internal and NRC security inspections.

The previous SALP report encouraged licensee management to continue their augmented support of the station security program, particularly with respect to: engineering support of the security program and the planned upgrade of vehicle and personnel access control areas. During this SALP period package search equipment has been upgraded and construction was begun on a new vehicle access portal.

Since February 1987, specific NRC concerns with the suitability of roll-up doors as vital area barriers has been raised. Although various design concepts to improve the resistance of such doors to penetration have been considered, each has been evaluated and rejected by the licensee's engineering staff and the specific concern remains unsolved. After nearly two years, these potentially vulnerable barriers remain augmented by compensatory measures.

The previous SALP report identified major program upgrades underway (particularly in the area of alarm station operation, access control, radio communications, and physical barrier evaluation) as requiring continued management attention. During this assessment period, the security management essentially completed the upgrade of their radio communication equipment. The alarm station upgrade is nearly complete. The licensee has initiated actions to incorporate suitable barrier characteristics into their security plan. However,

considerable engineering effort remains to be completed on the development of the necessary barrier evaluation criteria.

During the assessment period, four information notices related to security were issued. The licensee's actions, as reviewed to date, were found to be appropriate. As a result of the NRC Regulatory Effectiveness Review conducted during the SALP period, the licensee has initiated an evaluation project to consider upgrading the perimeter barrier system to include a double fence barrier enclosing an isolation zone with detection systems and continuous CCTV surveillance for immediate alarm assessment.

In response to the August 1986, NRC policy statement on Fitness for Duty of Nuclear Power Plant Personnel, corporate and plant management continued to support their established Fitness for Duty Program. As designed, this program requires that all applicants seeking onsite employment must satisfactorily complete a pre-employment urinalysis test. Individuals granted unescorted access to the protected area are subject to annual, but scheduled, urinalysis drug screening. The licensee's current Fitness for Duty Program does not follow the industrial standards published by Edison Electric Institute (EEI) i.e., the requirement for random testing is not included.

The enforcement history for the period November 1, 1987 through October 31, 1988 includes two violations, one related to the licensee's failure to alarm all protected area access portals and the second relates to the licensee's failure to properly secure safeguards information.

During this SALP period, the licensee reported seven safeguards events. Four of these events resulted from personnel: error one from failed security compensatory measures; one from unauthorized access to a vital area and one from an uncontrolled pathway to the protected area.

With respect to staffing, key positions were identified and responsibilities were generally well defined. The security training staff has initiated a special advanced training program which exceeds the requirements of regulation, and augments current offsite security resources to meet the special security demands wrought by the plant's isolated location.

2. Performance Rating

Performance assessment - Category 2.

3. Board Recommendations

Licensee management is encouraged to complete their construction project of an alternate vehicle access control point and to expeditiously address the engineering issues associated with the evaluation of roll-up doors serving as

vital area barriers and the upgrade of the perimeter barrier to eliminate potential vulnerabilities identified by the RER team.

Further, the licensee is encouraged to reexamine their current Fitness for Duty Program with respect to the EEI guidance pertaining to chemical testing of body fluids.

F. Engineering/Technical Support.

1. Analysis

This functional area was observed routinely during the assessment period by both the resident and regional inspection staff. Approximately 184 hours of inspection effort were devoted to this functional area. These inspections showed the licensee's engineering and technical support organizations to be staffed with experienced personnel. However, a number of significant weaknesses were observed. These include: significant errors in design basis documents; engineers lacked a sufficient knowledge of the design basis; inadequate implementation of the design change process; and management inattention to the Technology Transfer and System Engineer Programs.

Technical issues have, generally, been appropriately resolved in a timely manner after identification. However, self-revealing events or inspection findings have surfaced many of the technical issues. The need for management to insist upon a pro-active rather than reactive approach in identifying technical issues has been discussed in several inspection reports and management meetings during the assessment period.

The licensee instituted a Technology Transfer program to assure that design basis documentation developed by Bechtel for Palo Verde was effectively transferred to the cognizance of ANPP engineering personnel. The Safety System Functional Inspection (SSFI) team found ANPP had not adequately reviewed the design basis analysis to assure that a complete and accurate design basis is available for use in future plant design and modification efforts. This is one of several areas where management's inattention to an established program allowed results to diverge from management's expectations.

