

SALP BOARD REPORT  
U. S. NUCLEAR REGULATORY COMMISSION  
REGION V  
SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

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SOUTHERN CALIFORNIA EDISON COMPANY  
SAN ONFORE NUCLEAR GENERATING STATION  
UNITS 1, 2 AND 3  
JUNE 1, 1986 THROUGH SEPTEMBER 30, 1987

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## I. INTRODUCTION

The Systematic Assessment of Licensee Performance (SALP) is an integrated NRC staff effort to collect available observations and data on a periodic basis and to evaluate licensee performance based upon this information. The SALP program is supplemental to normal regulatory processes used to ensure compliance with NRC rules and regulations. The SALP program is intended to be sufficiently diagnostic to provide a rational basis for allocating NRC resources and to provide meaningful guidance to the licensee's management to promote quality and safety of plant operation.

An NRC SALP Board, composed of the staff members listed below, met on November 17, 1987, to review the collection of performance observations and data and to assess licensee performance in accordance with the guidance in NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance." A summary of the guidance and evaluation criteria used is provided in Section II of this report.

This report is the SALP Board's assessment of the licensee's safety performance at the San Onofre Nuclear Generating Station (SONGS) for the period of June 1, 1986 through September 30, 1987. This was a 16-month evaluation period.

SALP Board for San Onofre Units 1, 2 and 3:

- A. E. Chaffee, Deputy Director, Division of Reactor Safety and Projects, Region V (Board Chairman)
- R. P. Zimmerman, Chief, Reactor Projects Branch, Region V
- G. W. Knighton, NRR Project Director
- P. H. Johnson, Chief, Reactor Projects Section 3, Region V
- R. F. Fish, Chief, Emergency Preparedness Section (Division of Reactor Safety and Safeguards Representative)
- M. D. Schuster, Chief, Safeguards Section, Region V
- P. M. Qualls, Project Inspector, Region V
- F. R. Huey, Senior Resident Inspector, San Onofre
- R. F. Dudley, Jr., Acting NRR Project Manager
- D. W. Schaefer, Safeguards Inspector, Region V
- R. J. Pate, Chief, Reactor Safety Branch, Region V
- S. Richards, Chief, Engineering Section, Region V
- J. Russell, Senior Radiation Specialist, Region V
- G. M. Good, Emergency Preparedness Analyst, Region V

## II. CRITERIA

Licensee performance is assessed in selected functional areas, depending upon whether the facility is in a construction, preoperational, or operating phase. Functional areas normally represent areas significant to nuclear safety and the environment. Special areas may be added to highlight significant observations.

One or more of the following evaluation criteria were used to assess each functional area.

1. Management involvement in assuring quality

2. Approach to the resolution of technical issues from a safety standpoint
3. Responsiveness to NRC initiatives
4. Enforcement history
5. Operational and construction events (including response, analysis, and corrective actions)
6. Staffing (including management)

However, the SALP Board is not limited to these criteria and others may be used where appropriate.

Category 1: Reduced NRC attention may be appropriate. Licensee management attention and involvement are aggressive and oriented toward nuclear safety; licensee resources are ample and effectively used so that a high level of performance with respect to operational safety is being achieved.

Category 2: NRC attention should be maintained at normal levels. Licensee management attention and involvement are evident and are concerned with nuclear safety; licensee resources are adequate and are reasonably effective such that satisfactory performance with respect to operational safety is being achieved.

Category 3: Both NRC and licensee attention should be increased. Licensee management attention or involvement is acceptable and considers nuclear safety, but weaknesses are evident; licensee resources appear to be strained or not effectively used so that minimally satisfactory performance with respect to operational safety is being achieved.

### III. SUMMARY OF RESULTS

#### Management Overview

Overall plant performance was considered by the SALP Board to have improved during this period. The licensee has made significant enhancements to some programs in response to the previous SALP board report. A decline in performance was observed in two areas, and several other weaknesses were noted by the Board, as discussed further below.

Notable improvement was observed in the performance of operations activities, including a significant reduction in the number of automatic scrams in calendar year 1987. An increased emphasis on housekeeping has resulted in improvements in this area. In the surveillance and maintenance areas the use of computer systems has resulted in a reduction in the number of missed surveillances and in improvements in the IST program. Careful outage management has resulted in timely and effective completion of scheduled work and has minimized overlapping of unit outages. The licensee performed well in the area of training; SCE has completed INPO certification in all areas and has been accorded full membership status in the National Academy for Nuclear Training.

While these accomplishments indicate that San Onofre is becoming a mature facility, a need for improvement was identified in several SALP functional areas. Weaknesses were noted in the quality and thoroughness of engineering and technical support activities; these traits should be improved in a manner which builds on existing strengths of the engineering and technical staffs. Management should also require continued improvement in the root cause assessment program, take other actions to foster self-critical attitudes, and ensure active involvement of the various safety oversight groups. High levels of management attention should be maintained to provide improved adherence to procedures and NRC requirements. A need for more frequent management visits inside plant equipment areas was at times indicated. Although effective, Unit 1 procedures should also be improved to be more on a par with those of Units 2 and 3.

### Assessment Results

<u>Functional Areas</u>	<u>Performance Category</u>		
	<u>Previous SALP Period</u>	<u>Current SALP Period</u>	<u>Trend*</u>
A. Plant Operations	2	1	
B. Radiological Controls	1	2	Improving
C. Maintenance	2	2	
D. Surveillance	2	2	Improving
E. Fire Protection	1	2	
F. Emergency Preparedness	2	1	
G. Security and Safeguards	2	2	Improving
H. Outages**	1	1	
I. Quality Programs and Administrative Controls Affecting Safety	2	2	Improving
J. Licensing Activities	2	2	Improving
K. Training	2	1	
L. Engineering/Technical Support	-	2	

\* The trend indicates the SALP Board's perception of the licensee's performance during the current assessment period with emphasis on the latter portion of the period. It is not necessarily a comparison of performance during the current period with the previous period. NRC Manual Chapter 0516 states that discussion of performance trend should be reserved for those instances in which the Board believes it is necessary to focus NRC and licensee attention on an area because of a declining performance trend, or to credit licensee performance because of an improving trend.

\*\* NRC Manual Chapter 0516 describes outages as including all licensee and contractor activities associated with major outages. Thus, it includes refueling, outage management, major plant modifications, repairs or restoration of major components, and all post-outage startup testing of systems prior to return to service.

#### IV. PERFORMANCE ANALYSIS

The following is the Board's assessment of the licensee's performance in each of the functional areas and the Board's conclusions and recommendations with respect to licensee actions and management emphasis.

##### A. Plant Operations

###### 1. Analysis

During the SALP period, 1944 hours of direct inspection effort were applied in the area of plant operations. These inspection activities resulted in the identification of two violations. A Level IV violation was issued applicable to all three units in the areas of plant housekeeping and the seismic restraint of plant equipment, and a Level IV violation was issued applicable to Unit 1 for improper control of a modification to safety related plant equipment.

During the SALP period, Unit 1 had 13 LER's issued in the area of plant operations. Of these, 3 were due to operator error and one was the result of inadequate procedure. Unit 2 issued 12 plant operations-related LER's during the period. Of these, only one resulted from operator error, with 3 resulting from inadequate procedures. Unit 3 had 9 LER's issued in the area of plant operations, of which 4 involved operator error. Most other LERs were associated with design or equipment problems. Most of the 8 operations-related LERs involving personnel error resulted from inattentiveness or not following procedures, and indicate a need for improvement in these areas. Overall, however, the rate of occurrence (2 per unit per year) was reasonable and only one of these LERs (362/86-10) involved a unit trip or transient.

The SALP Board concluded that the licensee's approach to plant operation was generally conservative and safety-conscious. One exception was operation of Unit 1 in late July 1986 while the failure of pressure transducer PT-459 was being evaluated. In this case, the licensee continued to operate the facility after the steam/feedwater flow mismatch reactor trip was shown to be susceptible to certain single failures. At the time, licensee management was unaware that this reactor trip was relied upon by safety analyses for two transients - feedwater line break and loss of main feedwater. This is discussed further in Section IV.L.

Events at San Onofre were generally reported within the required time period. Reporting usually appeared to be accurate and complete. However, there were several instances in which the licensee did not perform an adequate root cause evaluation of the event. Significant examples, in this regard, include failure of a Unit 1 main feed pump, electrical grounds on a Unit 1 Vital DC bus, failure of Unit 2 power supplies and a Unit 2 low steam generator level trip. These concerns were

addressed during a May 1987 management conference with the licensee. The licensee implemented actions to correct this problem and the root cause evaluation associated with recent LER's was significantly improved.

