ENCLOSURE 2

U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket Nos:	50-361, 50-362
License Nos:	NPF-10, NPF-15
Report No:	50-361/96-08, 50-362/96-08
Licensee:	Southern California Edison Co. P.O. Box 128 San Clemente, California
Facility:	San Onofre Nuclear Generating Station, Units 2 and 3
Location:	San Clemente, California
Dates:	June 16 through July 27, 1996
Inspectors:	J. A. Sloan, Senior Resident Inspector J. J. Russell, Resident Inspector D. L. Solorio, Resident Inspector D. M. Garcia, Resident Inspector B. J. Olson, Project Inspector, Branch F
Approved:	Dennis F. Kirsch, Chief, Branch F Division of Reactor Projects
ATTACHMENT:	Partial List of Persons Contacted List of Inspection Procedures Used List of Items Opened and Closed List of Acronyms

EXECUTIVE SUMMARY

San Onofre Nuclear Generating Station, Units 2 and 3
NRC Inspection Report 50-361/96-08, 50-362/96-08

This routine announced inspection covers a 6-week period of resident inspection.

Operations

- In response to a failed part-length control element assembly (CEA) control circuit, the inspector found that operator communications were good and the involvement of the shift superintendent, as well as reactor engineering, was appropriate (Section O1.2).

Maintenance

- Instrument and control (I&C) craftsmen performed inadequate self-checking on two occasions, resulting in initiating work on wrong components. These were cited as examples of a violation of procedure compliance requirements (Section M1.3).

Engineering

- The licensee's discovery of defective dampers and initial evaluation of the potential to affect tornado protection were good. However, the timeliness and technical rigor of the licensee's operability evaluation did not meet management's expectations. Basing an operability determination on the probability of occurrence argument was not consistent with NRC Generic Letter 91-18 (Section E2.1).

- After NRC questions, the licensee performed a more comprehensive operability assessment of not having safety-related power to the charging pump seal water supply. However, the initial operability assessment was untimely and lacked technical rigor in the determination of the time duration that a charging pump would be needed (Section E8.1).

Report Details

Summary of Plant Status

Both units operated at essentially full power during this inspection period with the following exceptions: Unit 2 reduced power to 75 percent on June 22, 1996, for condenser waterbox cleaning, and returned to full power on June 23, 1996. On July 13, 1996, Unit 2 reduced power to 75 percent for condenser waterbox cleaning and heat treatment of the main circulating water system and saltwater cooling system and returned to full power on July 15, 1996.

I. Operations

O1 Conduct of Operations[1]

O1.1 General Comments (71707)

The inspectors observed several routine periods of operation from the control room. The inspectors also observed Operation's response to a Unit 2 failed CEA lift coil control signal, as described below. The licensee conducted a thorough tailboard (briefing). Discussions were conducted prior to all significant evolutions. Communications and command-and-control functions were sufficiently thorough and clear.

O1.2 Failed CEA Response to Upward Motion Demand (Unit 2)

a. Inspection Scope (71707)

On July 11, 1996, the inspector observed Unit 2 licensed operators respond to a failed part-length CEA control circuit.

b. Observations and Findings

The inspector entered the Unit 2 control room immediately after Unit 2 operators had attempted to align Subgroup 7 by moving part-length CEA 28 outward. The CEA did not move outward, and the operators discontinued the CEA alignment. Technical Specifications (TS) require that CEAs within a group be within 7 inches of each other or that they be declared misaligned. All CEAs in that subgroup remained within 7 inches of each other. Licensee I&C technicians monitored a subsequent attempt to move CEA 28 outward. This action produced outward movement, but at a less than normal rate. The I&C technicians informed the control room operators that the lift coil for this CEA was not receiving the current needed to produce an outward movement upon demand and that the problem

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[1]Topical headings such as O1, M8, etc., are used in accordance with the NRC standardized reactor inspection report outline. Individual reports are not expected to address all outline topics.

existed in the control circuitry. This situation required placing the subgroup on the hold bus during repairs. Normally, the licensee used the part-length CEAs for control of neutron flux shape. Operations personnel contacted reactor engineering personnel to determine if the reactor could be downpowered with the part-length CEAs degraded. Reactor engineering concluded that a planned downpower could not be accomplished without the use of the part-length CEAs to maintain axial flux shape within acceptable limits. On July 12, 1996, the licensee made repairs to the control circuitry.

c. Conclusions

Based on these observations, the inspector found that operator communications were good and that the shift superintendent, as well as reactor engineering, maintained continuous oversight of the activities described above.