The System Engineer Program has been established for several years at Palo Verde. However, management's expectations and program performance also diverged; due, here, to a lack of management oversight. This was evident from several events and inspection findings including: multiple failures within the engineering organization to identify work that rendered the steam driven Auxiliary Feedwater pumps at Units 1 and 2 inoperable; System Engineer lack of knowledge of design basis and/or walkdown functions; and the lack of system engineer involvement with complex work planning and significant maintenance activities. Management's poor definition of the

system engineer's responsibilities and duties in relation to the workload appears to be a contributing factor to the problems that occurred this assessment period.

In response to NRC initiatives and inspection findings, ANPP management instituted evaluation and improvement programs in the system engineer, design engineer, and configuration management areas. These programs required considerable effort and re-evaluation of long range goals. While most of these programs began in the first half of the SALP period the initial effort was spent in assessments, evaluations and long range planning. Thus, most of the implementation will not be completed until well into the next SALP period. Although ANPP management has been involved in the early stages of these improvement programs, continuous management oversight will be required to prevent a relapse of the divergence between performance and expectation.

No plant trips were attributable to the engineering and technical support organizations during the assessment period. However, inadequate technical review of engineering work did play a major role in rendering the steam driven auxiliary feedwater pumps inoperable at Units 1 and 2. Escalated enforcement action resulted from this event. Engineering involvement in trending and performance monitoring of equipment history and planning of significant maintenance and testing activities was notably absent when several operational events and transients were investigated (for example, in the Unit 1 early criticality event deficiencies were noted in the fuel management and reactor engineering groups that contributed to shortcomings in the Cycle 2 Core Data Book and the Xenon program used in calculating the estimated critical conditions).

Staffing, qualifications and training of both the site and corporate engineering departments has been under review as part of the System Engineer, Technology Transfer and Engineering Excellence programs. These reviews have concluded that increased training and staffing are required to meet the long range goals of ANPP management. Thus, management has committed to increase both the site and corporate engineering staffs to better manage the workload of a three unit site and reduce the current backlog.

2. Performance Rating

Performance Assessment - Category 2

3. Board Recommendations

The licensee appears to have initiated appropriate programs to improve performance in this area. The licensee is encouraged to closely monitor the implementation of these programs.

G. Safety Assessment/Quality Verification

1. Analysis

This functional area was observed routinely during the assessment period by the resident and regional inspection staff. In addition, several inspections focused specifically on events which were indicators of significant weakness in this area. Over 636 hours of inspection effort were devoted to this functional area. This SALP period evidenced significant weaknesses in problem identification, self-criticism of identified problems and management oversight. Underlying these weaknesses was the breakup and re-formation of departmental responsibilities and lines of communication, brought about by the November 1987 reorganization. Furthermore, the experience level of upper management, which has been a major NRC concern, was reduced when several key managers left ANPP after the reorganization . This reorganization left many licensee personnel unsure of their new responsibilities, and unclear of the expectations held by the new management organization. Without clear management direction, institutionalized self-critical assessments via Quality Assurance (QA), Quality Control (QC), Independent Safety Assessment Group (ISEG) and other problem finding arms of the organization failed to identify operational and engineering weaknesses. The lack of strong management interest contributed substantially to inaction and subsequent self-revealing problems.

The licensee's ability to initiate thorough and self-critical event assessments was called into question several times during this SALP period. These included an Auxiliary Feedwater pump unknowingly rendered inoperable following maintenance (Units 1 and 2), the loss of Multi Stud Tensioner coaster bearings which resulted in a stuck Control Element Assembly (Unit 1), an early criticality during reactor startup (Unit 1), and a radiation overexposure (Unit 2). In each case the licensee's assessment was found to be lacking or inadequate.

Although QA inspected in areas such as safety system engineering and radiation protection, they have not been at the forefront in assessing the safety significance of their results, demanding prompt and effective corrective action, or aggressive in clearly surfacing significant findings to senior management for resolution. Furthermore, management review of QA findings has not been sufficiently critical to require that this be routinely made a part of QA audits. In another instance, QA properly identified a possible deficiency with automatic pre-action fire suppression systems; however, they accepted an engineering disposition which was incomplete in addressing all the technical issues.

