U.S. NUCLEAR REGULATORY COMMISSION

REGION II

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Licensee:	Tennessee Valley Authority (TVA)
Facility:	Sequoyah Nuclear Plant, Units 1 & 2
Location:	Sequoyah Access Road Hamilton County, TN 37379
Dates:	March 28 through May 31, 1999
Inspectors:	M. Shannon, Senior Resident Inspector D. Starkey, Resident Inspector R. Telson, Resident Inspector W. Bearden, Reactor Inspector (Sections M1.4, M2.1 - 2.4 and M8.1 - 8.5) W. Kleinsorge, Reactor Inspector (Section M2.5) D. Jones, Senior Radiation Specialist (Section R1.1)
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Enclosure

EXECUTIVE SUMMARY

Sequoyah Nuclear Plant, Units 1 & 2
NRC Inspection Report 50-327/99-03, 50-328/99-03

This integrated inspection included aspects of licensee operations, maintenance and engineering. The report covers a 9-week period of resident inspection; in addition, it includes the results of three announced inspections by regional inspectors.

Operations

- The licensee was granted a Notice of Enforcement Discretion (NOED) following a failure of the 1B-B centrifugal charging pump (CCP). Based on the licensee's data and testing, the 1B-B CCP was considered to be operable and capable of performing its safety functions. The licensee was requested to perform full flow testing and committed (LER 99-01-00) to perform a full flow test of the 1B-B CCP at the next available outage (Sections O1.3 and E2.2).

- In most instances, plant control and communications during coast down and plant power reduction were effective. The inspectors noted a few instances of lacking operator attention to detail during the plant shutdown and during the subsequent refueling outage. These items were not considered to be safety significant and were addressed in the licensee's corrective action program (Section O1.4).

- Overall plant performance during the Unit 2 plant shutdown, outage, and startup was good and contributed to a successful refueling outage (Section O1.5).

Maintenance

- A non-cited violation (NCV) was identified for failure to remove a foreign material exclusion plug and failure to perform an associated cleanliness inspection following maintenance activities on the Unit 2 turbine driven auxiliary feedwater (TDAFW) pump. The blocked oil path went undiscovered for approximately two years (Section M1.2).

- Maintenance engineering performed a detailed analysis for an ice basket screw failure issue, which identified the root cause for the screw failure which provided a basis for the subsequent ice basket screw and ice condenser (IC) basket operability evaluation (Section M1.3).

- A review of two IC surveillance test procedures showed that these procedures were clearly written and met TS requirements (Section M1.4).

- No significant material condition problems for the Unit 2 IC upper deck blankets were identified (Section M2.1).

- A licensee-identified NCV was identified for the failure to promptly identify and correct damaged IC ice baskets (Section M2.2).

- The licensee effectively completed the replacement of two damaged IC ice baskets and planned to modify 31 damaged Unit 2 ice baskets in the same manner as previously performed on damaged Unit 1 baskets (Section M2.2).

- The material condition of the IC intermediate deck doors was acceptable (Section M2.3).

- Lower IC plenum inspections indicated adequate housekeeping. No examples of excessive ice flow blockage were noted during inspections of the lower IC plenum (Section M2.4).

- Inservice inspection, non-destructive examination and repair and replacement activities evaluated were conducted in accordance with procedures, licensee commitments and regulatory requirements (Section M2.5).

Engineering

- An NCV was identified for the failure to calibrate the thrust bearing oil sump temperature indicators prior to using the associated indicators in the design verification testing of the Unit 2 TDAFW pumps (Section E2.1).

- An NCV, with two examples, was identified for failure to perform an environmental assessment prior to removal of cooling water from the thrust bearing lube oil sump for the 1B-B motor driven auxiliary feedwater pump and the Unit 2 TDAFW pump (Section E2.1).

- An NCV was identified for failure to properly categorize preventable functional failures and repetitive functional failures (Section E2.3).

- The licensee's reactor engineering group responded pro-actively and conservatively to industry reports of potential problems with Westinghouse Vantage V fuel assemblies in redesigning the Unit 2 cycle 10 core to exclude 24 suspect fuel assemblies (Section E2.4).

Plant Support

- The licensee was properly monitoring and controlling personnel radiation exposure during the Unit 2 refueling outage and posting area radiological conditions in accordance with 10 CFR Part 20 (Section R1.1).

- Personnel entering the radiologically controlled area were adequately briefed on radiological hazards and protective measures (Section R1.1).

- Maximum individual radiation exposures were controlled to levels which were well within the regulatory limits for occupational dose specified in 10 CFR 20.1201(a) (Section R1.1).

- The licensee was successful in meeting established ALARA goals during 1997 and 1998 (Section R1.1).

- The licensee had implemented an effective shutdown chemistry control plan and closely monitored primary coolant chemistry during the shutdown for the Unit 2 refueling outage (Section R1.1).

Report Details

Summary of Plant Status

Unit 1 operated throughout the inspection period at 100 percent power.

Unit 2 began the inspection period at approximately 73 percent power in coast down for refueling outage cycle nine (U2C9). The unit was taken off line and the refueling outage began at 1:00 a.m. on April 18, 1999. The unit entered Mode 6 on April 21 and core reload was completed on April 26. The unit entered Mode 2 at 5:42 a.m. on May 10 and entered Mode 1 at 9:39 p.m. on May 10. The generator was synchronized to the grid at 5:31 a.m. on May 11. Unit 2 was returned to 100 percent power operation at 9:56 a.m. on May 15.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

The inspectors conducted frequent reviews of ongoing plant operations including the planned shutdown of Unit 2 for its cycle 9 refueling outage (U2C9). In general, the conduct of operations was considered to be good.

O1.2 4-Hour Non-Emergency Notification of Emergency Safeguards Actuation (93702)

At 8:04 p.m. on April 15, 1999, the licensee made an NRC non-emergency notification of a manual engineered safety feature (ESF) actuation in response to an actual plant condition. At 4:19 p.m., the in-service 1B-B centrifugal charging pump (CCP) was stopped and the 1A-A CCP started when an operator inspecting the pump observed water spraying from the outboard pump seal. Stopping the 1B-B CCP arrested the seal leakage. The pump was declared inoperable and corrective actions initiated.

O1.3 Request for Discretionary Enforcement (93702)

On April 17, 1999, the licensee requested discretionary enforcement to exceed the 72-hour limiting conditions for operation (LCOs) 3.1.2.2, 3.1.2.4, and 3.5.2 of Unit 1 Technical Specifications (TS) to support completion of repairs and testing for the 1B-B CCP. The licensee had concluded that completion of repairs and testing would likely exceed the allowed 72-hour allowed outage time. TS 3.1.2.2 requires that the flowpath through the charging pumps be operable for flow path boundary integrity; TS 3.1.2.4 requires that CCPs be available for reactivity control by providing boration flow to the RCS; and TS 3.5.2 requires that emergency core cooling water be available for accident mitigation. By letter dated April 20, 1999 the NRC granted an additional 48 hours of enforcement discretion after the expiration of the 72 hours of TS 3.1.2.2, 3.1.2.4, and 3.5.2. The inspectors identified the following unresolved item (URI) to track and document licensee's commitments and corrective action, URI 50-327/99-03-06, Evaluate Licensee's Commitments and Corrective Actions Regarding Unit 1 Notice of Enforcement Discretion, NOED 99-001.

The licensee determined that the requested 48-hour extension would have minimal safety significance based on the individual plant examination (IPE) which showed the incremental increase in large early release probability for a 5-day outage (72 hours plus a 48-hour extension) was 7.63E-9. In addition, the licensee noted that the extension would prevent an unnecessary unit shutdown. The NRC granted enforcement discretion and compensatory measures were implemented to protect further the 1A-A CCP during the 1B-B CCP outage.

The repairs and testing of the 1B-B CCP were completed at 2:30 a.m., on April 19, 1999. The post-maintenance testing procedure was modified to permit on-line pump performance testing. The Plant Operations Review Committee (PORC) reviewed the pump performance data and recommended restoring the pump to operable status. Operations reviewed the data and declared the pump operable at 11:11 a.m., on April 19, 1999.