O2 Operational Status of Facilities and Equipment

O2.1 AFW System Walkdown (Unit 2)

a. Inspection Scope (71707)

The inspector performed an inspection of the AFW system. The inspection consisted of a review of related TS, TS bases, Updated Final Safety Analysis Report (UFSAR) descriptions and drawings, the system operating procedure, and a walkdown of representative samples of the accessible portions of the AFW system components to verify that the installed equipment matched design and operating criteria. The outstanding corrective maintenance requests for the AFW system were also inspected.

b. Observations and Findings

The inspector determined that there were no significant work requests outstanding against the AFW system components. During the walkdown, the inspector did not identify any new deficiencies. The inspector verified that the observed AFW system components met the above inspection criteria.

c. Conclusions

The licensee maintained the AFW system in a condition of operational readiness and effectively managed corrective maintenance of the system.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments

a. Inspection Scope (62703)

The inspector observed all or portions of the following work activities:

- Replace CEA 28 optical isolator card component (Unit 2)
- Troubleshoot an intermittent ground on an emergency safety feature actuation signal subgroup relay power supply (Unit 3)
- Disconnect the motor and inspect cabling for Unit 3 Charging Pump 3P190 (Unit 3)
- Inspect the grease and actuator for Train B component cooling water Valve 3HV6228B (Unit 3)

b. Observations and Findings

The work performed under these activities was carefully controlled in accordance with appropriate procedures. All work observed was performed with the work package present and in active use. Technicians were knowledgeable and performed the activities in a professional manner. Supervisors and system engineers were frequently observed monitoring job progress, and quality control personnel were present whenever required by procedure. When applicable, appropriate radiation controls were in place.

In addition, see the specific discussions of maintenance observed under Section M1.3 and M1.4, below.

M1.2 General Comments on Surveillance Activities

a. Inspection Scope (61726)

The inspector observed all or portions of the following surveillance activities:

- "Safety Equipment Building 9' Area Radiation Monitor Loop ZZZZZZ 7847 Calibration" (Unit 3).
- "Component Cooling Water Pump 2(3)MP025 Train A Test" (Unit 3).

b. Observations and Findings

One surveillance performed by maintenance personnel did not comply with programmatic requirements, as described in Section M1.3 below. The inspectors also found that efforts by maintenance personnel to minimize radiation monitoring annunciation while performing a radiation monitor surveillance resulted in alarming all Unit 3 radiation monitors due to a blown fuse as described in Section M1.4 below.

M1.3 Work on Incorrect Components (Units 2 and 3)

a. Inspection Scope (62703)

The inspector examined the circumstances that resulted in surveillances being initiated by maintenance personnel on components not authorized for work.

b. Observations and Findings

On July 2, 1996, the licensee informed the inspector that earlier that day maintenance personnel had, in two separate instances, performed portions of surveillance activities on the wrong components. In both instances I&C technicians (including radiation monitoring technicians) performed work on the wrong components, causing unexpected control room annunciations. During performance of a surveillance for common waste gas decay tank oxygen Monitor 2/3 AIT 0565, a technician erroneously opened a knife switch for waste gas surge tank oxygen Monitor 2/3 AIT 0665. During performance of a surveillance for Unit 2 fuel handling building RM 7823, a technician erroneously removed fuses for Unit 2 containment purge isolation signal RM 7807. In both instances the technicians had commenced work on the correct component, had stopped work for a period of time, and then had resumed work on the wrong component. The licensee then halted all I&C work for that day and held meetings with all I&C personnel to assure that personnel understood management's expectations.

The inspector interviewed the I&C maintenance manager and observed that the licensee had determined that these instances were due to personnel error. In these instances, the technicians failed to adequately verify that the correct components were being manipulated. The inspector found that the safety consequence of temporarily disabling the instrumentation, as discussed above, was minor. Licensee's corrective actions included reinforcing management expectations with all I&C personnel, instituting a procedural aid to verify the correct component if work is stopped and restarted, and initiating an investigative report. The licensee also planned on constructing simulated equipment to assist in training all maintenance personnel on self-verification techniques. Although the licensee identified this problem and has subsequently taken corrective actions, a noncited violation had been issued by the NRC in NRC Inspection Report 50-361/96-05; 56-362/96-05.

regarding maintenance technicians having worked on the wrong component (a hydraulic actuator) in June 1996. This error was also caused by failure to adequately self-verify that the correct component was being manipulated. Licensee corrective actions included briefing the I&C technicians on the error made by mechanical maintenance personnel. The inspector considered that the briefings, which were completed by the time of the I&C errors, should have prevented these two instances of work on wrong components.

TS 6.8.1 requires that written procedures be established, implemented, and maintained covering activities recommended in Regulatory Guide 1.33, Revision 2, Appendix A. TS 6.8.1 applies to Procedure SO123-I-1.2, Procedure SO123-I-1.2, Temporary Change Notice 0-5, "Work Authorization Process," states in precaution Step 4.6 that "no person shall work on plant equipment without authorization." I&C maintenance personnel did not have permission to perform surveillance activities on common waste gas surge tank oxygen Monitor 2/3 AIT 0665 or on RM 7807, which is a violation of TS 6.8.1 (Violation 50-361(362)/96008-01).

c. Conclusion

The I&C maintenance craftsmen had performed inadequate self-verification, resulting in initiating work on wrong components.

M1.4 Inadvertent Unit 3 Radiation Monitoring Annunciation

a. Inspection Scope (62703)

The inspector examined the circumstances that led to a temporary loss of Unit 3 radiation monitoring annunciation due to a blown fuse. The blown fuse caused all radiation monitoring annunciation to annunciate in the Unit 3 control room and remain illuminated until the fuse was replaced and the annunciation was reset. A similar situation has occurred at least twice previously this year.

b. Observations and Findings

The inspector observed operator response from the control room on July 17, 1996, when all Unit 3 RMs annunciated in the control room. The inspector found that the operators responded appropriately by locally monitoring RM indications.

The cause of the annunciation was a blown fuse that occurred when a radiation monitoring technician attempted to install a jumper across two closed contacts. The technician was preparing to begin Surveillance Procedure SO23-XXV-4.79, Revision 0, "Safety Equipment Building 9' Area RM Loop ZZZZZZ 7847 Calibration." The inspector interviewed the technician and observed that the jumper had been installed to disable annunciation for the RM being surveilled in order to avoid operations distractions in the control room. The inspector reviewed the procedure

and the maintenance order used to perform the surveillance and found that there was no written step to install the jumper, although the jumper was controlled by use of a "jumper and lifted lead" form. The technician explained that it was I&C management expectation that the jumpers be installed and that the exact contacts to be jumpered be determined by a review of electrical drawings. These reviews were to be done by the technician and discussed during the preevolution tailboard. The inspector observed that on July 23 the surveillance was recommenced, with jumpers installed in the same positions. No overcurrent condition was created.

Based on the above, the inspector found that the maintenance personnel, in attempting to minimize operations distractions while performing surveillance, had caused multiple unanticipated annunciations. The licensee was verifying drawings associated with RM alarms at the end of the inspection period. The inspector will review the licensee's root cause evaluation (Inspection Followup Item 50-362/96008-02).

III. Engineering

E1 Conduct of Engineering

E1.1 Part 21 Defect on 480 Volt Circuit Breakers (Units 2 and 3)

a. Inspection Scope (37551)

The licensee received a 10 CFR Part 21 report from Asea-Brown Boveri, dated May 2, 1996, regarding defective solid-state trip devices in 480 volt circuit breakers. The inspector reviewed the Part 21 report sent to the NRC dated November 20, 1995; an undated licensee plan to replace solid-state trip devices; and licensee data on in-service and bench failure rates and interviewed the supervisory cognizant engineer for electrical systems.

b. Observations and Findings

The Part 21 report alerted the licensee to possible cracked solder connections on internal printed circuit cards in solid-state trip devices for 480 volt ABB/ITE K-line circuit breakers due to poor soldering techniques and a design deficiency. The defect could cause a failure of the breaker to trip open when required, or to trip open when not required. The inspector observed that the licensee identified 60 Class 1E and 251 non-Class 1E breakers installed in Units 2 and 3, as affected. The licensee developed a plan to replace the suspect solid-state trip devices, with on-line and outage replacement scheduled as the electrical lineup permitted. The licensee planned to complete all Class 1E replacements by the end of the next (Cycle 9) refueling outage for each unit and all non-1E replacements by the end of the Cycle 11 outages. The licensee had prioritized safety-related breakers for early replacement and planned to replace some trip devices for

individual components with the unit at power. The licensee planned to wait to deenergize load center feeder breakers until the outage, which the inspector found acceptable.