On several occasions, the conduct of maintenance proceeded with poor procedures resulting in significant errors which failed to be questioned by the involved maintenance, operations, engineering, or QA/QC organizations. Two steam driven auxiliary feedwater pumps were rendered inoperable following

engineering approved adjustments to the steam admission valves (Units 1 and 2). Reactor Coolant Pump (RCP) impeller nuts were under torqued during assembly (Unit 2). These two situations are a demonstration of poor performance of technical work by engineering and maintenance organizations.

The licensee was identified as having good procurement quality controls. Also, the Nuclear Analysis department identified a non-conservative computer code error which directly affected shutdown margin calculations. This is noteworthy due to the difficulty in locating such an error in the extensive computer codes used. However, this detailed review was conducted after and in response to the early criticality event.

Response to NRC initiatives such as Generic Letters, NRC Bulletins, and NRC Notices are adequate. Past licensee practices of allowing regulatory issues, such as compliance with the Anticipated Transient Without Scram (ATWS) rule, to be handled by other parties (i.e. the NSSS vendor), are now being more aggressively pursued by the licensee's own organization. The licensee continues to be responsive on a daily basis to issues NRC inspectors bring to their attention. In addition, some NRC concerns in areas such as improvements in the technical adequacy of engineering work, in general, and in the investigating and root cause methods employed following events, have resulted in licensee efforts to institutionalize programs meeting or exceeding industry standards. The effects of these and similar programs have not yet been fully realized, but appear to be an in-depth response to these significant issues.

The licensee's Compliance department staff was reduced significantly after the reorganization and resources now appear strained. For example, NRC open item status is tracked as a collateral duty of a single compliance engineer. The status of licensee followup to these items often requires prompting by NRC inspectors.

The events discussed in the enforcement conferences held during the SALP period appear to have resulted from several basic failures on the part of ANPP management. These include an inability to establish a working atmosphere which encourages step-by-step critical assessment during the conduct of operations, an inability of QA and other oversight groups to identify and correct significant problems prior to their becoming self-revealing, and a failure to demand thorough, critical assessments of events such that root causes can be clearly identified and effective corrective action taken. Additionally, ANPP management has not devoted sufficient time to direct observation of plant activities during a period when programs and policies were not being implemented to management expectations.

Inspection findings throughout the SALP period have indicated a high degree of non-compliance with established procedures.

Although this is sometimes due to a lack of knowledge or to procedural vagueness, it often appears that the working environment and attitudes of first line supervisors, QC personnel, and others accept less-than-strict adherence as an acceptable means of conducting business. Contributing to this attitude is the unacceptably high backlog of Procedure Change Requests (PCR) and a growing frustration on the part of personnel that their inputs are ineffective in creating constructive change.

The experience level of the QA organization is low in operations and engineering expertise, contributing to a lack of confidence, and a reluctance, to clearly identify poor practices when these areas are being assessed. However, following the inoperable auxiliary feedwater pump event, the NRC review determined the need for better training to achieve a clearer understanding of integrated plant operations, fundamental theory, procedural, and regulatory requirements. Although staffing of the ISEG organization meets Technical Specifications minimum requirements, it has been insufficient to reduce an administrative backlog and has detracted from their ability to monitor plant activities on a routine basis.

The licensee's approach to the resolution of licensing issues generally exhibits conservatism, timeliness, and an understanding of the issues. Licensing activities at the beginning of the evaluation period were focused primarily on actions in support of the issuance of a full power license on Unit 3. The full power license was issued on November 25, 1987.

This SALP period has been marked by a series of events and inspection findings which, when taken as a whole, indicate significant weakness in the licensee's ability to self-identify and effectively correct technical and organizational problems. Organizations such as Operations, Training, Maintenance, and Engineering do not always work toward common purposes, nor do functionally related entities, such as onsite and offsite engineering, communicate sufficiently to their mutual benefit. Corrective actions have sometimes failed to be effective because of inadequate establishment of root causes and insufficient communication of the actions and the basis for them to all affected organizations. Senior management began to strongly stress the theme of teamwork, communication, and attention to detail during the last portion of the SALP period.