The resident inspectors observed licensee operation of the units on a daily basis and noted that operators consistently demonstrated a thorough knowledge of plant conditions. When questioned by the inspectors, operators were able to quickly and accurately address equipment operability. In this regard, the licensee's technical specification action statement tracking (LCOAR) system was well managed and effective in ensuring availability of safety related equipment when required. The inspectors also noted that operators were generally conscientious in their attention to plant alarms, working to minimize the number of alarms and clearly understanding the significance of existing alarms. Licensee management was actively involved in daily plant operations, as well as in providing prompt and well organized coverage of plant events. Management has set an example of professionalism in their activities and the licensee has been responsive and straightforward in dealings with the NRC at all levels of interface. Frequent NRC resident interface with various levels of licensee supervision and management has generally indicated a clear understanding of technical issues involving plant safety. Plant operations have been conducted such that safety is a top priority. Staffing of the operations department, including management, has been good.

The units demonstrated improved on line reliability during the 486 day SALP period. Unit 1 experienced 3 reactor trips during 386 days of power operation (2 personnel errors and 1 equipment failure). Unit 2 experienced 8 automatic trips and one manual trip during 424 days of power operation (2 personnel errors, 2 design problem, and 5 equipment failures). Unit 3 experienced 3 automatic trips and one manual trip during 389 days of power operation (3 personnel errors and one design problem). Unit 1 had 42 days of forced outage (9%) during the period (approximately 80% due to equipment failures associated with the main feedwater pumps). Unit 2 had 16 days of forced outage (3%) during the period (approximately 60% due to instrument and control equipment failures). Unit 3 had 6 days of forced outage (1%) during the period (mostly due to personnel errors associated with the trips noted above). Notwithstanding this discussion of trips and forced outage rates, plant performance was observed to have improved notably during the latter portion of the SALP period.

One effort wherein the licensee demonstrated management involvement in improving plant operational performance was the establishment of the Trip Reduction Task Force (TRTF). The task force commenced operation on November 1, 1986. The effort was initiated in response to the fact that unplanned unit trips are a significant contributor to the perceived and real

performance of the units. A compilation of plant trip data for the recent past was conducted to identify trip rates for each unit and for the station as a whole, indicating that trip histories were not improving. As a consequence, the objective of the task force was to reduce unit trips in the second half of 1987 to a frequency of less than 0.25 trips per month, which represented a four-fold reduction in the rate of unplanned trips in all the three units at San Onofre.

The first quarter of 1987 demonstrated the impact of the TRTF efforts, the largest contributor of which was heightened awareness throughout the licensee's organization of its continued commitment to reducing the number of unplanned trips in all three San Onofre units. On May 20, 1987, San Onofre achieved the statistical objective of one trip during a period including four operating months. During the last 9 months of the SALP period (January - September 1987), a total of 3 automatic reactor trips (one per unit) were experienced. One manual trip also occurred on Unit 2 (resulting from loss of feedwater) to give an overall rate of 0.44 trips per month during this period. Although higher than the licensee's goal, this still represented significant improvement over 1986.

2. Conclusion

Performance assessment - Category 1. Performance in this area during the early portion of this SALP period is considered to have been category 2. However, significant improvement was observed during the latter portion of the period (i.e., calendar year 1987).

3. Board Recommendation

Although improvement has been observed since the previous SALP period, the board recommends continuing management emphasis on trip reduction, procedure compliance, and housekeeping.

B. Radiological Controls

1. Analysis

A total of 8 inspections were conducted by the Facilities Radiological Protection Section during the appraisal period. A total of 991 hours were expended in the areas of occupational exposure during outages, external exposure control and dosimetry, internal exposure control and assessment, solid waste, liquid waste, gaseous waste, low level waste facilities, control of radioactive material, water chemistry control, confirmatory measurements, training and qualification, organization and management, ALARA and follow-up of licensee events. In addition, the resident inspectors provided continuing observations in these areas.

During the previous SALP period the licensee was rated as a Category 1 performer with no violations or deviations noted in the period. During this appraisal period, 7 violations (three severity level III and four severity level V) associated with radiological control were identified. This represents a significant decline in performance. The severity level III violations were associated with an irradiated fuel particle (IFP) control problem and indicated a programmatic weakness in the area of radioactive material control. Escalated enforcement action was taken and a monetary penalty imposed for these violations. The licensee's response to the violations was comprehensive and indicated a commitment to reestablishing an exemplary program. The severity level V violations were isolated occurrences involving the labeling of radioactive materials and the inventory of radioactive sources. These indicated a lack of attention to detail. One unresolved item was identified, relating to the ability of the licensee's whole body counting system to detect internally deposited IFPs. No deviations were identified.

There was evidence of consistent management involvement in planning and in the assignment of priorities. Licensee procedures currently provide explicit control of activities. Radiation control policies are well stated, disseminated and understood. Records were generally complete and well maintained but were not always easily accessible through the licensee's archival system. Procedures and policies were occasionally not followed but corrective actions were typically effective and addressed the root cause of the problem. Licensee management has supported the radiological control activities by the development of effective training programs and support of industry professional activities. The licensee reduced liquid effluents by a factor of thirteen between 1985 and 1986 and is now in the top 25% of PWRs in minimizing liquid effluents, as indicated by INPO statistics. This program has been effective in establishing realistic goals and minimizing personnel exposures. The average annual exposure for a PWR is 392 person-rem, which would indicate a cumulative expected total of 1176 for a three-unit site. Total exposure at SONGS for 1986 was 824 person-rem.

Early in the evaluation period, the licensee was slow to respond to some indication of potentially safety significant problems. More recently, the licensee has demonstrated a clear understanding of issues when the potential for safety significance exists and conservatism is generally exhibited in their resolution. The approach to technical issues is generally sound and thorough but resolution is occasionally slow. The licensee has developed a comprehensive IFP control program that is a standard in the industry but its full implementation was not accomplished until after contamination of the facility had occurred, some particles had been released from the site and an apparent extremity overexposure had occurred. The initial underresponse of the licensee to the IFP

problem was corrected only after the events noted above, although a contributing factor may have been the unprecedented nature of the problem.

The licensee is generally responsive to NRC initiatives. Responses are commonly thorough and technically sound although some are slow. Currently, concerted efforts are being made by the IFP task force to ameliorate the particle problem and a great deal of attention is being focused on reducing the number of spurious containment and fuel handling building isolations. Both actions are in part a result of concerns expressed by the NRC. Problems have also been noted in the licensee's computer software systems which could have significant impacts on safety. The licensee has systematically undertaken validation, verification and documentation of software affecting safety. Completion of this effort is expected to take two more years.

Significant operational events have occurred in the radiological control area which were attributable to causes under the licensee's control. Such events were properly identified and analyzed but were not always reported in a timely manner. An overexposure of a worker's hand was not promptly reported and this item was one component of the above noted enforcement action. There has also been a steady increase in the number of containment and fuel handling building isolations due to spurious monitor indications at Unit 2. The licensee has initiated a concerted effort to eliminate these spurious actuations and these efforts appear to be comprehensive and to be addressing the root cause.

The licensee has an excellent staff with key positions identified and responsibilities well defined. Vacancies are filled in a reasonable time and there is a high level of expertise within the organization. The licensee has also obtained extensive consultant support when specialized technical issues arise. Front line contractor support for Unit 2 has recently been inadequate, however, and extensive use of overtime has been necessary. This has had a negative impact on outage support. The licensee appears to be making every effort possible to correct the problem.

Overall, the licensee has demonstrated a dedication to exemplary radiological controls as a necessary and important part of their operational program and has dedicated significant resources toward the expeditious resolution of NRC concerns.

## 2. Conclusion

Performance assessment - Category 2. A declining trend was observed at the beginning of the SALP period but recent efforts indicate that this trend has been reversed.

### 3. Board Recommendation

The licensee should continue strong support of the radiological control program and intensify efforts to assure increased attention to detail in program development and implementation by increased management oversight. Licensee management should strive to assure responses to off-normal conditions are realistic and timely. The staff should also complete efforts to reduce the number of spurious actuations of engineered safety systems associated with radiation monitoring equipment.

## C. Maintenance

### 1. Analysis

During the SALP period 700 direct inspection hours were applied in the area of plant maintenance. These inspection activities resulted in the identification of three violations. Two Level IV violations were issued applicable to Unit 1, involving failure to comply with maintenance procedures and failure to provide adequate procedures for performing instrument and control maintenance. A Level V violation was issued applicable to Unit 3, resulting from improper review of a completed maintenance procedure.

