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EXECUTIVE SUMMARY

This preliminary assessment of the San Onofre Nuclear Generating Station, Units 2 and 3 was conducted by the Special Inspection Branch of the U.S. Nuclear Regulatory Commission's Office of Nuclear Reactor Regulation during the weeks of September 11 and 18, 1995. The purpose of this preliminary assessment was to develop an integrated perspective of performance strengths and weaknesses based upon an in-office review of inspection reports, event reports, and other NRC and licensee generated performance information. The assessment covered a two year period from September 1993 to September 1995. A two week on-site assessment scheduled for the period of October 16 through 26, 1995 will be conducted to validate the conclusions reached during this in-office review.

Based on the documentation review, the assessment team determined that Engineering, and Plant Support organizations exhibited a general superior level of performance. Performance in the area of Safety Assessment/Corrective Action and Maintenance was superior in some respects while indeterminate in others. Performance in the Operations area was variable during power operations and weak during outage periods. Ratings for performance area elements are depicted on the attached Preliminary Performance Assessment/Inspection Planning Tree (Appendix B).

In the area of Safety Assessment/Corrective Action, the team determined that quality oversight groups have been effective at identifying a wide range of performance concerns. Most effective were those special assessments conducted by the Safety Engineering Group. Concern was identified with the complexity and fragmentation of the corrective action system. The effectiveness of the corrective actions taken to resolve programmatic issues, such as those identified with operational performance was indeterminate.

In the area of Operations, management involvement and safety focus was often weak as illustrated by the numerous operational events which were noted during the assessment period. Some of these events were of moderate safety significance. Numerous hardware deficiencies were identified during the course of NRC inspections that had not been previously identified by Operations personnel. Performance in the area of problem identification was indeterminate, as was the ability of Operations to resolve problems, both hardware and performance oriented. Overall quality of Operations was variable during power operations with numerous examples of both strong and weak performance. During outage periods, the quality of operations was generally weak. Numerous instances were cited where operators either did not follow procedures, used poor judgement, or were inattentive. Weaknesses were also cited in Operational programs and procedures; however, this area was identified as being indeterminate due to a lack of adequate information.

Strong engineering performance was evident in problem identification, problem resolution, and in the general quality of engineering work. Engineering response to equipment anomalies was good as was follow-up on industry events.

Engineering safety focus and management involvement appeared to be adequate although information in this area was limited. The quality of engineering programs and procedures appeared adequate; however, again information was limited.

Maintenance safety focus was strong as denoted by effective planning, scheduling, and supervisory oversight. The maintenance backlog appears to have been well managed. Some concerns were identified in the area of problem identification; however, information in this area was limited. Maintenance self-assessments did not identify any meaningful issues and lacked a significant analysis of performance data. Plant material condition was identified as being about average and improving, with some component failures reported. The quality of maintenance work was variable with both examples of strong and weak performance. Maintenance programs and procedures were identified as adequate.

In the Plant Support areas of Security and Emergency Preparedness, overall strong performance was demonstrated. Performance in the area of Health Physics was mixed with some concern expressed regarding numerous improper entries into high radiation areas.

OVERALL ASSESSMENT SCOPE AND OBJECTIVES

This Integrated Performance Assessment of the San Onofre Nuclear Generation Station Units 2 and 3, is being performed in accordance with NRC Inspection Procedure 93808 "Integrated Performance Assessment Process." The assessment is broken up into two phases; a preliminary assessment performed in NRC headquarters, and a final assessment which will be performed on-site. The assessment is being conducted by the Special Inspection Branch of the Office of Nuclear Reactor Regulation. The preliminary assessment was performed during the weeks of September 11 and 18, 1995. The final assessment is scheduled to be performed during a two week period beginning October 16, 1995.

The assessment objectives are to identify programmatic and performance strengths and weaknesses in the areas of Safety Assessment/Corrective Action, Operations, Engineering, Maintenance, and Plant Support. The preliminary assessment is based on an in-office review of NRC inspection reports, licensee event reports, NRC and licensee performance indicators, enforcement history, regional assessments, and licensee internal and external assessments. The results from this phase of the assessment are contained in the following preliminary assessment report. References to source documents are contained throughout the report. The reference list is attached as Appendix A to the report.

Following the issuance of this preliminary assessment report, the team will attempt to validate its conclusions via a performance based, on-site assessment. The results of this phase of the assessment will be integrated with those of the preliminary assessment and documented in a Final Assessment Report which will be issued following conclusion of the on-site visit. Included in the Final Assessment Report will be recommendations on where to focus future NRC inspection effort. These recommendations will be depicted on a Final Performance Assessment/Inspection Planning Tree.

ASSESSMENT METHODOLOGY

During the preliminary assessment, the team evaluated the San Onofre inspection record and performance history for a two year period spanning September 1993 to September 1995. Conclusions drawn from this review were then compared with the conclusions contained in licensee internal and external assessment reports. Where the conclusions were relatively consistent, a performance rating of either decreased, normal, or increased inspection was given to the individual elements. These ratings correspond to superior, good, or weak performance in the elemental areas. Where the conclusions obtained from the team's review of inspection and performance data differed significantly from those described in the licensee's internal and external assessments, or where sufficient information was not available to come to a meaningful conclusion, individual elements were rated as being indeterminate. Ratings for the <u>overall</u> performance areas of Safety Assessment/Corrective Action, Operations, Engineering, Maintenance, and Plant Support are not addressed during the preliminary assessment phase.

