U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-361/82-25
50-362/82-16

Docket No. 50-361; 50-362 License No. NPF-10 Construction Permit No. CPPR-98 Safeguards Group

Licensee: Southern California Edison (SCE) Company
P. O. Box 800
2244 Walnut Grove Ave.

Rosemead, California 91770

Facility Name: San Onofre - Unit 2 and Unit 3

Inspection at: San Onofre, California

Inspection conducted: July 3 through August 19, 1982

Inspectors: D. F. Kirsch 8-30-82
for A. Chaffee, Senior Resident Inspector, Unit 2 Date Signed

D. F. Kirsch 8-30-82
for G. Johnston, Reactor Inspector Date Signed

D. F. Kirsch 8-30-82
for J. Carlson, Reactor Inspector Date Signed

Approved by: D. F. Kirsch 8-30-82
D. F. Kirsch, Chief Date Signed
Reactor Projects Section 3

Date Signed

Summary:

Inspection on July 3, 1982 through August 19, 1982
(Report Nos. 50-361/82-25 and 50-362/82-16)

Areas Inspected: Routine, unannounced inspection of the Unit 2 Start-up Test Program including the following areas: operational safety verification; post core hot functional start-up test witnessing; initial criticality witnessing; low power physics testing witnessing; and independent inspection effort. In addition, inspection of the Unit 3 Preoperational Test Program was conducted in the following areas: fuel receipt and storage; preoperational test witnessing; precore hot functional test witnessing; reactor protection system test witnessing; plant tour; and independent inspection effort. This inspection involved 211 inspector hours by three NRC inspectors.

Results: Of the twelve areas examined, one apparent item of noncompliance was identified (failure to follow auxiliary feedwater system operating procedure - paragraph 7, severity level IV).

RV Form 219 (2)

DETAILS

1. Persons Contacted - Units 2 & 3

*T. Garven, Operations Quality Assurance Engineer
*H. Ray, Station Manager
*D. Nunn, Project Manager
*H. Richter, Project Engineer
*C. Horton, Start-up Quality Assurance Supervisor
*D. Schone, Project Quality Assurance Supervisor
*P. King, Operations Quality Assurance Supervisor
*P. Croy, Manager, Configuration Control and Compliance
*W. Moody, Deputy Station Manager
*R. Rosenblum, Assistant Project Manager
*M. Short, Project Support Manager
*J. Iyer, Lead Compliance Engineer
*B. Katz, Manager, Station Technical
*M. Wharton, Supervising Engineer
*R. Santosuosso, Instrumentation and Control Supervisor
*S. Scholl, Station Engineer

The inspectors also interviewed and talked with other licensee employees during the course of the inspection; these included shift supervisors, control room operators, start-up engineers, and quality assurance personnel

*Denotes those persons attending the exit interview on August 13, 1982.

2. Monthly Surveillance Observation

The inspector observed technical specifications required surveillance testing on the RCS leak rate on two occasions and observed the shift routine walkdown to verify that testing was performed in accordance with adequate procedures, test instrumentation was calibrated, and limiting conditions for operation were met.

No items of noncompliance or deviations were identified.

3. Operational Safety Verification - Unit 2

The inspector observed control room operations, reviewed applicable logs and conducted discussions with control room operators. The inspector verified the operability of selected emergency systems and reviewed tagout records. Tours of the containment, safety equipment building, radwaste building and turbine building were conducted to observe plant equipment conditions, including potential fire hazards, fluid leaks, and excessive vibrations, and to verify that maintenance requests had been initiated for equipment in need of maintenance. The inspector, by direct observation and interview, verified that the physical security plan was being implemented in accordance with the station security plan.

The inspector observed plant housekeeping/cleanliness conditions and verified implementation of radiation protection controls.

No items of noncompliance or deviations were identified.

4. Post-Core Hot Functional Start-up Test Witnessing - Unit 2

The inspectors witnessed various portions of the following tests:

2HB-316-01, Control Element Drive Motor Tests
2HB-313-01, Pressurizer Spray Valve and Control Adjustments

The inspectors observed no significant inconsistencies with the licensee's start-up test program during those witnessed portions of the tests.

No items of noncompliance or deviations were identified.

5. Initial Criticality Witnessing - Unit 2

The inspectors observed the following during the performance of the initial criticality procedure (2IC-301-01):

- procedure prerequisites were completed
- a reactor scram was performed prior to start-up
- a controlled copy of procedure was used
- proper use of the inverse multiplication plot during the approach to criticality
- procedure changes were properly developed and followed.