O1.4 Plant Shutdown and Outage Observation, Unit 2

a. Inspection Scope (71707)

Inspectors observed plant coast down, outage and shutdown preparations, plant shutdown, cool down, transition to residual heat removal cooling and other refueling operations.

b. Observations and Findings

Unit 2 pre-outage preparations appeared well-controlled and plant control during coast down and final power reduction were uneventful. Inspectors observing the unit shutdown found operator communications to be effective. However, immediately following a planned manual reactor trip from 20 percent reactor power, while executing Emergency Procedure ES-0.1, Reactor Coolant System (RCS) temperature decreased to approximately 538 degrees F. This necessitated emergency boration. In addition, pressurizer level decreased to less than 17 percent due to the cool down, which caused an automatic letdown isolation.

The inspectors determined the apparent cause of cool down to be an unnecessarily sustained high auxiliary feedwater feed rate (1600 gpm for five minutes). The initial feed rate was the normal system response to the reactor trip. However, within two minutes, RCS temperature was below 547 degrees F and decreasing. Operators transitioned to Emergency Subprocedure, ES-0.1, Reactor Trip Response, three minutes after the trip. Step 3.b. of ES-0.1 directs operators, under these conditions, to throttle feed flow. The operators did not effectively control auxiliary feedwater flow which resulted in a letdown isolation signal and a need to emergency boration. Boration was performed in accordance with ES-0.1 approximately five minutes after the trip. Subsequently the operators throttled auxiliary feedwater flow to an acceptable flow rate. This over cooling issue, which resulted in an automatic letdown isolation and the need to initiate emergency boration was considered to be an example of a lack of operator attention to detail.

The inspectors also noted additional problems related to operator attention to detail during the refueling outage. On April 19, 1999, during the performance of 2-SI-OPS-082-026.A, Loss of Offsite Power with Safety Injection, the control room operator paralleled the emergency diesel generator to the unit board. However, the operator failed to maintain load on the emergency diesel generator and approximately 40 seconds later the emergency diesel generator tripped due to reverse power. In addition, on May 6, during refill and de-oxygenation of the pressurizer relief tank (PRT), the control room operator failed to stop the filling of the PRT when level indicated 100 percent. Subsequently, 2 minutes and 40 seconds later the PRT rupture disc ruptured due to over-pressure.

c. Conclusions

In most instances, plant control and communications during coast down and plant power reduction were effective. The inspectors noted a few instances of a lack of operator attention to detail during the plant shutdown and during the subsequent refueling outage. These items were not considered to be safety significant and were addressed in the licensee's corrective action program.

O1.5 Plant Outage and Startup Observation, Unit 2

a. Inspection Scope (71707)

The inspectors observed various outage and startup activities during the Unit 2 refueling outage.

b. Observations and Findings

During the Unit 2 refueling outage, the inspectors observed portions of core off-load, core reload, reduced inventory operations, ice condenser (IC) maintenance activities, and plant startup. Evolutions, in general, were well controlled with effective communications observed. Reactor coolant system (RCS) drain down operations and RCS midloop and vacuum fill operations were well planned and controlled. Midloop operations, in particular, were conducted safely with a minimal amount of time spent in midloop. Briefings for various evolutions were thorough and focused on safety. A significant level of senior management oversight was observed in the control room during sensitive plant activities. The inspectors observed that licensee management focused on risk assessment and risk reduction with planning and frequent review of risk significant activities. Prior planning of plant activities resulted in radiation exposure during the outage being the lowest dose in the plant's history.

c. Conclusions

Overall plant performance during the Unit 2 plant shutdown, outage, and startup demonstrated prior planning with a focus on safety which contributed to a successful refueling outage.

O8 Miscellaneous Operations Issues (92700, 92901, 92902)

O8.1 Closure of Open Severity Level IV Violations

The NRC recently revised NUREG-1600, Rev. 1, "General Statement of Policy and Procedures for NRC Enforcement Actions," (Enforcement Policy) by the addition of Appendix C. Appendix C, Interim Enforcement Policy for Power Reactor Severity Level IV Violations, effective March 11, 1999, revises the NRC's enforcement approach for severity Level IV violations, based on the violation being entered into the licensee's corrective action program, as well as other considerations as described in the Appendix. The NRC has conducted a review of the following Severity Level IV violations, and considers it appropriate to close these violations consistent with Appendix C of the Enforcement Policy:

Violation Number	Problem Evaluation Report (PER) Numbers
50-327,328/98-06-04	SQ980620PER SQ980621PER SQ980791PER
50-327/98-09-01	SQ981283PER SQ981220PER

O8.2 (Closed) IFI 50-327,328/97-300-01: Poor Quality of Audit Examination and Remediation Program. The licensee conducted a root cause analysis after the high failure rate on a 1997 initial examination. This root cause analysis identified that the quality of the audit examination did not meet current standards, and that a candidate was allowed to take a second audit examination without remediation. The inspectors reviewed the licensee's corrective actions for these concerns and found them to be adequate. Since this 1997 initial examination, the inspectors have not identified any reoccurrences of these concerns.

O8.3 (Closed) IFI 50-327,328/97-300-02: AFW Flow Control to Prevent Overfill While in EOPs. The inspectors reviewed the changes made to EPM-4, "User's Guide," Rev. 6. The changes adequately addressed the inspectors concerns. EPM-4 now allows the operators to " take actions to isolate the turbine driven auxiliary feedwater level control valves to preclude a steam generator overfill condition", without invoking 10CFR50.54(x) (i.e., taking reasonable action that departs from licensing condition or Technical Specifications (TS) in an emergency.

O8.4 Closed URI 50-327/99-03-06: Evaluate Licensee's Commitments and Corrective Action Regarding Unit 1 Notice of Enforcement Discretion, NOED 99-001. The inspectors conducted inspections of licensee's corrective actions to repair and perform post modification testing of the 1B-B CCP. Based on the licensee's extrapolated data and pump testing results, the 1B-B CCP was considered to be operable and capable of performing its safety functions and commitments of NOED 99-001 were satisfied. This event is further discussed in Sections O1.3 and E2.2.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments

a. Inspection Scope (61726, 62707)

The inspectors conducted frequent reviews of ongoing maintenance and surveillance activities.

b. Observations and Findings

The inspectors observed and/or reviewed all or portions of the following work activities and/or surveillances:

• PI-170.4, Rev 6	Periodic Calibration of the Standby Diesel Generator 2B-B
• 1-SI-SXP-063-201.A, Rev 3	Safety Injection Pump 1A-A Performance Test
• 1-SI-SXP-063-201.B, Rev 2	Safety Injection Pump 1B-B Performance Test
• 0-SI-SXV-001-859.0, Rev 4	Testing and Setting of Main Steam Safety Valves
• 2-SI-SXP-074-201.B	Residual Heat Removal Pump 2B-B Performance Test
• TACF 1-99-004-003, Rev 1	Replace Lube Oil of Motor Driven Auxiliary Feedwater Pump 1B-B with Synthetic Oil
• 0-MI-MRR-070-611.0, Rev 4	Component Cooling System (CCS) Heat Exchanger Maintenance (Cleaning 2A2 CCS Heat Exchanger)
• 2-SI-OPS-082.007A	Electrical Power Systems Diesel Generator 2A-A
• WO 98-011962	Install Rains-Flow Packing on Unit 1 TDAFW Pump
• WO 99-003536	Inspect Unit 1 Vital Inverters for Solder Joint Problems.

c. Conclusions

The above maintenance and surveillance activities were completed in accordance with procedures and performed by knowledgeable personnel.

M1.2 Blockage of Oil Flow to Auxiliary Feedwater Pump 2A-S Bearing

a. Inspection Scope (62707)

The inspectors reviewed the licensee's corrective action and documentation, including a technical operability evaluation (TOE), following the licensee's April 16, 1999 discovery during routine maintenance, that a plastic pipe cap had been left in the pressurized oil supply line to the inboard turbine bearing of the 2A-S turbine driven auxiliary feedwater pump (TDAFWP).

b. Observations and Findings

PER SQ99000277PER was generated to document the finding and work request (WR) C4134700 was initiated to inspect the bearing. TOE 2-99-003-2777, Rev 0, was issued on April 17, 1999, to evaluate the pump for past operability and reportability. The TOE determined that the oil supply line had been blocked since the last time maintenance was performed which occurred during the U2C8 refueling outage in the fall of 1997.

The oil supply line delivers forced oil flow from a shaft-driven oil pump to the inboard journal bearing, and provides continuous filtration and makeup flow to ensure oil in the sump remains clean and at a constant level. As forced oil flow enters the sump, excess oil spills over an internal weir, passes a bearing oil temperature probe and the bearing oil sample point, and returns to the pump suction. An oil ring (slinger ring) in the bearing housing supplies oil to the bearing during startup (before the shaft-driven oil pump has reached operating pressure) and also augments forced oil lubrication during normal operation.