Since 1990, the licensee had recorded five in-service failures of these breakers, with one failure in a safety-related application (3B0613 for Unit 3 Charging Pump 3P192). These were failures of the breaker to open or shut associated with the trip device. The licensee considered that a visual inspection of the soldered connections of these trip devices was not practical, due to the location of the connections.

c. Conclusions

The inspector concluded that the licensee's planned response to the Part 21 report was acceptable.

E2 Engineering Support of Facilities and Equipment

E2.1 Licensee Discovery of Tornado Dampers (Units 2 and 3)

a. Inspection Scope (37551)

The inspector reviewed the following:

- Action Request 960200513, "Corroded Tornado Damper"
- Drawings 41358 and 41366, "Heating Ventilation and Air Conditioning Plans"
- Project Specification 410-06, Addendum 6, "Specification for Heating, Ventilation, and Air Conditioning (HVAC)"
- Portions of the UFSAR, TS, Standard Review Plan, and the Safety Evaluation Report involving tornado protection
- NRC Generic Letter 91-18, November 7, 1991, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability"

b. Observations and Findings

The inspector reviewed the action request listed above and noted that in February 1996 the licensee had found six previously unknown manually-operated dampers located on HVAC openings on a wall of the Units 2 and 3 auxiliary building. One of the dampers was rusted open. The licensee noted that these dampers were listed on the above safety-related drawings and construction plan as required to be shut during a tornado. However, the UFSAR and TS did not mention the dampers

and there was no other licensee procedural guidance for manipulation or maintenance of the dampers. On June 16, 1996, the licensee design engineering organization concluded it was necessary to shut the dampers in the event of a tornado to prevent a maximum 1.5 psid pressure difference from damaging the ducting, connected to the control room emergency air cleanup system (CREACUS) envelope ducting, and containing the toxic gas isolation signal monitors. On June 21, 1996, licensee Station Technical personnel completed an operability analysis of the CREACUS system and determined that it would remain operable until the end of the summer. The analysis was based on the low probability of a tornado during the summer.

On July 1, 1996, the inspector met with licensee Engineering, Operations, and Compliance personnel. The inspector was concerned that no interim corrective actions were in place or had been planned and that a probability of the occurrence of an external event argument had been used as a basis to establish operability, which was discouraged by NRC Generic Letter 91-18. In response to the inspector's findings, the licensee initiated an interim response to place CREACUS in the recirculation mode if a tornado was imminent. This would separate the safety-related and nonsafety-related ducting by the closure of dampers downstream of the tornado dampers. The licensee also decided to do further research into the need for the dampers, as well as any requirement to protect HVAC ducting from differential pressure effects of a tornado. The licensee's final review of the licensing basis indicated that the dampers were not required and that the CREACUS was not required to be protected from a tornado.

The licensee's operability assessment was not completed until 5 days after the time that Design Engineering had concluded the dampers were necessary. The inspector found that the licensee had been slow in assessing the operability of the CREACUS. The guidance in Generic Letter 91-18 is to complete an initial operability assessment, generally within the allowed outage time of TS, which for both trains of CREACUS being inoperable was 7 hours; however, this is not a regulatory requirement.

c. Conclusions

The inspector concluded that the licensee's identification of the situation was good. However, the licensee was slow to initiate and complete an operability assessment and based the determination of operability on a probability of occurrence argument which was not consistent with the guidance contained in NRC Generic Letter 91-18.

E2.2 Review of Facility and Equipment Conformance to UFSAR Description

A recent discovery of a licensee operating its facility in a manner contrary to the UFSAR description highlighted the need for a special focused review that compares plant practices, procedures, and/or

parameters to the UFSAR description. While performing the inspections discussed in this report, the inspectors reviewed the applicable sections of the UFSAR that related to the inspection areas inspected. The following inconsistency was noted between the wording of the UFSAR and the plant practices, procedures, and/or parameters observed by the inspectors.