In addition, the inspector verified the critical boron concentration, by independent calculation, and that criticality was achieved within 1 percent of the predicted valve.

No items of noncompliance or deviations were identified.

6. Low Power Physics Testing Witnessing - Unit 2

The inspectors observed portions of the following Low Power Physics tests:

- boron reactivity worth
- moderator temperature coefficient
- control rod worths
- functional checkout at the reactivity computer

During the performance of these tests, the inspectors verified on a selected basis, by observation and discussion with licensee personnel, that those portions of the tests observed were conducted in accordance with an approved procedure, that the test

equipment was properly calibrated, that the test data were collected and recorded, and that the test adequately demonstrated conformance with applicable acceptance criteria.

No items of noncompliance or deviations were identified.

7. Independent Inspection Effort - Unit 2

a. Auxiliary Feedwater System Vibration Problem

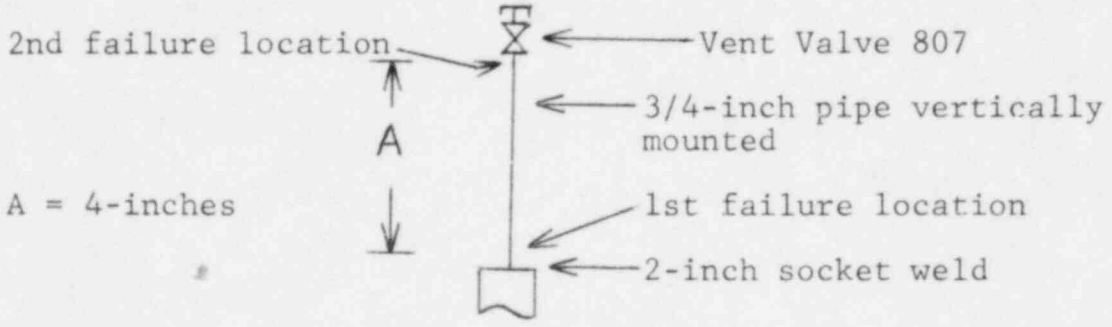
On May 27, 1982 the inspector observed mechanical vibration on the main feedwater line to steam generator 089. The licensee subsequently determined that the observed vibrations resulted from an unauthorized lineup of the auxiliary feedwater system. The unauthorized lineup caused reverse flow through Kerotest valve 154. This valve has a floating disc which vibrated at approximately 3Hz when subjected to reverse flow. This vibration was transmitted through the auxiliary feedwater system to the main feedwater piping.

The auxiliary and main feedwater systems were subjected to this mechanical/hydraulic cyclic force for approximately 4-1/2 minutes on May 27, 15 seconds on June 9, and 15 seconds on June 11, 1982. The vibration on June 9 and 11 was due to testing being conducted to identify the cause of the vibration observed on May 27, 1982.

The above mechanical/hydraulic cyclic force significantly contributed to the following damage:

(1) Fatigue failure on June 11, 1982, of an ASME code class 3-3/4 inch pipe in the weld heat affected zone above a 2-inch socket weld on the auxiliary feedwater cross-connect piping located in the auxiliary feedwater building. This failure occurred during the vibration testing on June 11, 1982 at 12:45 P. M. No indications of improper welding were identified.

(2) Fatigue failure, on June 17, 1982 of an ASME Code Class 3-3/4 inch pipe in the weld heat affected zone below a 3/4-inch socket weld to vent valve 807. This failure location was about 4-inches above the first failure (see diagram below).



The failure on June 17, 1982 occurred during feeding of a steam generator using an authorized auxiliary feedwater lineup which did not include backflow through Kerotest valves. This lineup resulted in essentially normal system vibration even though two pipe supports (see (4), below) had been slightly damaged during the initially observed vibration. The licensee's engineering analysis subsequently determined that the degredation of these two supports resulted in a slight increase in vibration of the piping during normal lineups. However, the slight increase in normal system vibration was felt, by the licensee, to have a small effect on the time interval between the first failure on June 11 and the second failure on June 17, 1982. (Again no indication of improper welding existed in this case)

(3) The reverse flow conditions caused the failure of Kerotest valve 154 such that the valve would pass flow in either direction even when shut manually. The failure of the valve was postulated to have occurred during the initial excessive vibration event.

(4) Damage indications existed on two supports located on the auxiliary feedwater cross-connect piping. These indications were indentified on June 11, 1982 after the performance of the second vibration test.