The results obtained from the preliminary assessment will then be used by the assessment team to develop individual on-site assessment plans for each of the major assessment areas. The areas in which the team will focus during the on-site review will be those areas rated as indeterminate and those areas where the inspection or performance data record indicated potential performance weaknesses.

Following the on-site phase of the assessment, the team will issue a Final Performance Assessment and Inspection Planning Report. This report will contain an assessment of each elemental and overall area. The final report will also contain recommendations for future NRC inspection. These recommendations will be depicted on a Final Performance Assessment and Inspection Planning Tree and will be based on an assessment of overall plant performance, performance in the individual elemental area, and relative safety significance. The inspection recommendations will be scaled to what would be normal NRC inspection effort at a two unit site.

1.0 SAFETY ASSESSMENT AND CORRECTIVE ACTION

1.1 Problem Identification

At the program level, the licensee's Nuclear Oversight Division (NOD) has maintained a strong capability for oversight assessment and evaluation in all functional areas. Quality Assurance (QA) assessments identified substantial findings and made meaningful recommendations for improvement. The QA reports reviewed were effective in identifying deficiencies (References 4, 5, 6, 37, 45, 110). In addition a report prepared within NOD concerning performance during the Unit 2 Cycle 8 Refueling Outage provided a good, general overview of strengths and weaknesses associated within each Division. It effectively captured the most pronounced deficiencies observed during the performance of the outage, along with ineffective areas of the corrective action system (Reference 111). Other reports such as the report prepared by the Safety Engineering Group on Operational Command and Control were particularly effective at identifying performance weaknesses (Reference 112).

However, at lower levels within the corrective action system, concern has been raised over the complexity of the many site-wide corrective action documents. This complexity has led plant employees to sometimes hesitate to initiate a non-conformance report (NCR) (Reference 34). In a few instances, a lack of thoroughness and inappropriate initial categorization of the corrective action was also a problem; however, this problem did not appear to be pervasive. For example, the licensee discovered during the Unit 3 outage that two contract personnel were in a posted high radiation area without a radiation exposure permit (REP). The licensee did not perform an in-depth investigation or root cause analysis of this issue. Subsequently, numerous additional examples of inappropriate entries into high radiation areas have occurred. In another example, the licensee's response to an issue involving the seismic adequacy of the pressurizer safety valve acoustic monitor power supplies was delayed due to the issue originally being identified on a station problem report (SPR) and not an NCR (Reference 30).

Although the corrective action system was stated as being complex and cumbersome, the assessment team did not identify any examples of significant problems which were not addressed in some form of the corrective action system. Overall performance in this area was therefore rated as indeterminate pending on-site assessment of the effectiveness of lower level problem identification systems.

1.2 Problem Analysis and Evaluation

The root cause evaluations conducted by the Safety Engineering Group (SEG) are examples of the strong performance in the self-assessment area. For example, the SEG issued an insightful and detailed report regarding control room operator performance (References 5, 112, and 45).

QA has also performed evaluations of the site-wide problem identification programs including an evaluation of the effectiveness of the tracking and implementation of corrective actions related to Division Investigation Reports (DIRs). QA identified that the performance and follow-up of DIRs, and associated corrective actions, lacked consistent and focused direction. Similar concerns with DIRs were also identified in NRC inspection reports (References 5, 26, and 105).

The Nuclear Safety Engineering Group also performs trending analyses to identify if individual problems are related to common organizational causes (References 5, 26, and 45). These trending analyses which report the effectiveness of people, programs and hardware were identified as a strength (References 5 and 26).

The Quarterly Station Performance Reports prepared by the Nuclear Oversight Division assess the performance of each divisional area based on trended information. The results from the assessment are evaluated and represented on a color coded annunciator panel, which reflects the rated performance and trend of each organizational and functional area within the plant. The assessment team reviewed the latest report, for the second quarter of 1995 and considered it a strength. However, the report was mainly a compilation, rather than a integration and analysis, of quantitative and qualitative performance data. Also, the report did not highlight specific action items related to Operations, even though performance in the Operations area was identified as needing improvement. It was not clear how the information contained in the report was being used to make necessary performance improvements (Reference 107).

Notwithstanding the above concerns, overall performance in this area was considered to be superior. Reduced inspection effort in this area is recommended.

1.3 Problem Resolution

Licensee management attention has reduced the back-log of open NCRs and SPRs. Efforts to deal decisively with procedural compliance problems have also been undertaken. However, the effectiveness of these actions has yet to be established (References 5 and 102).

