ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-361/95-21
50-362/95-21

Operating Licenses: NPF-10
NPF-15

Licensee: Southern California Edison Company
P. O. Box 128
San Clemente, California

Facility Name: San Onofre Nuclear Generating Station, Units 2 and 3

Inspection At: San Onofre, San Clemente, California

Inspection Conducted: October 8 through November 18, 1995

Inspectors: J. A. Sloan, Senior Resident Inspector
D. L. Solorio, Resident Inspector

Approved: _____ 12/1/95
F. R. Huey, Acting Chief, Project ~~Branch~~ F Date

Inspection Summary

Areas Inspected (Units 2 and 3): Routine, announced resident inspection of onsite followup of events, operational safety verification, maintenance and surveillance observations, and engineering and plant support observations.

Results (Units 2 and 3):

Operations

- Operators properly assessed an excore nuclear instrument detector failure in Unit 3, and operator actions were appropriate. Operations also proactively identified and resolved potential licensing problems associated with replacing the detector (Section 2.1).

- Excore nuclear instrument circuit card failures in Unit 2 were properly assessed and operators promptly acted to bypass the failed channel (Section 2.2).

- Operators properly assessed the operability of the Unit 2 turbine-driven auxiliary feedwater pump after its trip/throttle valve could not be reset following a trip test (Section 2.3).

- Operators properly assessed the test start failure of an emergency diesel generator in Unit 3 (Section 2.4).

Maintenance

- Maintenance personnel performing troubleshooting of the Unit 2 turbine driven auxiliary feedwater pump trip/throttle valve were methodical and careful in their activities (Section 2.3).

- The inspector identified two minor weaknesses in the licensee's procedure for repairing a check valve (Section 4.1).

Engineering

- Engineering personnel accurately diagnosed an excore nuclear instrument detector failure in Unit 3, and properly identified and evaluated potential restoration alternatives (Section 2.1).

- Engineering personnel provided active support of the troubleshooting of the Unit 2 turbine-driven auxiliary feedwater pump, when its trip/throttle valve could not be reset following a trip test (Section 2.3).

Plant Support

- Housekeeping appeared to have improved, with few discrepancies noted during this period. In particular, the licensee's cleanup activities during the Unit 3 refueling outage were good (Section 5.1).

- Licensee performance during an evaluated emergency preparedness exercise appeared to be excellent. However, the inspector identified a minor control board misoperation by an operator in the simulator (Section 5.2).

Summary of Inspection Findings:

There were no inspection findings.

Attachment:

- Persons Contacted and Exit Meeting

DETAILS

1 PLANT STATUS (71707)

1.1 Unit 2

The unit began the inspection period operating at 100 percent power. On October 24, 1995, power was reduced to 80 percent to perform a heat treatment of the circulating water system. The unit returned to 100 percent power on October 26, 1995, and operated at full power through the end of the inspection period.

1.2 Unit 3

The unit began the inspection period operating at 100 percent power, and operated at full power until the last day of the inspection period. At 10:30 p.m. on November 18, 1995, the unit reduced power to 80 percent to perform a heat treatment of the circulating water system.

2 OPERATIONAL SAFETY VERIFICATION (71707)

2.1 Failed Excore Nuclear Instrument

On October 12, 1995, during performance of a weekly surveillance in Unit 3, Engineering personnel observed an anomaly between the power levels indicated by the excore detectors. The Channel A lower detector subchannel linear gain indicated a difference of about 7.5 percent above the other excore channels. The other detectors agreed within about 2 percent of each other, and the acceptance criteria was a maximum difference of 7 percent. The higher reading affected the departure from nucleate boiling ratio nonconservatively. The licensee noted that the change had occurred since the previous week's readings. Based on review of the data, the inspector determined that the licensee's assessment that the data indicated a detector problem, and not a core performance problem, was reasonable.

Operations declared the detector inoperable and bypassed the affected parameters in the core protection calculator, in compliance with Technical Specifications. Additionally, the licensee performed troubleshooting of the detector and determined that the failure was in the detector itself, and not in the associated electronics. The inspector noted the active involvement of Engineering personnel in the troubleshooting assessment of the detector performance. The licensee continued to monitor the failed detector and noted continued gradual degradation throughout the inspection period.