The licensee concluded that the TDAFWP would have performed its design function with no limitations and had no loss of functional capability due to the obstructed forced oil supply to the inboard bearing. In support of this conclusion, the licensee provided the following mitigating factors: (1) oil filtration existed primarily to support the governor, not the bearings, (2) the slinger ring provided lubrication during startup and operation; (3) blockage of forced oil flow to the bearing should have had no adverse effect on the oil pump since parallel flow paths to the governor and outboard bearing remained; (4) although some babbit wear had occurred, there were no gouges, balling up of babbitt metal, galling of the bearing surfaces, or deeply scored areas; (5) the shaft had some minor deposits of babbit which cleaned up quickly with scotchbrite; (6) vibration data taken over the past year did not show elevated velocities on the turbine; (7) the pump operated reliably at least 13 times during the period in question, including one period of continuous operation for 28 hours; and (8) according to the vendor, turbines similar to the licensee's are designed to operate without forced oil systems.

The inspectors confirmed the licensee's observation that babbitt material had been displaced and deposited elsewhere on the bearing and, in addition, that the bearing surface was partially blackened and showed surface irregularities. The inspectors were unable to examine the shaft as the pump had already been reassembled when they became aware of the issue. The inspectors observed that, without forced oil flow,

lubrication to the bearing was reduced and oil makeup and filtration were lost. Due to the flow blockage and the location of the monitoring points downstream of the bearing sump, neither oil temperature indication nor predictive oil analysis could have de .ed a potential or impending failure of the bearing or the oil in the inboard sump during the two-year period. The sump oil was not retained or analyzed by the licensee. The opportunity to evaluate the oil condition, and by inference, the bearing condition against established predictive maintenance limits, was lost.

The inspectors reviewed work documentation from the October 1997 maintenance instruction (MI), 0-MI-MRR-003-461.0, Disassembly, Inspection, and Reassembly of the Auxiliary Feedwater Pump Turbine, and noted that the appropriate blocks in Section 6.4.9 had been checked for removal of the foreign material exclusion (FME) covers following the maintenance activities. Section 6.4.9, Block (35) stated, "Remove covers from oil piping and openings and ensure lines are clean." The licensee concluded that this step had been inappropriately checked off as completed, although the FME plug was still installed. The failure to remove the FME plug also indicated that the maintenance technician had failed to perform the oil line cleanliness inspection, specified in Section 6.4.9, prior to reinstallation of the lube oil piping. 10 CFR 50, Appendix B, Criterion V, Instructions, Procedures, and Drawings requires that, "Activities effecting quality shall be prescribed by documented instructions , procedures...and shall be accomplished in accordance with these instructions and procedures..." The failure to remove the FME plug and perform the visual cleanliness inspection as required by 0-MI-MRR-003-461.0, Section 6.4.9 is identified as a violation of 10 CFR 50, Appendix B, Criterion V, Instructions, Procedures, and Drawings. The violation is identified as a non-cited violation, NCV 50-328/99-03-01, Failure to Remove FME Plug and Perform Cleanliness Inspection on the Unit 2 Turbine Driven Auxiliary Feedwater Pump. This Severity Level IV violation is being treated as an NCV, consistent with Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as PER SQ99002777PER.

c. Conclusions

An NCV was identified for failure to remove an oil line FME plug and failure to perform an associated cleanliness inspection following maintenance activities on the Unit 2 TDAFWP. The blocked oil path went undiscovered for approximately two years.

M1.3 Resolution of Ice Basket Screw Failure Issue

a. Inspection Scope (62707)

The inspectors reviewed the licensee's root cause investigation, failure mechanism determination and corrective actions following the failure of ice baskets screws at the upper joint of one ice basket.

b. Observations and Findings

On April 24, 1999, PER SQ99003066PER was initiated to document that during Unit 2 initial ice basket weighing of ice basket G-1, the basket was found broken at the upper 12-foot joint. Written statements and subsequent interviews with the maintenance personnel involved with the weighing indicated that during the weighing process only approximately 800 pounds of lift had been exerted on the ice basket. This was well below the normal 1600-pound weight of a fully loaded ice basket. The licensee's subsequent investigation determined that all 12 screws at the upper 12-foot joint had sheared.

In order to determine the failure mechanism of the screws, the licensee performed chemical analysis and micro-hardness testing. The analysis indicated that the screws had failed due to ductile shear overload. The analysis also indicated that the some of the screws did not exhibit the proper hardness as specified by the vendor's purchasing requirements. However, the as-found hardness exceeded the minimum hardness requirements for use in the ice baskets. The licensee's analysis and conclusions were documented in Metallurgical Laboratory Section Report 99-1109, dated May 6, 1999. Based on the laboratory results, engineering noted that the screws met the design requirements and, therefore, the operability of the IC was not in question. However, engineering had not identified the failure mechanism prior to making this determination.

During subsequent reviews, the inspectors noted that maintenance engineering was in the process of performing a detailed apparent cause evaluation on the failure of the ice basket screws. Based on discussions and statements from the IC workers, the maintenance engineer concluded that the ice basket screws were broken when the workers attempted to move the upper basket from side to side approximately ½-3/4 inch. Normally this movement would not have created a problem; however, the ice basket frozen solid at the first 12-foot joint, created a high-stress pivot point on the screws. Based on having the basket frozen with solid ice and the first 12-foot joint frozen solid, the calculations indicated that movement of the basket by ½-3/4 inch would shear the screws at the ice basket coupling. The licensee's statements, analysis and calculations were well documented in PER SQ99003066PER. The inspectors determined that the amount of movement and stresses at the screw and basket interface indicated by the licensee's calculations provided a reasonable identification of the failure mechanism and a basis for the IC basket operability determination.

c. Conclusions

Maintenance engineering performed a detailed analysis for the ice basket screw failure issue, which identified the root cause for the screw failure and provided a basis for the subsequent ice basket screw and IC operability evaluation.

M1.4 Ice Condenser Surveillance Testing

a. Inspection Scope (62707, 61726)

The inspectors observed portions of surveillance instructions (SIs) and reviewed documentation for the following:

- 2-SI-MIN-061-107.0, Ice Condenser Floor Drains, Revision 1
- SI-108.5, Ice Condenser Intermediate and Lower Inlet Door and Vent Curtains (Unit 2) Revision 5

b. Observations and Findings

The surveillance instructions reviewed were clearly written and met TS requirements. Additionally, the inspectors observed portions of operational testing of the lower inlet doors performed in accordance with SI-108.5. The TS required surveillance testing was performed by adequately trained personnel who were thoroughly familiar with the requirements. The results reviewed met procedural and TS requirements and documentation was adequate.

c. Conclusions

The review of two IC surveillance test instructions showed that these instructions were clearly written and met TS requirements.

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Observation of Unit 2 Ice Condenser Upper Deck Blankets

a. Inspection Scope (62707)

The inspectors observed the Unit 2 IC upper deck blankets for adequacy of material condition. The inspectors also reviewed procedures and drawings for installation of tape and the licensee's evaluation of PER SQ981146 which documented taping that was not in accordance with requirements.

b. Observations and Findings

Requirements for taping are contained in Westinghouse Drawing 1186F75, Revision 7. This drawing requires radial tape to be one piece and contained at the blanket hinge end with clips to assure the tape was retained during a design basis event. In addition, circumferential tape at the outer wall is to be stapled to the blankets.

The inspectors observed the Unit 2 IC upper deck blankets for adequacy of material condition. Each flexible vent assembly was installed and free movement was not restricted. The IC upper deck blanket material showed no evidence of condensation or

internal moisture saturation. No interference was observed which might restrict proper operation of the IC upper deck blankets. No structural damage was identified and the material condition of the IC upper deck blankets was acceptable. The inspectors noted that each section of radial tape was contained at the blanket hinge end with clips to assure that the tape was retained during a design basis event.

Deficiencies associated with stapling and application of the circumferential tape had been identified during a previous NRC review in this area as documented in NRC Inspection Report 50-327, 328/98-13. The licensee had identified this condition on PER SQ981146. Correction of those deficiencies had not yet been performed for the Unit 2 IC and PER SQ981146 had not been closed by the licensee. The inspectors determined that WO 98-12775-00 had been issued to correct these deficiencies and was scheduled to be performed prior to the end of the refueling outage. No significant material condition problems for the Unit 2 IC upper deck blankets were identified.

c. Conclusions

No significant material condition problems for the Unit 2 IC upper deck blankets were identified.