In most cases, corrective actions were adequate. For instance, the review of the Fermi-2 turbine failure was aggressive and focused on exploring the vulnerability of the San Onofre main turbines to a similar failure mode (References 22 and 45). However, in some instances, the licensee's corrective actions were too narrow to prevent recurrence of similar problems. Furthermore, reviews to ensure the effectiveness of the corrective action have apparently not consistently been performed. Weaknesses in the effectiveness of corrective actions are demonstrated by the following: (1) on two occasions the containment pressure was inadvertently allowed to increase resulting in a decrease in the refueling pool water level by forcing water into the spent fuel pool; (2) several NRC identified program weaknesses and three violations in the licensee's measurement and test equipment (M&TE) program; (3) inadequate corrective actions to an incident where work was begun on both trains of safety-related equipment in Unit 3 at the same time; and (4) several failures of the Post LOCA Hydrogen Monitoring System (References 10, 30, and 106).

Operator performance was identified as a concern when CAR 013-94 was issued to the Operations Division. The CAR cited one event in which operators did not recognize that they had entered a TS action statement, and two events which resulted in damage to two high pressure safety injection (HPSI) pumps and could have damaged the third HPSI pump. Again, operator performance was identified as a concern in the Unit 2 refueling outage. In April of 1995, operator error resulted in the diversion of over 650 gallons of reactor coolant to the refueling water storage tank (RWST) while heating up in Mode 4. It is not yet clear that the issues identified in the CAR have been effectively resolved (Reference 107).

Another example of ineffective corrective actions occurred during a Unit 3 refueling outage. In this instance, temporary trailers and cargo containers were moved into the protected area without any engineering evaluation. A CAR was issued and corrective actions were taken. The problem reoccurred during a Unit 2 outage (Reference 107). Actions were not timely to address an issue raised in NRC Information Notice Number 89-52 which alerted the licensee that curtain-type fire dampers might not shut under certain air flow conditions. The licensee took five years to revise their procedures (Reference 30). A licensee corrective action follow-up report dated August 5, 1994 identified similar concerns (Reference 108).

Overall performance in this area was determined to be indeterminate pending on-site assessment of the effectiveness of the corrective actions taken to resolve operational performance issues.

2.0 OPERATIONS

2.1 Safety Focus and Management Involvement

Although safety focus and management involvement appeared to be adequate during periods of power operations, numerous concerns were identified with operational performance during outage periods. For example, several events have indicated a lack of command and control and inadequate oversight of plant activities by management. Examples documented in inspection reports indicated inadequate management review of temporary procedures that resulted in air binding of the low pressure safety injection (LPSI) pump and leakage from the chemical and volume control system (CVCS) purification filter (Reference 49). In addition, lack of management oversight at times contributed to events such as the operation of the boric acid system with a relief valve removed, which resulted in a spill (Reference 43); and inadvertently racking in circuit breakers for all three high pressure safety injection pumps, which was contrary to Technical Specifications (Reference 49).

Because of some of the previous events, operations management initiated an operations stand-down to address performance deficiencies (Reference 49). Subsequently, during the plant start-up from the Unit 2 outage, weak operational performance resulted in a drain-down of several hundred gallons from the reactor coolant system (RCS) and a TS violation for RCS oxygen concentration (References 49 and 51), which indicated that the stand-down was not effective. In addition, an inspection report indicated that outage scheduling pressure was felt by the shifts to get work accomplished which resulted in operators performing a less than comprehensive review of pump running requirements (Reference 39).

Management initiated performance improvements such as moving the shift superintendent into the control room and placing additional operations management on shift to oversee activities (Reference 49). However, management has, at times, become too involved in the work details rather than providing effective oversight (Reference 49). In addition, during the reactor start-up, which is typically a closely monitored activity by the senior reactor operators (SROs) and the oversight manager, the reactor operator failed to properly control reactivity and caused the actuation of the plant protection system (PPS) pre-trips on all four channels of high log power (Reference 52).

Overall performance in this area was determined to be weak. Increased inspection is recommended in this area.

2.2 Problem Identification and Resolution

2.2.1 Problem Identification

Several inspection reports indicated that both control room and equipment operators sometimes failed to identify control room and operating plant deficiencies. In the plant, the resident inspectors noted undocumented water and oil leaks (Reference 49), missing fasteners, and inadequate pipe supports (Reference 39). In addition, the inspectors identified that the boric acid makeup pump oiler was empty (Reference 39), the saltwater cooling pump was being run with the oil level above the high level mark (Reference 38), the main feedwater block valve hydraulic fluid reservoir was above the indicated acceptable range (Reference 43), and unusually loud charging pump discharge check valve noises (Reference 44). Also, following fire system surveillance testing, an alarm pull station was left with a broken glass without writing a deficiency. The glass subsequently fell out which caused a fire system deluge actuation of the auxiliary feedwater (AFW) pump room (Reference 52).

For many of the items above, it was noted that maintenance work requests had not been written, that logs did not identify the deficiencies and equipment operators had not informed the control room of the discrepancies.

Reports also indicated that control room operators were occasionally not aware of control room indication abnormalities until questioned by the residents. For example, the residents noted an instance where that the steam generator lumigraph bar was not lighted (Reference 47), the reactor trip breaker light was flickering (Reference 47), and the equipment status light for emergency core cooling system (ECCS) equipment was not properly reset (Reference 42). In addition, the resident pointed out an instance where operators did not acknowledge a component cooling water (CCW) parameter that was reading significantly below normal until its associated alarm was actuated. (Reference 49). It was also noted that operators failed to initiate a work request for a control board deficiency that was distracting the operators during an approach to criticality (Reference 52).