The licensee documented the deficiency in Nonconformance Report 95100023 and determined that the detector should be replaced. Although Technical Specifications allowed the channels to be bypassed until the next period of Mode 5 operation, the licensee evaluated the possibility of replacing the detector during Mode 3 operations. The licensee recognized that bringing a new detector into the containment structure would require both containment

airlock doors to be opened simultaneously for a few minutes, because of the length of the detector assembly. The licensee initiated discussions with appropriate NRC personnel to gain clarification of applicable Technical Specifications requirements.

The inspector noted that all excore detectors were replaced during the recently completed Cycle 8 refueling outage. The licensee did not notice any similar problems with the other detectors in either unit.

The inspector concluded that the licensee's response to the failed detector was excellent, and the licensee's ongoing assessment of the failure, being performed by Engineering, appeared to be sound. Additionally, the licensee's recognition of the Technical Specifications implications of detector replacement in Mode 3, and the timely pursuit of clarification of regulatory requirements reflected an appropriate level of sensitivity to those issues.

2.2 Excore Nuclear Instrument Circuit Card Failures

On October 17, 1995, a circuit card failed associated with Unit 2 excore nuclear instrument Channel D. Operations declared the affected parameters in the channel inoperable, determined that the card had failed, replaced the card with a qualified spare, tested the channel and declared it operable. On October 19, 1995, the replacement card also failed. The licensee determined that the second failure was the fifth failure of that type of circuit card in the past year (although the other failures were in different channels). Engineering initiated an evaluation to determine the root cause of the failures. The licensee replaced the card again and restored the channel to service, and no additional failures occurred during the inspection period. The inspector reviewed the nonconformance reports for the failures and discussed the failures with licensee Engineering personnel. Based on this review, the inspector determined that the licensee's response was appropriate.

2.3 Failure of Turbine-Driven Auxiliary Feedwater Pump Trip/Throttle Valve 2HV4716

On October 18, 1995, the licensee was unable to close the motor actuator for the auxiliary feedwater trip/throttle valve, which had just been successfully tripped as part of an annual surveillance test. The licensee declared the pump inoperable and began troubleshooting to determine the cause of the failure. Initial inspection of the valve, and actuation by the licensee, revealed that some old grease had become wedged between the sliding nut and the yoke, inhibiting free movement of the sliding nut. Further evaluation by the licensee established a preliminary root cause that the setting on the valve operator torque switch allowed insufficient margin to overcome any appreciable increase in friction. The licensee had not regarded the valve resetting action as being safety-related, and had not considered potential additional friction forces in its setpoint calculation. The licensee had not completed the final root cause evaluation by the end of the inspection period.

The licensee acted quickly to complete troubleshooting and effect repairs.

The licensee inspected the valve actuator and removed excess grease from the sliding nut. The licensee also reset the torque switch, using the previously established setpoints, retested the valve and the trip and reset functions, and declared the pump operable. The licensee and the inspector inspected the Unit 3 valve, which had been replaced during the recent Cycle 8 refueling outage, and noted that the valve appeared externally clean. The licensee scheduled an inspection and cleaning of the sliding nut on the Unit 3 valve for late November 1995. The inspector concluded that the licensee's response to the failure was good.

The inspector discussed normal valve operation and testing with the licensee. Based on these discussions and previous observations, the inspector determined that the licensee normally left the valve closed and latched (reset), so that the resetting function was not required for emergency operation from the standby condition. However, if the valve were to trip during an emergency, operators would have to close and relatch the actuator in order to run the pump. The inspector determined that the Final Safety Analysis Report accident analyses did not take credit for this action, and that resetting the valve was not a safety-related function.

The inspector also determined that the licensee only tested the trip and reset function with the valve initially open (pump operating) annually and after each refueling. This meant that the sliding nut was infrequently exercised. The licensee determined that the sliding nut had not been cleaned since the valve was replaced in 1991. The licensee also contacted the vendor and learned that dirty grease around the sliding nut had been experienced at other facilities. The inspector noted that, considering the high safety significance of this valve, more comprehensive attention to valve condition and design limitations would appear to have been warranted.