The resident inspectors routinely monitored licensee maintenance activities, paying particular attention to the adequacy of issued procedures and compliance with those procedures. The inspectors also evaluated the adequacy of licensee programs to ensure proper clearance of equipment, timely performance of required maintenance, proper quality control of safety related materials and adequate post maintenance testing. Licensee management was actively involved in scheduling and coordinating station maintenance activities, although a need for more management presence in the plant during maintenance activities was at times indicated. Licensee management was very aggressive in addressing NRC concerns relating to maintenance activities; however, as discussed below, the licensee experienced difficulty in resolving some of these concerns. In almost all cases the licensee took a technically sound and thorough approach to maintenance work. The licensee did a good job of prioritizing maintenance activities and the staff has been effective at minimizing backlogs. In this regard, the licensee's automated maintenance tracking system (SOMMS) was very effective and contributed significantly to the licensee's ability to efficiently schedule and complete maintenance backlogs when changing plant conditions provide the opportunity. The staffing of licensee maintenance activities has been adequate in the number and qualifications of personnel.

During the previous SALP period, one concern in the area of plant maintenance involved an occasional lack of formal and rigorous approach to safety related maintenance activities by

first line supervision. This concern was highlighted during the previous period by the improper repair of a Unit 1 auxiliary feedwater pump that subsequently contributed to failure of the pump. This concern continued into this SALP period, as evidenced by supervisory involvement in the Unit 1 procedure violations noted above and by several plant events (discussed below) involving poor performance by maintenance personnel. These procedure violations are of particular concern in that they involve the same type of basic maintenance program administrative requirements as those involved in the earlier auxiliary feed pump incident. Corrective maintenance problems were recently noted at Unit 2 when an improperly grounded containment radiation monitor caused a large number of spurious containment purge isolations. This condition appears to have existed since plant startup in 1982.

During the SALP period, Unit 1 had 5 LER's issued in the area of plant maintenance. All but one of these were the result of procedure noncompliance or poor workmanship. A review of Unit 1 forced outages noted that 3 of 5 forced outages involving main feedwater pump deficiencies were the result of improper maintenance (incorrect installation of a bearing seal, failure to install an orifice and improper torquing of a jam nut).

Unit 2 experienced 5 maintenance related events involving inattention by maintenance personnel or poor workmanship. Unit 3 issued 4 maintenance related LER's involving poor workmanship or inadequate procedures. The failure of a Unit 2 shutdown cooling system valve and the resultant non-isolable reactor coolant system leak emphasized several NRC concerns in the area of the proper control of maintenance activities. This event was initiated when excessive force was applied to the valve handwheel using an extension tool that was specifically prohibited by valve operating procedures and was not authorized by the applicable maintenance procedure. The event also highlighted broader concerns involving the adequacy of licensee administrative controls over maintenance activities and the adequate coordination of other plant disciplines involved in maintenance activities. For example, was operations involvement in maintenance preparations adequate for work on a non isolable valve in a pressurized primary system; or was cognizant engineer involvement in work preparation adequate to properly address the problem of possible boric acid corrosion of valve components? The resident inspectors have raised several concerns along these lines with the licensee. Senior licensee management has stated that they have similar concerns. However, since this event occurred late in the SALP period, these issues are still in the process of being evaluated. Specific concerns under consideration include the adequacy of control over the shift supervisor's accelerated maintenance (SSAM) process. The adequacy of coordination among cognizant engineering, operations and maintenance personnel is also being reviewed.

2. Conclusion

Performance assessment - Category 2.

3. Board Recommendation

Licensee management should provide additional emphasis on a high standard of performance by maintenance supervision. The licensee should continue ongoing efforts to improve the quality of all maintenance procedures, especially in efforts to make the Unit 1 procedures of a quality equal to the Units 2 and 3 procedures. Site management should carefully evaluate the adequacy of controls currently implemented in the area of shift superintendent accelerated maintenance (SSAM), and assess the effectiveness of coordination among the various departments involved in maintenance activities.

D. Surveillance

1. Analysis

During the SALP period, 585 hours of direct inspection effort were applied in the area of plant surveillance, resulting in the identification of three violations. A Level II violation (inoperable Auxiliary Feedwater Flow Path) and a Level III violation (inservice testing program deficiencies) were issued during this SALP period related to the Unit 1 feed line water hammer event which occurred and was addressed during the previous SALP period. A Level IV violation which occurred during this period, applicable to Units 2 and 3, involved failure to comply with station procedure requirements for calibration of radiation monitoring equipment.

During this SALP period, a total of 12 LER's were issued among the three units in the area of surveillance related activities. Of these, 6 involved inadequate procedure and 4 involved procedure noncompliance or personnel inattention. This is a significant reduction from the 29 surveillance related LER's issued during the previous SALP period.

Licensee management has been actively involved in correcting the inservice test (IST) program deficiencies identified following the Unit 1 water hammer event. The licensee was responsive to NRC initiatives in this regard and the entire IST program has been revised and carefully monitored to minimize the opportunity for recurrence of problems similar to those which resulted in the water hammer. An NRC team inspection reviewed the revised program in June 1987 and confirmed licensee corrective actions.

The resident inspectors have periodically reviewed the licensee's program for followup and trending of failed surveillances and noted that corrective actions were promptly

implemented where warranted. Staffing of surveillance related activities has been adequate.

As discussed further in Section IV.L of this report, the licensee was cited for improper surveillance testing of Unit 1 safety related batteries. A fundamental concern raised by this violation involved the adequacy of administrative controls implemented by the licensee for ensuring that the battery design basis is properly maintained by the station technical organization. A review of licensee surveillance activities associated with periodic calibration of emergency diesel generator relays also identified concerns related to the adequacy of specified tests to detect improper deviations in equipment performance from design requirements. In this instance, licensee surveillance tests did not properly document or trend as-found conditions when performing calibration of time delay relays.

2. Conclusion

Performance assessment - Category 2.

3. Board Recommendation

Licensee management should place additional emphasis on reducing the number of instances of surveillance deficiencies involving inadequate procedures. Additional emphasis is also warranted in ensuring procedural compliance and operator attentiveness.

E. Fire Protection

1. Analysis

During this assessment period, two inspections were conducted in the area of fire protection. One inspection was conducted to assess Unit 1 compliance with the requirements of Appendix R to 10 CFR 50. The other inspection was conducted to assess the compliance of all three units with the NRC's routine fire protection program requirements and to follow up on previous licensee and NRC identified open items. In addition, the project and resident inspectors provided continuing observations in this area.

In Units 2 and 3 a number of Safe Shut Down (SSD) fire protection issues were identified by the inspectors during this SALP period and remained unresolved at the end of the period. The SSD program for Units 2 and 3 was still undergoing licensing review with NRR at the end of the period and these issues were not addressed in this report. NRR plans to issue a Safety Evaluation Report (SER) in early 1988, and assessment of Safe Shut Down issues will accordingly be included in the next SALP evaluation.

In general, the licensee's implementation of fire protection program requirements was determined to be satisfactory in the areas assessed. The inspectors' assessment recognized the effort expended in this area to achieve Unit 1 compliance with Appendix R and cited strengths in the licensee's assignment of responsibilities for routine program implementation to qualified individuals. In particular, a full-time site fire department has been provided and has responded effectively to fires reported or experienced at the station. The Quality Assurance program was assessed as being effective in performing its function to verify fire protection system reliability in the areas covered by audits, and technical specification surveillance testing was determined appropriate to satisfy system design and readiness requirements. However, the inspectors observed deficiencies and areas wherein improvements should be made in order to achieve a stronger fire protection program. These are summarized as follows:

- A violation was identified at Unit 2 regarding the absence of fire blanketing material in a cable raceway. The licensee's response to the violation appeared appropriate and thorough, in that approximately 200 additional discrepancies between the plant raceway schedule and the actual plant configuration were identified by the licensee's review. Although followup to the violation was good, the licensee later determined that all the deficiencies were not corrected in accordance with their commitments to the NRC.
- Later in the assessment period, the inspectors observed that the cable tray fire blanket material in several plant areas was worn, deteriorated, or otherwise disturbed, such that the ability of the material to provide the intended protection was questionable. The licensee has indicated an intent to replace these barriers with a more durable material.
- A violation was identified at Unit 3 regarding grinding work being performed with an expired Flame Permit. Additionally, the violation cites that the firewatch did not have a fire extinguisher readily available, the Flame Permit was improperly posted, and the worker performing the grinding recommenced grinding after the firewatch left the area to reestablish the Flame Permit. The worker had been informed by the firewatch that the Flame Permit had expired.
- A violation was identified at Unit 1 regarding housekeeping practices. While this violation is considered to be primarily applicable to the SALP Functional Area of Plant Operations, the violation also reflected on the licensee's implementation of the fire prevention program. Additionally, on several occasions during this assessment period, inspectors have questioned

the appropriateness of leaving miscellaneous flammable materials in safety related areas unattended for significant periods of time. The licensee's response has often been to prove that the fire loading in the room was maintained less than that assumed in the Fire Hazards Analysis, rather than to approach the issue from the aspect that fire loading should be maintained as low as feasible.

- o The inspectors identified an issue associated with fire door installation for the new multi-purpose laundry facility. This facility is located between the Unit 2 and 3 penetration buildings, with a door at each end. The licensee's original design indicated that the doors were required to be Technical Specification fire doors. However, when questioned by the inspectors regarding what appeared to be inappropriate control of the doors, the licensee's initial response was to reassess whether the doors should be classified as Technical Specification fire doors, rather than focus on the circumstances that resulted in the concern being raised.

The above items indicate a need for the licensee to reemphasize to employees the importance of adhering to the basic principles of fire prevention. The licensee's response to several issues indicates that the licensee's staff in this area is apparently more oriented towards compliance with regulatory requirements, rather than being focused on determining where advances in performance can be made.

## 2. Conclusions

Performance Assessment - Category 2

## 3. Board Recommendation

The board recommends that the licensee continue to devote comprehensive management attention to its commitments and responsibilities in this area. In addition to focusing on implementation of routine fire protection program requirements and their interaction with other elements of plant operations, commitment and resources should be dedicated to expeditious implementation of plant modifications and procedures needed to meet licensing requirements associated with Appendix R, which are presently under NRR review.

## F. Emergency Preparedness

### 1. Analysis

Region V conducted a total of seven emergency preparedness inspections during this appraisal period. Two of these involved the routine inspection program. Three special inspections were performed: one to evaluate Unit 1's Emergency

Response Facilities (Supplement 1 to NUREG-0737); one to follow up on an unresolved item identified during the routine inspection program; and one to evaluate/observe the licensee's annual medical emergency drill. The 1986 and 1987 annual emergency exercises were also observed during this appraisal period. State and local authorities participated in the 1987 exercise. Additionally, revisions to the licensee's Emergency Plan (EP) and Emergency Plan Implementing Procedures were reviewed. A total of 603 hours of direct inspection effort were expended in the area of emergency preparedness. No violations of NRC requirements were identified during this inspection effort.

The inspections during this appraisal period showed that licensee management has been consistent in its support of the emergency preparedness program. Noteworthy examples include the newly operational state-of-the-art radio system that will significantly enhance in-plant/field communication capabilities during emergencies. Additionally, the emergency preparedness staff members have been provided with personal computers to connect them with the site-wide electronic mail system. This electronic mail system should make inter-departmental communications more efficient. Some difficulties associated with the emergency preparedness staff's awareness of significant plant activities were noted in the previous SALP report. With respect to communications with the NRC during emergencies, the licensee has committed to provide Senior Reactor Operator personnel to man the Emergency Notification System telephone at an alert or higher classification.

The licensee's training program for emergency response personnel is well established and clearly documented. Drills and exercises have been a major part of the training program. Subsequent to the 1986 exercise, the licensee took corrective actions to resolve issues involving coordination of protective action recommendations, event classification and issuance of news releases. Corrective action, in one case, involved a major shift in responsibilities of certain key emergency response personnel. These areas were satisfactorily demonstrated during the 1987 exercise. Weaknesses identified during the 1987 exercise involved contamination control in the Operations Support Center, notification of in-plant workers, and radiological controls in the Emergency Operations Facility. Examples of over-simulation were identified during the observation of the most recent medical drill and the 1987 exercise. The licensee's program for addressing these weaknesses should provide for appropriate corrective action. It should be noted that licensee management has supported quarterly integrated drills (involving activation of all emergency response facilities). Given the basic nature of some of the annual exercise findings, it would appear that the hands-on/drill portion of the licensee's training program could be strengthened.

In general, the licensee has been responsive to NRC initiatives; however, during this appraisal period, there were a couple of occasions when the licensee's responsiveness wavered. One was associated with review of a change to the licensee's EP. Questions/concerns which resulted from the Region V review were initially discussed with licensee personnel on July 30, 1987. Final resolution of all concerns was accomplished on October 28, 1987. On occasion, the licensee has resisted taking the initiative to correct identified problems.

No significant operational events have occurred relevant to the functional area of emergency preparedness. The staff assigned to the emergency preparedness program is above average in numbers and includes individuals with operations, health physics and communications expertise.

Overall, the licensee has maintained an effective emergency preparedness program. The program includes all areas associated with responding to an emergency. Management has actively supported the program. Generally, the licensee has addressed needed improvements in a timely manner.

2. Conclusion

Performance assessment - Category 1

3. Board Recommendation

Licensee management is encouraged to maintain its support of the emergency preparedness program. Emphasis should be placed on trying to improve exercise preparation, control and performance. The licensee should also be more critical of performance demonstrated during the quarterly practice drills.

G. Security and Safeguards

1. Analysis

During this assessment period of June 1, 1986, through September 30, 1987, six safeguards inspections and one safeguards-related enforcement conference were conducted. One inspection was a material control and accounting inspection and the remaining five were physical security inspections. A total of 335 hours of direct inspection effort were conducted by regional inspectors. In addition, resident inspectors provided continuing observations in the physical security area.

With regard to management involvement in assuring quality, the licensee has been continually involved in the implementation and review of the overall security program and has implemented remedial measures to correct self-identified deficiencies, as well as deficiencies identified in the course of the NRC security inspections. During this assessment period, the

licensee upgraded the radio communication system for the Security Division. This new multi-channel computerized system was designed to also support other site functional areas. Additionally, the Security Division has upgraded its security computer access control system and the security perimeter detection system.

The security management has demonstrated a continuing effort, in coordination with other plant staff, to identify and resolve safety/security problems at San Onofre. On-duty plant operators continue to carry a set of security keys for the locked and alarmed vital areas, thereby insuring their immediate entry to all plant vital areas in the event of any emergency.

During the current assessment period, six information notices related to security were issued. The licensee's actions, as reviewed to date, were appropriate. The licensee has devoted continued and successful effort towards the concerns addressed in Information Notice 86-83, titled: Underground Pathways into Protected Areas, Vital Areas, Material Access Areas and Controlled Access Areas.

On December 3, 1986, Region V issued a Confirmatory Action Letter in response to two separate events occurring three days apart, related to unauthorized tampering with lens covers on five switches inside a Unit 1 vital area, and the unauthorized manipulation of ten non-safety related circuit breakers inside a Unit 3 vital area. The plant management, with assistance from Corporate Headquarters and the FBI, investigated all circumstances surrounding these events, interviewed sixty employees, and met all of the provisions and requirements of this Confirmatory Action Letter. Similar events of this nature have not recurred.

The enforcement history for this assessment period identified a total of three violations. One Level-III violation pertained to the licensee's failure to adequately respond to a reported threat situation on site; a Level-IV violation pertained to the licensee's failure to notify the NRC of this threat situation. The Level-V violation pertained to the licensee's failure to properly notify the NRC of two changes made to the security program as governed by the approved security plan. All three violations occurred early in this assessment period.

The five physical security inspection reports issued during this assessment period discussed 115 security events that had been previously identified by the licensee, and were properly reported to the NRC Operations Center pursuant to 10 CFR 73.71(c). The majority of these events (72%) pertained to security card keys that had either been lost, found, or misissued at the site. Five of these security events, which occurred very early in the assessment period, related to watchpersons posted at vital area doors and the failure of

these watchpersons to properly control employee access to the vital areas. Additionally, during the first half of this assessment period, the licensee reported inability to account for one copy of the approved security plan. After extensive investigation, the licensee concluded that this copy of the security plan had been inadvertently discarded with office trash and had been buried at the county landfill. The overall significance of the licensee's loss of a copy of the security plan was reduced by the circumstances surrounding the loss, together with the licensee's total investigative efforts and extensive corrective actions, which included necessary changes to the security plan and contingency plan.

With respect to staffing, the licensee's total security staff was effective in fulfilling commitments. During this assessment period, the licensee has reduced the use of contract security personnel to the extent that the uniformed security force is almost totally proprietary. The security training and qualification program was adequate to provide security personnel with the knowledge and practical application of their responsibilities necessary to conduct the security program in accordance with established commitments.

2. Conclusion

Performance assessment - Category 2. An improving trend was observed.

3. Recommendations

The licensee should provide continued management attention and commitment in maintaining the security program, with a goal of reducing; (a) the number of enforcement actions and (b) the number of reportable security events.

H. Outages

1. Analysis

During the SALP period, 195 hours of direct inspection effort were applied in the area of outages. No violations specifically attributable to outage activities were identified during these inspections.

The licensee has continued to do an excellent job in the area of plant outages. During this SALP period, a total of 258 days of unit outage related activities were accomplished at San Onofre (Unit 1 - 100 days, Unit 2 - 62 days and Unit 3 - 96 days). Many of these activities overlapped, requiring close management attention and careful control and utilization of resources. This SALP period included a reactor coolant pump seal replacement outage on Unit 3, refueling outages on Units 2 and 3 and a mid cycle outage on Unit 1. Station management has done a good job of staffing, organizing and coordinating

activities between the station maintenance and project support organizations.

Station management continues to be actively involved in unit outage activities and has demonstrated a strong sense of leadership and high standards. The only significant criticism noted by the resident inspectors during this SALP period involved deficiencies and poor work practices associated with the initial implementation of the licensee's fuel fragment control program during the Unit 2 refueling. The licensee took prompt and aggressive corrective action in response to the NRC concerns.

No LERs were issued during the SALP period involving outage related activities. Also, no problems were identified associated with foreign material exclusion control or with control over contractor activities. These areas were noted as problem areas during the previous SALP period, and the licensee has made significant improvements in these areas.

2. Conclusion

Performance assessment - Category 1.

3. Board Recommendation

None.

I. Quality Programs and Administrative Controls Affecting Quality

1. Analysis

During this SALP period, 574 hours of direct inspection effort were applied in the area of quality programs and administration. One Level III violation was cited and a \$50,000 civil penalty was imposed for inadequate corrective actions associated with a noise in a Unit 1 feedwater line. Although cited during this SALP period, this violation was related to events which occurred during the previous period.

The licensee has defined and implemented a strong quality assurance organization. Senior licensee management is strongly committed to an aggressive and effective quality assurance and quality control program. Quality program related activities appear to be adequately staffed and current licensee efforts to shift quality assurance organization emphasis from that of an "in-line" organization to that of a more independent overview organization appear to be well organized and controlled. However, the staff considers that there is a need to improve the aggressiveness and involvement of the quality assurance organization and site oversight committees in the problem identification and correction process employed to assess the adequacy of the licensee's activities.

One of the quality program weaknesses noted in the wake of the Unit 1 water hammer event was a tendency on the part of the quality assurance organization to emphasize rote compliance with detail requirements at the expense of periodic overall reassessment of the adequacy of specific programs for accomplishing their intended functions. This concern continued during this SALP period; however, the licensee has recognized this problem and has implemented several organizational changes to correct it.

In this regard, more of the mechanics of quality assurance and quality sensitivity are being emphasized within the various in-line site organizations, allowing quality assurance resources more flexibility to emphasize a broader and more independent quality assurance role on site. Examples of this shift include the transfer of foreign material exclusion (FME) responsibilities to the maintenance organization and non-conforming requirements (NCR) management to the station technical group. This effort to increase quality responsibility and sensitivity within the first line organizations that are directly responsible for the safety product is seen to be an important step in correcting some of the quality program deficiencies that have been noted during the SALP period. For example:

- a. The failure of Unit 2/3 auxiliary feedwater system valves 2HV-4730 and 3HV-4706, in addition to several other licensee event evaluations discussed in NRC inspection reports, provided significant examples of poor root cause evaluation and inadequate corrective actions by the licensee. This problem area has been the subject of extensive NRC review and discussion with licensee management throughout the SALP period. The licensee has acknowledged the need for improvement in this area and has implemented several measures within the quality assurance organization and individual site disciplines to correct the problem. Recent licensee efforts to evaluate the failure of a Unit 2 shutdown cooling valve (2HV-9378) appeared to be an indication of renewed licensee commitment to aggressive root cause followup.
- b. The licensee performed additional evaluation of the environmental qualification of Limitorque valve actuators in response to resident inspector questioning of the qualification basis for the use of internal space heaters. This is discussed further in Section IV.L of this report. The resident inspector review also noted other concerns relating to the adequacy of licensee implementation of the quality program for motor operated valves (MOVs), such as the failure to properly initiate Nonconformance Reports (NCRs) to address observed deficiencies on MOV internal wiring.

- c. Several examples of problems involving inadequate licensee procedures were identified during this SALP period. In addition to 15 LER's involving inadequate station procedures which contributed to an event, the resident inspectors addressed several concerns involving the adequacy of procedures for performing instrument calibrations, rigging attachments to safety related equipment, trending of as found surveillance conditions, and improper control of shift superintendent accelerated maintenance (SSAM) activities.
- d. During this SALP period the licensee performed and submitted a number of evaluations responding to questions raised by the staff concerning SCE evaluations of San Onofre 2 design against the requirements of 10 CFR Appendix R. These responses have been timely. The SER for this fire protection evaluation is currently scheduled for issuance in January 1988.

Licensee management appeared to be sensitive to the current deficiencies in site quality programs and seems to be moving in the right direction towards correcting the underlying problems.

## 2. Conclusion

Performance assessment - Category 2. An improving trend was observed.

## 3. Board Recommendation

The licensee is urged to improve the aggressiveness and involvement of the quality assurance organization and oversight committees in providing early identification and correction of potential problem situations before these manifest themselves in undesirable events. The licensee is encouraged to clearly define the specific goals for quality program improvement during the next SALP period, publicize these goals to all involved licensee personnel, and aggressively monitor progress towards meeting the goals.

## J. Licensing Activities

### 1. Analysis - Unit 1

Licensing activities during the beginning of the rating period were dominated by efforts to complete the NRC staff's restart evaluation following the November 21, 1985 loss-of-power/water hammer event.

Shortly after restart, the failure in late July of a pressure transmitter disabled the steam/feedwater mismatch reactor trip circuit and indicated the need for additional single-failure studies and certain revised transient analyses. Since previous licensee submittals had indicated that this reactor trip was

single-failure proof, the event showed evidence that prior licensee review activities were not thorough and technically sound. The licensee responded promptly by reanalyzing the loss of feedwater and feedwater line break events to show acceptable results by relying on other reactor trip signals. However, on April 30, 1987 the licensee identified an error in the revised feedwater line break analysis which necessitated a more complicated reanalysis. Again the licensee promptly responded with a new analysis which demonstrated a clear understanding of the technical issues and conservatism when the potential for safety significance exists.

In October 1986 the licensee reopened a significant licensing issue by informing the NRC staff that as the result of cost-benefit analysis, SCE no longer planned to install a dedicated safety injection system in accordance with a commitment made in September 1982. To support this position, the licensee provided detailed reliability and cost-benefit studies of the existing and alternative systems. In this case, although understanding of the issues is apparent, the licensee's actions have significantly delayed resolution of the issue.

In support of Systematic Evaluation Program (SEP) efforts, the licensee has shown a good understanding of the issues and has generally exhibited conservatism when the potential for safety significance exists. Responses generally provide sound and thorough approaches; however, they have not always been timely.

The licensee's performance on routine licensing actions, amendments, etc. is generally good and does not usually result in longstanding regulatory issues. Prior planning and assignment of priorities is generally evident and sound, and thorough approaches are generally proposed. Corporate management is frequently involved in licensing activities and decision making is usually at a level that ensures adequate management review.

#### Analysis - Units 2/3

During the appraisal period, San Onofre Unit 2 entered and completed its third cycle of commercial operation and commenced its third refueling outage. Unit 3 completed its second cycle of commercial operation, refueled, and commenced cycle 3.

Licensing activities were focused on issuance of a number of technical specification and license condition changes requested by the licensee. A total of 19 proposed changes were issued for San Onofre Unit 2 and 20 proposed changes were issued for Unit 3. This was accomplished by the issuance of twelve license amendments for each unit.

The licensee's performance on license amendment requests and other licensing actions was generally good during the appraisal

period. Planning of submittals and the maintenance of a current priority status list for pending actions evidenced the licensee's management involvement in assuring quality.

The licensee's docketed submittals during the appraisal period were sufficiently thorough and complete that staff requests for additional information were not usually necessary. This demonstrated the effectiveness of the licensee's technical approach to resolving safety issues. Further, the licensee showed adequate responsiveness to NRC initiatives in the resolution of safety issues.

2. Conclusion

Performance Assessment - Category 2. An improving trend was observed.