There were additional instances where operators did not identify deficiencies such as not promptly identifying out of tolerance nuclear instruments during a surveillance test (Reference 44), not recognizing a failed containment sump level recorder used to meet TS requirements (Reference 44), and failure to recognize that additional ECCS equipment became inoperable when the room cooler was removed for maintenance (Reference 78).

The "Operational Near Misses" program which is designed to evaluate incidents which do not meet the threshold of the Operations Division Experience Report appeared to be a strength, although it appeared that some of the issues identified in this program may have been better identified in a more formal corrective action document.

Notwithstanding the above issues, significant problems are apparently being identified appropriately. Consequently, overall performance in this area was indeterminate.

2.2.2 Problem Resolution

The inspection reports reviewed by the assessment team documented that some control room deficiencies identified as far back as 1988 had not been resolved (Reference 46). For example: 5 of 6 radiation monitors used to detect steam generator tube leaks were inoperable (Reference 47); operator work-arounds have not been resolved such as a leaking volume control tank (VCT) 3-way valve, an inoperable reactor coolant dilution counter, and perturbations in the control system for the HP turbine governor valve (Reference 58). Also, the plant start-up procedure had 17 temporary changes and had not been revised (Reference 51). The inspection reports also documented two loss of inventory events on the Unit 1 spent fuel pool. Approximately 800 gallons of spent fuel pool water were drained into the Unit 1 containment due to a common valve line-up problem that had not been resolved after the initial loss of inventory event (Reference 49).

The effectiveness of recent actions taken by licensee management to address operational performance problems has not yet been reviewed. Consequently, definitive conclusions regarding performance in this area could not be developed. Overall performance in this area was indeterminate.

2.3 Quality of Operations

During power operations, general operator performance and attention to detail appeared to be mixed. Some of the inspection reports documented instances of excellent command and control (Reference 47), clear communications and use of repeat backs during drills (Reference 42), appropriately obtaining approvals (Reference 43), good interface between operations and maintenance (Reference 46), thorough and professional pre-evolution briefings (Reference 47), and good implementation of emergency response actions during a walk-through (Reference 54). Operator response during minor operational events was also good, such as in operations response to a control element assembly on May 27, 1994 (Reference 30).

However, performance weaknesses were also identified including some weak shift turnovers (Reference 52), multiple instances where non-operating materials were observed in the control room (Reference 47), and an example where operators reduced shut-down cooling (SDC) flow below the alarm set-point and approached the TS limit during mid-loop operations (Reference 49). Other instances were identified where operators were not knowledgeable of control board caution tags (Reference 49), where operators did not recognize or subsequently respond to a significantly low CCW critical loop flow until the alarm actuated (Reference 49), and where operators did not identify the reason for control element drive alarms but continued with the reactor start-up (Reference 49). Additional weaknesses were identified with inadequate command and control during the unit 2 start-up (Reference 51), failure to follow procedures during an evolution to establish proper cooling flow to the salt water cooling pump seals (Reference 58), an instance where an equipment operator used a two by four board to mechanically agitate a clogged cyclone separator (Reference 58), and instances of informal communications (Reference 58).

Overall, operator performance during outage periods was often lacking. For example: the HPSI pump was run for 2 hours without cooling water, even after two HPSI pumps had been damaged during the last SALP period due to improper operation (Reference 39). In another instance, a LPSI pump was not properly vented and became air bound when started (Reference 49). Failure to follow procedures resulted in a loss of RCS inventory of 670 gallons (Reference 51). Other performance weaknesses included an instance where RCS temperature was increased above 250 degrees without verification that oxygen concentration met the TS requirements (Reference 51); all three HPSI pump breakers were improperly racked in which violated TSs (Reference 49); and where during a reactor start-up, the control room operator inappropriately increased reactor power causing the plant protection system pre-trips to alarm on all four channels of high log power (Reference 52).

Although most work activities appeared to have been controlled adequately, there were limited instances where operations did not recognize the implications of certain activities. For example, when the boric acid pump common relief valve was removed for maintenance, the clearance order was not adequate to prevent a boric acid spill, and the operability of the boric acid system was not identified by operations as being inoperable with the relief valve removed (Reference 43). In addition, operators failed to enter an applicable limited condition for operation (LCO) when an ECCS room cooler was taken out of service and subsequently exceeded the LCO action statement and although there were control room alarms, the operators did not pursue the significance of the alarms (Reference 78).

During simulator and emergency preparedness (EP) exercises, performance weaknesses similar to those noted above were also identified (References 24, 47, and 54). A review conducted by the site Safety Engineering Group identified similar problems with control room command and control (Reference 112). Both units have operated successfully with extended runs and few forced outages during the assessment period which is a positive indicator of performance although not a complete indication of operational performance from a safety perspective. The weak operator performance exhibited during the outages appeared to be a common theme for Unit 2 and 3 outages during 1995 and 1993 respectively. Problems such as operators not following procedures and not understanding the configuration of plant equipment before conducting an evolution were issues for both Unit 2 and 3 outages (References 17, 47, 49 and 51).

Overall performance in this area was determined to be weak. Increased inspection is recommended in this area.

2.4 Programs and Procedures

The information available in the inspection reports was limited and definitive conclusions regarding performance in this area could not be developed. The reports documented the following types of inadequate procedures and program deficiencies: a temporary procedure led to air binding of a LPSI pump (Reference 49), a temporary procedure led to a CVCS leak and loss of RCS inventory (Reference 49), a procedure led to inoperable main feedwater isolation valves (Reference 47), an alarm response procedure referenced the wrong TS action statement (Reference 42), equipment identifications in two surveillances did not match local equipment identifications (Reference 52), and a start-up procedure was weak in that there were 4 pen and ink changes required during start-up and 17 temporary changes since its last revision (Reference 51). An LER documented that the licensee did not have a formal program for controlling watertight flood doors (Reference 91) and an inspection report noted that the program for decommissioning record-keeping on Unit 1 was weak (Reference 41).

Overall performance in this area was indeterminate.

3.0 ENGINEERING

3.1 Safety Focus and Management Involvement

The information available in the inspection reports was limited and definitive conclusions regarding performance in this area could not be developed. Operability evaluations associated with non-conformance reports were stated as being well performed, with the results clearly documented (Reference 49). Assessment of plant conditions, such as the extensive corrosion in the steam generator blow-down line, and the failure of the middle stage of the reactor coolant pump seal were adequately performed (Reference 49). However, the licensee had not evaluated the effects of design basis flood due to blocking open water tight doors of rooms containing ECCS components (Reference 8).

Overall performance in this area was indeterminate.

3.2 Problem Identification / Problem Resolution

The licensee identified plant problems in an adequate manner. When problems in fuel fabrication were reported, the licensee quickly got involved and issued a stop work order when the vendor's handling of the problem was not satisfactory (Reference 46). Identification of problems, such as incorrect addressable constants provided by the vendor for the core protection calculator (Reference 66), and the lack of tornado missile protection for portions of Units 2 and 3 AFW pump suction and mini-flow lines (Reference 88) were appropriate. However, in a few instances the licensee did not initiate non-conformance reports (NCRs) to take corrective actions and evaluate generic applicability. For example, the licensee did not issue NCRs when Furmanite was used on a safety-related valve (Reference 17), and Agastat relays with unqualified auxiliary switches were installed in safety-related circuits (Reference 47).

In the area of problem resolution, the licensee's performance has generally been good. Engineering evaluation was thorough and corrective actions appropriate for the following: reported failure of the AFW turbine trip and throttle valve at another nuclear plant (Reference 39), investigation of steam flow noise using thermographic examination in Unit 2 AFW pump area (Reference 47), possible damage to steam generator tubes due to removal of a stuck fiber optic cable (Reference 49), AFW governor valve corrosion (Reference 42), pressure locking conditions in four motor operated valves (MOVs) in CCW system (Reference 57), and confirmation of the operability of the feedwater isolation valve under dynamic conditions by developing a computer model to study the problem (Reference 57).

Licensee audits of the NCR program and corrective action programs have not identified any significant deficiency in the implementation of these programs (References 96 and 97). The backlog of drawing changes and engineering work resulting from resolution of site problem reports have decreased from a total of 607 in January 1994 to 315 in May 1995 (Reference 95).

Overall, performance of engineering in problem identification and resolution was superior. Reduced inspection is recommended in this area.

3.3 Quality of Engineering Work

Quality of work performed by the licensee in the areas of design changes, corrective actions for identified deficiencies, licensing submittals, and interdepartmental communications was generally good.

Design changes and work requests contained proper documentation of the description and reason for changes, the impact of the change on licensee programs, safety evaluations, and post-work testing and acceptance criteria (Reference 46). Engineering design changes and coordination with other departments were good. For example, coordination was good during the performance of modifications for correcting the problem of a stuck open pressurizer spray valve (Reference 52), installing thermowells in the CCW heat exchanger outlet piping (Reference 43), and replacing the degraded solenoid for the main feedwater isolation valve (Reference 44).

Minor weaknesses identified included: specifying inadequate acceptance criteria for the CCW pump discharge check valve reverse flow detection (Reference 6), not anticipating the effects of nitrogen ingress in the newly installed CCW makeup system (Reference 38), and not performing a conservative load sequence analysis for the diesel generators and including that sequence in the test program (Reference 46).

The overall qualification program for permanent engineering personnel was effective (Reference 44).

Licensee audits of the configuration control process confirmed that the as-built configuration was being maintained and field changes were being tracked or incorporated into drawings (Reference 98). Weaknesses in implementing calculation recommendations for procedure changes, and review and incorporation of vendor technical information were identified in the audit report.

Overall performance in this area was determined to be strong. Reduced inspection is recommended in this area.

3.4 Programs and Procedures

Procedure quality and implementation for MOVs, in-service testing (IST) of components, and IST inspections was adequate.

The IST performed on pumps and valves was in accordance with the ASME Code, and the IST program complied with the licensee's commitments to GL 89-13 (References 1 and 2). Design calculations for MOVs adequately evaluated the design basis conditions, and the sizing and switch setting were adequate (Reference 33). The development of the steam generator tube inspection plan, sampling methodology, and eddy current testing were good (Reference 10). Open items in design bases document (DBD) preparation and verification and validation process were tracked and managed for closure, and the DBD efforts contributed to plant safety (Reference 5). Licensee procedures established an effective program for periodically testing the load shedding of nonsafety-related and non essential loads (Reference 39).