2.4 Diesel Test Start Failure

On November 15, 1995, during performance of a test start surveillance, Emergency Diesel Generator 3G002 tripped after about 9 seconds of operation. The emergency diesel generator consists of two tandem diesel engines, which both tripped on low-low lube oil pressure. The licensee declared the emergency diesel generator inoperable and commenced troubleshooting. The licensee determined that the K-3 relay failed. The K-3 relay normally inhibits the low-low lube oil pressure trip signals for about 50 seconds, to allow the engines to come up to speed and develop adequate oil pressure. The licensee tested the K-3 relay and determined that it timed out in about 10 seconds. The relay was removed for root cause of failure analysis and replaced with a new relay. The inspector noted active Engineering involvement in the troubleshooting and testing of the relay.

The inspector reviewed the nonconformance report and the elementary drawings and determined that the licensee had adequately documented the deficiency, and that the K-3 relay failure was the likely cause of the start failure. The inspector also observed the successful re-performance of the test start surveillance, which the licensee conducted about 12 hours after the initial

failure. The inspector concluded that the licensee's response to the event was appropriate.

3 PLANT MAINTENANCE (62703)

During the inspection period, the inspector observed and reviewed selected documentation associated with maintenance and problem investigation activities listed below to verify compliance with regulatory requirements, compliance with administrative and maintenance procedures, required quality assurance/quality control department involvement, proper use of safety tags, proper equipment alignment and use of jumpers, personnel qualifications, and proper retesting.

3.1 Auxiliary Feedwater Check Valve Leak Repair - Unit 2

On November 7, 1995, the inspector observed maintenance associated with auxiliary feedwater Check Valve S21301MU005 (2MU005). The work was conducted in accordance with Maintenance Order 95110133, and Maintenance Procedure S023-I-6.160, Temporary Change Notice 2-12, "Valve Anchor Darling Pressure Seal Tilting Disc Check Valve." The purpose of the work was to repair a small, recently developed, steam leak. The maintenance activity revealed that the check valve bonnet had a very small scratch on its sealing surface which contributed to the small steam leak. As a result, the bonnet and its associated pressure seal gasket were replaced.

The inspector noted that Maintenance personnel had a good understanding of the repair activity and complied with the licensee's administrative requirements. In addition, the inspector noted significant oversight during the work activity by the Maintenance supervisor (onsite during the entire work activity), Maintenance general foreman, Quality Control, and Quality Assurance personnel. However, the inspector noted two weaknesses associated with valve Maintenance Procedure S023-I-6.160.

The inspector noted the first weakness when Maintenance personnel were installing the check valve bonnet. Specifically, the first concern involved the process of determining whether or not the bonnet was installed level. The bonnet was required to be level to create a pressure boundary seal with the valve body. To determine whether or not the bonnet was level, measurements were taken with a depth micrometer from a common reference -- the top of the valve cap -- to the bottom of the four bonnet bolt holes. Based on this method, it was assumed that if all four measurements were equal, the bonnet was level. The inspector noted that the procedure provided no quantitative guidance regarding the magnitude of allowable difference in the four measurements, in order to ensure appropriate bonnet levelness. In this regard, the inspector noted that the Maintenance general foreman provided direction that the measurements could be within 15 mils, but that the goal was to obtain measurements within 10 mils if possible. The inspector observed that the Maintenance personnel leveled the bonnet such that measurements were all within 5 mils.

The second, and more significant concern involved the use of the bonnet bolt holes as a measurement reference point. The inspector noted that the bolt holes were cone shaped at the bottom. In addition, the inspector independently measured the bolt holes of the replaced bonnet, and noted that the holes measured differences in depth of as much as thirty mils. Based on these two observations, the inspector concluded that, as written, the procedure could result in unlevel installation of the bonnet. The inspector noted, however, that these observed weaknesses did not appear to result in deficiencies in this instance, since Valve 2MU005 was returned to service satisfactorily.