M2.2 Damaged Ice Condenser Ice Baskets - Material Condition (Unit 2)

a. Inspection Scope (62700)

The inspectors reviewed and evaluated the adequacy of identification and repair/replacement of degraded IC ice baskets. As-found conditions were evaluated with respect to TS, the Final Safety Analysis Report (FSAR), design criteria, and applicable licensee drawings and procedures.

b. Observations and Findings

The inspectors reviewed the adequacy of identification and repair/replacement of degraded IC ice baskets during the ongoing Unit 2 refueling outage. Previous problems in this area had been identified during NRC reviews of Unit 1 IC activities. These reviews were documented in NRC Inspection Reports 50-327, 328/98-06 and 50-327, 328/98-13. NCV 50-327/98-13-03 for failure to promptly identify and correct damaged ice baskets had been identified during the most recent NRC review. The inspectors determined that the material condition of ice baskets in the Unit 2 IC were similar to that previously found in the Unit 1 IC in that additional new examples of previously unidentified basket damage had existed. In response to the damaged Unit 2 ice baskets, the licensee issued PER SQ981141, dated August 27, 1998, to document the problem and to track the corrective actions taken.

During the ongoing Unit 2 refueling outage, the licensee visually inspected the ice baskets from the top and bottom with the aid of a drop light. During this inspection the licensee identified approximately 69 baskets (six from the August 1998 forced outage), exhibiting various degrees of damage. Through discussions with the system engineer

and by inspection, the inspectors determined that the baskets were most probably damaged from the licensee's servicing technique used to free-up, frozen-in-place ice baskets in the same manner as previously noted for Unit 1 baskets.

The licensee determined that out of the 69 damaged ice baskets 31 did not meet the acceptance criteria and would require repair, modification or replacement. Acceptance criteria for punctured and/or dented ice baskets had been previously developed by Westinghouse and documented under Task No. TVA-98-083, dated September 18, 1998. The licensee decided to modify the 31 baskets under DCN T20013A, which had not been started at the time of this inspection. Of the total damaged ice baskets, 36 of the 69 Unit 2 ice baskets met the acceptance criteria and no further work was required. The remaining two damaged baskets were replaced earlier during the refueling outage. For the most part, the identified damage was located on the lower section of the ice basket column. Based on observations, discussion and document reviews, the inspectors determined that the licensee had numerous opportunities to identify and to promptly correct the damaged ice baskets during previous inspections, maintenance and/or during material condition walkdowns. 10 CFR 50, Appendix B, Criterion XVI, Corrective Action requires that "Measures shall be established to ensure that conditions adverse to quality are promptly identified and corrected." The failure to promptly identify and correct these damaged ice baskets is identified as a violation of 10 CFR 50, Appendix B, Criterion XVI, Corrective Action. The violation is identified as a non-cited violation, NCV 50-328/99-03-05, Failure to Promptly Identify and Correct Damaged Ice Baskets. This Severity Level IV violation is being treated as an NCV, consistent with Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as PER SQ981141.

c. Conclusions

A licensee-identified NCV was identified for the failure to promptly identify and correct damaged ice baskets. The licensee effectively completed the replacement of two damaged baskets and planned to modify 31 damaged Unit 2 ice baskets in the same manner as previously performed on damaged Unit 1 ice baskets.

M2.3 Intermediate Deck Doors

a. Inspection Scope (62707)

The inspectors observed the material condition of the Unit 2 intermediate deck doors. This observation included condition of bolting, intermediate deck doors, and intermediate deck door frames.

b. Observations and Findings

The inspectors accompanied the system engineer into the Unit 2 IC to observe the intermediate deck doors and associated equipment. The inspectors observed that each flexible vent assembly was correctly installed and free movement was not restricted. No structural damage or examples of loose or missing bolts or washers were identified. No

frost or other interference was observed which might restrict proper operation of the doors. The material condition of the intermediate deck doors was acceptable.

c. Conclusions

The material condition of the intermediate deck doors was acceptable.

M2.4 Final Walkdown Inspection of Lower IC Plenum

a. Inspection Scope (62700)

Determine by observation and document review the adequacy of the material condition of the lower IC plenum prior to Unit 2 entering Mode 4.

b. Observations and Findings

The licensee conducted a containment inspection prior to Unit 2 entering Mode 4 to verify that no loose debris, equipment or tools were present and that all floor drains had been checked to be free from obstructions. As a part of this inspection, the system engineer also performed a lower IC plenum inspection as a final check to assure that lower inlet doors, monitoring equipment, tools and housekeeping in this area were in order. Adverse conditions were logged and corrective actions were taken as required. On May 7, 1999, during the final walkdown, the inspectors, accompanied by the system engineer, entered the lower IC plenum to inspect for loose debris in and around the lower sections of the ice baskets and turning vanes. In addition, the inspectors observed floor monitoring instrumentation, floor drains and general housekeeping. Special emphasis was placed on the condition of the lower ice basket sections for material condition, including freedom of flow passage from blockage, damage to baskets and the uniformity of ice content in the lower sections. The inspectors noted voids and coning in the lower portion of some Unit 2 baskets. This condition was similar to that identified for Unit 1 IC baskets during the previous Unit 1 refueling outage. Voids and coning are further discussed in Section M8.2. The inspectors concluded that housekeeping in the lower plenum was adequate. Additionally, no examples of excessive ice flow blockage were noted during this tour of the lower IC plenum.

c. Conclusion

Lower plenum inspections found adequate housekeeping. No examples of excessive ice flow blockage were noted during this tour of the lower IC plenum.

M2.5 Inservice Inspection

a. Inspection Scope (73753)

The inspectors evaluated the licensee's Inservice Inspection (ISI) Program and its implementation in the areas of: ISI examinations; nondestructive examination (NDE) records of ultrasonic (UT), liquid penetrant (PT), magnetic particle (MT), and visual (VT-

1/3) examinations of the reactor vessel, reactor coolant pressure boundary piping and components, and eddy current (ET) examinations of steam generator tubing; PT, MT, UT, and VT-1/3 NDE records for ISI examinations of other safety-related piping welds, supports and the containment pressure vessel. This evaluation included both the regular and augmented ISI programs; independent evaluation of indications or defects that exceeded ASME Code Section XI acceptance criteria which the licensee accepted for continued service to confirm the licensee NDE examiners' evaluations; a review of six safety related weld radiographs, three WO packages for the repair and replacement program to verify that Code requirements were met; a review of a sample of notification of indication reports to verify that identified problems associated with or by the ISI Program were entered into the licensee's corrective action program; a review of records for equipment utilized to perform ISI/NDE examinations and NDE personnel that attest to NDE examiner qualification, certification and visual acuity.

b. Observations and Findings

The inspectors determined that the procedures reviewed were concise and well written. The inspectors verified that inservice activities, including NDE examinations and repair and replacement activities, were conducted in accordance with approved procedures, by qualified and certified examiners using certified or calibrated equipment and materials. Indications or defects when present were dispositioned appropriately. These observations were compared with applicable procedures, the Final Safety Analysis Report (FSAR) and ASME B&PV Code Sections V and XI, 1989 Edition, No Addenda (89NA).

c. Conclusion

Inservice inspection, NDE, and repair and replacement activities evaluated were conducted in accordance with procedures, licensee commitments and regulatory requirements.

M8 Miscellaneous Maintenance Issues (92902)

M8.1 (Open) Unresolved Item (URI)50-327, 328/98-04-02: Potential Inadequate Sampling of Ice Condenser Ice Baskets and Ice Basket Weights Due to Frozen Baskets. This item involved whether the TS required "representative" sample could be obtained due to many frozen baskets which were unable to be weighed. The inspectors determined that 714 Unit 2 baskets were found to be frozen at the beginning of the current outage with 654 baskets still frozen at the end of the outage. This condition was similar to that identified for Unit 1 IC baskets during the previous Unit 1 refueling outage. Based on this inspection, this item was left open pending NRC evaluation of a licensee review of this issue.

M8.2 (Open) URI 50-327/98-06-01: Potential Deficiencies in Maintenance and Inspection Procedures which Resulted in Ice Condenser Ice Basket Damage and Did Not Promptly Identify the Damage. This item involved a question as to the adequacy of maintenance procedures to identify damaged IC baskets due to excessive force placed on the bottom

of the basket. Additional inspections during the current outage found 69 Unit 2 damaged IC baskets, of which 33 would require repair, modification, or replacement. A review of the licensee's corrective actions for this problem was conducted and documented in Section M2.2. Based on this review, this item was left open pending NRC review.

M8.3 (Closed) IFI 50-328/98-08-02: Followup on Dented Unit 2 IC Ice Baskets, PER No. SQ981141PER, TOE 2-98-061-1140. A review of the licensee's corrective actions for this problem was conducted and documented in Section M2.2. The inspectors determined that the material condition of ice baskets in the Unit 2 IC was similar to that previously found in the Unit 1 IC in that additional new examples of previously unidentified basket damage had existed. NCV 50-328/99-03-05, Failure to Promptly Identify and Correct Damaged Ice Baskets, was issued.

M8.4 (Closed) VIO50-328/98-13-02: Failure to Follow Intermediate Deck Door Installation Requirements. The inspectors had identified that a significant number of the bolts used to secure the IC intermediate deck door frames to the radial beams were not properly configured or torque to specified requirements. The inspectors toured the Unit 2 IC upper plenum to observe the intermediate deck doors and associated equipment following reinstallation after completion of basket servicing. No examples of loose or missing bolts or washers were identified. The inspectors determined that the licensee had taken appropriate actions to correct the problem.

M8.5 (Open) URI 50-327, 328/98-13-04: Evaluation of Ice Density Increase and Effects of Ice Voiding. This item involved a significant number of baskets that were not full as evidenced by voids and coning in the lower portion of some Unit 1 IC baskets. The inspectors noted that this condition for Unit 2 IC baskets was similar to that identified for Unit 1 IC baskets during the previous Unit 1 refueling outage. Based on this inspection, this item was left open pending NRC evaluation of a licensee review of this issue.

M8.6 (Closed) URI 50-327, 328/98-03-10: Revise Procedures to Include Precautions & Load Limit Requirements of DCN Q12261B. PER SQ971928PER was written to document a condition in which operations procedures did not reflect precautions and limitations specified in design change notice DCN Q12261B for transferring loads between 6.9 KV common boards A and B. Corrective actions associated with TROI Sequence Number 8 was reviewed by the inspector. Based on this review the inspector concluded that the operations staff have reviewed plant procedures and caution orders (COs) and verified that restrictions specified in DCN Q12261B were being implemented for electrical equipment identified by the extent of condition review. Caution Orders 2-CO-95-1765 and 1-CO-95-1935 listed the affected electrical equipment and provided instructions for not closing circuit breakers listed on the CO unless the requirements of DCN Q12261B were met. The licensee also performed a 10 CFR 50.59 safety evaluation for DCN Q12261B. This safety evaluation determined that the guidance provided to the operations staff on transferring electrical loads implemented restrictions that assured the equipment is capable of performing its safety functions and is acceptable from a nuclear safety standpoint. This item is closed.

II. Engineering

E2 Engineering Support of Facilities and Equipment

E2.1 Removal of Bearing Cooling Water from the 1B-B MDAFW Pump

a. Inspections Scope (71707, 37551)

The inspectors reviewed the temporary design change package for the removal of cooling water from the 1B-B motor driven auxiliary feedwater (MDAFW) pump outboard thrust bearing oil sump. In addition, due to problems with the temporary design change associated with the MDAFW pump, the inspectors expanded the extent of condition review to the temporary modification for the removal of cooling water from the Unit 2 turbine driven auxiliary feedwater (TDAFW) pump outboard thrust bearing oil sump.

b. Findings and Observations

On January 28, 1999, the licensee initiated temporary alteration control form (TACF), 1-99-004-003, to isolate the cooling water to the 1B-B MDAFW outboard thrust bearing. The modification was necessary to stop the previously identified water intrusion through the bearing jacket water housing into the bearing oil sump. The water intrusion into the bearing oil sump was discussed in Inspection Report 50-327, 328/99-01.

On February 17, 1999, the licensee isolated the cooling water to the 1B-B MDAFW pump outboard thrust bearing and performed a test to ensure that the removal of the cooling water had not adversely affected the bearing as a result of expected higher lube oil temperatures. During the test, the pump was operated on minimum recirculation flow for approximately three hours while the licensee monitored the thrust bearing lube oil sump oil temperature. The licensee had expected the lube oil sump temperature to stabilize in the range of 130 to 140 degrees F. However, data recorded during the test documented that the oil temperature had increased to 171 degrees F during the pump run. The final temperature of 171 degrees F was above the manufacturer's limitation of 160 degrees F documented in the TACF.

On February 18, 1999, the manufacturer provided revised guidance for the maximum lube oil sump temperature. The manufacturer stated that, "At 180 degrees F a concern should be issued...at 185 degrees F an alarm should be issued...and finally at 190 degrees F shut down" indicating a need to shut down the pump at 190 degrees F. In addition, the manufacturer stated that, "This is all based on oil temperatures taken in the oil sump." Based on the manufacturer's memo and the results of the February 17 test, the licensee considered the 1B-B MDAFW pump to be operable.

The inspector's subsequent review of the TACF identified that the licensee had conducted the test using the existing and normal at-power temperatures in the auxiliary building area location of the 1B-B MDAFW pump and had not considered the specific design temperature parameters documented in the UFSAR. The UFSAR, Chapter 3.11, Environmental Design of Mechanical and Electrical Equipment, references the design

basis document, Environmental Design, SQN-DV-V-21.0, and states that the design basis document "will identify and specify all environmental parameters associated with normal/abnormal and design basis accident plant conditions necessary for design, procurement and qualification of equipment," SQN-DV-V-21.0 lists the design basis maximum expected temperature for the 1B-B MDAFW pump area as 104 degrees F. In addition, the licensee's TACF Procedure, Temporary Alterations, SSP-9.5, Section 3.1.b.2, states, "Obtain an environmental evaluation by the environmental section, if required." Subsequently, the licensee performed a review of the area temperature change effects associated with the UFSAR specified design temperature parameters and on March 15 issued Revision 1 of the TACF. The revision documented a calculated thrust bearing lube oil sump temperature of 194 degrees F which would be anticipated during UFSAR specified "Normal-Max" auxiliary building conditions (104 degrees F). However, this was greater than the revised limit of 190 degrees F documented in revision 1 of the TACF. In order to resolve this issue, the revised TACF also referenced another memo from the manufacturer, dated March 4, 1999, that documented another new thrust bearing oil sump temperature limit of 198 degrees F. Based on the revised evaluation, the licensee again concluded that the 1B MDAFW pump was operable.

Based on the calculated oil sump temperature being very close to the revised vendor limit, the inspectors reviewed, in more detail, the supporting data from the February 17, 1999, pump post modification test. In addition, the inspectors reviewed the supporting data for the post modification testing of a Unit 2 TDAFW pump, conducted on February 9, 1999, following removal of cooling water to the thrust bearing lube oil sump (also on February 9). The inspectors identified that the Unit 2 TDAFW pump thrust bearing oil sump temperature indicator, used in the February 9, 1999, test was not in the licensee's calibration program and had not been calibrated. This instrument was used to perform the verification of operability for the design changes that removed the cooling water from the TDAFW pump thrust bearing lube oil sump. 10 CFR 50, Appendix B, Criterion XII, Control of Measuring and Test Equipment, requires that, "Measures shall be established to assure that...instruments, and other measuring and testing devices used in activities affecting quality are properly...calibrated, and adjusted at specified periods to maintain accuracy within necessary limits." The failure to calibrate the thrust bearing oil sump temperature indicator prior to performing the design verification testing of the Unit 2 TDAFW pump is a violation of 10 CFR 50, Appendix B, Criterion XII, Control of Measuring and Test Equipment. The violation is identified as a non-cited violation, NCV 50-327/99-03-02, Failure to Calibrate the AFW Pump Thrust Bearing Oil Sump Temperature Indicator. This Severity Level IV violation is being treated as an NCV, consistent with Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as PER SQ99002334PER.

In addition, the inspectors reviewed the UFSAR for the basis of the auxiliary building room temperatures. The inspectors noted in the UFSAR that the "Max-Normal" auxiliary building room temperature was postulated to reach 104 degrees F during accident conditions. The maximum room temperature was based on a maximum design basis river water temperature of 84.5 degrees F, which directly correlates to the room temperature as the river water is used to provide room cooling through two safety related room cooler heat exchangers. Based on the river water temperature being at

approximately 55-68 degrees F, and well below the design basis temperature limit of 84.5 degrees F, the licensee and the inspectors concluded that this issue did not pose an immediate operability concern. However, further review was conducted to ensure that the MDAFW pump would be qualified for worst case design temperature conditions as required by the UFSAR.

The inspectors were still concerned that the licensee had not adequately verified the adequacy of the design change by performing an environmental evaluation against the environmental parameters specified in the UFSAR. The inspectors noted that the licensee had used 81 degrees F for the ambient room temperature during the February 17 test. Further discussions identified that the pump test had not explicitly documented the room temperature. Discussions with the licensee indicated that a room temperature had been taken in the area of the bearing after the bearing housing had heated up. However, the inspectors considered this to be inappropriate, based on radiation and convection heat transfer characteristics to an ultimate heat sink (ambient room temperature). The inspectors noted that the licensee had taken three different bearing housing temperatures with a pyrometer at the start of the test, which indicated that the ambient room area temperature was approximately 72.7 degrees F, versus the 81 degree F, used during the February 17 test. This would result in the maximum temperature being approximately 8 degrees F higher than previously calculated (202 vs.194 degrees F), which was again found to be above the manufacturer's maximum limit of 198 degrees F. This information was discussed with the licensee on March 24 and the licensee subsequently revised the MDAFW environmental calculations.

On April 2, 1999, the licensee recalculated the maximum thrust bearing lube oil temperature and found it to be 201 degrees F. To ensure that the manufacturer's limit of 198 degrees F would not be exceeded, an administrative limit for 1B-B MDAFW pump operability was established for river water temperature at 80 degrees F (198 degrees oil) vs. the previous design limit of 84.5 degrees F (201 degrees oil). This administrative limit on the maximum river water temperatures also created an auxiliary building temperature limit of 101 degrees F vs the Max-Normal limit of 104, for pump operability.

In order to eliminate this administrative restriction on maximum river water temperature, the April 2 memo noted that "Until the 1B-B MDAFW pump casing leak is repaired, a high temperature synthetic oil will be used in this pump." This change was supported by two attached memos from the manufacturers. In the first memo, dated March 30, 1999, the oil manufacturer had stated that the synthetic oil "will be able to withstand the new operating temperature for the 100 day requirement as long as the temperature does not maintain itself greater than 240 degrees F." In the second memo, dated March 31, 1999, the pump manufacturer provided a new limit of 210 degrees F for the thrust bearing lube oil sump.

On April 19, 1999, the licensee indicated that efforts were underway to refurbish an existing spare AFW pump and to replace the 1B-B MDAFW pump within the next few months. In addition, on April 28, 1999, the thrust bearing lube oil was changed out to the higher temperature synthetic oil and the MDAFW pump was satisfactorily tested.

Based on the above, the inspectors concluded that the licensee had not performed an adequate review of the environmental conditions associated with the temporary design change TACF 1-99-004-003, which removed cooling water from the 1B-B MDAFW pump thrust bearing lube oil sump. 10 CFR 50, Appendix B, Criterion III, Design Control, requires that "Measures shall be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems, and components." The licensee's temporary design change procedure, SSP-9.5, Temporary Alterations, Section 3.1.B.2, implements this requirement by requiring an environment evaluation. However, the licensee had documented an "NA" in the block for "Environmental Evaluation" and had not performed an environmental evaluation until questioned by the inspectors.

The failure to verify the adequacy of the design change on the 1B-B MDAFW pump by performing an environmental evaluation for the expected environmental conditions is a violation of 10 CFR 50, Appendix B, Criterion III, Design Control. The violation is identified as the first example of non-cited violation NCV 50-327/99-03-03, Inadequate Environmental Assessments for Removal of Cooling Water from 1B-B MDAFW Pump Thrust Bearings. This Severity Level IV violation is being treated as an NCV, consistent with Appendix C of the NRC Enforcement Policy. This violation example is in the licensee's corrective action program as PER SQ99001910PER.

Similar to the previous violation above, the licensee had also documented a "NA" in Section 3.1.b.2 of TACF 2-99-003-003 and did not perform an environmental evaluation for the design change, on February 9, for removal of cooling water to the Unit 2 TDAFW pump bearing lube oil sump. The failure to verify the adequacy of the design change by performing an environmental evaluation for the expected environmental conditions is a violation of 10 CFR 50, Appendix B, Criterion III, Design Control. The violation is identified as the second example of NCV 50-327/99-03-03, Inadequate Environmental Assessments for Removal of Cooling Water from Unit 2 TDAFW Pump Thrust Bearings. This violation example is also in the licensee's corrective action program as PER SQ99001910PER.

c. Conclusions

An NCV was identified for the failure to calibrate the thrust bearing oil sump temperature indicator prior to using the indicator in the design verification testing of the Unit 2 TDAFW pump. An NCV, with two examples, was identified for failure to perform an environmental assessment prior to removal of cooling water from the thrust bearing lube oil sump for the 1B-B MDAFW pump and the Unit 2 TDAFW pump.

E2.2 1B-B CCP Failure, Repair, and Operability Determination

a. Inspection Scope (71707, 62707, and 37551)

The inspectors reviewed the surveillance testing, operability determination and license event report (LER) related to the failure and repair of the 1B-B CCP.

b. Observations and Findings

On April 15, 1999, the 1 B-B CCP experienced a failure which resulted in decreased charging flow and reduced reactor coolant pump seal flow. The operators responded promptly and placed the 1A-A CCP pump in service and removed the 1B-B CCP from service. A subsequent investigation into the failure found that the pump shaft had cracked due to fatigue failure. This is an industry problem; however, the pump had only been in operation for approximately 50 percent of its predicted life (minimum time to failure).

Technical Specification 4.5.2.h requires the licensee to perform "a flow balance test during shutdown following completion of modifications to the ECCS subsystem flow characteristics and verifying the following flow rates...(2) For the centrifugal charging pump lines with a single pump running: a. the sum of the injection line flow rates, excluding the highest flow rate is greater than or equal to 309 gpm and b. the total pump flow rate is less than or equal to 555 gpm." The licensee concluded that this test did not need to be performed in that the pump replacement was like-for-like and did not constitute a change in system flow characteristics. The licensee only had the manufacturer's pump curve which was not a readily usable curve and the inspectors had noted that a previous extrapolation for a different pump of the manufacturer's pump curve had not matched the in-plant developed pump curve. However, the licensee, with the assistance of the vendor, concluded that the curve was acceptable. The licensee performed a three point check of the extrapolated manufacturer's pump curve and noted that the actual pump performance was less than predicted but was still acceptable.

As part of the 1B-B CCP pump test, the licensee completed the ASME Section XI testing as required by TS 4.0.5, by performing surveillance test 1-SI-SXP-062-001.B, Centrifugal Charging Pump 1B-B Performance Test. However, the 1B-B CCP did not meet the procedural acceptance criteria for minimum developed differential pressure specified in step 6.1.12 of the procedure. At this time, the licensee rebaselined the pump performance data and concluded that the pump ASME Section XI test data was acceptable.

Based on the extrapolated pump curve and the pump testing, the licensee concluded that the 1B-B CCP would be capable of fulfilling its safety functions. However, because the licensee could not provide an installed pump curve to positively show that the pump replacement did not change the system flow characteristics, the NRC requested in a notice of enforcement discretion (NOED) that the licensee perform a full flow test of the 1B-B CCP at the first outage opportunity. In LER 99001-00 dated May 11, 1999, the licensee committed to "perform a full flow test of the 1B-B CCP in the next available outage."

c. Conclusions

Based on the licensee's extrapolated data and pump testing results, the 1B-B CCP was considered to be operable and capable of performing its safety functions. However, the

licensee was requested to and committed to perform a full flow test of the 1B-B CCP at the next available outage.

E2.3 Failure to Place System 201A (480V essential power loads) and 202A (6.9kv load shed logic) in Maintenance Rule A(1) Status

a. Inspection Scope (62707, 37551)

The inspectors continued to review Unresolved Item 50-327/98-09-03 related to the maintenance preventable functional failure determination for a DS-532 breaker failure on May 19, 1998, which resulted in a Unit 1 reactor trip.

b. Observations and Findings

As discussed in IR 50-327,328/98-03, following the May 19, 1998 reactor trip the inspectors reviewed the licensee's implementation of the Maintenance Rule requirements for the DS-532 type electrical breakers. The inspectors had noted that the licensee had not initially categorized the failed breaker as a functional failure although the failure of the breaker had resulted in a loss of the related vital inverter and a subsequent reactor trip. The licensee later concluded that the failure did constitute a functional failure and reclassified the May 19 failure. However, the licensee did not consider the May 19 failure to be a "maintenance preventable functional failure."

Based on the licensee's investigation into the failure, the inspectors noted that the licensee had not properly aligned the main line contacts which had contributed to the breaker's failure. Violation 50-327/98-09-01 was issued to address this deficiency. Based on this violation, the inspectors concluded that the May 19 failure was preventable and therefore the failure should have been categorized as a maintenance preventable functional failure. The licensee agreed to provide additional information and URI 50-327/98-09-03 was opened to further evaluate this issue.

Discussions with NRR confirmed that the May 19 failure of the DS-532 breaker should have been considered to be a maintenance preventable functional failure. However, since this was the only failure known by the inspectors and it was known that two maintenance preventable functional failures were necessary to place system 201A into a(1) status, the inspectors deferred this issue until completion of the licensee's annual review of system performance under the maintenance rule prior to further action.

After completion of a detailed review of breaker failures, on March 5, 1999, the licensee initiated PER SQ991846PER. The PER documented the discovery of unknown functional failures, preventable functional failures and repetitive preventable functional failures in electrical system 201A (480V essential power loads) and system 202A (6.9kv load shed logic). A total of nine functional failures were re-categorized as preventable functional failures or repetitive preventable functional failures. On March 17, 1999, "A" level PER SQ992075PER was generated to document that the breakers in systems 201A and 202A had previously met the criteria for entry into a(1) Maintenance Rule status but had not been categorized as a(1). System 201A had met the criteria for a(1)

status for failures on 1/14/97 and again on 5/19/98. System 202A had met the criteria for a(1) status for failures on 8/21/96, 8/18/97and again on 12/10/97.

10 CFR 50.65(a)(1) requires, in part, that holders of an operating license shall monitor the performance or condition of SSCs within the scope of the monitoring program as defined in 10 CFR 50.65(b) against licensee-established goals, in a manner sufficient to provide reasonable assurance that such SSCs are capable of fulfilling their intended functions.

10 CFR 50.65(a)(2) states that monitoring as specified in (a)(1) is not required where it has been demonstrated that the performance or condition of an SSC is being effectively controlled through the performance of appropriate preventive maintenance, such that the SSC remains capable of performing its intended function.

Contrary to the above, on January 14, 1997, for system 201A, and August 21, 1996, for system 202A, the licensee could not demonstrate that performance for these systems was being effectively controlled through the performance of appropriate preventive maintenance in that, functional failures of electrical breakers exceeded the licensee established reliability performance measures (no more than 1 functional failure per 2 years) and the systems were not placed in maintenance category (a)(1) for monitoring.

The failure to properly categorize preventable functional failures and repetitive functional failures is a violation of 10 CFR 50.65(a)(1) and 10 CFR 50.65(a)(2), Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants. This violation is identified as NCV 50-327/99-03-04, Failure to Properly Categorize Preventable Functional Failures and Repetitive Functional Failures. This Severity Level IV violation is being treated as an NCV, consistent with Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as PER SQ99002075PER and PER SQ99001846PER.

c. Conclusions

An NCV was identified for failure to properly categorize preventable functional failures and repetitive functional failures.

E2.4 Defects in Fuel Assembly Upper Nozzle Blocks

a. Inspection Scope (37551)

The inspectors reviewed licensee response to an operating experience report of defective upper nozzle blocks on Westinghouse Vantage V fuel assemblies and subsequent confirmation of similar problems during the U2C9 core offload.

b. Observations and Findings

On April 20, 1999, the licensee received information regarding broken screws which hold down the upper nozzle springs on the Westinghouse Vantage V fuel assemblies. With

the hold-down screws broken, the springs no longer perform their design function in that the fuel is no longer properly constrained; thus creating a potential FME problem and possible difficulty with properly latching the fuel handling tool. On April 25, 1999, during fuel offload, the licensee identified a similar problem with the fuel assembly in location M-12. The fuel assembly was identified with a displaced top nozzle block (three inches).

The licensee identified 24 twice-burned Westinghouse Vantage V fuel assemblies that were scheduled to be reloaded into the U2C10 core. In order to resolve the issue, the licensee chose not to reload the 24 Westinghouse assemblies. This required a new core design and analysis to be completed prior to plant startup. This decision required an extensive amount of effort and resulted in increased costs to the licensee in order to fully resolve the nozzle block issue.

c. Conclusions

The licensee's reactor engineering group responded pro-actively and conservatively to industry reports of actual problems with installed Westinghouse Vantage V fuel assemblies in redesigning the U2C10 core to exclude the 24 suspect fuel assemblies.

E8 Miscellaneous Engineering Issues (92903)

E8.1 Year 2000 (Y2K) Readiness Program Review (TI 2515/141)

The staff conducted an abbreviated review of Y2K activities and documentation. The review addressed aspects of Y2K management planning, documentation, implementation planning, initial assessment, detailed assessment, remediation activities, Y2K testing and validation, notification activities, and contingency planning. The reviewers used NEI/NUSMG 97-07, "Nuclear Utility Year 2000 Readiness," and NEI/NUSMG 98-07, "Nuclear Utility Year 2000 Readiness Contingency Planning," as the primary references for this review.

The licensee stated that, as of June 17, 1999, 100% of the mission critical Y2K Readiness Project activities were complete while non-mission critical activities were greater than 99% complete and on target to be completed by October 1999. The licensee reported contingency planning to be greater than 95% complete and on target to be completed by July 1, 1999.

Conclusions regarding the Y2K readiness of the facility are not included in this report. The results of this review will be combined with the results of reviews of other licensees in a summary report to be issued by July 31, 1999.

E8.2 (Closed) URI 50-327, 328/98-09-03: Breaker Failure Not Categorized As a Maintenance Preventable Functional Failure. This issue was identified following a detailed review of the May 19, 1999 reactor trip. Subsequent review by the licensee found that preventable functional failures, related to electrical breakers, were not being categorized properly as failures under the Maintenance Rule. This issue was discussed in Section E2.3, in which

NCV 50-327, 328/99-03-04 was identified for failure to properly categorize preventable functional failures and repetitive functional failures.

E8.3 (Closed) LER 50-327/99-01-00: Failure of a Centrifugal Charging Pump Results in Exceeding the Allowed Outage Time. This event was discussed in Section O1.2 and Section E2.2. The licensee completed the required repairs and returned the pump to operable status within the time frame allowed by the NOED extension. ASME Section XI pump testing was completed and the licensee provided the extrapolated manufacturer's pump curve. Full flow testing of the 1B-B CCP with flow through the ECCS injection valves will be completed at the first available outage.

IV. Plant Support

R1 Radiological Protection and Chemistry (RP&C) Controls

R1.1 Occupational Radiation Exposure Control Program

a. Inspection Scope (83750)

During the U2C9 outage, the inspectors reviewed personnel exposure monitoring and control practices, radiological postings, and primary coolant shutdown chemistry controls for dose rate reduction. Posted radiation dose rates and contamination levels within the radiologically controlled area (RCA) were selectively verified.

b. Observations and Findings

Personnel preparing for routine entries into the RCA were observed being briefed on the radiological conditions in the areas to be entered. The briefings were given by radiation control personnel before access was granted and covered the dosimetry and the protective clothing and equipment required by the radiation work permit (RWP). The administrative limits for the allowed dose and dose rate were emphasized during the briefings. The briefings provided thorough descriptions of the existing dose rates which could be encountered. The inspectors determined that personnel entering the RCA were adequately briefed on the radiological hazards which could be encountered while in the RCA and the radiological protective measures required to be taken. Individuals at selected job sites were interviewed and the inspectors determined that the workers were aware of their administrative dose and dose rate limits, the work area dose rates, the proximate low-dose waiting areas, areas of high contamination, and protective clothing required by the RWP.

Thermoluminescent dosimeters (TLDs) were used as the primary device for monitoring personnel radiation exposure. In addition, digital alarming electronic dosimeters (EDs) were used for monitoring the accumulated dose and the encountered dose rates during each RCA entry. The EDs were set to alarm at administrative limits established for the specific RWP under which the RCA entry was being made. During tours of the RCA, the inspectors noted that the required dosimetry was being properly worn by personnel when entering and while in the RCA. The inspectors also noted that personnel exiting the RCA

routinely surveyed themselves for contamination using personal contamination monitors (PCMs).