Weaknesses in the MOV program, plant procedures, and engineering were also noted. For example, degraded circuit analysis did not consider the AC transient on the DC bus during a failure of a switch (Reference 43), safety-related pressure transmitters were found with plastic plugs instead of vent screens (Reference 52), and procedures for HPSI pump operation in different modes did not specify quantitative acceptance criteria (Reference 34).

Licensee audits of engineering activities identified no significant deficiencies. Some minor procedure weaknesses were noted.

Overall performance in this area was indeterminate.

4.0 MAINTENANCE

4.1 Safety Focus

Planning and scheduling appeared to be effective as exhibited by the licensee's use of a temporary pump for pool water transfer during the repair of a Spent Fuel Pool cross-tie valve and the data base used for scheduling channel checks and calibrations of radiation monitors (References 4 and 30). Effective prioritization of maintenance activities was noted in a review of caution tags, control board deficiencies, in-process work activities, and backlog information (Reference 46). The licensee's approach to prioritizing outage-related corrective maintenance was considered conservative, in that, no outage-related corrective maintenance would be deferred beyond the outage (Reference 46). Implementation of the licensee's on-line maintenance program was stated as being excellent (Reference 44). Supervisory oversight has been strong as determined from interviews and field observations during electrical and I&C maintenance activities (Reference 46). The maintenance test committee which evaluates the scope of the maintenance activities and determines the correct test requirements was also identified as being a strength (Reference 29).

Overall, the safety focus exhibited by the maintenance department during the time period covered by the assessment was identified as being superior. Reduced inspection in this area is recommended.

4.2 Problem Identification/Problem Resolution

Several examples involving inadequate problem identification were noted during the maintenance review. Examples of inadequate problem identification included: the failure to evaluate abnormal MOV test data which subsequently resulted in the inoperability of the MOV, the failure to initiate an NCR for a deficient condition associated with an MOV on the refueling water storage tank, and the failure to identify a deficient conditions associated with numerous Agastat relays (References 15, 49 and 57).

Self-assessments of maintenance department performance have not identified significant programmatic issues. The self-assessments reviewed contained a compilation of various performance indicators but lacked any significant analysis of the performance data. The Nuclear Oversight Division assessment of the maintenance department identified the need to improve the communication of management expectations, improve procedures, increase field supervision, and implement steps to ensure positive component identification (Reference 46).

The maintenance backlog appeared to be well managed as noted by the decrease in the maintenance order backlog from 1170 to 310 maintenance orders over the assessment period (Reference 29).

Overall performance in this area was indeterminate as definitive conclusions could not be drawn from the information contained in the inspection reports.

4.3 Equipment Performance/Material Condition

The overall plant material condition has been improving; however, numerous material deficiencies continue to be discovered, including some of a rather significant nature. For example: cracks were found on the low pressure turbine blades, erosion was noted in steam generator system piping, and a leaking crack was identified in ASME code class III piping. Other minor material condition deficiencies have been found including: fasteners missing from electrical boxes, wrong size lugs on class 1E switchgear, and a bent bracket on back of a 480v breaker (Reference 38, 42, 43, 49, 58 and 62).

Plant equipment has operated adequately with some exceptions. Two reactor coolant pump (RCP) seal problems have been identified during the last two years, including excessive seal packing leakage and 5 inch flames near the seal packing caused by rubbing of the pump shaft and the thrust bearing ring due to mis-positioned motor bearing. Several valve issues have also been identified. Two MOV operator failures occurred due to mechanical wear. Also, Feedwater and Auxiliary Feedwater system valve operators have failed. Other valve problems include safety relief valve set-points found outside set-point range, steam leaks, and a solenoid failure (References 5, 8, 10, 17, 26, 49, 57, and 69).

Normal inspection in this area is recommended.

4.4 Quality of Maintenance Work

Surveillance testing was identified as being well managed with effective administrative controls as identified during a review of 60 surveillance data packages and observation of 10 surveillances. The data package review identified only two minor errors. The surveillance observation identified no errors (References 6, 30, and 58).

The planning and scheduling of maintenance activities has been considered good to excellent due to the normal practice of staggering equipment outages and evaluating non-safety-related components that contribute to core damage risk. The craft performance in maintenance activities has been good despite the large number of activities accomplished, except for some attention to detail problems. For example: an instance where maintenance of the flow isolation valve was performed on the wrong unit and an instance where the a hydrogen monitor surveillance test was performed using the wrong unit's data (References 38, 44, and 49).

A few instances of inadequate foreign material control have occurred in the last two years including an instance where an aerosol can of cleaner was found in an auxiliary compartment of a load center and a length of chain was found on the steam generator tube sheet (References 42, 53 and 61).

Several instances of maintenance personnel not following procedures were also identified including the following examples:

* a machinist did not apply sealant to the bearing of a component cooling water pump according to procedure (Reference 30),
* the clearance between a salt water pump and motor was not verified as being adequate prior to bumping the motor (Reference 6),
* a welder did not verify the proper system and location prior to welding a piping coupling (Reference 43).