The inspector reviewed the vendor maintenance manual, "Anchor Darling Valve Company Tilting Disc Check Valve Maintenance Manual," for Valve 2MU005 as referenced by Procedure SO23-I-6.160, and noted that the vendor did not provide criteria for determining what differences in measurements were acceptable. As a result, the inspector contacted a vendor representative and learned that in training routinely provided to vendor customers, fifteen mils was an acceptable limit, although not absolute. The inspector discussed these observations with Maintenance management. Maintenance management stated that based on its review of the vendor manual, the intent was only to maintain relative levelness when installing the bonnet. However, Maintenance management also stated that based on the inspector's observations it would review and revise the procedure to reflect the appropriate method to measure for levelness and associated acceptance criteria. The inspector considered the licensee's proposed corrective actions were adequate.

3.2 Other Maintenance Observations

Other maintenance activities were observed:

Unit 2

- Repair oil leak on the actuator for Valve 2HV4763, auxiliary feedwater bypass to Steam Generator 2E089
- Troubleshooting failure of auxiliary feedwater Pump 2P140 trip/throttle Valve 2HV4716

Unit 3

- Motor operated valve analysis testing of the Unit 3 high pressure safety injection loop injection Valve 3HV9333

These activities were performed adequately.

4 SURVEILLANCE OBSERVATIONS (61726)

Selected surveillance tests required to be performed by the Technical Specifications were reviewed on a sampling basis to verify that: (1) the

surveillance tests were correctly included on the facility schedule; (2) a technically adequate procedure existed for performance of the surveillance tests; (3) the surveillance tests had been performed at the frequency specified in the Technical Specifications; and (4) test results satisfied acceptance criteria or were properly dispositioned.

4.1 Auxiliary Feedwater Monthly Surveillance - Unit 3

On October 12, 1995, while performing monthly surveillance in accordance with surveillance Procedure SO23-3-3.16, Temporary Change Notice 7-24, "Auxiliary Feedwater System Monthly Tests," operators were unable to statically vent auxiliary feedwater Pump 3P140 and discharge piping, as required by the procedure. Because the vent valves were thought to be Kerotest valves, which were known to occasionally stick closed due to valve design, the surveillance procedure provided guidance which directed operators to start the pump in order to unseat the valve. The design of the Kerotest valve is such that the valve disk and stem are physically separated by a diaphragm to preclude packing leaks. Operators started the pump and observed water from the vent line, which indicated that the vent valve was capable of venting, and completed the surveillance.

During followup discussions with Engineering personnel, the inspector noted a procedure weakness in that the vent valve for Pump 3P140 was not a Kerotest valve as referenced in the procedure, but rather a gate valve. The inspector determined that this was of no safety significance since the valve properly served its intended safety function, but this weakness reinforces recent licensee efforts to improve the quality of plant procedures. Based on the inspector's observation, Operations management stated that the procedure would be revised during the next scheduled revision (around February 1996) to accurately reflect the status of plant equipment. The inspector concluded that the licensee's proposed corrective action was adequate.

The inspector also addressed two additional concerns. The first involved potential detrimental effects associated with running the pump without first venting its discharge line. The inspector reviewed system drawings and discussed this issue with Engineering personnel. The inspector determined that the miniflow pipe for Pump 3P140 tapped into the pump discharge piping upstream of the vent valve. In addition, there were normally closed auxiliary feedwater valves located downstream of the vent valve. As a result, the inspector concluded that the water in the auxiliary feedwater piping near the vent valve would be stagnant and therefore not likely to result in damage to downstream auxiliary feedwater system piping if air was present. The inspector also determined that before Pump 3P140 had been started, Engineering reviewed the condition, as documented in Nonconformance Report 95100018, and concluded that the pump could be safety started to determine whether or not the vent path could be re-established. The second concern involved the potential for possible loose parts in the vent valve entering the auxiliary feedwater system. The licensee stated there were no potential loose parts, based on the gate valve design. The inspector reviewed drawings of the gate valve and concluded that the drawings did not show any loose parts small

enough to leave the valve body and enter the auxiliary feedwater system. The inspector also noted that the licensee had scheduled the vent valve to be replaced during the next scheduled outage for Pump 3P140. The inspector concluded that the Engineering support was good and that the overall licensee response was appropriate.