3. Recommendations

The Board recommends that the licensee review the current SEP submittal schedules and propose new schedules consistent with resource availability.

K. Training and Qualification Effectiveness

1. Analysis

The evaluation of the functional area of Training and Qualification Effectiveness consisted of observations from Operator Licensing lead examiners, as well as resident, region-based, and team inspectors. The licensed operator training programs have been fully accredited, and individual training records of the plant staff were well maintained. The licensee has provided good training facilities, including a plant specific simulator for units 2 and 3, and modern classrooms with audio/video/visual aid equipment.

Operator Licensing examinations during this assessment period identified a general weakness in management involvement in assuring the quality of training materials supplied to initial operator license candidates for Unit 1, as well as material supplied to the NRC for developing these examinations. During the preparation of written examinations and the subsequent examination reviews, the facility references were found to be marginal for the development of objective NRC examinations. NRC Examiners identified specific cases of out-of-date information, incomplete data, and the exclusion of key information. Two examples of out-of-date information were related to the alarm function for Operational Radiation Monitor System detector R-1214 and conditions that will cause a main turbine runback.

NRC Operator Licensing Examiners also identified training weaknesses during the operating portions of examinations conducted during this assessment period, as follows:

- a. Operator knowledge of portable radiological instrumentation.
- b. Operator understanding of spent fuel handling equipment.
- c. Operation of the hydrogen recombiners.

Once these areas of concern were identified to the facility training staff, the licensee was generally responsive to NRC initiatives as evidenced by acceptable resolutions to the examination process for all of licensing examinations conducted during this assessment period.

The overall effectiveness of the facility's licensing requalification training program was found to be satisfactory. No violations or LER's were issued in this functional area. Finally, staffing for this functional area was satisfactory. Personnel were experienced, the licensee placed minimal reliance on contract personnel, and turnover was low with key positions rarely vacant.

During this evaluation period, two requalification and four replacement examinations were administered at San Onofre. The replacement examination results indicated a pass rate consistent with the national pass rates for initial operator candidates.

In the area of non-licensed operator training, the licensee has performed well. The licensee completed INPO certification in all training areas, with the final acceptances occurring in June 1987, and was one of the first licensees to complete this certification. As a result of achieving this accreditation in all 10 areas, the licensee was accorded full membership in the National Academy for Nuclear Training. The licensee's quality control organization has also taken a leadership role in providing a comprehensive and standardized quality control technician training program for U. S. nuclear utilities.

2. Conclusion

Performance assessment - Category 1.

3. Board Recommendations:

The licensee should provide continuing management involvement to assure quality in all areas of the operator licensing training program, particularly in the incorporation of plant/industry experience into training programs (feedback). The licensee should continue efforts to improve in maintenance training and to improve the Unit 1 training materials.

L. Engineering/Technical Support

1. Analysis

During the SALP period approximately 220 hours of direct inspection effort were applied to the Engineering/Technical Support area. Region-based inspectors and two regional team inspections assessed engineering/technical support activities, and the resident inspectors provided continuing inspection coverage in this area, particularly in assessing the licensee's followup of plant events. These inspection efforts identified one Severity Level IV violation related to the Engineering/Technical Support area, involving failure to update a Unit 1 battery surveillance procedure to account for additional battery loads.

A total of 28 LERs were associated with Engineering/Technical Support activities. Most of these, particularly for Units 2 and 3, involved spurious actuations of engineered safety features (ESF), including containment, fuel building, toxic gas, and control room isolation systems. Other LERs included two Unit 2 trips caused by rod control system problems, a single failure in the Unit 1 RPS, failure of environmentally qualified components, and a failed mechanical snubber.

A number of instances have identified weaknesses in engineering and technical support of plant activities. While some have related to long-standing unresolved technical issues, others have involved weaknesses in implementing administrative controls or in following generally accepted engineering practices. The following are examples:

- ° One long-standing unresolved technical issue is the excessive number of spurious ESF actuations experienced, particularly in Units 2 and 3. Of the 26 LERs associated with this functional area, 22 reported spurious ESF actuations, with most of the 22 reporting two or more such actuations. These present unnecessary distractions to operating personnel and cause excessive starting cycles on safety-related systems and components.
- ° In July 1986 the failure of Unit 1 main steam pressure transmitter PT-459 caused a simultaneous loss of the steam flow/feed flow mismatch signal to all three reactor trip channels. While the incomplete analysis which failed to identify this vulnerability to single failure occurred well before this SALP period, the licensee's engineering and technical reviews after discovery of the problem also lacked rigor and thoroughness. After completion of repairs, the licensee continued with plant operation based on an incorrect belief that safety analyses did not take credit for the flow mismatch trip. Although the licensee believed that the pressurizer high level trip at 70% would provide backup protection for loss of feedwater, this belief was also determined to be incorrect. In addition, an initial assumption regarding a backup trip on low RCS

pressure (in the event of main feed line break) was later determined to be in error.

- o The one violation noted above involved failure of engineering personnel processing design changes to provide feedback to plant staff personnel for incorporation into plant procedures. In this case, a design change added additional load to a Unit 1 battery, but engineering personnel completing the associated documentation checklist indicated that no procedure changes were required. As a result, the battery load profile was not modified in the related surveillance test, and the battery was subsequently tested with incorrect loading.
- o Inadequate guidance or direction was given to craft personnel who installed new environmentally qualified electrical penetrations in Unit 1 in early 1986. As a result, the fragile insulation on the conductors was damaged in a number of cases, requiring extensive reinspection and repair.
- o In response to questions from the resident inspector about the use of internal space heaters, the licensee performed additional evaluation of the environmental qualification of Limitorque valve actuators. These evaluations determined that the use of space heaters was not a qualified condition. In addition to identifying deficiencies in the program for performing environmental qualification evaluations, this problem indicated a need for improvements in the Independent Safety Engineering Group (ISEG), which had previously reviewed an NRC Information Notice dealing with Limitorque space heaters but had not recognized the problem identified by the NRC resident inspector.

Other examples include repeated failures of Unit 1 feedwater pumps, the Unit 1 vital bus #4 power failure, and failure to properly document or trend as-found surveillance results associated with diesel generator time delay relays.

Overall, although a generally effective engineering/technical support capability was demonstrated, the examples discussed indicate a need for more deliberate actions, engineering discipline, and attention to detail in the conduct of engineering activities.

## 2. Conclusion

Performance assessment - Category 2.

## 3. Board Recommendation

In inspection of other nuclear power plants we find that in some cases the utility has not had a clear understanding of the

basic design of the plant -- its bases, functional requirements, and test setpoints. In addition, design changes over the years have not been well controlled such that further confusion and ambiguity have been introduced. Some of the inspection findings during this period (which are very limited) tend to raise similar questions at San Onofre. We intend to focus more attention on this area during the next report period, and advise SCE to do the same. In particular, attention should be given to whether the basic design of the plants is understood, changes have been controlled over the years, and whether responsibility for and "ownership" of the design is clearly assigned within the licensee's organization. In addition, we strongly encourage you to reassess carefully the support provided in this and other areas by your various safety review groups (QA/QC, Nuclear Safety Group, Independent Safety Engineering Group, and Onsite Review Group).

V. Supporting Data and Summaries

A. Licensee Operating Activities

Unit 1

Unit 1 started the SALP period in the latter stages of a 267 day outage which ended on July 15, 1986 and was the result of the water hammer event which occurred on November 21, 1985. Except for the outages identified below, the unit operated nominally at its power limit of 92% (based on reduced Tave to limit corrosion in the steam generators), until the mid cycle outage which began on May 9, 1987, lasted 52 days and ended on June 30. After restarting from the outage the unit operated at 92% power for the rest of the SALP period.

Unit 1 Events and Shutdowns

- ° Unusual Event declared on July 30, 1986 due to failure of Main Steam pressure transmitter PT-459 causing a simultaneous loss of steam flow/feed flow mismatch signal of all 3 trip channels.
- ° Plant Shutdown on August 2, 1986 to repair "C" Steam Generator level transmitter
- ° Reactor Trip on August 5, 1986 due to Turbine Governor Valves shutting due to dirt in Turbine Control hydraulic system
- ° Plant shutdown on August 9, 1986 to investigate leak of containment spray valves
- ° Plant shutdown on September 4, 1986 caused by failure of the west feedwater pump (MFP) shaft. This pump also serves as a safety injection pump.
- ° Plant shutdown on October 2, 1986 to repair oil leak on the west MFP (forced).