2. Performance Rating

Performance Assessment - Category 3.

3. Board Recommendations

Licensee management should continue to implement initiative programs such as Radiation Protection improvements, the QA

Improvement Program, Engineering Excellence, and Event Investigation procedures. The new organizational structure must be solidified with clearly defined authority and accountability. Management must demonstrate and encourage increased self-criticism, at all organizational levels, but particularly at the highest levels. In parallel with increased self-criticism must be the creation of an atmosphere where such criticism is eagerly sought, analyzed, and strongly acted upon. Corrective actions must be personally identified with by all affected personnel. Departmental intercommunications must be increased, and a common goal to support safe plant operations must be strengthened. The licensee established efforts to date toward these goals are noted and encouraged.

The QA organization needs to obtain personnel experienced in operations and engineering activities to enhance their abilities to effectively assess these areas.

Increased inspection coverage of daily in-plant activities is recommended, with emphasis on procedure compliance and communication. Increased inspection by licensee oversight groups (QA, QC, QS&E, ISEG, NSG, PRB) is also strongly recommended.

V. SUPPORTING DATA AND SUMMARIES

A. Enforcement Activity

Three resident inspectors were essentially onsite during the SALP assessment period. Forty-nine inspections, including a team Safety System Functional Inspection (SSFI) in January and February 1988, were conducted during this period for a total of 5935 inspector hours. A summary of inspection activities is provided in Table 1 along with a summary of enforcement items from these inspections. A description of the enforcement items is provided in Table 2. During this SALP period a two part escalated enforcement item ($100,0000 Civil Penalty) was identified concerning operating with turbine auxiliary feedwater (AFW) pump steam isolation valves improperly modified and operating with less than three AFW pumps operable (units 1 and 2, November 1987). A three part escalated enforcement item ($150,000 civil penalty) was identified, concerning an early criticality event at Unit 1 (May 14); a personnel radiation overexposure event which occurred at Unit 2 (May 22-23); and an inadvertent rendering inoperable of the Essential Chilled Water System at Unit 1, in violation of Technical Specification requirements (May 20-29).

B. Confirmation of Action Letters

One Confirmation of Action Letter was issued on June 23, 1988 concerning introduction of nonconservative information into channel B Core Protection Calculator. The licensee's letter of July 21, 1988 responded to the concerns.

C. Other

The Office for Analysis and Evaluation of Operational Data (AEOD) reviewed the licensee's events at Palo Verde and prepared a report which is included as Attachment 1. AEOD reviewed the LERs and significant operating events for quality of reporting and effectiveness of identified corrective actions.

TABLE 1

INSPECTION ACTIVITIES AND ENFORCEMENT SUMMARY (11/01/87 - 10/31/88)

Palo Verde Unit 1

Functional Area		Inspections Conducted Inspection* Hours	Percent of Effort	Enforcement Items Severity Level** I	II	III	IV	V	D
A.	Plant Operations	1270	47.7			1@	3	1	
B.	Radiological Controls	345	13.0				3	2	
C.	Maintenance/ Surveillance	374	14.0						
D.	Emergency Prep.	105	3.9						
E.	Security	143	5.4				2		
F.	Engineering/ Technical Support	74	2.8			1#	3		1
G.	Safety Assessment/ Quality Verif.	351	13.2			1	1	1	
	Totals	2662	100.00			3	12	3	1

* Allocations of inspection hours to each functional area are approximations based upon NRC form 766 data. These numbers do not include inspection hours by NRC contract personnel.

** Severity levels are in accordance with NRC Enforcement Policy (10 CFR Part 2, Appendix C).

1 No violation was issued, but a deviation was identified.

@ One NOV pending in this area.

This violation which resulted in a civil penalty also applies to Unit 2.