4.2 Other Surveillance Tests

Other surveillances were observed:

Unit 2

- SO23-3-3.21, Temporary Change Notice 12-76, Attachment 7, "Shiftly Flow Estimates."

Unit 3

- SO23-3-2-13, Temporary Change Notice 10-34, Attachment 6, "Diesel Generator Manually Initiated Operation" (Emergency Diesel Generator 3GOO2 Monthly Surveillance).

These surveillances were performed adequately.

5 PLANT SUPPORT ACTIVITIES (71750)

5.1 Housekeeping Observations

During plant tours, the inspectors observed several minor housekeeping discrepancies, all promptly corrected by the licensee. Examples included sand on and around the skid for the hydraulic actuator for feedwater isolation Valve 3HV4048, and an unsecured ladder near safety-related piping in Unit 3 penetration building Room 107. The inspectors noted that these examples did not have any specific safety impact, but represented areas for improved housekeeping performance. Overall, the inspectors concluded that housekeeping in most areas had improved significantly, and that the licensee had effectively cleaned up areas affected by the Unit 3 refueling outage.

5.2 Annual Emergency Preparedness Exercise

On October 11, 1995, the inspector participated in the licensee's annual emergency preparedness exercise, which was also evaluated by a regional inspection team. The inspector observed operators' performance in the Unit 2 simulator. During the drill the inspector noted that communications were generally very good. Specifically, the inspector noted that operators routinely used two-way communications, and that senior reactor operators exerted strong oversight throughout the drill. In addition, the inspector noted that the simulator operations crew appropriately diagnosed the event.

The inspector noted one minor weakness with respect to operator performance during the drill. Specifically, an assistant control operator experienced momentary difficulty when directed to open a saltwater cooling pump breaker to allow reenergizing its bus. Before the bus had become denergized, the pump had been sequenced to start in response to the safety injection signal previously initiated. The operator attempted to open the breaker remotely by pressing only the pump stop button, without first pressing the reset button, so the breaker did not open. The operator then successfully opened the breaker by pressing the reset button and then the stop button. As a result of this observation, the inspector was concerned of a weakness in operator knowledge. The inspector subsequently determined that operator training addressed the need to use the reset button to override safety injection conditions. As a result, the inspector concluded that the observed deficiency was probably a momentary lapse in memory and not indicative of an Operations training weakness.

ATTACHMENT

1 PERSONS CONTACTED

1.1 Licensee Personnel

*D. Breig, Manager, Station Technical
*J. Custer, Plant Superintendent, Unit 1
*J. Fee, Maintenance Manager
*D. Franklin, Compliance Engineer
*G. Gibson, Manager, Compliance
D. Herbst, Manager, Quality Assurance
*M. Herschthal, Manager, Nuclear Systems Engineering
*J. Hirsch, Manager, Power Generation, Station Technical
*P. Knapp, Manager, Health Physics
*R. Krieger, Vice President, Nuclear Generating Station
*J. Lambla, Compliance Engineer
H. Newton, Manager, Site Support Services
*G. Plumlee, Supervisor, Compliance
*K. Rauch, Supervisor, Nuclear Training
*J. Reilly, Manager, Nuclear Engineering & Construction
*R. Rosenblum, Vice President, Nuclear Engineering and Technical Support
*A. Schramm, Manager, Safety Engineering
*J. Scott, Supervisor, Health Physics
M. Short, Manager, Site Technical Services
*K. Slagle, Manager, Nuclear Oversight
*T. Vogt, Plant Superintendent, Units 2/3
R. Waldo, Operations Manager
M. Wharton, Manager, Nuclear Design Engineering
W. Zintl, Manager, Emergency Preparedness

1.3 NRC Personnel

*J. Sloan, Senior Resident Inspector
*D. Solorio, Resident Inspector
*F. Huey, Branch Chief, Division of Reactor Projects, Region IV

In addition to the personnel listed above, the inspectors contacted other personnel during this inspection period.

*Denotes personnel that attended the exit meeting.

2 EXIT MEETING

An exit meeting was conducted on November 17, 1995. During this meeting, the inspectors reviewed the scope and findings of the report. The licensee acknowledged the inspection findings documented in this report. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspectors.