U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No.	50-206/87-05
Docket No.	50-206
License No.	DPR-13
Licensee:	Southern California Edison Company P. O. Box 800 2244 Walnut Grove Avenue Rosemead, California 91770
Facility Name:	San Onofre Nuclear Generating Station, Unit 1
Inspection at:	San Clemente, California
Inspection conducted:	June 1 - June 12, 1987

Inspectors:

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for P. W. McLaughlin, Office of Nuclear Reactor Regulation — Date Signed 7/14/87

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For P. Eng, Resident Inspector — Date Signed 7/14/87

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J. Russell, Radiation Specialist — Date Signed 7-14-87

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7-15-87
Date Signed

Inspection Summary:

Inspection on June 1 - June 12, 1987 (Report No. 50-206/87-05)

Areas Inspected: Announced team inspection of San Onofre Nuclear Generating Station (SONGS) Unit 1. The inspection focused on determining the effectiveness of preventive and corrective maintenance practices in preventing, or detecting and correcting, equipment degradation. The inspection was conducted for a two week period during a 42-day mid-cycle maintenance outage in Unit 1.

The following activities were examined:

1) Procurement Program
2) Quality Assurance Program
3) Operations
4) Surveillance Testing
5) I&C, Electrical and Mechanical Maintenance Practices
6) IST Program and Implementation
7) Engineering
8) Health Physics

This inspection was conducted by six NRC Region V inspectors, one NRC staff engineer from NRR, one NRC staff engineer from the Office of Research, one NRC inspector from Region III, and one contractor. Inspection Procedures 30702, 30703, 41400, 37700, 38701, 62700, 62704, 62705, 73756, 72701, 83729, 92701 and 92702 were applied to this inspection effort.

Results: Of the areas inspected, two violations of NRC requirements were identified. One violation was identified in the area of providing adequate information to permit individuals to take precautions to avoid or minimize their exposure to radiation (paragraph 11) and one violation (two examples) was identified in the area of demonstrating 125 volt vital battery no. 1 operable (paragraph 2).

DETAILS

1. Persons Contacted

San Onofre Nuclear Generating Station (SONGS)

*H. B. Ray, Vice President and Site Manager
*W. C. Moody, Deputy Site Manager
*H. E. Morgan, Station Manager
*D. Heinicke, Deputy Station Manager
D. B. Schone, QA Manager
*R. W. Krieger, Operations Manager
*D. E. Shull, Maintenance Manager
*P. Knapp, Health Physics Manager
W. G. Zintl, Compliance Manager
*J. T. Reilly, Station Technical Manager
*M. A. Wharton, Assistant Technical Manager
*K. E. O'Connor, E&C Field Manager
*H. W. Newton, Material Support Manager
*M. P. Short, Nuclear Training Manager
*J. J. Wambold, Project Manager
*W. M. Lazear, QA Supervisor
*B. Katz, Manager, Outage Management
*D. C. Stonecipher, QC Manager
*G. D. Bogosian, QA Supervisor
*K. L. Brooks, Health Physics Supervisor
*J. M. Joy, Outage Management Supervisor
*R. D. Plappert, Compliance Supervisor
*K. Johnson, NSSS Engineering Supervisor
J. Schramm, Operations Superintendent
*L. O. Cash, Unit 1 Maintenance Manager
*C. A. Couser, Compliance Engineer

* Denotes those persons attending the final exit meeting on June 12, 1987.

The inspectors talked with numerous other licensee employees during the course of the inspection.

2. Review of Station Class 1E Batteries

a. Battery Surveillance Testing

When the team arrived onsite on June 1, 1987, it was learned that one of the station Class 1E batteries had failed a surveillance test a short time before the team's arrival. Since the objective of the team inspection was to evaluate how well the licensee detected and corrected equipment degradation, it was decided that this would be an appropriate event to review in light of the team's objective.

The inspectors therefore reviewed, with the licensee, the results of the service test that was performed May 29, 1987 on 125 volt vital battery no. 2. The battery had failed its service test since it

reached its low voltage limit after approximately 20 minutes of the 90 minute test. The licensee determined that the wrong load profile values were used to perform the test. These values were from a calculation sheet that had an extraneous load profile, i.e. a dotted line on a graph, in addition to the actual load profile. These extraneous load profile values were the ones used in the service test. This extraneous dotted line represented discharge rates that were approximately twice as great as those of the correct load profile. Thus the battery reached its low voltage limit in 20 minutes. The test was halted when the battery terminal voltage reached its low limit, thereby saving the battery cells from potential damage due to cell reversal.

The inspectors noted that the calculation was prepared by one engineer, reviewed by an independent engineer and two supervisors, and issued by E&C. The calculations underwent various reviews by Station Technical personnel and were then incorporated into the service test procedure. However, no one in E&C, Station Technical, or the maintenance personnel who wrote the procedure, caught, or questioned the extraneous dotted line with the incorrect values during the review process. As a result of this review and the discrepancies identified, the inspectors questioned the values that were used in the performance of the service test on 125 volt vital battery no. 1.

The inspectors reviewed the documentation that the licensee provided for battery no. 1. This battery was installed on May 18, 1984 to replace an aging battery. E&C personnel performed a load profile calculation for this battery so that an acceptance test could be performed. This load profile calculation, DC-1604 Rev. 0, was performed on April 23, 1984 and was used in the acceptance test that was performed on the battery on July 23, 1984.

On April 14, 1986, Rev. 1 to calculation DC-1604 was issued to analyze the effect of adding 125 volt vital inverter 4A to the load profile for battery no. 1. Shortly thereafter, Proposed Facility Change (PFC) 1-86-3400.13 Rev. 0, was issued to add inverter 4A to the plant. The inspectors reviewed the PFC and the new load profile calculation along with licensee personnel. This PFC indicated that the change to the plant had no impact on surveillances, Technical Specifications, or limiting conditions for operation, as part of the engineering/safety evaluation. However, that was incorrect, since it did increase the load profile on battery no. 1 which affected the service test surveillance procedure. Consequently, the need for a change in the service test to include the load addition was not identified and this load addition to the battery and the resulting change in load profile were not included in the service test procedure. As a result, on May 7, 1986, the battery no. 1 service test was completed using the original Rev. 0 load profile calculation. These values were less than the Rev. 1 values. Therefore, the battery was not demonstrated operable in accordance with station Technical Specification 4.4.D.2.d. This is a violation of Technical Specification requirements (87-05-01). The inspectors noted that in this case also, the PFC was reviewed and approved by

various independent and supervisory E&C and Station Technical personnel. However, nobody recognized that a change to the service test procedure was required.

As a further example of missed opportunities, the inspectors noted that on May 7, 1986, the Independent Safety Engineering Group (ISEG) issued a report on an evaluation they did of the PFC administrative procedure. ISEG recommended in their report that the PFC procedure be revised to require that a new load calculation be performed whenever it is determined that a load is added to the batteries. Upon receipt of the new calculation, Station Technical should assess the need for modification of the battery surveillance procedures and provide the information to Maintenance as necessary. During the turnover of vital inverter 4A, it was discovered that an Appendix R and a seismic qualification evaluation were needed for this component. Therefore, it was not placed in service until a few months later. On July 15, 1986, Rev. 1 to PFC 1-86-3400.13 that added inverter 4A was issued. This revised PFC also indicated that the calculation had been updated but incorrectly stated that there was no impact on existing surveillance requirements, Technical Specifications, or limiting conditions for operations in the engineering/safety evaluation. Therefore, the service test procedures were not revised to include the new load profile. Again, the PFC underwent various levels of review by E&C and Station Technical personnel. The May 7, 1986 ISEG report recommendation, discussed previously, was incorporated as temporary change (TCN) 6-1 to the PFC procedure. The ISEG report was issued 2 months prior to PFC 1-86-3400.13 Rev. 1 but TCN 6-1 was not added to the PFC procedure until 6 months later on November 13, 1986. If this change had been made prior to issue of the revised PFC, it would have required that an assessment be made of the new calculation for the need to modify the surveillance procedures and provide the information to Maintenance as necessary. This could have prevented the use of the wrong calculation in the service test procedure.

Over the next few months several other changes were made to the battery no. 1 load profile. On September 15, 1986, Rev 2 to calculation DC-1604 was issued which reflected increases to the battery no. 1 load as part of a "worst case adjusted load" profile. On February 12, 1987, PFC 1-87-3465 Rev. 0 was issued to remove the regulating transformer for inverter 4A. This caused a slight load reduction on battery no. 1.

On May 22, 1987, the scheduled refueling interval service test was performed. Again, the load profile values from calculation DC-1604 Rev. 0 were used. These values were still less than the Rev. 2 values. Therefore, the battery was not demonstrated operable for a second time in accordance with station Technical Specification 4.4.D.2.d. This is a further example of violation (87-05-01).

In addition, an extraneous 815 amp discharge rate was included somehow on page 9 of the DC-1604, Rev. 2 calculation. This value is labeled as representing the original load duty cycle and as being superceded by section 7.2 of the calculation. Section 7.2 shows the

value as 800 amps. Procedural reviews did not catch or question this error.

Based on these discrepancies, the inspectors questioned the load values used in the acceptance test performed on battery no. 1 in 1984. The acceptance test consisted of a service test and a performance test. The inspectors noted that the service test portion was performed satisfactorily. However, the inspectors were concerned about the values used in the performance test portion. That portion required that the battery be discharged at a value specified by the vendor for a certain period of time. In this case, the time period was 90 minutes. The procedure indicated that the battery be discharged for this period at 1240 amps. Licensee personnel evaluated the calculations upon the inspectors' request and determined that the value that should have been used was 944 amps. Once again, the values that were provided by E&C were incorrect and were incorporated into station procedures. In this case however, the test was performed in a conservative manner, although this still indicates a laxness in the performance of technical work.

As a result of these problems the licensee took aggressive action toward resolving the deficiencies identified in past battery service tests. The license issued several non-conformance reports (NCRs) to identify the battery service test problems and to propose corrective action. In addition, the QA organization prepared two CARs that will be used to perform a generic evaluation of the design control process. The licensee committed to correct the deficiencies in accordance with an interim root cause analysis, Rev. 1, dated June 9, 1987, as follows:

1. Prepare a TCN to battery surveillance procedure SO1-I-2.7 to test per the calculation DC-1399, Rev. 2, documented load profile for battery no. 2.

2. Add a step to record battery voltage at the end of the 90th minute, prior to removing the load current, for future reference.

3. Require that the Individual Cell Voltages (ICVs) be recorded during the load test so that any failed cell can be identified after the first load test. (This should have been done previously as a good engineering practice).

4. Revise station maintenance procedures for all 3 units' battery service tests to:

   - require that the station cognizant engineer document the revision of the calculation in effect during the last battery service test, document the current revision of the applicable battery load calculation and verify that the load profile within the maintenance procedure correctly applies to the calculated load profile.

- Clearly specify the required wait time after an equalizing charge prior to starting a service or performance test.

5. Review E&C QA procedures for "Proposed Facility Changes" and revise as required to ensure that modifications that alter the battery loading require re-analysis of the battery load calculations and reperfomance of the battery service test as necessary. This was completed per TCN 6-1 to the PFC procedure.

6. A refueling interval battery service test will be performed on battery no. 1 in accordance with Calculation DC-1604, Rev. 2, and PFC 1-87-3465 prior to Mode 4 entry.

7. Expand the review of battery calculations and refueling interval service test procedures to include the remaining Unit 1 batteries and all Units 2 and 3 batteries.

8. Review and revise, as required, the battery maintenance procedures and operating instructions for Units 1, 2, and 3 for uniformity and adequacy and to add specific definitions of battery operability requirements following maintenance.

9. Perform further analysis, by the QA organization, of the problems identified with the design review process. CARs SO-P-1049 and SO-P-1050 have been issued in order to evaluate why testing was performed on the batteries with the incorrect acceptance criteria provided in the procedure and why the configuration document checklist did not show that there needed to be a change to the discharge procedure.

As a followup to the discrepancies identified, the licensee performed service tests of both battery no. 1 and 2 prior to startup of the unit. Both batteries passed these tests and were demonstrated operable.

b. System Physical Walkdown

The inspector conducted observations of equipment and component rooms to determine if they were being maintained in accordance with station procedures and regulatory requirments.

In general, components, systems, and areas appeared to be well maintained and in good physical condition. However, the inspector identified the following concerns to the licensee for evaluation:

- Battery no. 1 battery has styrofoam end spacers located at one end of each row of battery jars. This could potentially jeopardize the seismic qualification of the battery. This concern was identified to the licensee for evaluation. The inspector will review the licensee's evaluation. This is identified as inspector followup item (87-05-02).

- There were two bottles used as portable eyewash stations located in battery no. 2 room. One of the eyewash stations was secured to safety related conduit that contained the battery cables. This was done by using a long chain. This bottle, as installed, could damage several battery jars or damage the battery connectors if a seismic event should occur. Station procedure S0123-I-1.20 Rev 1, denotes the controls that are in place to ensure that every reasonable effort is made to prevent impairment of any safety related system. Section 6.1.1 requires that precautions shall be taken to ensure that no tool, material, or any other item capable of damaging a safety-related piece of equipment be allowed to impact any safety-related equipment. The inspector was concerned that even though there is a procedure in place to protect safety-related equipment, personnel are not adhering strictly to the procedure. Similar conditions have been previously identified in resident inspection report 50-206/87-03. The licensee's corrective actions on controls over items located near safety-related equipment will be followed in a future resident inspector report.

3. Modification Testing

To evaluate the licensee's program for modification testing, several of the licensee's documents which describe their program for testing were reviewed. These documents include administrative procedures for testing and are listed below:

- Topical Quality Assurance Manual, Chapter 6-C Construction Inspection and Testing.

- Topical Quality Assurance Manual, Chapter 6-D Prerequisite, Preoperational, and Startup Testing.

- Retrofit Program Manual, Volume II, Administrative Procedure AP-4 (S0123-AP-004) Preparation, Review and Approval of Prerequisite Test Procedures.

- Retrofit Program Manual, Volume II, Administrative Procedure AP-5 (S0123-AP-005) Preparation, Review and Approval of Preoperational Testing Procedures.

- Retrofit Program Manual, Volume II, Administrative Procedure AP-6 (S0123-XXVI-2.6) Review, Evaluation and Approval of Test Results.

- Retrofit Program Manual, Volume II, Administrative Procedure AP-7 Test Working Group.

The test procedures that were used during the modification activities which were reviewed were:

- Instrument and Test Procedure, S01-II-1.32, Pneumatic Valve Calibration.

- Instrument and Test Procedure, S0123-II-9.37, Control Valve Calibration.

- Generic Test Procedure, GT-400-14 (S0123-XXVI-6.4.14), Circuit and Calibration Tests.

Because of the dates of the inspection, most of the modifications planned for this outage were completed prior to the team's arrival. Most of the Construction Work Orders (CWOs) which were reviewed had already been performed, signed-off, and sent to configuration control for final documentation. Therefore, there were very few opportunities for observing actual modification testing being performed.

The following CWOs were reviewed during this inspection:

- 87031251000, S1-RSS-CV-948-ACT, PRT Gas Space Sample Actuator (Valve Preload Setting)

- 87060463000, S1-ELE-Y14, 120V Vital Bus 4 (Transfer Switch Modification)

- 87030385000, S1-DG1-E08, L.V. Exciter Cabinet DG1 (Conduit and Cable)

- 86051181000, S1-VCC-2159, Discharge Solenoid Valve from Charging Pumps Suction Header (Piping)

- 87020467000, S1-MVS-MSH-4109, A-33 Fan Intake High Humidity Switch (Switch Installation)

- 87030912000, S1-MVS-A-33, Emergency Makeup Fan for A-31 (Power On Mechanical Testing)

Two of the CWOs were examined in more detail than the others. For an example of a CWO which had been completed, CWO # 87031251000 was used. The CWO selected for in-field inspection was CWO # 87060463000.

During the review of the completed CWO (87031251000), it was found that the test procedure identified to be used in the work package had been superseded by another procedure. Based on the dates on the CWO for planning and approval of the work order, the superseding had occurred prior to the development of the CWO. However, the technician identified the proper test procedure when he began working on the task. The inspector felt that the incorrect test procedure should have been identified during the approval process. Upon questioning QA personnel, they stated that the approval dates on the procedure don't always reflect when the procedure was developed (the procedure is often prepared long before those dates that appear). They also stated that this is an example of why the CWOs always include a step for the technician to assure he has the most recent revision of the procedure.

As a result of these conversations with QA, several QA Field Surveillance Reports were reviewed. These reports indicated that minor discrepancies

similar to the one noted above occur and are resolved by the technicians per program guidelines.

While observing work in the Unit 1 Control Room, a problem arose concerning the functional testing required by CWO 87060463000. This CWO, which affected Vital Bus #4, referenced a generic test procedure for performing the functional test on a design modification. When the reactor operator requested clarification as to what the functional test affected, the technicians and cognizant engineer generated a two (2) page "back of the envelope" type procedure. After the operator expressed concern about performing parts of the test, the shift superintendent interjected and said the work would not be done until the informal procedure was evaluated and approved by engineering personnel. The CWO was subsequently revised to include these steps and plans were made to perform the test.

Startup Engineering's position is that this "back of the envelope" process is a type of "tailboarding" and takes place all the time. Also, the Generic Test Procedure for Circuit and Calibration Tests is often approved and used for modification testing. However, the fact that the reactor operator requested more information and the shift superintendent requested engineering approval reflects the inadequacies of using generic test procedures for performing tests. The inspector contends that the generic test procedure should only be used to develop a detailed procedure (similar to the one subsequently generated by Startup Engineering). Further, at the QC holdpoint in the CWO, it was not clear what the QC inspector was specifically required to verify.

Although no violations or deviations were identified, several concerns were identified regarding this program.

The previous example illustrates a lack of engineering effort in the area of test procedure preparation and planning for post modification testing. The test procedure was inadequate and appeared to have no engineering guidance or management approval. The "back of the envelope" approach is not suitable for the testing of safety-related equipment. This less than rigorous effort by Startup Engineering is another example of a weakness in the performance of technical work.