TABLE 1

INSPECTION ACTIVITIES AND ENFORCEMENT SUMMARY (11/01/87 - 10/31/88)

Palo Verde Unit 2

Functional Area		Inspections Conducted Inspection* Hours	Percent of Effort	Enforcement Items Severity Level** I	II	III	IV	V
A.	Plant Operations	871	48.3			1#		
B.	Radiological Controls	291	16.1			2&	3	1
C.	Maintenance/ Surveillance	200	11.1					
D.	Emergency Prep.	104	5.8					
E.	Security	86	4.8					
F.	Engineering/ Technical Support	96	5.3					
G.	Safety Assessment/ Quality Verif.	156	8.6			1		
	Totals	1804	100.00			4	3	1

* Allocations of inspection hours to each functional area are approximations based upon NRC form 766 data. These numbers do not include inspection hours by NRC contract personnel.

** Severity levels are in accordance with NRC Enforcement Policy (10 CFR Part 2, Appendix C). No deviations were identified during this SALP period.

\# This violation which resultd in a civil penalty also applies to Unit 1.

& One of these violations which resulted in a civil penalty also applies to Units 1 and 3.

TABLE 1

INSPECTION ACTIVITIES AND ENFORCEMENT SUMMARY (11/01/87 - 10/31/88)

Palo Verde Unit 3

Functional Area		Inspections Conducted Inspection* Hours	Percent of Effort	Enforcement Items Severity Level** I	II	III	IV	V
A.	Plant Operations	804	54.7				1	
B.	Radiological Controls	224	15.2			1&	1	
C.	Maintenance/ Surveillance	138	9.4					
D.	Emergency Prep.	104	7.1					
E.	Security	56	3.8					
F.	Engineering/ Technical Support	14	1.0					
G.	Safety Assessment/ Quality Verif.	129	8.8					
	Totals	1469	100.00			1	2	

* Allocations of inspection hours to each functional area are approximations based upon NRC form 766 data. These numbers do not include inspection hours by NRC contract personnel.

** Severity levels are in accordance with NRC Enforcement Policy (10 CFR Part 2, Appendix C). No deviations were identified during this SALP period.

& This violation which resulted in a civil penalty also applies to Units 1 and 2.

Table 2
Palo Verde
Enforcement Items

Report Number	Subject	Severity Level	Functional Area
Unit 1			
87-37	Limitorque valve operators inside containment were not shown to be qualified because of deviations from qualification test specimen configuration.	4	A
87-37	ANPP files did not adequately document qualification of skinner solenoid valves because design and material differences between the plant equipment and test speciments were not evaluated in detail.	5	A
87-40	Radiation areas within the west mechanical penetration access room of the auxiliary building were not conspicuously posted.	5	B
87-40	West mechanical penetration access room of the auxiliary building had two areas where the intensity of radiation measured between 100 and 800 millirem per hour and were not posted	4	B
88-01	An access door,vital static inverters,thumb screws,and battery spacers were found contrary to their respective drawings.Eyewash station installed without comparison to seismic category 9 requirements.	4	A
88-01	Licensee did not consider or make calculations to demonstrate that pressure relief valves were sized to accommodate flows from failure of upstream regulating valves in the fully open position.	4	F
88-01	A temporary modification that installed tanks to supply hypochlorite for emergency spray ponds was completed with an unacceptable written safety evaluation.	4	F
88-01	Spacers were missing between battery jars and eyewash stations were installed without revising the calculation isometric drawing and were never compared to seismic category 9 requirements.	4	F
88-02	Unit 1 entered mode 4 and operated for approximately one hour and twenty-five minutes without an operable HPSI pump.	3	A

Table 2
Palo Verde
Enforcement Items

Report Number	Subject	Severity Level	Functional Area
88-03	A copy of the notice of violation involving radiological working conditions received by the licenses was not posted.	5	B
88-07	Contrary to tech specs, unit 1 operated with only two operable independent steam generator AFW pumps.Modifications to valves were not reviewed by plant manager or other proper authority.	3	G
88-12	Contrary to Reg Guide 1.97, wide range steam generator level instrumentation had a range from 32% to 112% of the range described in the Reg Guide.	D	F
88-13	Licensee radwaste shipments were made with loose chain restraints and had shifted during transport as evidenced by loosened or broken bracing.	4	B
88-14	Nonconservative operator performance combined with errors in information used to calculate boron concentration resulted in an inadvertent criticality.	*	A
88-15	Protected area portals were not alarmed and monitored as required.	4	E
88-18	Contrary to stated requirements, a valve was found to be in the open position following the addition of chemicals to the system.	4	A
88-24	Contrary to specific technical specification requirements while Unit 1 was operating in Mode 1, both loops of the essential chilled water system were rendered inoperable.	3	A
88-27	No written safety evaluation addressing the processing of radioactive equipment in a trailer recently converted into a respiratory processing facility was performed.	4	B
88-31	Improper Protection of safeguards information	4	E
Unit 2			
88-02	Unit 2 operated with less than 3 AFW pumps operable due to the discharge valve on a pump being closed.	3	A

