SAN ONOFRE NUCLEAR GENERATING STATION
SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE
Report 50-361/97-99; 50-362/97-99

I. BACKGROUND

The SALP Board convened on July 9, 1997, to assess the nuclear safety performance of San Onofre Nuclear Generating Station for the period of December 31, 1995, through July 5, 1997. The Board was conducted in accordance with Management Directive 8.6, "Systematic Assessment of Licensee Performance." The Board members included: K. E. Perkins (Board Chairperson), Director, Walnut Creek Field Office, Region IV; A. T. Howell, Director, Division of Reactor Safety, Region IV; and J. W. Roe, Director, Division of Reactor Projects III/IV, Office of Nuclear Reactor Regulation. This assessment was reviewed and approved by the Regional Administrator.

Functional Areas and Ratings:

	Current	Previous
Plant Operations	2	2
Maintenance	1	2
Engineering	2	1
Plant Support	1	1

II. PLANT OPERATIONS

Overall performance in the Plant Operations area during this assessment period was good. Operations performance during outages improved during this assessment period; however, performance throughout the period was inconsistent. Management involvement in control room oversight and programs for operations were generally excellent. Operators generally performed well during transient and routine operations; although, they occasionally demonstrated weakness in attentiveness, procedure implementation, communications, and control of evolutions involving important field activities.

Management involvement in control room oversight was generally excellent, including effective oversight of important activities. The strong management coverage of control room activities during the refueling outages and reduced reactor coolant level conditions contributed significantly to improved performance during the outages. Although management oversight of operations activities was improved, control room supervisory oversight of plant activities and performance by control room operators did not always meet management's written expectations for conduct of operations. The performance problems included exceeding the pressurizer cooldown limit and the inadvertent transfer of refueling storage tank water to the reactor coolant system in Unit 2. Management consistently took effective corrective actions for identified problems.

Programs for operations were generally excellent, including the programs for conduct of operations and minimizing operator work-arounds. However, procedure quality and usage problems were observed. Some procedures were very complex, contained transition and

component identification errors, or were inconsistent with other guidance. Procedure changes continue to be numerous, indicating a need for improved procedures; although, the backlog of changes was being effectively managed. Weaknesses in procedure detail contributed to the failure to properly position a reactor vent valve. In addition, weaknesses in operation's verification and validation of the Improved Technical Specifications (TS) contributed to problems discussed in the Engineering functional area. The corrective actions taken to resolve these deficiencies were thorough and effective.

The conduct of operations was generally good. Planning and preparation for most operational activities was good. Operators generally followed plant procedures during normal operations; however, operators occasionally exhibited weakness in attention to detail. Examples of this include setting the automatic boric acid flow rate low, the mispositioning of several valves, and not verifying offsite power sources when an emergency diesel generator was inoperable. There were no reactor trips or other significant events and operators generally performed well during routine power operations. Operation's performance of activities during outages was generally improved from the previous period. Communications were generally good; although, they occasionally did not conform to management expectations. Communications improved after management attention to this area increased. Operations management consistently ensured that appropriate corrective actions were taken in response to material deficiencies and procedural problems. Plant and control board monitoring by operators was generally good; although, isolated lapses did occur.

The operators performed well during simulator training exercises. Some examples of weak operator knowledge and skills were observed; including the failure to recognize a change in Unit 3 control element assembly position resulting in the upper electrical limit lights not lit and the failure to know the Unit 2 shutdown cooling flow limit applicable to the procedure being executed.

Licensee self-assessments continued to be a program strength. The use of metrics to critically self-assess performance and to provide feedback on the extent to which management expectations were met was a strength. The assessment of valve lineup performance problems, performed by the Nuclear Oversight Division, was excellent.

The performance rating in the area of Plant Operations is Category 2.

III. MAINTENANCE

Overall performance in the Maintenance area improved to a superior level. The quality of existing programs was maintained at a high level. While maintenance procedures were of very good quality, there were some surveillance problems that stemmed from procedural weaknesses. The conduct of maintenance activities was excellent, while the conduct of surveillance activities was good. The overall material condition of the plant improved throughout the assessment period. Self-critical assessments and root cause evaluations contributed to improvement in this area.

The quality of existing programs was maintained at a high level. For example, the steam generator inservice inspection program was a noteworthy strength. However, as discussed in the Engineering functional area, weak engineering oversight and support resulted in the development of inadequate Maintenance Rule performance criteria for structures, systems, or components and in the improperly scoped review of the Improved TS surveillance requirements.

Maintenance procedures were very good overall and the licensee initiated a comprehensive plan to further enhance them. However, there were a number of surveillance implementation problems, stemming in part from procedural weaknesses. Some of these problems were attributed to procedural validation and verification weaknesses associated with the implementation of the Improved TS. Licensee actions to correct these deficiencies were comprehensive.

The overall conduct of maintenance was excellent. Maintenance activities were well planned and conducted in accordance with procedures by knowledgeable personnel. Supervisors were frequently observed in the field providing oversight and guidance at job sites. The performance of welding activities improved; however, some implementation problems continued to be identified.

Surveillance and testing performance was good. Although not individually significant, there were a number of surveillance implementation problems that occurred throughout the assessment period. As discussed in the Operations functional area, many of these problems were attributed to control room operator inattention and operations surveillance procedure weaknesses.

The licensee continued to demonstrate a conservative approach to outage planning and management. The work scope of the two 1997 refueling outages was well defined, and the outage schedules appropriately incorporated risk-informed considerations. However, reactor coolant system instrument nozzle leaks and other emergent hardware problems caused significant unplanned delays during both 1997 refueling outages.