Unresolved Item 50-361/96005-02 was examined and left open (Section E8.1). This item involved the UFSAR description of the seal water system for the charging pumps as Class 1E powered, when the as-built condition was not Class 1E power. The inspector found the subsequent operability assessment performed by the licensee was adequate.

E8 Miscellaneous Engineering Issues (92903)

E8.1 (Open) Unresolved Item 50-361/96005-02: charging pump non-Class 1E seal water supply. This item involved an NRC inspector's finding on April 11, 1996, and subsequent notification of the licensee cognizant engineer, that the UFSAR described the seal water supply system for the Units 2 and 3 charging pumps as loading onto the emergency diesels when necessary, when, in fact, it would not because it was not Class 1E powered.

The licensee initially categorized this discrepancy as an editorial error in the UFSAR and did not initiate an action request (960600793) until June 17, 1996. The manager of mechanical design engineering stated that some members of the Action Request Committee had specific knowledge of the seal water system design requirements and did not believe that the system needed to be Class 1E. The UFSAR described the system as Class 1E. The licensee did not initiate an operability assessment to assess charging pump operability and resolve the discrepancy when the issue was initially considered by the Action Request Committee.

An operability assessment for the charging pumps was initiated on July 3, following questions by NRC management. The inspector reviewed the assessment following completion and contacted a vendor representative from the Gaulin Pump Company. The licensee had determined that the charging pumps were required to operate a maximum of 2 hours under worst case accident conditions and would operate without seal water for at least 100 hours. As a result of inspector questions, on July 11, 1996, the licensee revised the operability assessment to lengthen the assumed time for which the pumps were required to operate to approximately 14 hours. The inspector observed that the revised analysis was not based upon a rigorous analysis of all UFSAR Chapter 15 events to establish the time assumptions for charging pump operation. Further, the licensee had not referenced any clear vendor information or test data to support the time a charging pump would actually operate without seal water. In response, on July 25, 1996, the licensee revised

the time the pumps were required to operate to about 34 hours and gave the inspector a summary of testing of similar pumps operating without seal water, performed at Palo Verde Nuclear Generating Station, and a design change package dated 1983 (DCP 3-303CE), which discussed the performance of the pumps without seal water. The testing done at Palo Verde Nuclear Generating Station indicated the pumps would perform for 100 hours without packing cooling water. The NRC will further review the operability assessment.

There was an approximate 3-month time span from initial NRC notification of the UFSAR discrepancy until a satisfactory operability assessment was performed. Based on this, the inspector concluded that the licensee was slow in resolving this discrepancy.

The inspector concluded that the technical rigor of the initial assessments, regarding the time duration that a charging pump would be needed, was not sufficiently thorough. This represents another situation where engineering work did not meet management expectations for technical rigor and timeliness.

This item remains open pending NRC review of the licensing basis of the UFSAR statement.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the exit meeting on August 1, 1996. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

Following the exit meeting, the Vice President, Engineering and Technical Services stated that the licensee's performance regarding the timeliness of initiating action requests and the technical rigor and timeliness of completing operability assessments, described in Sections E2.1 and E8.1, did not meet management's expectations. Further, he indicated that actions to improve performance were being developed.

ATTACHMENT

PARTIAL LIST OF PERSONS CONTACTED

Licensee

D. Brieg, Manager, Station Technical
J. Fee, Manager, Maintenance
G. Gibson, Manager, Compliance
D. Herbst, Manager, Site Quality Assurance
R. Krieger, Vice President, Nuclear Generation
D. Nunn, Vice President, Engineering and Technical Services
T. Vogt, Plant Superintendent, Units 2 and 3
R. Waldo, Manager, Operations

INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 61726:	Surveillance Observations
IP 62703:	Maintenance Observations
IP 71707:	Plant Operations
IP 92903:	Followup - Engineering

ITEMS OPENED AND CLOSED

Opened

50-361(362)/96008-01	VIO	Work on incorrect components
50-362/96008-02	IFI	Inadvertent radiation monitoring annunciation

Examined and Left Open

50-361/96005-02	URI	Charging pump non-Class 1E seal water supply

LIST OF ACRONYMS USED

AFW	auxiliary feedwater
CEA	control element assembly
CREACUS	control room emergency air cleanup system
HVAC	heating, ventilation, and air conditioning
I&C	instrument and control
PDR	Public Document Room
RM	radiation monitor
TS	Technical Specifications
UFSAR	Updated Final Safety Analysis Report