4. Inservice Testing Program

a. Overall Program Status

San Onofre Nuclear Generating Station, Unit 1, is currently in their first ten year inspection interval which is scheduled to end on December 31, 1987. The licensee is currently in the process of updating their Inservice Testing (IST) program in preparation for the second ten year program. Current valve and pump test programs are written to comply with the requirements of the 1977 Edition of the American Society of Mechanical Engineers' Boiler and Pressure Vessel Code, up to and including the Winter 1979 Addendum.

By letter dated December 22, 1977, the Division of Operating Reactors advised the licensee to implement the proposed IST program

until a detailed review of the program was completed. As of the date of this inspection, the licensee's IST program had not been approved.

b. Inservice Testing of Valves Program

The licensee delineates the policies and procedures for inservice testing of valves in the following procedures:

- S0123-IN-1, In-Service Inspection Program
- S01-V-2.15, In-Service Testing of Valves Program
- S01-12.4-2, Operations In-Service Valve Testing
- S0123-V-5.15, Inservice Testing (IST) Coordination and Trending

The inspector reviewed the valve inservice testing requirements. Based on this review which included the NRC findings related to the November 21, 1985 loss of power and water hammer event at San Onofre Unit 1, documented in NUREG-1190, the inspector determined that the valve inservice program was based on the ASME Boiler and Pressure Vessel Code, Section XI, which specifies valve inservice testing (IST) requirements, and states in part:

> Valves shall be exercised to the position required to fulfill their function unless such operation is not practical during plant operation.... Valves that cannot be exercised during plant operation shall be specifically identified by the owner and shall be full-stroke exercised during cold shutdowns. Full-stroke exercising during cold shutdowns for all valves not full-stroke exercised during plant operation shall be on a frequency determined by the intervals between shutdowns as follows: for intervals of 3 months or longer, exercise during each shutdown; for intervals of less than 3 months, full-stroke exercise is not required unless 3 months have passed since last shutdown exercise.

Further review of the licensee's program revealed that Step 6.3.1.2.d of licensee procedure S01-V-2.15 states that "As a matter of policy, an initial requirement of 25% (minimum) of all cold shutdown valves will be tested each Mode 5 forced outage." Item K of Attachment 1 to the same procedure states, "Valve testing at cold shutdown is valve testing which commences not later than forty-eight hours after cold shutdown and continues until required testing is completed or Plant startup, whichever occurs first.... Completion of all required valve testing is not a requisite to Plant startup. Valve testing which is not completed during a cold shutdown will be performed during subsequent cold shutdowns...."

The inspector noted that during the only Mode 5 shutdown since the water hammer event that occurred September 4-28, 1986 (excluding the current mid cycle outage) 40% of the valves listed on the cold

shutdown test list were tested. During the current outage all of the valves listed on the cold shutdown test list will be tested.

The inspector inquired as to the changes made to the valve IST program resulting from the water hammer event of November 21, 1985. The licensee stated that 17 check valves in the feedwater system and the auxiliary feedwater system had been replaced after the event and that these check valves are full stroked and leak tested at every cold shutdown. Review of the valve program revealed that although the valve test requirements had been revised, the valves in question were still designated as category "C". The licensee agreed to revise the valve categories for the 17 check valves in their next IST program submittal to NRR. Revision of the licensee's valve IST program to reflect the valve recategorization of the 17 check valves will be tracked as an open item (87-05-03).

The inspector inquired whether valves which can be controlled from the licensee's dedicated shutdown (DSD) panel were included in the valve IST program. The licensee stated that there was only one valve whose position was indicated on the DSD panel and that the valve in question, FCV-5051, was not included in the IST program. IWV-1100 defines the scope of IST testing for valves to encompass "those valves which are required to perform a specific function in shutting down a reactor...or in mitigating the consequences of an accident." IWV-3300 states that valves with remote position indicators shall be observed at least once every 2 years to verify that valve operation is accurately indicated. Although the DSD panel has been in place for approximately a year, the inspector noted that FCV-5051 had not been included in the valve IST program as submitted to the Commission. The licensee's QA organization initiated a Problem Review Report (PRR) to address this concern. The inspector will follow the licensee's resolution of this concern (50-206/87-05-04).

No violations or deviations were identified.

c. Valve Testing

The inspector reviewed selected valve test procedures and noted that the method to be used for obtaining valve stroke times was not specified. The licensee stated that a valve stroke time technique would be added to the appropriate procedures to ensure valve stroke timing consistency in accordance with the requirements of IWV-3413(a), by August 1, 1987. Incorporation of a specific valve stroke timing method to valve test procedures by the licensee will be tracked as an open item (87-05-05).

Subsection IWV-2300 of Section XI defines valve exercising as "the demonstration based on direct or indirect visual or other positive indication that moving parts of a valve function satisfactorily." IWV-3413 provides for the limiting value of full stroke time as one of the criteria for test acceptance. Consequently, stroke time limits for valves must be chosen such that operation within such limits indicate satisfactory valve condition. Several of the

maximum allowable stroke times, as defined by the licensee, are not adequate for this purpose. For example, several valves that typically stroke in less than 10 seconds are assigned maximum valve stroke time values of up to 120 seconds. The inspector noted that the maximum allowable stroke times have been submitted to NRR for review.

The licensee stated that, although they assign maximum stroke times of up to 120 seconds, they initiate corrective action on valves based on the criteria delineated in IWV-3417, which is triggered on significant increases in stroke time from the last valve stroke time test.

d. Inservice Testing of Pumps Program

The licensee delineates the policies and procedures for inservice testing of pumps in the following procedures:

- S0123-IN-1, In-Service Inspection Program
- S01-V-2.14, In-Service Testing of Pumps Program
- S0123-V-5.15, In-Service Testing (IST) Coordination and Trending

The inspector reviewed licensee relief requests for the IST of pumps and noted that a relief request addressing the expansion of the allowed full scale range of inservice testing instruments from three times the reference value to four times the reference value had been submitted to the Commission. IWP-4120 states that the full scale range of each instrument shall be three times the reference value or less. Since there appears to be no basis for the licensee's relief request, the licensee's QA department agreed to pursue resolution of this discrepancy.

The inspector noted that the licensee had not established acceptance criteria for pump bearing temperatures based on the manufacturer's recommendations. This item was also identified in a recent QA audit of the licensee's IST program and will be resolved by June 30, 1987.

e. Inservice Testing Performance

The inspector witnessed the inservice testing of the G-10W electric driven auxiliary feedwater pump. The test engineer performed the pertinent portions of test procedure S01-V-2.14.1, "Auxiliary Feedwater In-Service Pump Test" in accordance with the requirements of the procedure. Prior to and during test performance both the cognizant engineer and the equipment operator repeatedly inspected the material condition of the pump and associated piping and valves. Test data was obtained in general agreement with the methodology specified in the Code; however, the inspector noted that neither the test procedure nor the physical pump installation had provided for identifying the locations on the pump and motor bearing where vibration data was to be obtained. IWP-4160 states that instruments

that are position sensitive shall be either permanently mounted or provision shall be made to duplicate the position for each test. IWP-4520 allows use of a portable vibration indicator that clearly identifies the probe or measurement reference point to permit subsequent duplication in both location and plane. The licensee stated that vibration measurements on pumps in the IST program are taken by the system cognizant engineer who knows where to take vibration readings, and several system cognizant engineers stated that they always measured vibration at the same point from test to test. Review of pump test data by the inspector could not identify instances where failure to measure bearing vibration at specific points per the requirements of the Code was key in determining pump operability. The inspector stated that should the cognizant engineer be unavailable to perform IST tests in the future, the locations for obtaining pump vibration data for IST purposes would be subject to question. The licensee stated that an evaluation of an appropriate method to clearly define points where IST vibration data is to be taken would be performed and incorporated into the pertinent IST test procedures for all 19 pumps in the IST program by July 15, 1987. Completion of incorporation of vibration data point locations into licensee procedures for all pumps in the IST program will be tracked as an open item (87-05-06).

During performance of the Auxiliary Feedwater pump G-10W test, the inspector noted that the lubricant in the slinger ring region appeared to be the consistency of syrup. The cognizant engineer stated that he would request that the oil be sampled and changed. The inspector also noticed a lube oil addition log sheet stored on the side of the pump motor housing which is subjected to the prevailing environment and was becoming hard to read. The cognizant engineer stated that the copy observed by the inspector was a field copy and not the official records copy.

f. Quality Assurance Audits of IST Programs

The inspector reviewed the licensee's latest QA audit (SCES-042-86) of the implementation of the IST program and noted that the audit was both comprehensive and thorough. Identified findings were pertinent, appropriate, and similar to violations identified during typical Commission inspections of IST program implementation at other facilities. The inspector noted that the items identified were in the process of being corrected by the technical staff. The inspector also noted that several comments were made in the audit text which were not specifically identified as deficiencies in the audit report, the most notable of which was the lack of identification of those locations on Unit 1 pump installations where vibration data for IST testing was to be obtained (see paragraph e). The inspector also noted that the QA audit recognized that vibration measurement locations for pumps in the Units 2 and 3 IST program were identified in the Units 2 and 3 test procedures.

Within the areas inspected, no violations or deviations were identified.