Table 2
Palo Verde
Enforcement Items

Report Number	Subject	Severity Level	Functional Area
88-07	Operation occurred with only two AFW independent steam generator pumps operable. Valves were modified without review by the proper individual/group.	3	G
88-08	A principle gamma emitter analysis performed on a gas grab sample from waste gas decay tank did not achieve the required LLD.	5	B
88-14	Radioactive noble fission product gases were vented from portions of the gaseous radwaste system without prior evaluation of the potential release.	4	B
88-22	An enclosed area with a door which was not locked had an intensity of radiation accessible to a major portion of the body measured up to at least 3 Rem/hr.	3	B
	Failure to provide an exposure report.	4	B
88-26	No written safety evaluation addressing the processing of radioactive equipment in a trailer converted into a respiratory processing facility was performed.	4	B
88-22, 26/27	Occupational radiation exposure in excess of the quarterly limit. Failure to perform radiation surveys. Failure to implement the ALARA program.	3	B
Unit 3			
88-18	Valves were found to be in the open position following the addition of chemicals to the system.	4	A
88-25	No written safety evaluation addressing the processing of radioactive equipment in a trailer recently converted into a respiratory processing facility was performed.	4	B
88-33	Failure to control access to high radiation area.	3	B

* Enforcement action is being considered for this item.

D Deviation from regulatory requirements.

TABLE 3

SYNOPSIS OF PALO VERDE 1 LICENSEE EVENT REPORTS (LERs)

	Functional Area	SALP Cause Code* A	B	C	D	E	X	Totals
A.	Plant Operations	7			2	6		15
B.	Radiological Controls	3						3
C.	Maintenance/ Surveillance	7			1	1		9
D.	Emergency Prep.							
E.	Security	3	1		1		1	6
F.	Engineering/ Technical Support							
G.	Safety Assessment/ Quality Verification							
	Totals	20	1		4	7	1	33

The above data are based upon LERs 87-24 through 88-24 . LERs 88-09, 88-20, and 88-23 will be included in the next SALP assessment period. LER 84-01 was received during this SALP assessment period.

* Cause Code
A - Personnel Error
B - Design, Manufacturing or Installation Error
C - External Cause
D - Defective Procedures
E - Component Failure
X - Other

TABLE 3

SYNOPSIS OF PALO VERDE 2 LICENSEE EVENT REPORTS (LERs)

	Functional Area	SALP Cause Code* A	B	C	D	E	X	Totals
A.	Plant Operations	2	1		1	3		7
B.	Radiological Controls	2	1				1	4
C.	Maintenance/ Surveillance	4			1			5
D.	Emergency Prep.							
E.	Security	1						1
F.	Engineering/ Technical Support							
G.	Safety Assessment/ Quality Verification							
	Totals	9	2		2	3	1	16

The above data are based upon LERs 87-18 through 88-13.

* Cause Code
A - Personnel Error
B - Design, Manufacturing or Installation Error
C - External Cause
D - Defective Procedures
E - Component Failure
X - Other

TABLE 3

SYNOPSIS OF PALO VERDE 3 LICENSEE EVENT REPORTS (LERs)

	Functional Area	SALP Cause Code* A	B	C	D	E	X	Totals
A.	Plant Operations		1			1	1	3
B.	Radiological Controls							
C.	Maintenance/ Surveillance	5				1		6
D.	Emergency Prep.							
E.	Security							
F.	Engineering/ Technical Support							
G.	Safety Assessment/ Quality Verification							
	Totals	5	1			2	1	9

The above data are based upon LERs 87-03 through 88-06.

