ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-361/95-20
50-362/95-20

Licenses: NPF-10
NPF-15

Licensee: Southern California Edison Co.
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: August 27 through October 7, 1995

Inspectors: J. A. Sloan, Senior Resident Inspector
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Approved: P.H. Hyer for
F. R. Huey, Acting Chief, Project Branch F

11/5/95
Date

Inspection Summary

Areas Inspected (Units 2 and 3): Routine, announced inspection of operational safety verification, maintenance and surveillance observations, plant support activities, followup on corrective actions for violations, other followup, and followup of licensee event reports.

Results (Units 2 and 3):

Operations

- A noncited violation was issued due to a repeated cavitation of a low pressure safety injection pump that revealed that corrective actions from a previous event were too narrow in scope (Section 6.3).

- Operator performance with respect to termination criteria for draindown to reactor coolant midloop operations was observed to be inconsistent (Section 2.1).

- The inspector noted that operator response to a plant transient caused by surveillance activities was good (Section 2.3).

Maintenance

- A noncited violation was identified due to the failure of an operator to follow procedures, resulting in surveillance testing being performed on the wrong train. In addition, this event also highlighted weaknesses with the operations event investigation process (Section 2.2).

- Nonconservative decision making during a tailboard for main steam safety valve setpoint testing led to an unnecessary plant transient (Section 2.3).

- The inspector identified that maintenance personnel were not performing maintenance documentation activities in accordance with management expectations (Section 3.1).

- The inspector identified one instance in which the on-line maintenance planning process did not factor in increased risk due to concurrent switchyard maintenance activities. However, it was also noted that the licensee's Safety Engineering Group monthly analysis of past on-line maintenance activities was instrumental in identifying this condition (Section 3.2).

Plant Support

- The inspector performed a containment walkdown of Unit 3 following the Cycle 8 refueling outage, just prior to final containment closure, and considered the material condition of readiness to be significantly improved from previous outages (Section 5.1.1).

- Operator performance during an emergency preparedness drill was good overall; however, a weakness was identified with respect to communication of protective actions recommendations in the control room (Section 5.2.1).

- The inspector identified an open fire door to a Train B safety injection pump room that had not been appropriately controlled. However, the inspector verified that compensatory measures for adjacent fire barriers provided sufficient compensatory measures for the door (Section 5.3.1).

Summary of Inspection Findings:

- A noncited violation was identified regarding failure of operators to follow procedures during surveillance testing (Section 2.2).

- Violations 361, 362/9506-01 and 361, 362/9506-02 were closed (Section 6.1).

- Unresolved Item 361, 362/9506-03 was closed (Section 6.2).

- A noncited violation was identified regarding ineffective corrective actions to preclude the cavitation of a safety injection pump (Section 6.3).

- Licensee Event Reports 361/95-002 (Revision 0, Revision 1); 361/95-005 (Revision 0); 362/95-003 (Revision 0); 361/95-006 (Revision 0); 361/95-014 (Revision 0); and 361/95-015 (Revision 0) were closed (Sections 7 and 8).

Attachments:

- Attachment 1 - Persons Contacted and Exit Meeting

DETAILS

1 PLANT STATUS (71707)

1.1 Unit 2

The unit began the inspection period at 99 percent power and reduced power on September 3, 1995, to 80 percent for a heat treatment of the circulating water system. On September 4, the unit returned to 99 percent power. On September 9, the first point heater bypass valve was throttled open, and power was increased to 100 percent. The unit operated at full power from September 9-20, 1995. On September 21, 1995, power was reduced to 97 percent to repair a steam leak on a downstream isolation valve for the second point heater. The unit operated at this reduced power level until September 26, 1995, and the unit returned to full power through the end of the inspection period.

1.2 Unit 3

The unit began the inspection period in Mode 6 for the Cycle 8 refueling outage, with core reload in progress. Core reload was completed on August 28, 1995. The unit entered Mode 5 at 1:13 p.m. on September 3, and Mode 4 at 3:35 p.m. on September 15. Mode 3 was entered at 4:05 a.m. on September 21. Criticality (Mode 2) was reached at 10:19 p.m. on September 22. The unit entered Mode 1 at 3:33 p.m. on September 24, and the breakers were closed at 1:18 a.m. on September 26, ending a 65-day refueling outage. On September 29, reactor power was held at 80 percent to perform a heat treatment of the circulating water system. Reactor power was increased to 92 percent on October 2, and the licensee determined that reactor power would be limited to maintain a steam generator pressure of greater than 855 psia. On October 4, the first point heater bypass valve was throttled open to allow an increase in power (to 96 percent) while maintaining 855 psia steam generator pressure. The unit ended the inspection period operating at 96 percent power.

2 OPERATIONAL SAFETY VERIFICATION (71707)

2.1 Endpoint for Reactor Coolant Draindown to Midloop (Unit 3)

On September 1, 1995, the inspector observed licensee operators drain the Unit 3 reactor coolant system from the top of the pressure vessel flange to approximately 26 inches from the bottom of the hot leg. Overall, the inspector concluded that the draindown was performed well, with one procedural problem noted.

Procedure SO23-3-1.8, Temporary Change Notice 7-20, "Draining the Reactor Coolant System," was the procedure controlling the evolution. Step 2.2.16 stipulated the endpoint of the draindown as narrow range level indication or local sight glass indication at 26 inches, or wide range indication at -6.208 feet, or a maximum value of total gallons drained (which ever occurs first). Step 2.2.16.1 then directed the operators to observe reactor coolant system

level for at least five minutes and, if necessary, redrain to 26 inches (narrow range or sight glass). The inspector noted that the licensee secured the draindown at wide range indication of -6.26 feet, a narrow range indication of 27.01 inches, and a sight glass indication of 27.4 inches. The operators were confused as to whether to continue draining to achieve a narrow range indication of 26 inches, or to stop at the wide range indication of -6.26 feet. The shift superintendent made the decision to stop draining. The inspector noted that during a previous draindown, operators had interpreted the step as finishing at 26 inches narrow range, and had drained regardless of exceeding the wide range indication limit. The inspector questioned operations management as to the intent of the step. In response to the inspector's concern, the endpoint criteria of 26 inches was revised to include a 3-inch tolerance band. The inspector considered that the wider band would allow all indications to be within the specified endpoint limits, eliminating possible confusion.

2.2 Wrong Train Surveillance Testing - Unit 3

On September 13, 1995, operators performed an engineered safety features subgroup relay test on a wrong train component in Unit 3. At the time of the event Unit 3 was in Mode 5. The testing was conducted in accordance with Procedure SO23-3-3.43.22, Temporary Change Notice 0-5, "ESF Subgroup Relays K-212A, K-201B, K-314A, and K-314B Semiannual Test." The procedure required testing Train B Relay 201B, which would close main feedwater regulator bypass Valve 3HV1105; however, an auxiliary reactor operator tested Train A Relay 201A. The inspector noted that the testing of Relay 201A was also independently verified by the Unit 3 assistant control operator. The inspector reviewed Document 90016, Revision 21, "NSS ESFAS Relay Assignments Train A Cabinet L034," and determined that there were no components actuated by Relay 201A. Therefore, the inspector concluded that it was fortuitous that there was no safety significance associated with actuation of this wrong relay.

The inspector interviewed the auxiliary reactor operator responsible for performing the test, the control room supervisor, and the shift supervisor who had oversight responsibility for Unit 3 at the time the test was performed. The auxiliary reactor operator stated that he had performed a tailboard with the Unit 3 control operator and control room supervisor. However, the control room supervisor stated that he was not part of a tailboard for the test, but that he had reviewed the surveillance procedure with the auxiliary reactor operator. In addition, the control operator stated that he was given a briefing and not a tailboard by the auxiliary reactor operator. The control operator also stated that he assumed the auxiliary reactor operator had previously held a tailboard with the work process supervisor (a licensed senior reactor operator). Based on these statements and additional statements by the auxiliary reactor operator (e.g., he felt that he did not have adequate attention from the unit control operator and control room supervisor, since they were in the process of starting a reactor coolant pump), the inspector concluded that pretest communications and supervisory oversight of the test were poor.

In addition, the inspector determined that just prior to testing Relay 201A, communications had been established between the control room and the test location (the cabinet area directly behind the Unit 3 side of the control room, between the auxiliary reactor operator and the assistant control operator). However, because both the auxiliary reactor operator and assistant control operator believed they were supposed to be testing the Train A relay, the opportunity to note that the wrong train component was about to be tested was missed. The inspector also noted that neither the control room supervisor nor the control operator was involved in the communication between the auxiliary reactor operator and assistant control operator, thus precluding the opportunity to question why the assistant control operator was at the Train A cabinet rather than the Train B cabinet.

The inspector also determined that a contributing cause to the event was inadequate knowledge of plant component designations, based on the fact that the auxiliary reactor operator and assistant control operator were unaware that Designators A and B at the end of the relay number were train designators. The inspector conducted an informal survey and did not identify any additional operators unaware of the train designations. However, the inspector determined that operator training did not cover this information as part of initial or requalification training of licensed operators.

As a result of this event, the licensee completed Operation Division Evaluation Report 3-95-29 to determine the root cause for this event and to identify corrective actions to prevent recurrence. The inspector reviewed the Operation Division Evaluation Report and concluded that the evaluation addressed most of the relevant issues, with two exceptions. Specifically, as discussed above, communications were established between the control room and the Train A relay cabinet. Nevertheless, the wrong component was tested. The inspector noted that it was operations management expectation that operators routinely call the control room prior to performing plant manipulations to provide an additional barrier to performing manipulations on wrong train or unit components. In this case, however, calling the control room did not provide an effective barrier, since the auxiliary reactor operator was on the receiving end of the call from the assistant control operator at the test location, and both operators erred regarding which train component was supposed to be tested. The inspector noted that the licensee's evaluation did not address why establishing communications between the control room and the test location did not result in prevention of testing the wrong train component. In addition, the inspector noted that the licensee's evaluation did not appear to focus on poor test oversight by the control room supervisor and control operator. Based on these observations, the inspector concluded that the licensee's evaluation was not thorough. In response to the inspector's concerns, the licensee stated that the poor oversight exhibited by the control room supervisor and control operator was discussed with those individuals, however, the details were not documented in the Operation Division Evaluation Report.

Operation Division Evaluation Report 3-95-29 also documented the licensee's corrective actions, which included disciplinary action for the individuals

involved, addition of training on relay designation to 1996 operator requalification training, and enhanced labeling of the relay cabinets. In addition, the inspector noted that, in order to assure interim lessons were learned, the licensee required all on-shift operators to read the Operation Division Evaluation Report. The inspector concluded that, based on corrective actions already taken and lessons learned through discussions regarding Operation Division Evaluation Report 3-25-95, the licensee's corrective actions were adequate.

The inspector concluded that operators failed to follow procedural guidance when they tested the wrong train relay, 201A. The failure to follow the guidance is a violation. However, this licensee-identified and corrected violation is being treated as a noncited violation, consistent with Section VII of the NRC Enforcement Policy.

2.3 Main Steam Safety Valve Testing - Unit 3

On September 21, 1994, maintenance and engineering personnel were setting up for main steam safety valve setpoint testing for main steam safety valves replaced during the Unit 3, Cycle 8 outage, and initiated a reactor coolant system temperature decrease. While installing a test pressure gauge to an existing steam generator pressure sensing line for pressure Transmitter 3PT8241, maintenance personnel initiated a pressure decrease in the sensing line, which resulted in the closing of two steam bypass control system valves. The pressure decrease was ultimately attributed to a small leak in the instrument pressure-sensing line tubing where the test gauge was connected. Prior to the event, the two steam bypass control system valves, 3HV8423 and 3HV8425, were approximately 13 and 10 percent open, respectively, and were being used to provide a steam path to the condenser. After the pressure decrease in the instrument line, caused by valving-in the gauge, the valve controller responded to the low pressure (as seen by pressure Transmitter 3PT8241, upstream of the temporary gauge) and closed the valves. Shortly after the valves closed, the pressure sensed by pressure Transmitter 3PT8421 recovered at a rate which resulted in the same two valves momentarily opening to approximately 60 and 45 percent. As a result, the reactor coolant system temperature decreased approximately 3 degrees, from 545°F to 542°F. The effects on pressurizer level and pressure were minimal. The inspector entered the control room shortly after the reactor coolant system temperature decrease and observed operators troubleshooting to determine the cause of the reactor coolant system temperature decrease. The inspector concluded that operators quickly diagnosed that the cause was the above-mentioned maintenance activity.

The inspector reviewed the system response and concluded that the system responded as designed. The inspector determined that during the tailboard for the main steam safety valve testing, operations personnel questioned the impact of valving the gauges into plant instrument pressure sensing lines. The tailboard was led by the main steam safety valve system engineer, with the maintenance personnel and the unit control operations in attendance. As a result of the plant impact question, plant drawings were reviewed and it was

identified that the steam bypass control system pressure sensors were in the same instrument line to which maintenance personnel had planned to connect the temporary gauge. However, the licensee inappropriately concluded that there would be no effect, largely based on the fact that previous tests had not resulted in a similar event. As a result, Operations left the steam bypass control system in automatic with two valves controlling reactor coolant system temperature. The inspector concluded that the tailboard for the main steam safety valve testing did not result in implementing actions to preclude the plant transient as described above. As a result of this event, the licensee's corrective action was that the next time main steam safety valve testing was performed, the steam bypass control system would be placed in the manual mode of operation. The inspector concluded that the licensee's corrective action was adequate for preventing future problems associated with main steam safety valve testing. However, the inspector also concluded that the licensee's preliminary evaluation of this event appeared to be too narrowly focused, in that it did not address whether the leaking fitting should have been identified and corrected prior to the event (e.g., by an appropriate pretest leak check, or by more cautious valving-in of the test gauge). In this regard, the inspector noted that an incomplete root cause evaluation of this event could result in the recurrence of a similar event during valving-in of test equipment on other active plant systems.

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 and quality control department involvement, proper use of safety tags, proper equipment alignment and use of jumpers, personnel qualifications, and proper retesting.

3.1 Containment Spray Pump Maintenance - Unit 3

On September 21, 1995, the inspector reviewed maintenance documentation (Maintenance Order 95090889001) associated with repair of Unit 3 containment spray Pump 3P012. During the review, the inspector determined that several steps associated with installation of the pump impeller, and one foreign material exclusion signoff, were not completed until the day after the steps had been performed. The inspector interviewed the responsible individuals and determined that they had forgotten to sign the steps after completing the maintenance activity the day before. The inspector reviewed administrative maintenance program Procedure SO123-I-1.3, Revision 4, "Work Activity Guidelines," and determined that it was a management expectation that signoffs be completed at the completion of the work activity, or at least at the end of the shift.

The inspector discussed these observations with maintenance management and determined that during the inspection period maintenance "stand-down" meetings were held with maintenance personnel. During the meetings, expectations for

performance of maintenance were discussed and reenforced, specifically the expectation that steps be signed as the work was completed. The inspector reviewed the lesson plan from these meetings and concluded that meeting topics adequately addressed the observed weaknesses.

3.2 On-line Maintenance Activities

The inspector reviewed the monthly Nuclear Oversight Division "Nuclear Safety Group Report for July 1995," and noted that the Unit 3 "Instantaneous Core Damage Risk Profile" graph displayed several maintenance activities which resulted in a notable increase in the cumulative core damage risk value. The inspector subsequently determined that the major contributors to the increased risk were switchyard work concurrent with maintenance on the Train B component cooling water heat exchanger, and on a Train B refueling water storage tank outlet valve. The period of time for concurrent performance of all three activities was on the order of several hours. The inspector also determined that all three activities had not been planned to occur simultaneously. Specifically, the cumulative effects of the heat exchanger and the refueling water storage tank outlet valve work had been analyzed prior to performing the maintenance activity. However, because the switchyard work was performed by San Diego Gas and Electric, and outside of the licensee's internal maintenance planning process, it was not considered in the cumulative risk analysis performed for the heat exchanger and refueling water storage tank work.

The inspector noted that a lack of control of switchyard activities during critical plant maintenance activities had been observed during the Unit 2 refueling outage (see NRC Inspection Report 361/95-01). The switchyard controls implemented as a result of the Unit 2 observations were still in place, in that the switchyard was locked and all personnel had to contact the control room to get permission to enter and to get the key. These controls allowed the shift superintendent to ascertain the scope of the intended activities, so that technical specification compliance could be assured, and the impact on plant risk could be judged. However, in this Unit 3 instance, consistent with current licensee management expectations, the licensee did not utilize its risk monitor to judge the risk of performing the switchyard activities before the shift superintendent authorized switchyard activities to proceed. Instead, as with other emergent activities, the shift superintendent based his decision on an informal risk judgment, based on his understanding of related plant conditions.

The inspector noted that licensee management was similarly concerned that risk associated with switchyard work activities should be routinely evaluated in a more quantitative manner. In this regard, the licensee stated that it was in the process of developing a method to preclude similar occurrences during future switchyard maintenance activities. Corrective actions implemented by the licensee included instruction to work process evaluators to perform risk analysis for on-line maintenance activities assuming concurrent switchyard work. The intent of this evaluation was to provide an early warning of cumulative activities that may have higher risk potentials. In addition, the licensee initiated an evaluation to determine if there were other maintenance

activities currently outside of the maintenance planning process that may need to be incorporated, and to better evaluate emergent maintenance after the routine analysis had been performed. The inspector concluded that the licensee's corrective actions appeared to be appropriate.

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 Integrated Engineered Safety Features Surveillance - Unit 3

On September 8, 1995, the inspector observed parts of the Unit 3 integrated engineered safety features surveillance conducted in accordance with Procedure SO23-3-3.12, Temporary Change Notice 11-2, "Integrated ESF System Refueling Tests" (testing of dual train components) and noted that the common control operator had difficulty closing diesel Generator 3G002 output breaker onto the 4 kV bus. Specifically, the operator attempted to synchronize the diesel generator to the 4 kV bus six times before finally closing the diesel generator output breaker. The inspector reviewed the procedure for diesel generator operation and determined that the operator performed the evolution in accordance with procedural guidance. As a result of the difficulty in closing the breaker, a maintenance order was initiated against the synchronization check permissive relay. Maintenance personnel determined that the synchronization relay, which controlled the ability of the operator to close the diesel generator output breaker, was set such that the operator had a very narrow window of opportunity to close the breaker. Specifically, the synchronization relay setpoint was found set at ±5 degrees and should have been set to ±10 degrees. The relay was readjusted and tested satisfactorily during the next scheduled monthly surveillance of diesel Generator 2G002. The inspector noted that for accident conditions, the diesel generator loaded onto a dead bus, and the synchronization relay was not required.

The inspector was concerned that the synchronization relay may have been inappropriately set during the Cycle 8 refueling outage. The inspector reviewed the maintenance history for the synchronization relay, and determined that the last preventive maintenance was performed in 1992. The inspector determined that there were four synchronization relays, one for each diesel generator, and the preventive maintenance frequency was four years. The inspector questioned if there had been any other failures of synchronization relays before the surveillance intervals had expired. The licensee determined that there had been at least one other failure. Maintenance management stated that the licensee would review the performance history of the synchronization relays to determine if the current preventive maintenance frequency was

adequate. The inspector concluded that the licensee's proposed corrective actions were adequate.

5 PLANT SUPPORT ACTIVITIES (71750)

5.1 Radiological Controls

The inspectors verified by sampling that radiological postings and door controls were consistent with NRC requirements, and that licensee personnel were following licensee procedures for radiation protection. Additionally, the inspectors reviewed radiation monitor traces and verified that there were no indications of uncontrolled releases.

5.1.1 Containment Walkdown - Unit 3

On September 21, 1995, the inspector performed a walkdown of Unit 3 containment prior to containment closure. Overall, the inspector concluded that containment material condition and cleanliness were much better than had been observed during the previous Unit 2 refueling outage. However, the inspector noted several minor deficiencies that were promptly corrected, or appropriately evaluated by the licensee before containment closure. The noted deficiencies included minor leakage from a shutdown cooling valve, and missing fasteners from conduit and junction boxes. The inspector also noted that the final approval for containment closure was given after the Plant Manager and Nuclear Oversight Division Manager performed a walkdown of containment immediately following the inspector's walkdown.

5.2 Emergency Preparedness

The inspectors observed that the onsite emergency response facilities were maintained in a state of readiness.

5.2.1 Operator Performance In Simulator During Emergency Preparedness Drill

On September 5, 1995, the inspector observed operator performance during a routine emergency preparedness drill at the plant simulator. The drill was initiated by a turbine trip without a reactor trip. The trip was followed by a loss of coolant accident greater than makeup capability, and eventual loss of offsite power, complicated by temporary loss of diesel generators. The core was ultimately uncovered, following the station blackout condition, resulting in approximately 5 percent of the reactor fuel being damaged. Offsite power was eventually restored, and the Train A Unit 3 diesel generator was aligned to supply power to the Unit 2 Train A bus. The inspector noted that operators correctly diagnosed events and implemented appropriate actions. However, the inspector noted several minor weaknesses in performance, with respect to consistent repeat-back of information. These weaknesses were also noted by licensee evaluators, and appropriate corrective actions were taken.

Additionally, the inspector observed a drill weakness which did not appear to have been identified by the licensee. Specifically, the inspector noted that

the announcement of a site area emergency was not performed in the control room until 25 minutes after having been declared by the licensee's Site Emergency Director. Subsequently, the inspector determined that the cause for the delay was attributed to oversight by a control room-based communicator, the "ivory phone communicator." As a result of the inspector's observation the licensee counseled the communicator. The inspector also determined that a possible root cause for the problem was the lack of training provided to the communicator. Specifically, the inspector determined that the communicator had not been provided formal training regarding responsibilities or expectations for his position. In response to the inspector's observation, the licensee committed to develop training guidelines for the communicator. The inspector concluded that the licensee's proposed corrective actions were adequate.

5.3 Fire Protection

The inspectors observed, on a sampling basis, that plant areas were free from inappropriate fire hazards and generally, with one exception, fire protection equipment was functional.

5.3.1 Open Fire Door Noted During Plant Walkdown - Unit 3

On September 27, 1995, the inspector identified two open and unattended fire doors in the Unit 3 safety equipment building. The inspector subsequently determined that the licensee had implemented the appropriate compensatory measures for one of the doors. However, the inspector noted that the licensee had not initiated compensatory measures for the door to Room 005, the Train B emergency core cooling system pump room on the -15 foot elevation. The inspector noted that the door was a technical specifications fire door and required establishment of a roving fire watch patrol on one side of the barrier within 1 hour if it were to be left open.

In response to the inspector's observations, the licensee provided the inspector with documentation which demonstrated that adequate compensatory actions had been provided, even though a fire watch had not been established for the barrier to Room 005. Specifically, the licensee had implemented compensatory measures for Rooms 002 and 015 which were adjacent to Room 005 (all three rooms entered from the same hallway, which was approximately 20 feet in length). The inspector concluded that since Rooms 002 and 015 were accessed from the same hallway as Room 005, a roving fire watch for Rooms 002 and 015 provided adequate compensatory measures for Room 005. Based on a review of fire watch logs and security records, the inspector determined that an hourly fire watch had been performed prior to the inspector finding the door open. Accordingly, the inspector concluded that there was little safety significance associated with leaving the fire door open. The inspector noted that the licensee generally performed well with respect to maintaining fire doors closed and considered this to be an isolated incident.

5.4 Physical Security

The inspectors observed protected areas barriers, isolation zones, nighttime protected area illumination levels, personnel access measures, package and material access measures, vehicle access measures, and visitor controls, and determined that these security measures were adequate.

5.5 Sampling and Chemistry

The inspectors observed that plant chemistry was within technical specifications and procedural limits, and that steam generator tube integrity was appropriately monitored.

6 FOLLOWUP - OPERATIONS (92901)

6.1 (Closed) Violation 361/9506-01: Inadvertent Transfer of Reactor Coolant to Unit 2 Refueling Water Storage Tank, and

(Closed) Violation 361/9506-02: Failure to Properly Verify Reactor Coolant Oxygen Prior to Exceeding 245°F

The first violation was issued for failing to follow procedure, resulting in an inadvertent transfer of approximately 560 gallons of reactor coolant (approximately 10 percent pressurizer level) from the Unit 2 reactor coolant system to a Unit 2 refueling water storage tank, while the reactor was shutdown and the plant was in transition from Mode 5 to Mode 4. The second violation also involved failure to follow procedure, resulting in uncertainty as to whether or not reactor coolant system oxygen concentration, with the reactor coolant system greater than 250°F, was below the steady state limit of 0.1 ppm, as stated in Technical Specification 3.4.6.

The inspector reviewed the licensee's responses to these violations, contained in Licensee Event Reports 2-95-005, dated May 8, 1995, 2-95-006, dated May 8, 1995, and a reply to the Notice of Violation, dated June 16, 1995. The inspector also attended a public management meeting held at the NRC Region IV office on July 10, 1995. In addition, the inspector observed numerous control room activities and conducted extended control room observations during the course of normal resident inspection activity.

Two factors, poor communications and a breakdown in command structure, were the principal causes of both events. Licensee corrective actions included counseling the involved operators, personnel changes in the operating crews, moving the shift superintendent's primary operating station from an office outside the main control room to inside the main control room, restricting access to the main control room, and providing more management attention to control room command structure and communications.

Based on several control room observations, during both low activity and high activity periods, the inspector concluded that specific improvements were apparent in control room formality, communications, and command structure.

The most significant improvements appeared to be associated with restriction of access to the control room and moving the shift superintendent to the main control room.

6.2 (Closed) Unresolved Item 361/9506-03: Evaluation of Licensee's Probabilistic Risk Assessment of Inadvertent Transfer Event

This unresolved item was created to review a licensee determination of increased risk to the plant due to an inadvertent transfer of approximately 560 gallons (10 percent pressurizer level) of reactor coolant from the Unit 2 reactor coolant system to a Unit 2 refueling water storage tank, over a 2 minute and 10 second period while the reactor was shutdown and the plant was in transition from Mode 5 to Mode 4. The event occurred on April 6, 1995, and was caused by a valve misalignment while terminating shutdown cooling.

The licensee determined that the core damage frequency for that plant configuration was approximately 10 E -10 probability of core damage. The inspector noted that normal core damage frequency, with the plant fully operational and no abnormalities, was on the order of 10 E -5 core damage events per year. On September 26, 1995, the inspector discussed this assessment with the licensee probabilistic risk assessment organization and reviewed a risk management report dated August 1995. The inspector noted that the probabilities of operator action were taken from NUREG/CR-1278, "Handbook of Human Reliability Analysis with Emphasis on Nuclear Power Plant Application." Since the time to uncover the core, with no operator action, was approximately 8 hours, the risk of core damage was low, even though the event negated two of the three barriers to radioactive release (e.g., the reactor coolant system and containment). The inspector concluded that the licensee's evaluation was appropriate, and this item should be closed.

6.3 (Closed) Violation 361/9504-01: Inadequate Procedures for Emergency Core Cooling System Venting and Chemical Volume and Control System Operation

This violation cited two examples of inadequate procedures. In the first example, the licensee identified that the procedure used to vent the emergency core cooling system suction piping from the refueling water storage tank to the emergency core cooling system pumps (containment spray, low pressure safety injection, and high pressure safety injection) did not contain all of the vent valves necessary to adequately vent the pump suction piping. This condition resulted in the cavitation of low pressure safety injection Pump 2P016, while attempting to return the Train B emergency core cooling system suction piping to service following maintenance. After the pump cavitated, the licensee identified three vent valves that vented significant amounts of air.

The second example involved a procedure for placing a chemical volume and control system letdown purification filter into service. The procedure was determined to be inadequate because the method used to inspect for leaks after installation of a new filter did not properly address identification of large

system leakage. Specifically, the procedure directed: (1) operations personnel to isolate the filter from the chemical volume and control system, (2) maintenance personnel to install a new filter, and (3) operations personnel to fill the filter housing with nuclear service water. After the filter housing was filled, an operator was directed to isolate the filter again, and observe the filter housing for leaks. This method may have worked well for small leaks. However, because the filter was improperly installed by maintenance personnel, the large resulting leak drained the housing before it was inspected. When it was finally inspected, it did not appear to be leaking.

In a letter dated July 7, 1995, the licensee responded to the violation. The inspector reviewed the response and concluded that the licensee's corrective actions for the emergency core cooling system suction piping venting problem were too narrow. Specifically, the inspector noted that the licensee only focused on creation of a new procedure for emergency core cooling system suction piping venting, and did not consider that other system operating procedures might also address system venting inadequately. The adverse consequences of the licensee's failure to properly address broader corrective actions following the Unit 2 refueling outage was demonstrated by a repeated pump venting problem during the Unit 3 refueling outage. Specifically, on August 22, 1995, while attempting to place the shutdown cooling system in service, operators cavitated the Unit 3 low pressure safety injection Pump 3P016. Subsequently, the Operations Manager walked down the shutdown cooling system piping and found that there were three vent valves that had not been vented. After venting these three additional valves, the shutdown cooling system was placed in service without further cavitation of the low pressure safety injection pump. Additionally, the licensee determined that the same three valves were also missing from the abnormal operating instruction for loss of shutdown cooling. As a result of the August 22 event, both the shutdown cooling system operation and loss of shutdown cooling abnormal operating instruction procedures were revised to include the additional vent valves.

Since operators were attempting to place the shutdown cooling system in service, with no fuel in the core, the inspector considered that the significance of this event was low. The inspector also noted that the licensee's Nuclear Oversight Division had also concluded that the corrective actions for the earlier system venting problems were too narrowly focussed, and issued a management corrective action request to the Plant Manager for inadequate corrective actions. The failure to implement adequate corrective actions is a violation of 10 CFR Appendix B Criterion XVI, "Corrective Actions." However, consistent with Section VII of the NRC Enforcement Policy, this licensee-identified and corrected violation is being treated as a noncited violation.

In response to the section of the violation associated with the chemical volume and control system filter replacement, the licensee revised the chemical volume and control system filter procedure to ensure nuclear service water was not isolated prior to inspecting the filter housing for leaks. In

addition, because the cause of the leakage was attributed to improper installation of the filter by maintenance personnel, the maintenance procedure for installation of the filter was revised to ensure proper installation. The inspector concluded that the licensee's corrective actions for that section of the violation were adequate.

7 ONSITE REVIEW OF LERS (92700)

The following LERs were closed through direct observation, discussion with licensee personnel, or review of the records:

- 361/95-002, Revision 0 , Revision 1: Technical Specification 3.0.3 Entry Due to Inoperable Main Feedwater Isolation Valves
- 361/95-005, Revision 0: Loss of Pressurizer Level Due to a Valve Alignment Error
- 361/95-006, Revision 0: Reactor Coolant System Coolant System Dissolved Oxygen Out of Specification

8 IN-OFFICE REVIEW OF LERS (90712)

The following LERs were closed based on in-office review:

- 361/95-014, Revision 0: Missed Technical Specifications Surveillance due to Lack of Alarm
- 361/95-015, Revision 0: Reactor Coolant System Leakage Detection System Inoperable
- 362/95-003, Revision 0: Failure to Install Jumpers

ATTACHMENT

1 PERSONS CONTACTED

1.1 Licensee Personnel

*D. Breig, Manager, Station Technical
C. Chiu, Manager, Quality Engineering
*J. Clark, Manager, Chemistry
*C. Couser, Supervisor, Fire Protection
*J. Fee, Maintenance Manager
G. Gibson, Supervisor, Onsite Nuclear Licensing
*R. Giroux, Engineer, Compliance
*D. Herbst, Manager, Quality Assurance
*M. Herschthal, Manager, Nuclear Systems Engineering
*R. Kaplan, Engineer, Compliance
P. Knapp, Manager, Health Physics
*R. Krieger, Vice President, Nuclear Generating Station
H. Newton, Manager, Site Support Services
J. Reeder, Manager, Nuclear Training
*J. Reilly, Manager, Nuclear Engineering & Construction
R. Rosenblum, Vice President, Nuclear Engineering and Technical Support
M. Short, Manager, Site Technical Services
*K. Slagle, Manager, Nuclear Oversight
*A. Thiel, Manager, Electrical Systems Engineering
*T. Vogt, Plant Superintendent, Units 2/3
R. Waldo, Operations Manager
*M. Wharton, Manager, Nuclear Design Engineering
*C. Williams, Supervisor, Compliance
W. Zintl, Manager, Emergency Preparedness

1.3 NRC Personnel

J. Russell, Resident Inspector
*J. Sloan, Senior Resident Inspector
*D. Solorio, Resident Inspector

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 October 6, 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.