- Plant shutdown on October 10, 1986 to repair south turbine plant heat exchanger saltwater inlet isolation valve and piping.
- Plant shutdown on October 16, 1986 to repair oil leaks in the discharge of the East MFP shaft driven lube oil pump.
- Plant shutdown on November 13, 1986 to repair an oil leak on the west MFP motor bearings.
- Plant shutdown on December 13, 1986 to repair the component cooling water (CCW) saltwater discharge piping.
- Reactor trip on March 10, 1987 during routine main generator exciter brush replacement due to a dropped brush causing a loss of generator field.
- Plant shutdown on May 9, 1987 for mid-cycle outage.
- Plant shutdown on September 5, 1987 to repair east MFP discharge hydraulic valve.

#### Significant Unit 1 Outages

- |                                   |   |  |
|-----------------------------------|---|--|
| November 21, 1985 - July 15, 1986 | - | extended outage due to loss of offsite power/water hammer event (included refueling outage) - 236 days |
| September 4, 1986                 | - | Shutdown to repair a failure of the west feedwater pump shaft (forced) - 26 days                       |
| May 9, 1987                       | - | Mid-cycle outage for maintenance - 54 days   |

#### Unit 2

Unit 2 began the SALP period in day 78 of the Cycle 3 refueling outage. The reactor was returned to critical operation on June 5, 1986 and, except for short periods of time, remained on-line until the next refueling shutdown on August 4, 1987. The unit remained shut down the remainder of the SALP period.

#### Unit 2 Events and Shutdowns

- Reactor trip on June 19, 1986 due to failure of 120VAC vital bus no. 3 power supply inverter 2Y003
- Reactor trip on July 7, 1986 from 47% power due to two CEA's dropping.
- Unusual Event declared and terminated on July 8, 1986 due to seismic activity

- Unusual Event declared and terminated on July 13, 1986 due to seismic activity
- Reactor trip on July 14, 1986 due to a Reactor Coolant System (RCS) pressure transient
- Reactor trip on August 12, 1986 due to an RCS pressure transient
- Reactor trip on September 13, 1986 due to failure of a Reed Switch Position Transmitter for CEA 34.
- Reactor trip on December 10, 1986 due to a turbine trip
- Manual reactor trip on February 5, 1987 when feedwater flow to the steam generator was reduced to less than 50% during maintenance
- Shutdown on March 17, 1987 to repair main transformer
- Reactor trip on March 28, 1987 due to failure of feedwater flow control valve 2FV-1111
- Shutdown on August 29, 1987 to commence cycle four refueling outage
- August 31, 1987, in cold shutdown, an unisolable leak from the Reactor Coolant System (via a shutdown cooling valve) occurred during maintenance

#### Significant Unit 2 Outages

August 29, 1987      Shutdown for cycle four refueling outage (still in progress at end of SALP period)

#### Unit 3

Unit 3 was at 100% power at the beginning of the SALP period. The unit maintained essentially normal operations until September 30, 1986 when it was shut down for a scheduled outage to replace the reactor coolant pump seals. The unit was returned to critical operation on October 20 and maintained essentially normal operation until January 2, 1987 when the unit was shut down for the Cycle 3 refueling outage. The unit restarted from the outage on March 7, 1987 and operated at essentially full power for the remainder of the SALP period.

#### Unit 3 Events and Shutdowns

- Unusual Event declared and terminated on July 8, 1986 due to seismic activity
- Unusual Event declared and terminated on July 13, 1986 due to seismic activity

- Manual Reactor trip on July 26, 1986 due to loss of feedwater
- Reactor trip on September 4, 1986 due to turbine trip caused by loss of power to the turbine protection panel during breaker switching
- Scheduled shutdown on September 30, 1986 to replace reactor coolant pump seals
- Reactor shutdown on January 2, 1987 for cycle 3 refueling outage
- Reactor trip on June 21, 1987 due to low steam generator water level (loss of nonvital bus).

#### Significant Unit 3 Outages

September 30, 1986	Reactor coolant pump seal replacement	21 days
January 2, 1987	Cycle 3 refueling outage	65 days

#### B. Inspection Activities

Five NRC resident inspectors were onsite at the beginning of the SALP period. This number was reduced to three on site at the conclusion of the period. Forty-six inspections were made on Unit 1, forty-two on Unit 2, and forty-three on Unit 3, involving a total of 6301 inspection hours on all three units during the SALP period. A summary of inspection activities is provided in table 1.

During the SALP period, additional special inspections were conducted.

- A Unit 1 Control Room ventilation system inspection, conducted June 18 - July 1, 1986
- An Emergency Preparedness team inspection, conducted August 4-8, 1986
- A Region V team inspection of Units 2 and 3, conducted September 22-October 3, 1986
- A Fitness for Duty inspection, conducted by NRC headquarters personnel on November 17-20, 1986.
- A special Health Physics inspection concerning personnel exposure and control of radioactive particles, conducted December 15, 1986 - March 20, 1987
- A special procurement inspection, conducted by the Vendor Program Branch in March 1987
- A Region V team inspection of Unit 1, conducted June 1-12, 1987

Enforcement activities identified during this SALP period are summarized in tables 1 and 2.

C. Investigations and Allegations Review

Eighteen allegations were received and documented during the SALP period. Of these sixteen were closed. The remaining two are currently being evaluated.

D. Escalated Enforcement Actions

A Notice of Violation (NOV) issued on September 17, 1986 cited three violations associated with the November 21, 1985 Unit 1 water hammer event which occurred during the previous SALP period.

- ° A Level II violation for failure to have an operable flowpath for auxiliary feedwater to the steam generators, as a result of failure of feedwater check valves. An \$80,000.00 civil penalty was imposed.
- ° A Level III violation for an inadequate test program for feedwater check valves. A \$50,000.00 civil penalty was imposed.
- ° A Level III violation for failure to take proper corrective actions for noise in a feedwater line. A \$50,000.00 civil penalty was imposed.

An NOV issued on August 26, 1986 cited one Level III violation for failure to properly implement the security contingency plan. A \$25,000.00 civil penalty was imposed.

An NOV issued on June 25, 1987 cited three violations associated with radiation protection practices:

- ° A Level III violation for an apparent overexposure of a worker's hand. No civil penalty was proposed.
- ° A Level III violation for failure to control radioactive particles. A \$50,000.00 civil penalty was imposed.
- ° A Level III violation for failure to make an immediate report of a worker's overexposure. A \$50,000.00 civil penalty was imposed.

E. Confirmatory Action Letters

Two confirmatory action letters were written during this SALP period. The first, dated December 3, 1986, concerned licensee actions in response to unauthorized tampering with plant equipment. The other letter, dated April 20, 1987, concerned licensee reporting of ESF system actuations.

F. Review of LER's

Twenty-two LER's were submitted for Unit 1. Thirty five LER's were submitted for Unit 2, some of which also applied to Unit 3. Twenty-four Unit 3 LER's were submitted. A synopsis of LERs is provided in Table 3.

The NRC's Office for Analysis and Evaluation of Operational Data (AEOD) performed an evaluation of the quality of LER's issued for San Onofre Units 2 and 3 and found them to be of above average quality. Specifically, the San Onofre Units were ranked well above the national norm.

The strong points identified by AEOD for San Onofre LERs included the discussions of the assessment of safety consequences; corrective actions; the mode, mechanism, and effect of failed components; operator actions affecting the course of the event; and personnel and procedural errors. The principal weaknesses identified involved the manufacturer and model number information of failed components, and information on previous similar events.