A problem with the control of M&TE was identified which involved the failure to return between 1 to 2 percent of the M&TE for re-calibration (Reference 21 and 28). Licensee QA audits have also identified tracking and re-calibrating problems with M&TE.

Normal inspection in this area is recommended.

4.5 Programs and Procedures

Numerous instances of inadequate maintenance procedures were noted during the 1994 time period. Procedural deficiencies noted included incomplete steps, incorrect or unclear acceptance criteria, and not incorporating vendor information. Specific examples included:

* a solenoid actuator was wired incorrectly and the post-maintenance test procedure was not adequate to identify the incorrect operation (Reference 28),
* the containment hatch procedure did not identify the power source to be used, causing more than a 2 hour delay in closing hatch (Reference 21), and
* a Kirk key interlock for the service water cooling pump breaker was assembled incorrectly due to an incorrect procedure (Reference 27).

The licensee has established a reliability-centered maintenance program that effectively incorporates comprehensive reviews of individual component performance. The program was stated as being an excellent process for establishing technically sound preventive maintenance. A vibration predictive maintenance program was also identified as being effective, as noted by the indication, analysis, and resolution of high vibration on the instrument air compressor and the methodology used in the monthly testing of the auxiliary feedwater pump (Reference 46).

Normal inspection in this area is recommended.

5.0 PLANT SUPPORT

5.1 Safety Focus

5.1.1 Radiological Controls

Licensee management had recently placed emphasis on improving the material condition of the plant by reducing the size of contaminated areas around some safety-related equipment, and by reducing the total number of radiological drip catches from 270 to 51 (Reference 43).

However, there was limited oversight of plant activities by health physics (HP) management with respect to addressing radiological problems (Reference 56). Although preparations for the Unit 2 outage were properly performed, steam generator nozzle dam replacement was evaluated as an example where further improvement is needed to reduce the dose received by the workers (Reference 46). Additionally, total station dose appears to be high during some outage years although a 3 year unit average appears to be near the industry median for a pressurized water reactor facility (References 102 and 103).

The licensee performance in this area was considered to be indeterminate.

5.1.2 Security

Senior management provided strong support for the security program, and were directly involved in the efforts to reduce safeguard events (Reference 31). The security staff were highly qualified and well trained.

Reduced inspection in this area is recommended.

5.1.3 Emergency Planning

The licensee continued to provide outstanding support to local and state response personnel by offering training in incident response, radiological protection, and other emergency response subjects (Reference 45). The emergency facilities, equipment, and supplies had been maintained in a proper state of operational readiness (Reference 54). The management involvement and proper safety focus were observed as evidenced by the licensee management's decision to perform walk-down verification of the plant equipment in response to a low magnitude earthquake even though it was not required by plant procedures (Reference 21).

Reduced inspection in this area is recommended.

5.2 Problem Identification and Resolution

5.2.1 Radiological Controls

The reviewed information indicated that HP aggressively identified and addressed deficiencies in guidance provided to chemistry technicians, and appropriately identified and evaluated spent fuel pool leakage problems in Unit 1. However, there was a concern that the licensee's radiological occurrence reporting system was functioning poorly as indicated by the failure of the HP department to identify an adverse trend in unauthorized entries into the high radiation areas. This problem was identified by the licensee's quality assurance organization. The licensee has also been ineffective in resolving previously identified issues such as the chemist's inability to draw and analyze a post-accident reactor coolant sample (References 39, 49, and 56).

Normal inspection in this area is recommended.

5.2.2 Security

The security division self-assessments were performed every quarter, and the reports had identified minor procedural compliance errors and security infractions. The quality assurance organization's audits of the security division's compliance with the physical security plan and the safeguards contingency plan, implementation of software QA program, and training and qualifications of security staff were found to be satisfactory. Weaknesses were identified such as not logging the failure of a tamper alarm when a manhole cover was removed by maintenance under a maintenance order, and allowing persons to enter protected area before all portions of the screening process was completed (References 22, 99, 100, and 101).

Reduced inspection in this area is recommended.

5.2.3 Emergency Planning

The quality assurance organization audits and performance observations of emergency preparedness and planning had been performed by qualified personnel and were of proper scope, depth, and effectiveness. No major deficiencies were identified (Reference 54).

An effective system had been established to identify events or problems and to make the proper level of management aware of these issues for the timely implementation of corrective actions (Reference 54).

Reduced inspection in this area is recommended.

5.3 Quality of Plant Support

5.3.1 Radiological Controls

The reports reviewed by the assessment team indicated generally good performance with minor problems noted in radiological housekeeping and radiological practices. However, the reports indicated that there were 12 improper high radiation area entries between January and May, 1995, which resulted in a NRC issued violation. The inspectors observed instances of untimely documentation of radiation surveys and improper handling of potentially contaminated materials (References 37, 39, 41, 43, 46, 47, 49, 52, and 56).

Normal inspection in this area is recommended.

5.3.2 Security

Effective management of the site security program was evident during NRC inspections. Changes to the security program and plans were properly reported and implemented. The fitness-for-duty program was good, and it was properly implemented. Supervisors and operators of alarm stations were alert and well trained.