* Cause Code
A - Personnel Error
B - Design, Manufacturing or Installation Error
C - External Cause
D - Defective Procedures
E - Component Failure
X - Other

ENCLOSURE

AEOD INPUT TO SALP REVIEW FOR PALO VERDE
UNITS 1, 2, AND 3

Arizona Public Service Company submitted about 52 reports for the three units at Palo Verde, not including updates, in the SALP assessment period from November 1, 1987 to October 31, 1988. This review included the following LER numbers:

Unit 1	Unit 2	Unit 3
87-025 to 87-028	87-018 to 87-021	87-004 to 87-005
88-001 to 88-024	88-001 to 88-012	88-001 to 88-007

Our findings from the review of these LERs follows:

1. Abnormal Occurrences

There were no abnormal occurrences in the assessment period. However, an event that occurred in late October 1987 (just prior to the start of the assessment period) at Unit 1 was identified as an Appendix C item, and reported in the fourth quarter 1987 Report to Congress. In the event, ultrasonic testing revealed cracks in all four reactor coolant pumps (RCPs). Although the failure of one RCP is an analyzed accident, concerns were raised that there could be a potential for multiple RCP shaft failures. However, additional analysis concluded that once a crack initiates, the crack propogates slowly in a circumferential manner over millions of stress cycles. No LER was submitted for this event.

2. Significant Operating Events

There were four events, each at Unit 1, in the assessment period that were identified as particularly significant by the ROAB screening and review process. These events were:

(a) LER 88-010, "Ground Fault in 13.8 KV Bus Causes Fire in Unit Auxiliary Transformer and Reactor Trip," on July 6, 1988;

(b) LER 87-025 "Modification to Steam to Turbine Driven Auxiliary Feedwater Pump Isolation Valves Render Pump Inoperable," dated November 27, 1987;

(c) LER 88-013 "Auxiliary Feedwater Pump Degradation," dated March 25, 1988; and

(d) LER 88-022 "Shutdown Cooling Systems Valve Bolting Failure," dated July 25, 1988.

3. AEOD Technical Study Reports

There were no events identified at any of the units that were considered sufficiently serious to merit an in-depth technical study by AEOD in this assessment period.

4. PNs Issued in Assessment Period

There were many Preliminary Notification of Event or Unusual Occurrence issued for the three units. For the PNs that were issued for reportable events, the licensee submitted a LER for each event, so by this method of verification, the licensee appears to be reporting all events that are required to be reported. The content of the information in the LER was in substantial agreement with the event as described in the PN, so the licensee appears to be reporting these events accurately.

5. LER Quality

The LER submittals for all units were identical, so this review would be applicable to any of the three units. The licensee used two format styles in the assessment period; a narrative form prior to about mid-1988 and an outline form subsequently.

We found the narrative style to fully comply with the reporting guidelines listed in pages 5 through 7 of NUREG-1022. All aspects of the event were described in substantial detail and we thought the submittals were uniformly outstanding.

The outline form of LER submittal was an improvement over the previous narrative form. We thought these later LERs were the best of any licensee that we review.

Previous similar occurrences were properly referenced in the LERs as applicable.

The licensee updated several LERs that were promised to be updated in the assessment period. The updated LERs provided new information and the portion of the report that was revised was denoted by a vertical line in the right hand margin so the new information could be easily determined by the reader.

No reports were submitted on a voluntary basis in the assessment period. As stated on page 10 of NUREG-1022, licensees are encouraged to report any event that does not meet reporting criteria, if the licensee believes that the event might be of safety significance, might be of generic interest or concern or contains a lesson to be learned.

6. Effective Corrective Action

There were 43 events at the three units available for immediate review where a designated root cause had been fully determined for the event. The casual distribution of these events were:

Human Factor Deficiency	32 events	74%
Equipment Failures	8 events	19%
Spurious Malfunctions	2 events	5%
Inadequate Plant Design	1 events	2%

The Human Factor Deficiencies would include: personnel errors 25 events, inadequate procedures 4 events, bad engineering evaluation, inadequate administrative controls and error in the work document, 1 each.

Although there seemed to be a relatively high frequency of human factor deficiencies in the casual pattern of LERs, only one of the events rated as significant by ROAB was caused by cognitive personnel error (LER 87-025). The root cause of the other three events were equipment failure.