The material condition of the plant was improved throughout the assessment period because of plant preservation and maintenance backlog reduction activities. There were no reactor trips that were caused by hardware problems.

Efforts to encourage problem identification resulted in a significant reduction in the problem identification threshold. Comprehensive, performance-based assessments were conducted throughout the assessment period. The quality of root cause analyses, a strength noted in the previous SALP, was maintained at a high level.

The performance rating in the area of Maintenance is Category 1.

IV. ENGINEERING

Performance in the Engineering area was good during this assessment period. Strong performance was noted in engineering support to outages, self-assessments, and corrective action development and implementation. Management did not always provide the appropriate level of oversight for engineering activities. Weaknesses were noted in the support to maintenance and in the translation of design basis requirements into appropriate operational requirements and surveillances. Superior performance was noted in the resolution of complex engineering issues and in self-assessment and corrective action efforts.

Support to Maintenance and Operations during outage activities was excellent overall, with timely evaluation of emerging issues and good technical support for planned activities. The use of the safety monitor to plan maintenance activities optimized plant safety, as did the detailed risk assessments performed for each refueling outage. However, Engineering support to Maintenance lacked rigor and thoroughness for one significant program which resulted in a failure to develop an adequate program that would set goals and monitoring requirements for structures, systems, and components in accordance with the Maintenance Rule.

The capability of the engineering organization to conduct complex engineering activities continued to be superior. The efforts to resolve the degraded steam generator tube supports (i.e., eggcrates) in the Unit 3 steam generators were excellent. A comprehensive strategy was developed to identify and address all relevant issues, and extensive technical support for meetings with the NRC provided timely and accurate responses to staff questions. Also, Engineering took a leadership role in identifying and resolving the problems associated with the coaxial cable for the containment high range radiation monitors.

Management oversight of engineering activities was inconsistent. Oversight weaknesses resulted in inadequate control of some projects. The project management of the Improved TS conversion process did not properly scope the effort and engineering support was not sufficiently rigorous to ensure all surveillance requirements were properly verified by the implementing surveillance procedures. This resulted in a number of design basis requirements that were not translated into appropriate operational requirements and surveillances and in missed opportunities to identify several long-standing surveillance procedure deficiencies. Also, management missed an opportunity to replace Inconel 600 instrument nozzles with a history of susceptibility to primary water stress corrosion cracking. Conservative decisions related to plant safety included a commitment to perform midcycle inspections of the steam generators in both units and the decision to request staff approval to add an inter-unit 4.16 kV bus cross-tie.

Self-assessment and corrective action activities continued to be superior. After discovery of errors in the implementing procedures for the Improved TS, a thorough review of every surveillance requirement and associated implementing procedure was performed. Other notable activities during this assessment period included a detailed review of the Updated

Final Safety Analysis Report and a number of comprehensive root cause assessments of equipment malfunctions. The Independent Safety Engineering Group performed excellent root cause assessments of industry events.

The performance rating in the area of Engineering is Category 2.

V. PLANT SUPPORT

Performance in the Plant Support functional area was maintained at a superior level. Performance in radiological protection was strong. Emergency preparedness effectiveness remained a noteworthy strength. In the security area, overall performance was very good and was improving during the latter part of the assessment period. The fire protection program was effectively maintained and implemented. Housekeeping improved throughout the assessment period. Audits and self-assessments were self-critical and performance-based, and corrective actions were thorough and timely.

Performance in the radiological protection area continued at a high level. A comprehensive as-low-as-reasonably-achievable program was implemented and functioned effectively to maintain radiation exposures at a low level. Shutdown chemistry controls contributed to exposure reduction results. Collective radiation exposure was less than the national average during the assessment period. Good training was provided in all radiological control areas and technical staff qualifications were a strength. Consequently, technical reviews and analysis of information were excellent. Performance by radiation protection technicians was good; however, a few problems were noted in the implementation of some program areas. Strong programs were maintained in the solid waste management, transportation of radioactive materials, radiological environmental monitoring, and meteorological monitoring areas.

Radiochemistry and secondary chemistry programs were also effectively implemented. There was a marked improvement in the reduction of radioactivity released in gaseous effluents between 1994 and 1996. Chemical cleaning of the Units 2 and 3 steam generators resulted in the removal of large quantities of sludge and tube deposits.

Performance in the emergency preparedness area continued to be a program strength. Operating crews performed in an excellent manner during simulator walkthroughs. Emergency classifications, offsite agency notifications, and protective action recommendation formulation were correct and timely. Internal communications and procedural usage were effective. Emergency response facilities and equipment were operationally maintained; however, the program for control of emergency lighting permitted some safe shutdown emergency lighting to become ineffective.

Overall performance in the security area remained very good and improvements were noted during the latter part of the assessment period. Program strengths included records and reports, security plan changes, management support, security organization, training and

qualifications, and access authorization. Some isolated problems involving security procedures, the land vehicle barrier system, lock and key control, and protected area barriers were identified.

The fire protection program continued to be effectively implemented. The dedicated, on-site fire department provided a strong, well trained, and effective fire response capability. Systems were appropriately tested and well maintained. A fire protection innovation team maintenance program was initiated to reduce the fire protection maintenance backlog.

Overall, plant housekeeping was well maintained and continued to improve throughout the assessment period. Radiological housekeeping was good, with some minor exceptions noted.

Self-assessment activities were effective at identifying problems, and corrective actions were comprehensive and timely. In one instance, the quality assurance audit of the security program was not of sufficient scope.

The performance rating in the area of Plant Support is Category 1.