The physical security plan and implementing procedures, vital area barriers and detection aids, records and reports, access authorization program, and fitness-for-duty program complied with regulatory requirements (References 31 and 50).

Reduced inspection in this area is recommended.

5.3.3 Emergency Planning

The licensee had trained and qualified an appropriate number of emergency response personnel to ensure a good depth in the organization. The emergency planning organization was fully staffed with qualified personnel. Emergency response facilities were well maintained and ready for rapid activation. EP training was stated as exceeding regulatory requirements (References 45, 54, and 58).

Quarterly exercises continue to demonstrate that the EP program is strong and effective (Reference 100). The licensee adequately demonstrated its ability to respond to a major event during its annual emergency preparedness drill (References 42). The corporate critique performed after the 1993 annual emergency exercise was thorough (Reference 45). The performance of operating crews in implementing emergency response actions during walk-through evaluations was good. Effective communications and good comprehension of emergency operating instructions were demonstrated by the operating crews (Reference 54).

Reduced inspection in this area is recommended.

5.4 Programs and Procedures

The reports reviewed indicated generally good performance in radiation protection and chemistry departments. Program review in this area was limited to chemistry and the radiological analytical measurement programs (Reference 37). As stated in 5.3.2, the security plan, and programs and procedures for access authorization, and fitness-for-duty, were good. The QA Audit concluded that the EP program is effectively implemented with the exception of minor deficiencies (Reference 101).

The licensee had properly reviewed and submitted to NRC the emergency plan and implementing procedures (Reference 54). Revision 12 of the Emergency Plan Implementing Procedure was adequate and provided additional guidance for classifying events based on monitor readings and dose projections (Reference 29). The training organization had maintained an effective emergency response training program. All emergency response organization personnel had been trained in accordance with applicable station procedures (Reference 54).

Reduced inspection effort is recommended for security and emergency preparedness. Program performance in health physics was indeterminate.

APPENDIX A
LIST OF REFERENCES

NRC INSPECTION REPORTS

Reference No.		Reference No.	
1	93-13	2	93-17
3	93-21	4	93-25
5	93-26	6	93-27
7	93-28	8	93-29
9	93-30	10	93-31
11	93-32	12	93-33
13	93-34	14	93-35
15	93-36	16	93-37
17	93-38	18	93-39
19	93-40	20	94-01
21	94-02	22	94-03
23	94-04	24	94-05
25	94-06	26	94-07
27	94-08	28	94-09
29	94-10	30	94-12
31	94-13	32	94-14
33	94-15	34	94-16
35	94-17	36	94-18
37	94-19	38	94-20
39	94-21	40	94-22
41	94-23	42	94-24
43	94-25	44	94-26
45	94-99	46	95-01
47	95-02	48	95-03
49	95-04	50	95-05
51	95-06	52	95-07
53	95-08	54	95-09
55	95-10	56	95-11
57	95-12	58	95-13

LICENSEE EVENT REPORTS

Reference No.		Reference No.	
59	2-95-001	60	1-95-001-3/1/95
61	2-95-002	62	2-95-003-6/23/95
63	2-95-004	64	2-94-005-4/6/95
65	2-95-006	66	2-95-007-3/31/95
67	2-95-008	68	2-95-009-6/12/95
69	2-95-010	70	2-95-011-7/5/95
71	2-95-012	72	2-93-012-2/25/94
73	3-93-006	74	3-93-007-4/26/94
75	2-94-001	76	2-94-002-3/28/94
77	2-94-003	78	2-94-004-7/29/94
79	2-94-005	80	2-94-006-11/18/94
81	3-94-001	82	2-91-019-01-9/29/94
83	3-94-002	84	2-91-020-10/12/94
85	2-93-003	86	2-93-004-9/1/93
87	2-93-005	88	2-93-006-10/8/93
89	2-93-007	90	2-93-008-11/22/93
91	2-93-009	92	2-93-010-12/22/93
93	2-93-011	94	3-93-005-12/30/93

OTHER REPORTS AND DOCUMENTS REVIEWED

Reference No.	
95	SONGS Technical Division Performance Assessment Report
96	Audit Report No. SCES-442-94
97	Audit Report No. SCES-413-94
98	Audit Report No. SCES-444-94
99	Audit Report No. SCES-517-95
100	Audit Report No. SCES-424-94
101	Audit Report No. SCES-402-94
102	Semi-annual Plant Performance Review 95-01
103	Semi-annual Plant Performance Review 95-02
104	QA Audit Reports SCES-419/311/321
105	QA Report 95-04
106	Audit Report SCES-307-93
107	Station Performance Report 2nd Quarter 1995
108	Pre-INPO Assessment Team Report, August 1994
109	NOD Self Assessment Report for the 1st Quarter 1995
110	QA Audit Report SCES-305-93/437-94
111	Site Quality Assurance Assessment, Unit 2, Cycle & Outage Report, June 1995
112	Safety Engineering Root Cause Report (SEA 95-05) - "Command and Control Evaluation" July 12, 1995
113	Safety Engineering Root Cause Report (SEA 95-001) - "Focus Report" April 20, 1995

SAN ONOFRE UNITS 2 AND 3

PRELIMINARY PERFORMANCE ASSESSMENT/INSPECTION PLANNING TREE