G. Licensing Activities

Unit 1

1. Site Visits

07-14-86	-	7-19-86	-	Detailed Control Room Design Review (DCRDR) In-Progress Audit
12-10-86	-	12-12-86	-	Site Visit (R. Dudley & G. Lear)
02-02-87	-			Site Visit (T. Novak)
06-23-87	-	06-27-87	-	Site Visit w/Commissioner Carr, Access training, Containment walk-through
07-21-87	-	07-23-87	-	Site Visit w/ D. Crutchfield

2. Commission Briefings

06-12-86 - Licensee and staff presentation in support of facility restart

3. Schedular Extensions Granted

None

4. Reliefs Granted

None

5. Exemptions Granted

09-27-86            Appendix R Exemption

6. License Amendments Issued

Am. No. 95; Diesel Generator Technical Specifications, issued July 3, 1986

Am No. 96; Reactor Coolant System Specific Activity Requirements, issued March 3, 1987

Am. No. 97; Revised Pressurizer Level Trip Specification, issued April 7, 1987

Am. No. 98; Integrated Implementation Schedule License Condition issued April 20, 1987

Am. No. 99; Revised Containment Isolation Valve Technical Specifications, issued May 18, 1987

7. Licensing Actions

Open at beginning of period - 51  
 Number added during period - 46  
 Number completed during period - 48  
 Number open at end of period - 49

8. Emergency Technical Specification Changes Issued

None

9. Orders Issued

None

Units 2 and 31. Site Visits

6-10-86 to 6-12-86 - site visit (H. Rood)  
 7-14-86 to 7-19-86 - DCRDR final audit  
 2-2-87 - site visit (T. Novak)  
 6-16-87 to 6-18-87 - site visit (H. Rood)

2. Commission Briefings

None

3. Schedular Extensions Granted

None

4. Reliefs Granted

None

5. Exemptions Granted

None

6. License Amendments Issued

- Amendments 49 & 38 Containment Penetration Conductor Overcurrent Protective Devices, issued 6/20/86
- Amendments 50 & 39 Reactor Coolant Activity Specific Activity Requirements, issued 6/25/86
- Amendments 51 & 40 Use of trisodium phosphate rather than NaOH to control the pH of the containment sump following containment spray actuation, issued 8/11/86
- Amendments 52 & 41 Incineration of radioactively contaminated oil, issued 8/20/86
- Amendments 53 & 42 Surveillance requirement for isolation valve to refueling water storage tank, issued 8/20/86
- Amendments 54 & 43 Azimuthal Power Tilt-Tg, Reactor Trip Setpoints, & ESF Actuation System Instrumentation, issued 9/9/86
- Amendments 55 & 44 ECCS Subsystems - Tavg Greater Than or Equal to 350°F, issued 9/9/86
- Amendments 56 & 45 Fuel handling area vent gaseous airborne radiation monitor and minimum capacity of the refueling machine and the corresponding overload cutoff limit, issued 12/12/86
- Amendments 57 & 46 Radioactive Effluent Monitoring Instrumentation, issued 1/20/87
- Amendments 58 & 47 Additional requirements for visual inspection acceptance criteria and transient event inspections of snubbers, issued 3/23/87
- Amendments 59 & 48 Reduced frequency of EDG fast starts, reduced number of EDG tests and revised diesel fuel oil surveillance, issued 4/9/87
- Amendments 60 & 49 Environmental qualification of electrical equipment, ESFAS instrumentation, accident monitoring instrumentation and MSL isolation valves, issued 8/14/87

7. Licensing Actions

Open at beginning of period - 80  
 Number added during period - 30  
 Number completed during period - 54  
 Number open at end of period - 56

8. Emergency Technical Specification Changes Issued

None

9. Orders Issued

None

H. Results of Operator Licensing ExamsUnit 1

<u>Exam Date</u>	<u># of Candidates</u>	<u># Passed</u>	<u># Failed</u>	<u>% Passed</u>
6/3-5/86	RO 1	1	0	100
	SRO 3	2	1	67
7/28-8/5/87	RO 6	5	1	87
	SRO <u>2</u>	<u>2</u>	<u>0</u>	<u>100</u>
TOTAL	RO 7	6	1	86
	SRO 5	4	1	80

Units 2/3

3/30/87	RO 1	1	0	100
	SRO <u>11</u>	<u>11</u>	<u>0</u>	<u>100</u>
TOTAL	RO 1	1	0	100
	SRO 11	11	0	100

TABLE 1  
INSPECTION ACTIVITIES AND ENFORCEMENT SUMMARY

<u>Functional Area</u>	<u>Inspection Hours</u>	<u>Percent of Effort</u>	<u>Enforcement Items*</u>				
			<u>Severity Level</u>				
			<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>	<u>V</u>
A. Plant Operations	1944	31				2	
B. Radiological Controls	991	16			3		4
C. Maintenance	700	11				3	
D. Surveillance	585	9	1	1	1		
E. Fire Protection	106	2				1	1
F. Emergency Preparedness	603	10				1	
G. Security	335	5			1	1	1
H. Outages	195	3					
I. Quality Programs/ Admin.	574	9			1		
J. Licensing Activities	-	-					
K. Training/ Qualification Effectiveness	48	1					
L. Engineering/ Technical Support	<u>220</u>	<u>3</u>	-	-	-	<u>1</u>	-
Totals	6301	100	0	1	6	10	6

\* Severity levels are discussed in 10 CFR 2, Appendix C. No deviations were identified during this SALP period.

TABLE 2  
ENFORCEMENT ITEMS

Unit 1

<u>Inspection Report No.</u>	<u>Subject</u>	<u>Severity Level</u>	<u>Functional Area</u>
86-07	AFW Flow Path Inoperable	II*	D
86-07	Corrective Action Program Inadequate	III*	I
86-07	Failure to implement effective IST Program for Check Valves	III*	D
86-17	Failure to Properly Implement Security Plan	III	G
	Failure to Report Security Event to NRC Operations Center	IV	G
	Failure to Provide Report to NRC of Changes to Security Program	V	G
86-42	Failure to Label Containers Containing Radioactive Material	V	B
87-03	Improper Control of Plant Modifications	IV	A
87-05	Failure to Label Containers with Radioactive Material	V	B
	Failure to Adequately Test Battery	IV	L
87-10	Failure to Provide an Adequate Procedure for I&C Maintenance	IV	C
	Failure to Comply with I&C Maintenance Procedures	IV	C
87-12	Failure to Maintain Leak Test Records	V	B
	Failure to Label Containers with Radioactive Materials	V	B
87-14	Inadequate Housekeeping and Work Practices	IV	A

Unit 2

86-15	Inadequate Emergency Plan Training	IV	F
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86-25	Missing Fire Protection Material Over Cable Tray	IV	E
86-34	Improper Use of Radiation Monitor Calibration Procedure	IV	D

Unit 3

86-24	Failure to Comply with REP Respirator Requirements	IV**	B
86-37	Apparent Overexposure of 512 Rem to the Hand	III	B
	Particulate Control	III	B
	Failure to Make Immediate Report	III	B
86-38	Failure to Comply with Fire Protection Permit	V	E
87-21	Improper Review of Completed Maintenance Procedure	V	C

\* Although cited in a Notice of Violation issued during this SALP period, these violations were related to activities which occurred during the previous assessment period (as discussed in Section V.D of the SALP report).

\*\* This violation was contested by the licensee on the basis of conflicting testimony. Because corrective actions were taken and there were no programmatic implications, Region V decided not to pursue the matter and accordingly has not considered this item in this SALP review.

TABLE 3A - Unit 1  
SYNOPSIS OF LICENSEE EVENT REPORTS (LERs)

Functional Area	SALP Cause Code*						Totals
	A	B	C	D	E	X	
A. Plant Operations	3	4		1	4	1	13
B. Radiation Controls							0
C. Maintenance	5						5
D. Surveillance	1			2			3
E. Fire Protection	1						1
F. Emergency Preparedness							0
G. Security							0
H. Outages							0
I. Quality/ Administration							0
J. Licensing							0
K. Training/ Qualification Effectiveness							0
L. Engineering/ Technical Support		2		1	1		4
Totals	10	6	0	4	5	1	26

\* Cause Codes

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

The above data are based upon LERs 86-02, 86-05 and 86-07 through 87-13.

TABLE 3B - Unit 2

SYNOPSIS OF LICENSEE EVENT REPORTS (LERs)

Functional Area	SALP Cause Code*						Totals
	A	B	C	D	E	X	
A. Plant Operations	1	6	1	3	1		12
B. Radiation Controls							0
C. Maintenance	5				1		6
D. Surveillance	2			3	2		7
E. Fire Protection	1						1
F. Emergency Preparedness							0
G. Security							0
H. Outages							0
I. Quality/ Administration							0
J. Licensing							0
K. Training/ Qualification Effectiveness							0
L. Engineering/ Technical Support		13	1		2		16
Totals	9	19	2	6	6	0	42

\* Cause Codes

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

The above data are based upon LERs 86-11 through 87-17.

TABLE 3C - Unit 3

SYNOPSIS OF LICENSEE EVENT REPORTS (LERs)

Functional Area	SALP Cause Code*						Totals
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>X</u>	
A. Plant Operations	4	4	1				9
B. Radiation Controls	1			2			3
C. Maintenance	3			1			4
D. Surveillance	1			1			2
E. Fire Protection							0
F. Emergency Preparedness							0
G. Security							0
H. Outages							0
I. Quality/ Administration							0
J. Licensing							0
K. Training/ Qualification Effectiveness							0
L. Engineering/ Technical Support		7			1		8
Totals	9	11	1	4	1	0	26

\* Cause Codes

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

The above data are based upon LERs 86-07 through 87-16.