5. Procurement

The inspector reviewed the licensee's program for procurement. This included a review of procedures, purchase orders, and other documentation used in the procurement process to determine if the program was being properly implemented.

The following SONGS' procedures governing the material procurement process were reviewed.

- Material Control Procedure S0123-XI-1.4
  Upgrading an Item's Quality Class

- Material Control Procedure S0123-XI-2.0
  Procurement Document Control

- Material Control Procedure S0123-XI-2.1
  The Five-Level Procurement System

- Material Control Procedure S0123-XI-2.3
  Verification Test Procedures

- Material Control Procedure S0123-XI-2.5
  Substitution Part Equivalency Evaluation Report (SPEER)

- Material Control Procedure S0123-XI-2.6
  Critical Characteristics Evaluation

- Quality Assurance Procedure E&C37-26-16
  Procurement of Items and Services for SONGS 1, 2, & 3, Engineering and Construction Projects

In addition, over 200 samples of completed Purchase Orders, Spare Part Equivalency Evaluation Reports (SPEERS), evaluations for placement of items on the safety-related commodity list and Stock Upgrade Requirements Evaluations (SURES) were reviewed. Staff representatives of the Material Support Division and Station Technical Division were interviewed to ascertain qualifications and responsibilities concerning their procurement duties.

The SONGS' material procurement program was evaluated for compliance with 10 CFR 50, Appendix B, the procedures governing the program, and sound engineering principles applicable to procurement of spare parts for safety-related equipment.

During this inspection, the inspector identified one significant programmatic weakness. The inspector noted a pervasive lack of rigor to fully document engineering evaluations conducted to approve spare and replacement part substitutions or upgrades. An example of this lack of rigor is contained in SPEER 87-0071. In this example, the licensee approved the substitution of a 3" globe valve on the master valve list with a valve of significantly different configuration. This valve has many applications in the plant. However, the licensee's documentation of their evaluation failed to show any consideration of a seismic load

analysis performed on safety-related piping runs where the new valve could be installed. The seismic load analysis could be significant since the new valve assembly weighs approximately 10 pounds more than the valve being replaced.

This laxness to fully and professionally document the technical bases considered during these evaluations could result in possible significant information being overlooked during any subsequent reviews concerning the installation of substituted or upgraded parts in the plant. Also, since SONGS engineering analysis responsibilities for part procurement, substitution, and installation are split between Procurement Engineering, Station Technical Engineering, and E&C, the full disclosure of all information pertinent to the analysis must be provided for consideration by each of these various engineering organizations. Better documentation of the engineering analyses performed by each engineering organization could preclude the possible installation of an unauthorized, improper part in the plant.

Of the areas inspected, no violations or deviations were identified.

6. Quality Assurance

The inspection of this area included the review of the program documents and procedures governing the conduct of the quality assurance activities at SONGS. Interviews were held with QA engineers, QC inspectors, auditors, and supervisors concerning their experience, training, responsibilities, and activities on site. Six completed audit surveys were reviewed. The resulting Corrective Action Requests (CARS) and their subsequent disposition were also reviewed. In-field QC inspections of ongoing maintenance work were observed. The QA/QC activities of SONGS incoming inspection of receiving materials were reviewed and observed.

The licensee's performance in this area was evaluated against the requirements of 10 CFR 50, Appendix B and the guidance contained in ANSI/ANS 3.2. The completed audits and inspection documents were reviewed to ascertain if the completed work had been performed in accordance with the applicable SONGS procedures. The inspector noted that the completed audits were thorough, professional and in-depth. This was considered a strength of the QA program. It was also noted that the average time required to close a Corrective Action Request (CAR) was 66 days. This was based on a 1-year sample of 102 closed CARs. This was considered to be a satisfactory resolution time for CARs.

No violations or deviations were identified.

7. Reactor Operations

The inspector reviewed reactor operations related activities associated with the current midcycle maintenance outage. The plant was in Mode 5 during the inspection period and the following types of activities and plant configurations were reviewed and observed.

- System alignments.

- Conformance with Technical Specification Limiting Conditions for Operation for Mode 5.

- Chemical analyses of primary coolant, refueling water storage tank contents, and diesel generator fuel oil.

- Control room and shift superintendent log entries.

- Plant housekeeping.

- Implementation of temporary modifications.

- Implementation of clearance and tagging controls.

The inspector observed that formal approved procedures existed for the control of the observed activities. Records contained required documentation confirming executed activities and configuration control. Plant staffing was consistent with Technical Specification requirements and discussions with plant personnel revealed the staff to be knowledgeable of plant design and operation. The plant was in midloop operation for the greater portion of the inspection period. Control room instrumentation was observed to provide the required vessel level information. Adequate shutdown margin was observed to have been met. An inspection of control room panel areas revealed housekeeping to be adequate. No unauthorized jumpers were observed.

While touring one of the emergency diesel generator rooms, the inspector noted a storage room that contained bottles of fuel oil samples, oily rags, and spilled fuel oil on shelves. Operations personnel have exclusive use of this storage room, and it appeared to be used mainly for diesel fuel oil sample storage.

Discussions with licensee fire protection personnel indicated that the combustible loading for the diesel generator room in question, of which the storage room was considered a part, was much greater than that represented by the materials in the storage room. Therefore, they were not considered a fire hazard from an Appendix R point of view, since the licensee has installed a dedicated shutdown diesel, for Appendix R purposes, in a different area of the plant. However, the inspector was still concerned that the combustibles located in the storage room presented an undue fire hazard to safety related equipment. During a subsequent tour of the area with the Operations Manager, the inspector observed that it had been cleaned up noticeably. The Operations Manager stated he would develop a policy statement to instruct operations personnel on the storage of combustible material in this room.

No violations or deviations were identified.

8. Surveillance Testing

The inspector reviewed the licensee's surveillance program for compliance with established requirements. This review covered the following areas:

- Observations associated with the local leak rate testing of 3 penetration volumes, Nos. 27, 28 and 32.

- Observations associated with the conduct of the Safety Injection/Loss of Offsite Power test.

- The review of twenty completed surveillance tests.

The inspector noted that surveillance tests required by Technical Specifications had been identified and listed in a controlling document. The completed tests reviewed were performed using formal approved procedures. Required test data was documented, prerequisites were completed, acceptance criteria were met, and test results were approved by operations supervision. The tests reviewed by the inspector were completed at the required frequencies.

The inspector noted, during the performance of surveillance test SO1-12.8.2, "Cold SIS and Loss of Offsite Power Test," that a thorough pretest briefing had been held with the staff involved in performing the test. Communications and direction given during the test were effective and clear, and the control room personnel were serious and attentive. A formal approved procedure was written for the test and was checked as being the most current revision.

The local leak rate testing was performed in accordance with approved procedure SO1-V-1.12 "Containment Penetration Leak Rate Testing." Pretest meetings were held with control room operations staff and health physics personnel. The inspector observed that a test pressure slightly in excess of 50 psig was applied to the penetration volumes in accordance with test procedures. Valving configurations were checked out in accordance with procedures and test data was properly documented. Pressure gauges and stop watches had current calibration dates. Test engineers were knowledgeable of plant design and testing requirements. In the case of penetration volume 32, a retest was required as one of the boundary valves would not hold pressure.

One violation was identified in the area of surveillance testing, which dealt with station vital batteries, and is discussed in detail in paragraph 2.

9. Observation of Maintenance Activities

The licensee's maintenance program was examined to evaluate the effectiveness of the program and to determine whether or not corrective and preventive maintenance were being conducted in accordance with regulatory requirements and licensee-approved procedures and instructions. Maintenance for Unit 1 was inspected in four areas: electrical, instrumentation and control, pumps, and mechanical.

a. Electrical

The electrical maintenance program was inspected by examining the following procedures that describe the functioning and the administration of the program:

- Quality Assurance Program Chapter 5-C, "Maintenance Program"

- Maintenance Procedure S0123-I-1.6, "Maintenance Section Policy Guidelines"

- Maintenance Procedure S0123-I-1.7, "Maintenance Order Preparation, Use and Scheduling"

These procedures detail the administrative controls necessary to identify, plan and schedule routine and nonroutine maintenance. Instructions for initiating and preparing a maintenance order (MO), the principal device for accomplishing maintenance work, is contained in procedure S0123-I-1.7.

The inspector examined the following electrical MOs completed during this shutdown period to verify that the program for performing electrical maintenance was being conducted in accordance with established procedures. These MOs were examined for content, proper authorization signatures, QC participation, job completion sign-off, QA review, etc.

- 86031447000, Perform Disposition of NCR S01-P-5899, Implement FCN's SI-767E and SI-768E and Perform Movats Test per IEB 85-03.

- 86052779002, Safety Injection Pump Discharge Check Valve Miscellaneous Maintenance.

- 87051345000, Replace Unqualified Butt Splices per Disposition on NCR S01-P-6114.

- 8705148000, Remove Motor Mounting Bolts to Allow for Coupling Removal on Safety Injection Pump Motor West.

- 87051479000, Remove Motor Mounting Bolts to Allow for Coupling Removal on Safety Injection Pump Motor East.

- 87041416001, HV851A Replace Limit Switch with E/Q Namco EA 180 Limit Switch and Replace Conduit Seal.

- 87041411001, HV-853A Replace Limit Switch with E/Q Namco EA 180 Limit Switch and Replace Conduit Seals.

- 87041415001, HV-852A Replace Limit Switch with E/Q Namco EA 180 Limit Switch and Replace Conduit Seals.

- 87010075001, Permanently Attach SV-1 Terminal Block to the back of the J Box per NCR S01-P-6034.

- 87060355001, Feedwater Block Valve Actuator, Repair Motor and Replace Lugs. Inspect Limit Switch Wiring per Applicable Drawings.

- 87033305000, Inspect Terminal Blocks and Check Locknuts & Bushings for Tightness in all Hoffman J. Boxes on HV-851 A/B, 852 A/B, 853 A/B and 854 A/B.

The above MOs appeared to be in order and appeared to have been processed in accordance with prescribed procedures.

A field inspection was made of work in progress in the plant involving main feedwater pumps. The replacement of limit switches with EQ Namco EA 180 switches on valves HV-853B and HV-854B under MOs 87041414001 and 87041421001 respectively was taking place. The work appeared to be progressing in accordance with the description and instructions in the MOs.

The inspector examined audit SCES-007-86 dated June 23, 1986 performed by quality assurance to verify that documentation, instructions and controls have been established and implemented in accordance with topical quality assurance manual, chapters 5-C and 7-D for the station maintenance program. The audit team was made up of four members and was conducted during a six week period in 1986. The audit assessment of root causes of significant deficiencies was "no significant deficiencies have been identified".

The inspector examined in detail the audit plan items (eight) and findings for each of these items which were included in the audit report. The audit, the plan and the findings and conclusions appeared to be in order.

The inspector concluded that the electrical maintenance appeared to be accomplished in accordance with the program as described in the applicable procedures and appeared to be adequate.

b. Instrumentation Maintenance

The examination of the Instrumentation and Control (I&C) Systems Maintenance Program at SONGS-1 included a review of the licensee's program as described in the following licensee documents:

- Topical Quality Assurance Manual, Chapter 5-C Maintenance Program

- Maintenance Procedure, S0123-I-1.3, Maintenance Documentation.

- Maintenance Procedure, S0123-I-1.6, Maintenance Section Policy Guidelines.

- Maintenance Procedure, S0123-I-1.7, Maintenance Order Preparation, Use, and Scheduling.

After evaluating the overall maintenance program, specific test procedures were reviewed. Some of the procedures applied to Unit 1 only (S01-), and other procedures were for all of the San Onofre units (S0123-). The specific I&C procedures that were examined in detail were:

- Instrument and Test Procedure, S01-II-1.2, Surveillance Requirement Reactor Plant Instrumentation Test.

- Instrument and Test Procedure, S01-II-1.20, Nuclear Instrumentation System Detector Replacement.

- Instrument and Test Procedure, S01-II-1.72, Intermediate Range Compensating Voltage Adjustment.

- Instrument and Test Procedure, S01-II-1.76, Surveillance Requirement Auxiliary Feedwater System Test.

- Instrument and Test Procedure, S0123-II-8.10.1, Electronic Loop Verification.

- Instrument and Test Procedure, S0123-II-9.37, Control Valve Calibration.

- Instrument and Test Procedure, S0123-II-9.82, Pressure Switch Calibration.

Several MOs were reviewed for conformance to the station requirements as described in the maintenance program and procedures. The MOs were reviewed for the use of correct and current procedures, adequate instructions and QC "HOLD" points, identification of prerequisites, description of test requirements, and listings of required test equipment. The MOs were evaluated at different stages of the maintenance process. Some of the MOs were in planning, some were being worked in the field, and some had been completed and signed off.

The MOs which were in the planning stage were briefly reviewed for adherence to the program guidelines.

Several of the jobs being performed in the field were evaluated by observing the I&C personnel performing their assigned tasks. The work orders were examined to ensure that the technicians were following the instructions presented in the MOs and properly documenting the work being performed.

For MOs in which the work had been completed, the documentation was examined for completeness, to verify that the procedures had been followed, and that the "HOLD" points had been observed. Special attention was given to the presence of signatures and comments concerning the work performed.

The MOs examined in one of these three stages during this inspection were:

- 86042580000,S1-72-130, B Train High Voltage Control Power (Agastat Relay Replacement)

- 86091581000,S1-DEN-1GA2C15-187, DG2 Generator Differential Relay (Modification to SA-1 Relay)

- 86110753000, S1-RCS-G-2B, 'B' Reactor Coolant Pump (Instrumentation Removal/Reinstallation)
- 86111907000, S1-AFW-PT-2010, NPSH XMTR-G-10S (Calibrate Pressure Transmitters)
- 86111909000, S1-CVS-PT-1120A, Containment Hi Pressure Train A (Containment Isolation System Calibration)
- 87030632000, S1-AFW-PYV-3010, Current to Voltage Converter (Auxiliary Feedwater System Calibration (Train B))
- 87031063000, S1-FWS-FCV-457, Main Feedwater Flow Control-SG/B (Valve Response Data Collection)
- 87032621000, S1-NIS-N-1207, Power Range Channel 1207 (Detector Replacement)
- 87050552000, S1-AFW-FTL-3453, Differential Pressure Low Flow Transmitter (Auxiliary Feedwater Full Flow Test)
- 87051611000, S1-NIS-N-1203, Intermediate Range Channel 1203 Channel Checkout)

As a result of this inspection, implementation of the SONGS-1 I&C Maintenance Program was found to be consistent with procedural requirements. The personnel responsible for the I&C maintenance had a good knowledge of the program and systematically tracked and performed the required tasks.

c. Pumps

The inspector examined work control documentation, interviewed licensee personnel involved in pump maintenance and testing, and examined work in progress on various safety-related and non-safety related pumps. The objective was to determine whether modifications being made to these pumps, because of problems identified by the licensee, were reasonable and sound from a technical standpoint. Also, the inspector observed whether the work was implemented according to written instructions, and also evaluated quality control involvement.

1) Spray Chemical Addition Pumps, G 200 A&B

The inspector examined several In Service Testing (IST) records of the spray chemical addition pumps. The pumps were rated to deliver 0.4 gpm at 350 psi to the containment spray system, when driven at a speed in the range of 77.5 to 155 rpm. In order to meet the rated discharge, however, the pumps had been run at considerably higher speeds of up to 193 rpm during successive ISTs, dating back at least to June, 1986. As explained in SCE Memorandum for File dated Dec. 1986, gradual accumulation of "gases" (hydrazine vapor) in the pump cylinders was the cause and that running the pumps in the "unloaded"

state for some time would resolve the problem. This explanation of the problem was provided by the vendor, Union Pump Company. Since the pumps were positive displacement pumps, it made sense to the inspector that vapor accumulation in the cylinders would reduce their discharge capacity, as well as cause cyclic pressure fluctuations in the discharge piping. The March, 1987 IST of pump G 200-A appeared to confirm this diagnosis, during which the rated discharge was met while running this pump at 143 rpm.

In all of the test documentation examined by this inspector the reference pressure has been stated as 315 psig, rather than the rated 350 psig. The Technical Specifiations do permit surveillance testing of these pumps at 90% of the rated pressure. However, Article IWP-3100 of the ASME Boiler and Pressure Vessel Code, Section XI, specifies 0.93-1.02 dP (where dPr is the reference differential pressure) as the acceptable range of suction/discharge pressure differential for IST of pumps. Surveillance testing of the pumps at 315 psi discharge pressure falls outside this range. Furthermore, the acceptable range of flow range according to IWP-3100 is 0.94-1.02 Qr (where Qr is the reference flow rate). The test flow rates were slightly outside this range. These questions were raised with licensee representatives and a verbal commitment was obtained from the licensee to make a further engineering evaluation of these pumps.

2) Steam-Driven Auxiliary Feedwater Pump Modification

The steam-driven AFW turbine has had a history of repeated tripping on overspeed, both when starting and while running. The cause was determined to be slugs of condensed steam (low energy water) from the supply pipe entering the turbine. The realignment of the 3" steam supply line to give it a slope of 1/8" per 1'-0" to prevent accumulation of condensation appeared to the inspector to be an adequate remedy.

The work-package contained adequate details of the work to be performed, along with drawings and quality control hold points. At the time inspection began, the steam supply line modification had already been completed. Only the installation of insulation back on the pipes remained. Interviews with licensee representatives and those of the contractor (Bechtel), and examination of the documentation indicated that adequate quality control of the work had been implemented. No deviations or violations were identified.

3) Charging Pumps, North and South

The inspector toured the charging pump area and examined maintenance records relating to these pumps. MO No. 86032264000 required installation of a "chicken feeder" and associated piping to the south charging pump outboard motor bearing. The chicken feeder was a gravity-fed oiler and 1/4"

supply pipe to the bearing. Under the section titled "Problem" in the MO, no statement of the cause for malfunction of the lubrication system was given, only instructions to install. The licensee stated that the chicken feeder had been inadvertently displaced by personnel working in the area. The inspector noted that it is located in a restricted space of the charging pump area such that it may be displaced down again. No attempt at guarding against this possibility was apparent. Installation of a simple wire-mesh guard would seem prudent.

4) Other Pump Maintenance Activities

The inspector toured other pump areas and examined maintenance procedures and documentation, including those relating to the reactor coolant pumps B and C, the safety injection pumps E and W, the feedwater pumps E&W, the motor-driven auxiliary feedwater pump and the turbine plant cooling water pumps N and S.

The inspector was satisfied with the licensee's actions in these areas.

5) Lubricant Storage Areas

The inspector examined lubricant storage areas in the Unit 1 Turbine Building and in a common storage area for all three units. The latter was comprised of outdoor storage of oil-drums and a large lockable cargo container. The inspection was motivated by evidence of improper storage and labeling of lubricants discovered by QA as far back as May, 1983 (CAR No. S023-P-422, dated 5/1/83). A storage shed for proper storage of the many types of lubricants used in the plant was planned. This plan was postponed several times and the CAR is still open. Meanwhile, licensee representatives stated that proper labeling and protection measures from the weather has been taken. The inspector toured the storage area to verify this and found the conditions of storage, identification, and labeling of lubricants acceptable. However the inspector noted that the superior measure of a storage shed originally proposed, and considered viable for almost 4 years, still remained to be implemented, but there is no NRC requirement for this.

6) Fire Water Pump Diesel Tank Level Indicator

The inspector examined documentation regarding a deficient Level gauge, 2/3 LG-5653 on the Fire Pump Diesel Tank, Units 2 and 3. The problems associated with this gauge have been cited in at least 14 documents since July, 1984, including MO Nos. 85030006, 84000153001, 84110999, 85063049, and 86010020 and Non-Conformance Report No. 2-1652. While the level gauge has been inoperable all this time, interim measures have been taken to fabricate a sounding rod to provide a positive means of level indication, which appears to increase the risk of contamination of the fuel. A Technical Specification violation

was avoided by keeping the tanks filled to 75%, vice the required 65%. DCP/PFC 6630, dated 8/22/86 has been initiated to replace the defective level gauge with sight glasses. At the time of the inspection, the work remained incomplete.

No violations or deviations were identified.

d. Mechanical Maintenance

The inspector observed mechanical maintenance activities on motor operated valve (MOV) actuators; diesel generators (DGs); heating, ventilation, and air conditioning (HVAC); pipe supports; and other mechanical components. The activities were assessed to determine if the mechanical maintenance program is being implemented in accordance with regulatory requirements and governing procedures and instructions.

1) Motor Operated Valve Maintenance

Maintenance on motor operated valve (MOV) S1-RCP-MOV-18 was observed by the inspector. The documentation for S1-RCP-MOV-19 was reviewed. The completed MO numbers for MOV-18 and MOV-19 were 87051647000 and 87051689000, respectively. Both of these maintenance activities involved replacement of the torque switch. Although the torque switches were still functional, the switches were replaced with a similar torque switch due to problems with part availability of the older style of switch. The switch was tested according to procedure SO123-I.8.313, "Actuators - Motor Operated Valve Analysis and Testing System, MOVATS". The procedure was adhered to and the content of the procedure was found to be acceptable. The valve was observed to be properly lubricated, with no foreign material observed. The maintenance personnel were found to be knowledgeable on the MOVATS system.

2) Diesel Maintenance on Transamerica Delaval Incorporated (TDI) Diesels

A portion of the preventative maintenance/surveillance inspection of the TDI Number 2 Diesel was observed. The MO number was 86111532000 and the procedure referenced was SO1-I-2.2, "Emergency Diesel Generator Surveillance Inspection". The portions of the maintenance activity observed were in compliance with the MO and the procedure.

A suggestion for procedural enhancement of SO1-I-2.2 was made by the inspector to the licensee. During observation of step 6.13.4, "Hot Web Deflection Measurement", it was noted by the inspector that the gauge was brought to the temperature of the engine, though the procedure does not make mention of this. The concern was if the gauge was not brought up to the temperature of the diesel, the thermal expansion could cause an erroneous reading. The inspector also observed that two deflection gauges were used. The procedure implies that only

one gauge will be used. The licensee agreed to take these suggestions for procedural enhancement and clarity under consideration.

The inspector also observed tests performed by operations personnel to verify operability. Portions of the following procedures were observed:

- SO1-10-1, "Diesel Generator Operations"

- SO1-12.3-10, "Diesel Generator Load Test"

The TDI diesel performed a load rejection test (from 3000Kw) without overspeeding. At the end of the load test, the inspector was informed that the diesel was declared functional, but was not declared operable due to operability concerns over the vital station battery.

3) Diesel Maintenance on Dedicated Shutdown Diesels (DSD)

The DSD is used to power a third Auxiliary Feedwater (AFW) Pump. This diesel was installed due to Appendix R (fire protection) concerns relating to the loss of offsite power. The observation of the running of this diesel was in conjunction with an Integrated Surveillance Test on the AFW pump.

The inspector observed that the startup of the diesel was in accordance with procedure SO1-10.7. The diesel was started and tripped on low lube oil pressure. The inspector talked with the craft people present and was informed that this trip was a fairly common occurrence. The diesel was reset and started on the second attempt. The inspector had concerns regarding the operability of the diesel and talked with cognizant maintenance personnel. The inspector was informed that the sensing gauge for the lube oil is at the end of the piping system, and it takes time for the lube oil pump pressure to be seen by the sensor. The inspector was also informed that a Startup Problem Report (SPR) 6577 was written (4/1/87) describing this problem and Station Technical had recommended some fixes to the problem and an MO was currently being generated to repair it. The inspector was also informed that, during emergency starts of the diesel, this trip is bypassed. The actions taken by the licensee were appropriate, and the inspector had no further concerns regarding the operability of the DSD.

The DSD battery was also inspected. The battery was observed to have 1/2 of a spacer plate missing between cells 58 and 59, and some of the levels were slightly above the high level mark. The inspector was informed that the spacer plate would be replaced, and that procedure (SO1-I-4.14, "Battery Cleaning and Watering") allows the level to be up to 1/4 inch above the high level mark. The inspector was satisfied with the licensee's response in this regard.

4) HVAC Observations

The inspector walked down the Control Room Heating, Ventilating and Air Conditioning (HVAC) system at SONGS 1. The purpose of the control room HVAC is to limit the radiation and toxic gas exposure to the control room operators during a design basis accident.

The inspector had two concerns when inspecting the HVAC. One concern was the covering of the HVAC ductwork by a taped covering. This covering was to ensure system integrity. The inspector was informed that this was a temporary measure and was not a permanent fix to ensure system integrity. Another concern involved some HALON bottles secured near the HVAC system air intake. The concern was that the HALON concentration could be at unsafe levels if the tanks ruptured. In discussions with the licensee, the inspector was informed that the amount of HALON stored near the air inlet was not sufficient to cause a health hazard. The inspector was satisfied with this explanation.

5) Pipe Supports and Snubbers

The inspector performed a visual inspection of approximately two dozen pipe supports and snubbers on main feedwater, safety injection, and diesel generator piping. The supports and snubbers selected appeared to be installed in such a manner that they could perform their intended function.

6) Other Mechanical Components

The inspector observed work that was being performed on several mechanical components. The following MOs were observed in progress:

- 87041416001, to install Grafoil sealant and place torquing requirments on Conax connections to NAMCO EA120 limit switches.

- 8705140000, to replace a leaking gas valve and O-ring on the accumulator for Safety Injection System (SIS) valve S1-SIS-HV-851A

- 86110764001, to align "B" reactor coolant pump motor, install the flywheel cover, and perform a test run with the motor uncoupled.

The inspector considers that all work activities detailed on these MOs were being performed in a satisfactory manner by knowledgeable personnel. In addition, the inspector noted that there was extensive involvement by QC inspection personnel during performance of these MOs.

- Configuration Control Procedure(s)

  SO123-XIV-4.2, "Site Design Change Administration"

Modifications and design changes once approved by the plant modification review committee are processed by engineering and construction as a design change package (DCP). The design criteria is developed through a series of design review meetings which finally result in a design change package classified as Revision "A". This mile post is the first version of a design but is not yet approved. In this form (Revision "A"), the DCP is routed to the various groups such as station, operations, maintenance, quality assurance, startup, etc. for their review and recommended changes/input. Following this review, the DCP is revised to incorporate those changes and issued as Revision "0". Revision "0", once approved, is the first working revision from which Construction Work Orders (CWOs) are written to actually perform the work to accomplish the modification/design change in the plant.

Following installation of the design change or modification, component/system testing and preoperational testing takes place. After preoperational testing is completed, the turnover package, which includes all of the documentation from Revision "0" of the DCP through the preopational test results and as built drawings, is turned over to Quality Assurance (QA). QA reviews the package to determine that it is complete and that all QA requirements have been satisfied. The turnover package is further reviewed by Station Technical in parallel with station configuration control for completeness. Following this review the as-built drawings are released to operations for use in the control room and the package is forwarded to Corporate Document Management (CDM) where it becomes a permanent record of the plant.

b. Review of Design Change Procedures and Construction Work Orders

The inspector verified that the program for processing design, design changes and modifications is functioning in accordance with prescribed procedures, and examined in detail the following Design Change Packages (DCPs) which were in various stages of completion. Some of the DCPs were in configuration control indicating the installation was completed and the turnover packages were in the last review stage. For other DCPs, the installation was still in process in the field or installation in the field had not yet been started. The following DCPs were examined for authorization signatures; safety, engineering, environmental, and ALARA evaluations; drawing change authorization; QA review; as-built drawings; completion signatures; etc.:

- DCP-1-86-3072 Revision 0, Replace Magnecraft Relays In VR Transfer Scheme With Electro Switch Lockout Relay

- DCP 1-85-3303.0 Revision 1, Valve Operation Modifications

- DCP 1-87-3391, Provide Duct Heaters for the Control Room Emergency HVAC System

- DCP 1-85-3009-1, Install Switchgear Enclosure Foundation Floor Slab

- DCP 1-85-3009.5, Dedicated Shutdown System/Appendix R Modifications

- DCP 1-85-3009.9, Modification and Relocation of Dedicated Shutdown Panel C-38

- DCP 1-85-3009.14, Dedicated Safe Shutdown Water and Fuel Makeup

In addition, the following Construction Work Orders (CWOs) for the field installation of the Design Changes and Modifications, for the above DCPs, were examined in detail by the inspector for proper authorizing signatures, QC participation, job completion sign-off, final QA review, etc.:

- CWO 87030454000, install roto hammer remote extensions for valves VCC-324 and VCC-405 in accordance with FIDCN M-4743 and M-4769.

- CWO 87030382000, add two coredrills to concrete roof on reactor auxiliary building in accordance with FIDCN C-2151.

- CWO 87030892000, relocate valve VCC-324, add valve VCC-405 and delete valve FV-3079 in accordance with FIDCN M-4743.

- CWO 87030373000, install cables 1GHE09RP1, C1, I1 and terminate them at GE09RY.

- CWO 8703040900, grout any misdrilled holes resulting from installation of conduit 73471G and relay box GE09RY.

- CWO87022396000, install relay cabinet GE09RY and conduit 73471G for LV exciter cabinet for DG2.

- CWO8704298000, replace relay GE09RY per NCR-S01-P-6104.

- CWO8704302300, perform inspection and take baseline data on replacement LOR/ER relay in accordance with test procedure S0123-II-11.152.

- CWO87041288000, perform inspections and take baseline data on new LOR/ER relay as required per instrument and test procedure S0123-II-11.152.

- CWO87020803000, test LOR/ER relays in E09 Auxiliary Panel GE09RY, perform circuit tie-ins INE09, low voltage excitation panel, retest circuits in accordance with S0123-II-11.152.

The above documentation (DCPs and CWOs) appeared to be in order and processed in accordance with applicable procedures.

Two DCPs were selected to inspect in the field to verify the installation of the design changes and modifications. A walkdown was made in the charging pump area to inspect completed modifications made to two remote valve operators under DCP 1-85-3303.0, valve operator modifications. The in process work of installation of a switch on a panel in the control room was inspected. This installation was being accomplished under DCP 3465.0, Vital Bus No. 4 Transfer. These installations appeared to have been made or were being made in accordance with prescribed design and CWOs.

c. Audit Reports

Further verification of the licensee's program for design, design changes and modification included examining the following three audits conducted in this area by the licensee:

1) SCE-2-86/FCR-1-86, conducted February 1986

The purpose of this special audit was to assess the effectiveness of the application of the quality assurance program to the design and procurement processes for the Diesel Generator in the Dedicated Safe Shutdown System for San Onofre Unit 1.

2) SCES-027-86, conducted June/July 1986.

The purpose of this audit was to verify Project/Startup Engineering implementation of the applicable requirements specified in Chapter 2-A, "Design Development, Review and Approval" of the Topical Quality Assurance Manual (TQAM), E&C 24-10-16, "Development, Review, Approval and Release of SCE Design Change Packages (DCPs) SONGS 1, 2 & 3 and Administrative Procedure (AP) No. 10, "Design Change Process".

3) SCE-22-86, conducted August 1986.

This audit covered selected review of SCE design change packages and field generated interim design change notices.

The audits appeared to be comprehensive in the areas examined and demonstrates the effectiveness of QA's involvement in the licensee's program for design changes and modifications.

The inspector in his examination of the licensee program for design, design changes and modifications reviewed the licensee's annual report dated June 11, 1986 of facility changes including a summary of the safety evaluation for each change/modification. The report included only two facility changes for 1986; 1-85-3066.0 and 1-85-3055.1. Both changes involved replacement of environmentally unqualified containment electrical penetrations and safety related cables. The report and safety

evaluation summaries appeared to be adequate and to satisfy the requirements of 10 CFR 50.59(b)(2).

It appears from examination of the above documentation and the field inspections that the procedures prepared to describe the functioning and manage the licensee program for design, design changes and modifications have adequate controls to ensure a proper operating program.

No violations or deviations were identified.

11. Radiological Controls

The inspector reviewed the following areas: audits, changes in organization and programs, training and qualification of personnel, external and internal exposure, maintaining occupational exposures ALARA, and control of radioactive material. This included reviews of licensee records and reports, discussions with licensee and contract personnel, and several tours of the the licensee's facility.

The inspector reviewed Quality Assurance Audit SCES-020-86 and various Field Surveillance Reports as applicable to the Unit 1 mid-cycle outage. The deficiencies identified appeared to have been adequately addressed and corrected. The inspector observed that the audit team included individuals qualified as lead auditors in the area of radiological controls as defined in ANSI/ASME N45.2.23-1978, "Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants."

The inspector interviewed the Unit 1 Health Physics (HP) supervisor, the Unit 1 Radioactive Material Control (RMC) General Foreman, the RMC Manager, and various HP and RMC leads and technicians in regard to the preparations made for the Unit 1 outage and significant changes implemented since the last inspection. The inspector was informed that the Unit 1 HP Supervisor had been recently appointed to that position. The inspector was also informed that a significant effort had been made at the start of the outage by the RMC organization to decontaminate the 42 and 31 foot levels of the Unit 1 containment building. This resulted in entry to these levels, as well as a few areas of the 22 foot level, in street clothes. Several supervisors interviewed by the inspector commented that the decomtamination resulted in easier access to the work area and, they felt, more frequent supervisory tours.

The inspector was informed by the HP Supervisor and the RMC Manager that 30 and 47 temporary technicians had been added to their respective staffs to support the outage. The inspector examined the resumes of select temporary contract HP journeyman technicians and all appeared to meet the requirements of ANSI/ANS-3.1-1981, "American National Standard for Selection, Qualification and Training of Personnel for Nuclear Power Plants." The inspector reviewed several contract HP technician Qualification Manuals and all appeared to be appropriately complete. The inspector discussed with the RMC Manager and General Foreman the training of RMC technicians with regard to the Unit 1 decontamination effort and outage. The inspector was informed that temporary Unit 1 RMC decontamination personnel had received on-the-job training at Units 2/3 two weeks previous to the start of the outage to familiarize personnel

with the decontamination techniques to be used and that they also had received "weight" training to familiarize them with the proper methods for lifting and carrying heavy items.

The inspector made several tours of the Unit 1 containment building and observed numerous jobs in progress, particularily:

Reactor Coolant Pump Repair and Reassembly
Excore Detector Changeout
Reactor Cavity Inspection
Equipment Decontamination
Upender Cavity Sludge Removal Preparations

The inspector observed that the workers were wearing appropriate dosimetry, anti-contamination clothing, and respiratory protection (as required by their respective REPs) and appeared to be expeditiously carrying out their tasks. The inspector reviewed current exposure data for personnel involved in the outage and noted that there were none in excess of the 900 millirem whole-body SCE administrative limit but that five workers had received exposure extensions. The inspector reviewed the five respective Radiation Exposure Limit Extensions and noted that they appeared to be complete, properly reviewed and signed, and each included a correctly completed SCE Occupational External Radiation Exposure History which had information equivalent to that contained on Form NRC-4. During the tours the inspector also noted that plant areas appeared to be appropriately posted and that containment housekeeping appeared to be in good order. The inspector was informed that there were no known exposures of personnel to airbourne radioactivity in excess of the 30 MPC-hr administrative limit nor had there been any positive whole-body counts attributable to the intake of radioactive material at the site during the outage.

The inspector was informed that Irradiated Fuel Fragment controls had been instituted for select jobs but that none had been found in systems with the exception of one highly radioactive Co-60 particle which had been removed from the Radioactive Waste Storage Tank. The particle was noticed when a survey of the outside of the tank, after a flush of a hot spot on a Reactor Coolant loop drain line, revealed a 1000 R/hr hot spot on the bottom of the tank. The particle was removed by a special procedure and was in storage at the time of the inspection. The particle was observed to be about the size of a grain of sand. Four other discreet particles had been found during the outage at Unit 1 but were not associated with plant systems. The inspector was informed that there had been 45 personnel contamination events to date during the outage and that 18 of these had occurred during the containment decontamination process.

The inspector reviewed notations of calibration and performance checks on portable survey instruments and noted some minor discrepancies with the notation of performance check dates which were pointed out to the cognizant HP personnel and expeditiously corrected. The inspector observed personnel frisking with both hand-held friskers and the beta-booths. Personnel appeared to be frisking properly and personnel contamination alarms seemed to be properly responded to and documented.

The inspector toured radioactive material storage and processing areas at Units 1 and 2/3. The compressible waste generated at Unit 1 was being transferred to Units 2/3 for compaction.

During a tour of the radioactive material storage area on the east side of Units 2/3 the inspector noted eight gray boxes, approximately 3'x3'x5', in the area outside door R3-60. The boxes bore the required "Caution-Radioactive Material" label but no information was provided on the label as to what radiation levels were present or what material was contained in the boxes. The area was posted as a Radiation Area but the boxes were stored in a housekeeping area separate from the normal RMC storage. Readings taken by the inspector on June 3, 1987, with an Eberline model RO-2 ionization chamber, serial number 897, calibrated on March 24, 1987, and due for calibration on June 24, 1987, indicated a maximum contact dose rate of 48 mrem/hr and a general area dose rate around the boxes of 5-10 mrem/hr. These dose rates were markedly higher than others in the general area.

The inspector brought this to the attention of the Units 2/3 HP supervisor and inquired if the noted labelling was sufficient to meet the requirements of Health Physics Procedure SO123-VII-7.4, "Posting and Access Control," and 10 CFR 20.203, "Caution signs, labels, signals and controls." The supervisor stated that he felt that the current labelling was not sufficient to meet the requirements. The supervisor later informed the inspector that the boxes had been surveyed and appropriately labelled with the box contents and radiation levels. The supervisor stated that previously made documented surveys of the loaded boxes were not available. The inspector was informed by the HP Manager that the boxes contained Reactor Coolant Pump Seals in storage casks. The Manager stated that the labelling of these boxes with only the radiation symbol and the words "Caution-Radioactive Material" was not sufficient to meet the requirements of HP Procedure SO123-VII-7.4, that the vast number of packages containing radioactive material at the site were properly labelled and that these must have been missed as the packaging and movement had been completed at the time of shift turnover on June 1, 1987.

Technical Specifications, Section 6.11, Radiation Protection Program, reads:

> Procedures for personnel radiation protection shall be prepared consistent with the requirements of 10 CFR Part 20 and shall be approved, maintained and adhered to for all operations involving personnel radiation exposure.

Health Physics Procedure SO123-VII-7.4, paragraph 6.1.2.6, "Radioactive Materials Container," requires that:

> Each container having radioactive material in excess of the amounts specified in Appendix C of 10 CFR 20 shall bear a durable, clearly visible label bearing the radiation caution symbol and the words:

"CAUTION, RADIOACTIVE MATERIAL"

OR

"DANGER, RADIOACTIVE MATERIAL"

It shall also provide sufficient information to permit individuals handling or using the containers or working in the vicinity thereof to take precautions to avoid or minimize exposures.

A similar violation involving the labelling of two 55 gallon drums was noted in November, 1986, and documented in inspection report number 50-206/86-42. Failure to adequately label the eight Reactor Coolant Pump Seal boxes is a violation of the requirements of Technical Specifications (87-05-07).

The inspector interviewed the cognizant ALARA engineers and reviewed the ALARA program planning and execution for the Unit 1 outage. An outage goal of 80 person-rem had been set of which 67 person-rem had been expended by the 27th day of the 45 day outage. The inspector reviewed select Radiation Exposure Permits, Maintenance Orders, ALARA Job Reviews, Temporary Shielding Authorizations, Surveys, and the special procedure for the hot particle removal from the Reactor Coolant Drain Tank. The inspector noted that there had been a significant increase in the number of Maintenance Orders issued for the outage over the number planned, an increase from approximately 400 to approximately 650, and that there had been an increase in the scope of work on let-down valves in the vicinity of the non-regenerative heat exchanger. It appeared that the outage exposure goal might be exceeded but the level of effort and involvement of the ALARA group appeared significant. Indeed, the setting of a seemingly agressive exposure goal and the daily participation of the ALARA group in work planning and execution appeared to be effectively maintaining occupational exposures as low as reasonably achieveable.

Within the area inspected, one violation was identified.

12. Followup of Inspector Identified Items

a. (Closed) 50-206/86-43-01 - Safety Injection/Feedwater Pump Bearing Oil Supply

This item dealt with several concerns regarding safety injection/ feedwater (SI/FW) pump bearing oil supply.

1) One aspect concerned the ability of the installed flow meter to indicate flow at the reduced levels resulting from reinstallation of flow orifices. The licensee replaced the flow meter with one more suited to measure the existing flow levels per Maintenance Order (MO) 8611340000.

2) The inspector requested the licensee confirm the proper operation of the pump bearing temperature monitor and alarm. This was completed by the licensee per MOs 93111610002 and 86111207000.

3) The inspector requested the licensee confirm proper oil flow to the motor bearings. This was completed by the licensee as specified in MOs 86111166000 and 86111051001.

4) The inboard motor bearing lube oil sight glass appeared cloudy. The inboard sight glass was replaced with the outboard sight glass and a new sightglass was installed in the outboard position. This was accomplished per MO 86100605000.

The inspector found the licensee's actions concerning this item to be acceptable and it is closed.

b. (Closed) 50-361/86-25-03 Procedures and Training on AFW Tappet Relatch

This item involved a finding by the previous Region V team inspection with regard to the method for resetting the auxiliary feedwater (AFW) pump turbine overspeed trip.

Procedure S023-2-4 has been revised in accordance with TCN 9-4 to include resetting of the P-140 turbine overspeed trip by ensuring actuator HV-4716 is fully closed and pulling the trip lever connecting rod towards HV-4716.

The inspector briefly interviewed a representative sample of Nuclear Plant Equipment Operators (NPEOs) to ensure that they had knowledge of this reset procedure. Also, the inspector observed signs, located in the area of the AFW pumps, with detailed diagrams as to how to reset the P-140 turbine overspeed trip.

The licensee appeared to have addressed this item adequately and it is closed.

c. (Closed) 50-206/82-26-01 - ORMS Low Flow Alarms Unexplained on Channels 1211 and 1212

This item concerned the background count rate on Operational Radiation Monitoring System (ORMS) channel 1211 which had a background count rate of 35,000 CPM. This was 15,000 CPM above the alarm setpoint specified in procedure S01-I.3-1. Also, channels 1211 and 1212 were selected to monitor the stack instead of containment. The licensee made this selection because a low flow alarm was received whenever the channels were selected to monitor the containment.

Procedure S01-2.2.1 was revised to specify that the alarm setpoints for these channels are determined by the Chemistry Department and are periodically reviewed and revised as necessary by Chemistry.

Also, spurious low flow alarms from channels 1211 and 1212 have been eliminated. The inspector personally inspected these channels in the control room which were selected to monitor containment and no low flow alarm was present. Further, in order to ensure that Technical Specification requirements are met, these channels are

normally selected to monitor containment. The shift superintendent stated that he has not observed any spurious low flow alarms from these channels. Therefore, this problem is considered resolved and this item is closed.

d. (Open) 50-206/86-11-01: Safety Analysis and ASME Section XI-Operability Limits for Inservice Testing of Pumps

During this inspection, the licensee provided copies of memoranda between P. A. Croy and J. L. Rainsberry regarding: (1) determination of FSAR design requirements for those pumps tested in the inservice testing program, and (2) the acceptance criteria delineated in the inservice testing program. The two sets of pump requirements were summarized in a memo from P. A. Croy and B. L. Woods dated December 17, 1986. However, the methodology used to assess the appropriateness of the IST pump acceptance criteria was not clear. The individual who prepared the comparison document was unavailable for interview during the entire course of this inspection. Therefore, the validity of the comparison was not verified by the inspector. This item remains open pending review and discussion between the cognizant licensee individual and an inspector.

e. (Open) 50-361/85-22-03: Safety Analysis and ASME Section XI Operability Limits for Inservice Testing of Pumps

This item is identical to the item discussed immediately preceding except that it applies to Unit 2. This item remains open pending review and discussions between the cognizant licensee individual and an inspector.

f. (Closed) 50-206/86-34-01: Evaluate Need for Additional Licensee Actions on Testing Foxboro Controller Wire Harnesses

While evaluating the I&C maintenance program, the status of this open item concerning the degradation of Foxboro wiring harnesses was reviewed. Forty (40) MOs were generated to replace the Foxboro coil cords. Of these forty MOs, eight (8) were reviewed in detail. The detailed reviews included field observations of the preparatory bench work and the in-plant installations of the hardware. It was found that not all of the MOs had been completed and released to document control, but most of the actual work of installing the replacement cables had been completed.

The eight MOs for performing inspection, testing, or installation of the Foxboro equipment which were examined are as follows:

86090856000
86090857000
86090858000
86120839000
86120846000
86120853000

86120865000
86120869000

Based on the evaluation of the Foxboro related MOs and the work completed at the time of the inspection, actions are being taken by the licensee to replace the Foxboro coil cords. Therefore, this item is closed.

13. Exit Meeting

On June 12, 1987, an exit meeting was held with the licensee representatives identified in paragraph 1. The inspectors summarized the inspection scope and findings as described in this report.