(5) Licensee engineering analysis of the above events concluded, on June 24, 1982, that two separate sections of 2-inch auxiliary feedwater cross connect piping should be replaced due to potential for vibration induced work hardening of the piping material.

The licensee has repaired the above damages and has concluded that the system design margins are restored. To preclude the future possibility of the errant lineup the licensee is considering the addition of a caution statement to procedure SO23-2-4 "Auxiliary Feedwater System Operations" to assure that reverse flow through these Kerotest valves is prevented. (50-361/82-25-01)

The failure of each pipe weld, when combined with the failure of Kerotest valve 154, resulted in a flow path from one auxiliary feedwater pump (P-141) to atmosphere. Therefore, on June 11 and June 17, the above failures resulted in one inoperable auxiliary feedwater pump, thus putting the plant into an action statement for Limiting Condition for Operation (L.C.O.) 3.7.1.2 since the plant was in Mode 3 on both

occasions. The licensee has prepared two 30-day Licensee Event Reports (LER's 82-27, 82-31) addressing these aspects of the above events.

The following findings appear to have been significant contributors to the occurrence of the above events:

. The operators chose to place the auxiliary feedwater system in a lineup which was not allowed by procedure SO23-2-4

. The significance of this lineup was not well understood although the operators were aware, as were other licensee personnel through training, that backflow through Kerotest valves was not predictable and should be avoided.

The operators did have reason to suspect any lineup which included reverse flow through Kerotest valves and the procedure SO23-2-4 "Auxiliary Feedwater System Operation" did not allow this errant system lineup. The failure to comply with procedure specified auxiliary feedwater system operations is an apparent violation of Technical Specification 6.8.1. (50-361/82-25-02)

The licensee committed to do a generic review to determine the location of all similar Kerotest valves or other valves of the same type and assure that system operating procedures prohibit reverse flow through these valves. (50-361/82-25-03)

b. Main Steam Safety Valve Tests - Unit 2

The inspector observed selected portions of the main steam safety valve test, conducted in accordance with SO23-I-6.44 and SO23-I-2.5.

No items of noncompliance or deviations were identified.

c. In-service Testing Program (Valves) - Unit 2

The inspector reviewed the following documents:

. Engineering Procedure SO23-V-3.50, Revision 1, dated April 7, 1982 "Inservice Testing of Valves Program".

. Operator Surveillance Test SO23-3-3.30, Revision 1, dated April 10, 1982 "Inservice Valve Testing, Quarterly".

. Temporary Change Notice 20 to SO23-3-3.30.

- Inservice Testing Program Plan, Revision 1, dated June 16, 1982.
- Inservice Inspection and Testing Program Plan for the San Onofre Generating Station Unit Number 2, issue date February 23, 1982.
- Code of Federal Regulations, 1982.
- Section XI, Division 1, of the ASME Boiler and Pressure Vessel Code (B&PV), 1977 Edition through Summer 1978 Addenda.
- Safety Evaluation Report (SER) for SONGS 2, dated February, 1981.

Based on the above reviews the inspector noted the following:

(1) The licensee is required by Technical Specifications and the Code of Federal Regulations to have an IST program for valves complying with the ASME B&PV Code, Section XI, except for the specific reliefs reviewed and approved by SER, dated February, 1981.

(2) As a result of a meeting held on March 17, 1982 between the licensee and the Office of Nuclear Reactor Regulation, the licensee became aware that certain additional valves already contained in their IST program plan required cycling time acceptance criteria to conform to Section IWV 3413 (a) of the 1977 Edition, Summer 78 Addenda of ASME Section XI. In response, the licensee amended the IST Program Plan by the submittal on June 16, 1982 of Revision 1 to the IST Program Plan. The licensee then amended the implementing procedures SO23-V-3.50 and SO23-3-3.30 in August, 1982. The licensee is currently reviewing past IST test results to determine if past valve and system operability was affected by the noted inadequacies in their program. The following is a list of some of the valves requiring response time acceptance criteria, which were lacking until August 1982.

- Safety Injection System

  HV - 9302
  HV - 9303

- Containment Spray System

  FV - 0318
  FV - 0328

HV - 9306
HV - 9307
HV - 9347
HV - 9348

. Chemical and Volume Control System

FV - 9253
HV - 9231
HV - 9236

. Component Cooling Water System

HV - 6200
HV - 6201
HV - 6202
HV - 6203
HCV - 6537
HCV - 6538
HCV - 6539
HV - 6500
HV - 6501

In response to the inspectors concern regarding the discrepancies observed between the licensee's IST plan and the implementing procedure, the licensee performed a review of the above documents to insure conformance. This review resulted in the identification, by the licensee, of 17 valves that require IST testing prior to re-entering Mode 4.