During tours of the RCA, the inspectors noted that general areas and individual rooms were properly posted for radiological conditions. Survey maps indicating dose rates and contamination levels at specific locations within the RCA were conspicuously posted. At the inspector's request, a licensee health physics technician performed dose rate and contamination surveys in several rooms and locations. The inspectors verified that the survey instrument readings were consistent with the posted area dose rates. Independent contamination surveys performed around several posted contaminated areas indicated that contamination was not being tracked out of the contaminated areas.

As indicated in the table below, the licensee was successful in meeting established ALARA goals during 1997 and 1998. Nineteen days into the scheduled 25 day U2C9 outage the licensee was on track for meeting the outage goal.

Collective Dose (Man-Rem)							
Annual Dose				Outage Dose			
Year	Actual[1]	Goal[1]	3 Year Mean[2]	Unit/ Cycle	Actual	Goal	Days
1997	280[3]	300	345	U1C8	236[4]	244	51
				U2C8	140[4]	173	30
1998	369[3]	450	308	U1C9	200[4]	216	29
1999	195[4,5]	247		U2C9	143[4,5]	190	25[6]

[1] Fiscal year basis
[2] Calendar year basis
[3] TLD data
[4] ED data
[5] As of 5/6/99
[6] Scheduled for 25 days beginning 4/18/99

The following table indicates that the maximum individual radiation exposures were well within the regulatory limits for occupational dose specified in 10 CFR 20.1201(a).

Maximum Individual Radiation Doses (Rem)				
Year	TEDE[2]	Skin	Extremity	Eye Lens
1998	2.633	3.066	4.408	2.560
1999	2.411[1]	2.418[1]	2.418[1]	2.415[1]
Regulatory Limits				
10 CFR 20	5.000	50.000	50.000	15.000

[1] Year-to-date as of 5/5/99
[2] Total Effective Dose Equivalent

The inspectors reviewed the licensee's procedures for follow-up actions to personnel contamination events (PCEs) and reviewed selected records for those events which occurred during 1998. The inspectors noted that there were no intakes of radioactive material in excess of one percent of the annual limit on intake (ALI), and therefore, pursuant to section 6.5 of procedure RCI-11 Bioassay Program, no internal dose assignments were made. Procedure RCI-1 Personnel Monitoring, specified that skin dose assessments were to be initiated whenever a worker may have received a significant dose (>100 mrem) from skin or personal clothing contamination. The inspectors verified that the dose calculations for four of those events were consistent with licensee dose calculation procedures and verified that the assigned doses had been entered into the individuals dose records in the radiologically exposure system (REXS) data base. No regulatory dose limits were exceeded.

The inspectors also reviewed the licensee's records for contaminated floor space within the RCA. The inspectors noted that, following the cleanup for the fall 1998 Unit 1 outage until the start of the spring Unit 2 outage, the month ending values for the recoverable contaminated floor space ranged from 0.78 to 1.3 percent of the RCA floor space. The non-recoverable contaminated floor space was two percent.

The inspectors reviewed analytical results for selected chemistry parameters and determined that the licensee had closely monitored and controlled primary coolant chemistry during the shutdown for the U2C9 outage.

c. Conclusions

The licensee was properly monitoring and controlling personnel radiation exposure during the Unit 2 refueling outage and posting area radiological conditions in accordance with 10 CFR Part 20. Personnel entering the radiologically controlled area were adequately briefed on radiological hazards and protective measures. Maximum individual radiation exposures were controlled to levels which were well within the

regulatory limits for occupational dose specified in 10 CFR 20.1201(a). The licensee was successful in meeting established ALARA goals during 1997 and 1998. The licensee had implemented an effective shutdown chemistry control plan and closely monitored primary coolant chemistry during the shutdown for the Unit 2 refueling outage.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on June 4, 1999, and for region based inspections on May 7, 1999. 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.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

M. Bajestani, Site Vice President
H. Butterworth, Operations Manager
J. Gates, Site Support Manager
E. Freeman, Maintenance and Modifications Manager
J. Herron, Engineering and Support Systems Manager
C. Kent, Radcon/Chemistry Manager
D. Koehl, Plant Manager
B. O'Brien, Maintenance Manager
P. Salas, Manager of Licensing and Industry Affairs
J. Valente, Engineering & Materials Manager

INSPECTION PROCEDURES USED

IP 37550: Engineering
IP 37551: Onsite Engineering
IP 61726: Surveillance Observations
IP 62707: Maintenance Observations
IP 71707: Plant Operations
IP 92700: Events Reports
IP 92901: Operations Follow-Up
IP 92902: Maintenance Follow-Up
IP 92903: Engineering Follow-Up
IP 93702: Events
TI 2515/141: Year 2000 (Y2K) Readiness Program Review

ITEMS OPENED AND CLOSED

Opened

50-328/99-03-01	NCV	Failure to Remove FME Plug and Perform Cleanliness Inspection On the Unit 2 TDAFW Pump (Section M1.2).
50-328/99-03-02	NCV	Failure to Calibrate the AFW Pump Thrust Bearing Oil Sump Temperature Instrument (Section E2.1).
50-327,328/99-03-03	NCV	Inadequate Environmental Assessments for Removal of Cooling Water from AFW Pump Thrust Bearings (Section E2.1).
50-327,328/99-03-04	NCV	Failure to Properly Categorize Preventable Functional Failures and Repetitive Functional Failures (Section E2.3).
50-328/99-03-05	NCV	Failure to Promptly Identify and Correct Damaged Ice Baskets (Section M2.2).
50-327/99-03-06	URI	Evaluate Licensee's Commitments and Corrective Actions Regarding Unit 1 Notice of Enforcement Discretion, NOED 99-001 (Section O1.3).

Closed

50-327,328/97-300-01	IFI	Poor Quality of Audit Examination and Remediation Program (Section O8.2).
50-327,328/97-300-02	IFI	AFW Flow Control to Prevent Overfill While in EOPs (Section O8.3).
50-327,328/98-03-10	URI	Revise Procedures to Include Precautions & Load Limit Requirements of DCN Q12261B (Section M8.6).
50-327,328/98-04-02	URI	Potential Inadequate Sampling of Ice Condenser Ice Baskets and Ice Basket Weights Due to Frozen Baskets (Section M8.1).
50-327/98-06-01	URI	Potential Deficiencies in Maintenance and Inspection Procedures which Resulted in Ice Condenser Ice Basket Damage and Did Not Promptly Identify the Damage (Section M8.2).
50-327,328/98-06-04	VIO	Failure to Adequately Implement Section XI Code Testing Requirements (Three Examples) (Section O8.1).
50-328/98-08-02	IFI	Followup on Dented Unit 2 IC Ice Baskets, PER No. SQ981141PER, TOE 2-98-061-1140 (Section M8.3).

50-327/98-09-01	VIO	Inadequate PMT of Type DS 532 Breakers (Section O8.1).
50-327,328/98-09-03	URI	Breaker Failure not Categorized as a Maintenance Preventable Functional Failure (Section E8.2).
50-328/98-13-02	VIO	Failure to Follow Intermediate Deck Door Installation Requirements (Section M8.4) (Section M8.5).
50-327, 328/98-13-04	URI	Evaluation of Ice Density Increase and Effects of Ice Voiding (Section M8.5).
50-327/99-01-00	LER	Failure of a Centrifugal Charging Pump Results in Exceeding the Allowed Outage Time (Section E8.3).
50-328/99-03-01	NCV	Failure to Remove FME Plug and Perform Cleanliness Inspection On the Unit 2 TDAFW Pump (Section M1.2).
50-328/99-03-02	NCV	Failure to Calibrate the AFW Pump Thrust Bearing Oil Sump Temperature Instrument (Section E2.1).
50-327,328/99-03-03	NCV	Inadequate Environmental Assessments for Removal of Cooling Water from AFW Pump Thrust Bearings (Section E2.1).
50-327,328/99-03-04	NCV	Failure to Properly Categorize Preventable Functional Failures and Repetitive Functional Failures (Section E2.3).
50-328/99-03-05	NCV	Failure to Promptly Identify and Correct Damaged Ice Baskets (Section M2.2).
50-327/99-03-06	URI	Evaluate Licensee's Commitments and Corrective Actions Regarding Unit 1 Notice of Enforcement Discretion, NOED 99-001 (Section O8.4).