The licensee is currently evaluating the safety significance of the above listed 21 valves identified by the Inspector and the 17 valves identified by the licensee. (50-361/82-25-04)

(3) Position Indication Tests, required by IWV-3300 of Section XI, ASME B&PV Code, have no acceptance criteria or procedure. Only a sat/unsat block with signature block is provided in SO23-3-3.30.

The concern here is that the Position Indication Test may be inadequate to demonstrate proper valve position indication system performance. This then brings into question the reliability of response time testing of safety-related valves because SO23-3-3.30 only requires the use of remote position indicators for response time testing.

The licensee committted to upgrade his Position Indication Test program. (50-361/82-25-05)

(4) Position Indication Tests required by the IST program are not required for most retests of valves.

The concern here is that work on motor operated valves may affect the position indication system which will then affect the validity of ISI response times.

For example, valve 2HV-4713 upper limit switch was found set too low. This resulted in an open indication when the valve was only 55% open. Thus, when work is performed on certain valves, the Position Indication Test is an important part of the retest requirements. The licensee committted to evaluate and upgrade equipment retest requirements as necessary. (50-361/82-25-06)

The above areas will be examined during a future inspection.

8. Fuel Receipt and Storage - Unit 3

The inspector verified, prior to receipt of new fuel, that technically adequate, approved procedures were available covering the receipt, inspection, and storage of new fuel;and observed receipt inspections and storage of new fuel elements to verify that activities were performed in accordance with the licensee's procedures.

No items of noncompliance or deviations were identified.

9. Preoperational Test Witnessing - Unit 3

The inspectors observed selected portions of the following tests:

Pressurizer Safety Valve Test	3PE-313-02
Containment Isolation Valves	3PE-101-04
Concentrated Boric Acid System	3PE-223-05
Containment Spray System	3PE-226-01
Auxiliary Feedwater Pump Motors	3PE-235-01
Charging Sub System (CVCS)	3PE-223-03

During the performance of these tests the inspectors verified, on a selected basis, by observation and discussion with licensee personnel that those portions of the tests observed were conducted using an approved procedure, test equipment was properly calibrated, test data were collected and recorded, and that the test adequately demonstrated conformance with applicable acceptance criteria.

No items of noncompliance or deviations were identified.

10. Pre-Core Load Hot Functional Preoperational Test - Unit 3

The inspectors observed selected portions of the following tests:

Secondary Feedwater System Water Hammer Test	3HA-201-01
Reactor Coolant System Leakage Measurement	3HA-212-05
Steam By-pass Control System	3HA-210-01

During the performance of these tests the inspectors verified, on a selected basis, by observation and discussion with licensee personnel that those portions of the tests observed were conducted using an approved procedure, test equipment was properly calibrated, test data were collected and recorded, and that the test adequately demonstrated conformance with applicable acceptance criteria.

No items of noncompliance or deviations were identified.

11. Reactor Protection System Test Witnessing - Unit 3

The inspectors observed selected portions of the following preoperational test.

Reactor Protection System	3PE-357-01

During the performance of this test, the inspectors verified, on a selected basis, by observation and discussion with licensee personnel that those portions of the test observed were conducted using an approved procedure, test equipment was properly calibrated, test data were collected and recorded, and that the test adequately demonstrated conformance with applicable acceptance criteria.

No items of noncompliance or deviations were identified.

12. Plant Tour - Unit 3

The inspector toured Unit 3 and observed that housekeeping was satisfactory and fire protection equipment appeared to be properly maintained and distributed. The inspector also spot checked the adequacy of various testing activities in progress.

No items of noncompliance or deviations were identified.

13. Independent Inspection Effort - Unit 3

The inspectors observed selected portions of the following preoperational tests.

Safety Injection Check Valve Flow Test	3HA-315-01
Local Leak Rate Test	3PE-101-02

During the performance of these tests, the inspectors verified, on a selected basis by observation and discussion with licensee personnel that those portions of the tests observed were conducted using an approved procedure, test equipment was properly calibrated, test data were collected and recorded, and that the test adequately demonstrated conformance with applicable acceptance criteria.

No items of noncompliance or deviations were identified.

14. Exit Interview - Units 2 and 3

The inspector met with licensee representatives (denoted in Paragraph 1) on August 13, 1982, and presented the results of the inspection. The licensee acknowledged the apparent violation of prescribed auxiliary feedwater system operational lineup requirements (paragraph 7.a.).